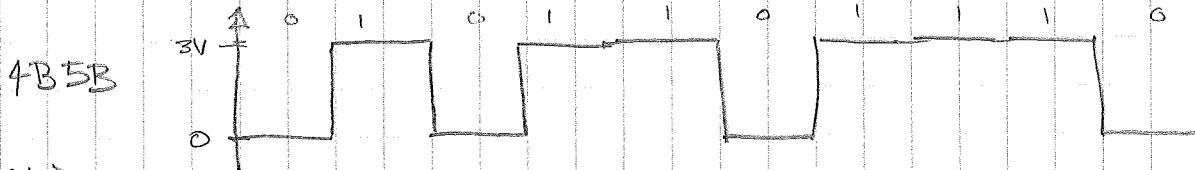
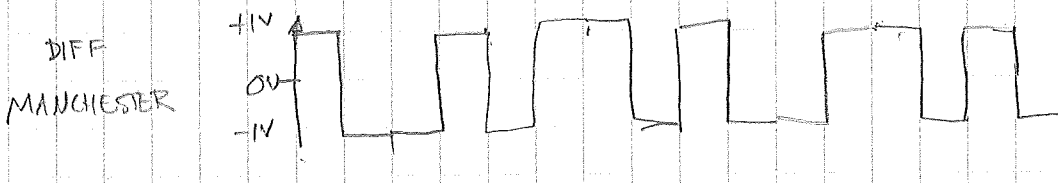
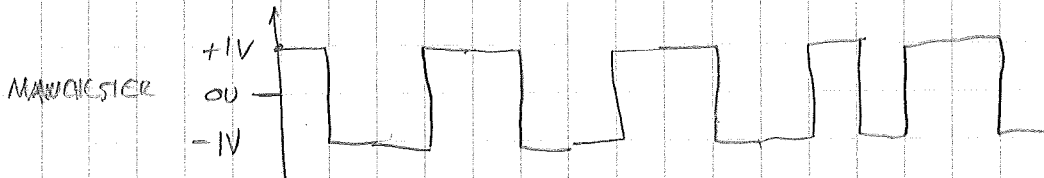


Q. 1

DATA

0 1 0 1 0 1 1 0



0101 → 01011  
0110 → 01110

Q. 2

INPUT

0 0 0 1 1 0 0 0 0 0 1 0

O-COUNT

1 2 3 0 0 1 2 3 4 5 0 1

OUTPUT OF STUFFER

0 0 0 1 1 0 0 0 0 0 1 1 0

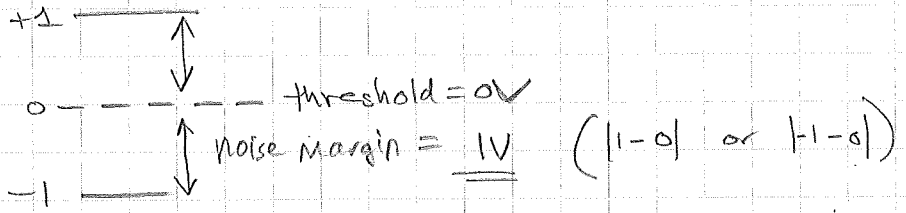
↑ stuffed bit.

O-COUNT

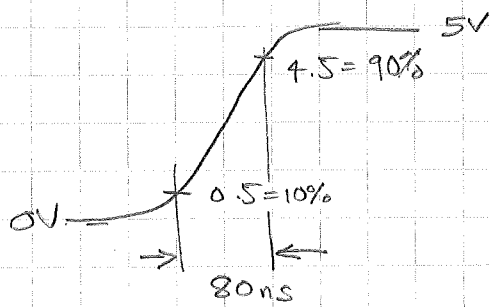
1 2 3 0 0 1 2 3 4 5 1 0

0 0 0 1 1 0 0 0 0 0 1 0

Q3



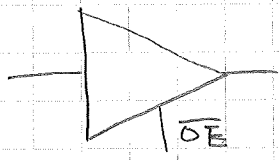
Q4



stew rate =  $\frac{4V}{80ns}$

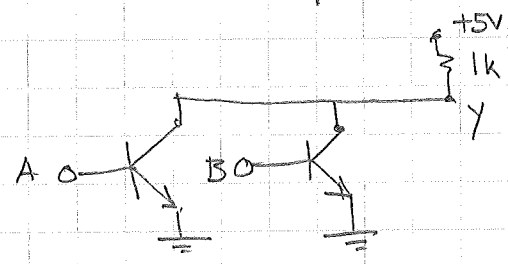
=  $\frac{4000V}{80\mu s} = \underline{\underline{50 V/\mu s}}$

Q5



$\overline{OE}$  is active-low  
 if  $\overline{OE}$  is 0V (low) the output is enabled & will follow the input.

