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Ans: to: Q: No: 1

$M(x) = x^7 + x^4 + x^3 + x^1 = 10011010$

$P(x) = x^3 + x^2 + 1 = 1101$

Since, P consists 4 bits, appends, k = 3 bits

K = 000; at the end of M

$\therefore S = 10011010000$

At sender,

```
P -> 1101 | 10011010000 <- S
             1101
             ----
              1001
              1101
              ----
               1000
               1101
               ----
                1011
                1101
                ----
                 1100
                 1101
                 ----
                  1000
                  1101
                  ----
                   101 <- R
```

At receiver,

Transmit sequence or codework $T = 10011010101$

Ans. to. Q. No. 2

(a)

Suppose that there is no error in the received sequence, Hence, $r = c = 1101010$

Hence $(n, k) = (7, 4)$

$n = 7 =$ code length $= q + k$ bits; $n = k + q$

$q = n - k$
$= 7 - 4$
$= 3$ bits

$m = 4$; k bits

So, $c = [\underbrace{110}_{Q}\ \underbrace{1010}_{M}]$

message, $M = 1010$

$\therefore$ code word, $c = M \times G$

$$= [1010] \times \begin{bmatrix} 1111000 \\ 0110100 \\ 1100010 \\ 1010001 \end{bmatrix}$$

$= [0\ 011010]$

$1 \times 1 \oplus 0 \times 0 \oplus 1 \times 1 \oplus 1 \times 0 = 1 \oplus 0 \oplus 1 \oplus 0 = 0$

$1 \times 1 \oplus 0 \times 1 \oplus 1 \times 1 \oplus 0 \times 0 = 0$

$1 \times 1 \oplus 0 \times 1 \oplus 1 \times 0 \oplus 0 \times 1 = 1$

$1 \times 1 \oplus 0 \times 0 \oplus 1 \times 0 \oplus 0 \times 0 = 1$

$1 \times 1 \oplus 0 \times 0 \oplus 1 \times 0 \oplus 0 \times 0 = 0$

$1 \times 0 \oplus 0 \times 1 \oplus 1 \times 0 \oplus 0 \times 0 = 1$

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$1 \times 0 \oplus 0 \times 0 \oplus 1 \times 0 \oplus 0 \times 1 = 0$

(b)

We know,

Parity-check matrix, $H = [I_q . P_{k \times q}]$

$$P_{k\times q} = P_{3\times 4} = \begin{bmatrix} 1 & 1 & 1 \\ 0 & 1 & 1 \\ 1 & 1 & 0 \\ 1 & 0 & 1 \end{bmatrix} ; \quad I_3 = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$= P_{3\times 4}^T = \begin{bmatrix} 1 & 0 & 1 & 1 \\ 1 & 1 & 1 & 0 \\ 1 & 1 & 0 & 1 \end{bmatrix}$$

$$H = \begin{bmatrix} 1 & 0 & 0 & 1 & 0 & 1 & 1 \\ 0 & 1 & 0 & 1 & 1 & 1 & 0 \\ 0 & 0 & 1 & 1 & 1 & 0 & 1 \end{bmatrix}$$

(c)

Syndrome ; $S = rH^T$

$$= [1 1 0 1 0 1 0] \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 1 & 1 \\ 0 & 1 & 1 \\ 1 & 1 & 0 \\ 1 & 0 & 1 \end{bmatrix}$$

$$= [1 1 1]$$

Here, the non-Zero syndrome ass erroreau
which is in faerth
reception there, S=[1111]
now. So, in the fourth element in receive
sequence will be after from 1 to 0
So, the valid codeword is = [1 1 0 0 0 1 0]

Ans ito: Q: No: 3

IPV4 address: 189.93.57.31

Convert it into IPV6

Presenting each octet with 8 bits binary

$189 = \underbrace{1011}_{B}\,\underbrace{1000}_{8} = B8$

$93 = \underbrace{0101}_{5}\,\underbrace{1101}_{D} = 5D$

$57 = \underbrace{0011}_{3}\,\underbrace{1001}_{9} = 39$

$31 = \underbrace{0001}_{1}\,\underbrace{1111}_{F} = 1F$

IPV6 address will be: 0::B850:391F

Ans ito: Q: No: 4

MAC address: 49E7:F25A:0361

Convert local address:

4957 = 0100 1001 1110 0111

= 0100 1011 1110 0111

= 4BE7

So, the local address is,

FE80::4B57:F2FF:FE5A:0361