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TUTORIAL - 1

18XW42 - TCP/IP

1)

Here, Data received = 00111001010011100000

	7	6	5	[4]	3	[2]	[1]
1st row	0	1	0	1	1	1	0
2nd row	0	1	1	0	1	0	0
3rd row	1	0	0	0	1	0	0

In 1st row, position 3 has an error

In 2nd row, position 4 has an error

In 3rd row, position 4 has error.

Thus, Data After correction

= 00 1 1 1 00 1 0 1 [110] 111 00000

↓

error

2) 5 bit Message : 10011

Formula: $(m+r+1) \leq 2^r$

$5+r+1 \leq 2^r$

$6+r \leq 2^r$

Least value of r that satisfies the inequality

$r = 4$

∴ Redundant bits are positioned at 1, 2, 4, 8 (powers of 2)

Total no: of bits = Data bits + Redundant bits

$= 5+4 = 9$

Here, G1 → (9, 7, 5, 3, 1)

G2 → (7, 6, 3, 2)

G4 → (7, 6, 5, 4)

G8 → (9, 8)

parity bits are at positions 1, 2, 4, 8.

- BEFORE COMPUTING REDUNDANT BITS

9	8	7	6	5	4	3	2	1
1		0	0	1		1		
					P4		P3	P2	P1

- COMPUTING REDUNDANT BITS

8	4	2	1
G8 = {1, 1}	G4 = {0, 0, 1, 1}	G2 = {0, 0, 2, 1)	{1, 0, 1, 1, 1}

Here, G8 = {1, 1} ⇒ P8 = 1

G4 = {0, 0, 1, 1} ⇒ P4 = 1

G2 = {0, 0, 1, 1} ⇒ P2 = 1

G1 = {1, 0, 1, 1, 1} ⇒ P1 = 1

- AFTER COMPUTING REDUNDANT BITS

9	8	7	6	5	4	3	2	1
1	1	0	0	1	1	1	1	1

Answer : 1 1 0 0 1 1 1 1 1

3) $G(x) = x^4 + x^2 + x + 1$

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

$= 10111$ ⇒ Degree $r = 4$

Binary form after adding zeros $= 110010000$ [M(x)]

Dividing it by 10111 i.e G(x),

```
          11100
      ------------
10111 ) 110010000
        10111
        -------
         11100000
         10111
         -------
          1011000
          10111
          -------
            00100
            00000
            -----
              0100
```

Quotient : 11100

Remainder : 0100

Transmitted value = 110010100

Here, $T(x) = R(x) + M(x)$

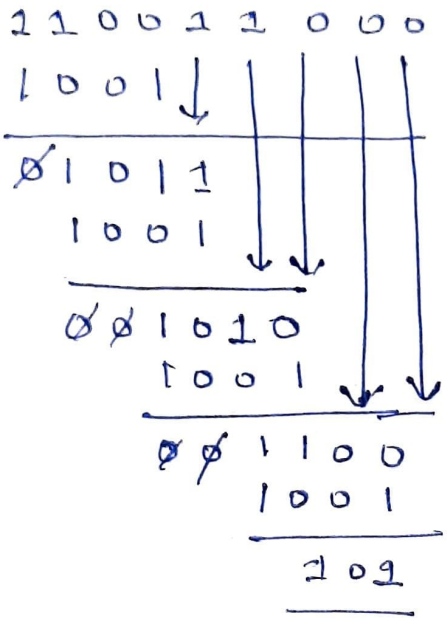
$T(x) = 110010100$

4) $M(x) = 11001$

$G(x) = 1001$

Here, Degree = 3

11001000 to be divided by $G(x)$ to check if any transmission error exists.



Here, remainder is not zero.

∴ Transmission error

There is no transmission error only when remainder of $\frac{M(x)}{G(x)}$ is zero.