Q6



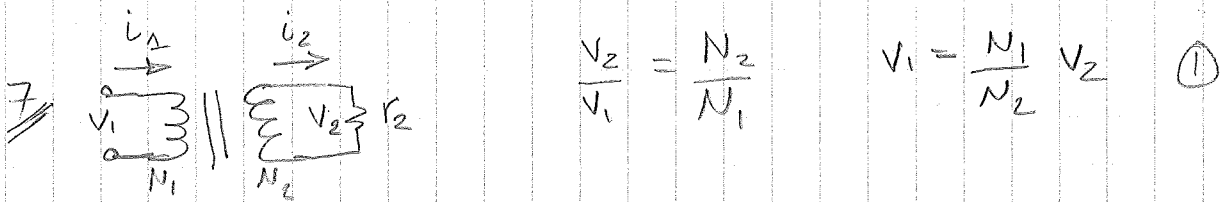
A	B	Y
L	L	H
L	H	L
H	L	L
H	H	L

if either A or B is H then transistor conducts & Y is low.

This is an NOR function if  $H=T$  (active-high)  
 $L=F$

This is an NAND function if  $L=T$  (active-low)  
 $H=F$

for this reason this is often called a "wired OR" connection.



$$i_1 V_1 = i_2 V_2 \text{ (lossless)} \rightarrow i_1 \frac{N_1}{N_2} V_2 = i_2 V_2, \quad i_1 = \frac{N_2}{N_1} i_2 \quad (2)$$

$$V_2 = i_2 r_2 \text{ (ohm's law)} \rightarrow r_2 = \frac{V_2}{i_2} \quad (3)$$

$$\text{solve for } r_1 = \frac{V_1}{i_1} = \underbrace{\frac{N_1}{N_2} V_2}_{(1)} \cdot \underbrace{\left(\frac{N_2}{N_1} i_2\right)^{-1}}_{(2)} = \left(\frac{N_1}{N_2}\right)^2 \cdot \underbrace{\frac{V_2}{i_2}}_{(3)} = \left(\frac{N_1}{N_2}\right)^2 r_2$$

8//

$$B = 4 \times 10^3$$

$$\text{SNR} = 20 \text{ dB} = 10^{\left(\frac{20}{10}\right)} = 100$$

$$\begin{aligned} \text{Capacity} = C &= B \log_2 \left(1 + \frac{S}{N}\right) = 4 \times 10^3 \log_2 (1 + 100) \\ &= 4 \times 10^3 \cdot \frac{\log_{10}(101)}{\log_{10}(2)} = 4 \times 10^3 \frac{2}{0.3} \approx \underline{\underline{27 \text{ kb/s}}} \end{aligned}$$

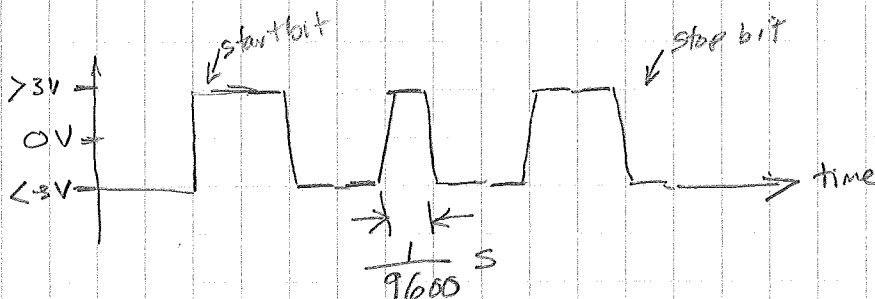
9//

if DTR has no voltage it is an input.  
DTR is an input on a DCE (modem), so the device is a DCE.

on a DCE TXD is an input.

10//

for the digit 6 the ASCII value is  $0x36 = 00110110$ .  
the bits are transmitted L.S bit first: 0, 1, 1, 0, 1, 1, 0, 0.



(your answer will probably be different).