Question-1: (25 p)

a. For data stream ***1011001*** ***(d7...d1)***, find the hamming coded data will be sent.

b. Data stream, coded by (7,4) hamming and received is ***10010100101*** ***(d7...p1)***.

- Check that if there is an error or not.
- If there is an error find that which bit is in error, correct it.
- Remove the check bits and write the data.

11	1011	M_7
10	1010	M_6
9	1001	M_5
8	1000	C_4
7	0111	M_4
6	0110	M_3
5	0101	M_2
4	0100	C_3
3	0011	M_1
2	0010	C_2
1	0001	C_1

$$C_1 = M_1 \oplus M_2 \oplus M_4 \oplus M_5 \oplus M_7$$
$$C_2 = M_1 \oplus M_3 \oplus M_4 \oplus M_6 \oplus M_7$$
$$C_3 = M_2 \oplus M_3 \oplus M_4$$
$$C_4 = M_5 \oplus M_6 \oplus M_7$$

a) Veri = 1011001 (7 6 5 4 3 2 1)

$C_1 = 1 \oplus 0 \oplus 1 \oplus 1 \oplus 1 = 0$

$C_2 = 1 \oplus 0 \oplus 1 \oplus 0 \oplus 1 = 1$

$C_3 = 0 \oplus 0 + 1 = 1$

$C_4 = 1 \oplus 0 \oplus 1 = 0$

Gönderilecek Veri = 10101001110

b) Alınan Veri = 10010100101 (11 10 9 8 7 6 5 4 3 2 1)

Hesaplanan Hamming	Verideki Hamming
$C_1 = 1 \oplus 0 \oplus 0 \oplus 0 \oplus 1 = 0$	$C_1 = 1$
$C_2 = 1 \oplus 1 \oplus 0 \oplus 0 \oplus 1 = 1$	$C_2 = 0$
$C_3 = 0 \oplus 1 \oplus 0 = 1$	$C_3 = 0$
$C_4 = 0 \oplus 0 \oplus 1 = 1$	$C_4 = 1$

$$\begin{array}{r} 1\ 1\ 1\ 0 \\ \oplus\ 1\ 0\ 0\ 1 \\ \hline 0\ 1\ 1\ 1 \end{array}$$

7. bit bozuk

Düzeltilmiş Veri = 10011100101

Question-2: (30 p)

x^3+x^2+1

a. The generator function is $G(x)=x^3+x^2+1$, find the data stream will be sent if data is ***11110101***. Then code the data stream with Differential Manchester

b. The generaor function is $G(x)=x^3+x^2+1$ and the received data stream with CRC is ***111101011***. Find that if there is an error or not (Show, why there is an error or not).

$\Rightarrow$ $11110101 = x^7+x^6+x^5+x^4+x^2+1$

a) $x^3 \cdot (x^7+x^6+x^5+x^4+x^2+1) = x^{10}+x^9+x^8+x^7+x^5+x^3$

$x^{10}+x^9+x^8+x^7+x^5+x^3 \;\big|\; x^3+x^2+1$

$\oplus\ x^{10}+x^9+x^7$

$x^8+x^5+x^3$

$\oplus\ x^8+x^7+x^5$

x^7+x^3

$\oplus\ x^7+x^6+x^4$

$x^6+x^4+x^3$

$\oplus\ x^6+x^5+x^3$

x^5+x^4

$\oplus\ x^5+x^4+x^2$

x^2

$x^7+x^5+x^4+x^3+x^2$

Gönderilecek Veri

$x^{10}+x^9+x^8+x^7+x^5+x^3+x^2$

$= 11110101100$

b) $111101011 = x^8+x^7+x^6+x^5+x^3+x+1 \;\big|\; x^3+x^2+1$

$\oplus\ x^8+x^7+x^5$

$x^6+x^5+x^3+x+1$

$\oplus\ x^6+x^5+x^3$

$x+1$

$\oplus\ x^5+x^4+x^2$

x^4+x^2+x+1

$\oplus\ x^4+x^3+x$

x^3+x^2+1

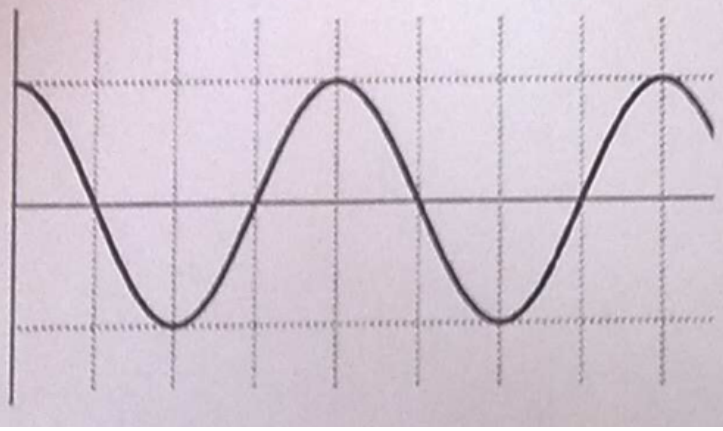
$\oplus\ x^3+x^2+1$

$0\ 0\ 0$

$x^5+x^3+x^2+x+1$

$\Rightarrow$ Hata yok

Question-3: (10 p)



In figure, each division for vertical (y) axis is 10 V and each division for horizontal (x) axis is 5 msec.

a. Find frequency, period and phase angle of signal.

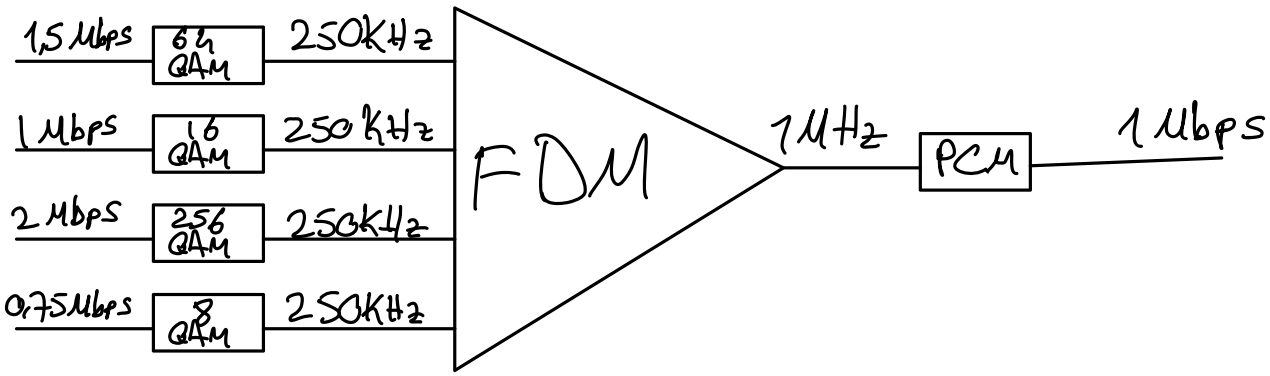
b. Write the equation of signal in sinus form.

⇒ Vize konusu !

Question-4: (20 p)

There are 4 digital data source that use **equally divided** same satellite transmission medium multiplexed by FDM. Satellite transmission medium has a 1000 kbps channel capacity. Source-1, Source-2, Source-3 and Soruce-4 have a data rate of 1500 kbps, 1000 kbps, 2000 kbps and 750 kbps respectively. Configure the system.

⇒ EBCB (1500, 1000, 2000, 750) = 250



Çözemedim !

Question-5: (15 p)

What are the ARQ-Automatic Repeat Request protocols. Write their names and explain them.

⇒ İşlemediğimiz konu var!