Serial #

O

-2 points for not writing your serial #

Name: _KEY_   Sec. 1

1. In a binary data transmission using duobinary pulses, sample values were read as follows:

1	2	0	-2	-2	0	0	-2	0	2	0	0	2	0	0	0	-2
1	1	0	0	0	1	0	0	1	1	0	1	1	0	1	0	0

a) If there is no detection error, determine the received bit sequence. State your decision rule and fill in the table.   **(4 points)**

In duobinary decoding   even if you do not remember
                                         this rule, you should be able
  0 ⇒ change   to derive it knowing what
  ±2 ⇒ no change   duobinary is.

b) Another sequence is given by

1	2	0	0	0	-2	0	0	-2	0	2	0	0	-2	0	2	2	0	-2

Explain if there is any error in detection   **(2 points)**

We cannot have
even # of zeros between opposite polarity 2 & -2

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2. In multiamplitude scheme with *M*=16

   a. Determine the minimum transmission bandwidth required to transmit data at a rate of 12,000 bits/s with zero ISI.   **(2 points)**

$\frac{I}{M} = \log_2 M = \log_2 16$

$= 4$ rate in symbols $= \frac{12000}{4} = 3\,000$ symbols/s

minimum bandwidth $B = \frac{R}{2} + r\frac{R}{2} = \boxed{1500 \text{ Hz}}$
$r = 0$

   b. Determine the transmission bandwidth if Nyquist criterion pulses with a roll-off factor r=0.2 are used in transmit data.   **(2 points)**

$B = \frac{R}{2} + r\frac{R}{2} = \frac{(1+r)}{2}R = \frac{1.2}{2}R$

$= 0.6 (3000) = \boxed{1800 \text{ Hz}}$

For ver 2 M=8 ⇒ $I_M = \log_2 8 = 3$ | rate   Good Luck, **Dr. Ali Muqaibel**
⇒ $B_1 = 2000$ Hz $= \frac{12000}{3} = 4\,000$ symbols/sec
$B_2 = 2400$ Hz.