

00 00 00 11
10 11 00 01
0000 0011
1011 00

≡ Q.1

$\alpha = 945 = 3B1 =$
 $\beta = 946 = 3B2 =$

yyyyyy = 011 10
xxxxxxx = 110 001

$\alpha = \text{Byte}_1 = \underline{110\ 011\ 10} = \text{CE}$
 $\beta = \text{Byte}_2 = \underline{10\ 110\ 001} = \text{B1}$

$\beta = \text{same plus 1} = \text{CEB2}$

\therefore sequence is CEB1 CEB2

Q.2 co-ax $Z_0 = \frac{138}{\sqrt{\epsilon_r}} \log_{10}\left(\frac{D}{d}\right)$

$D = 12\text{mm}$
 $d = ?$
 $\epsilon_r = 1$
 $Z_0 = 50$

$\frac{D}{d} = 10^{\left(\frac{Z_0}{138}\right)}$

$d = D \cdot 10^{-\left(\frac{Z_0}{138}\right)} = 12 \cdot 10^{-\left(\frac{50}{138}\right)} = 5.2\text{mm}$

AWG: $\left(\frac{5}{0.5}\right) = 10^x$

$\log_2 10 \approx 3.32$

for 4mm: $Z_0 = 138 \log_{10}\left(\frac{12}{4}\right) = 138 \log_{10}\left(\frac{3}{1}\right) = 87\Omega$

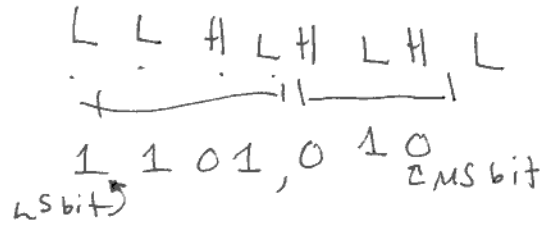
4mm. ~~3mm~~?
for $\frac{4\text{mm}}{0.5} = 8 = 2^3$

~~3x6 = 18~~
 $\frac{24}{18}$
AWG: 8 gauge

Q.3

Start bit

bit values are:



$$\frac{0010}{2} \frac{1011}{B} = 2B_{hex} \quad \underline{\underline{+}} \text{ character.}$$

Q.4

$$B = 6 \text{ MHz} = 6 \times 10^6$$

$$C = 50 \text{ Mb/s} = 50 \times 10^6$$

$$C = B \log_2(SNR + 1)$$

$$SNR = \left(\frac{C}{B} \right) - 1 = 2^{\left(\frac{50}{6} \right)} - 1 = 321 = \underline{\underline{25 \text{ dB}}}$$

Q.5

$$k = \log_2(4) = 2 \text{ bits}$$

$$n = 4 \text{ bits/codeword.}$$

minimum distance:

1001

0110

1010

0101

from 1st

from 2nd

from 3rd

4

2

2

2

2

4

$$d_{min} = \underline{\underline{2}}$$

$$\text{detected} = 1 \text{ error} = d_{min} - 1$$

$$\text{corrected} = \left\lfloor \frac{d_{min} - 1}{2} \right\rfloor = \left\lfloor \frac{1}{2} \right\rfloor = 0$$

Q.5

rx	distance to each cw	
1101	→ 1001	1
	0110	3
	1010	3
	→ 0101	1

closest codewords are 1001 and 0101
each at distance 1.

Q.6



(a) - not linear: only changes A & G
 - not non-linear: only IMD products are $\pm 2m$
 which cannot give result of 1.5 kHz

Q.7

01	10
11	01
11	00
01	10

(b) pseudo-random (from name)

(c) IP is next-highest protocol layer

(d) no, Star requires.

(e) 2 cable pairs

(f) $1+2+3+2=8=0x0008$
 complement = FFF7
 \therefore checksum is OK.

(g) 17 netmask
 18: 0xFF 0xFF
 0xFO.
 173.188.65.93
 & netmask is
 173.188.0.0.
 not in 173.188.128.0
 net...

Ethernet

(h)