

Q-3)

a) OR

A	B	OR
0	0	0
0	1	1
1	0	1
1	1	1

$$P_Y = 1 - \overline{P_A} \overline{P_B}$$

$$= 1 - (0.5 \times 0.5)$$

$$= 0.75$$

A	B	X NOR
0	0	1
0	1	0
1	0	0
1	1	1

$$P_Y = 1 - (P_A \overline{P_B} + \overline{P_A} P_B)$$

$$= 1 - [(0.5 \times 0.5) + (0.5 \times 0.5)]$$

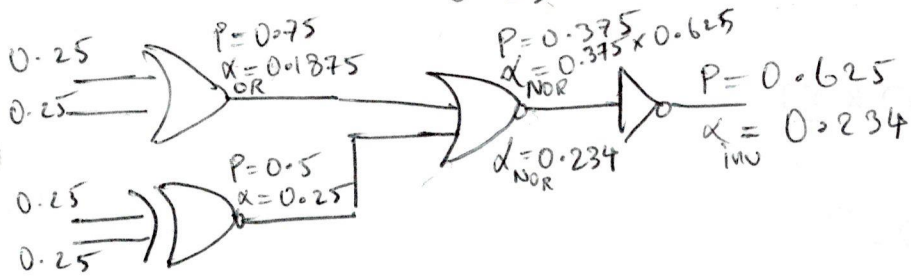
$$= 0.5$$

A	B	NOR
0	0	1
0	1	0
1	0	0
1	1	0

$$P_Y = \overline{P_A} \overline{P_B}$$

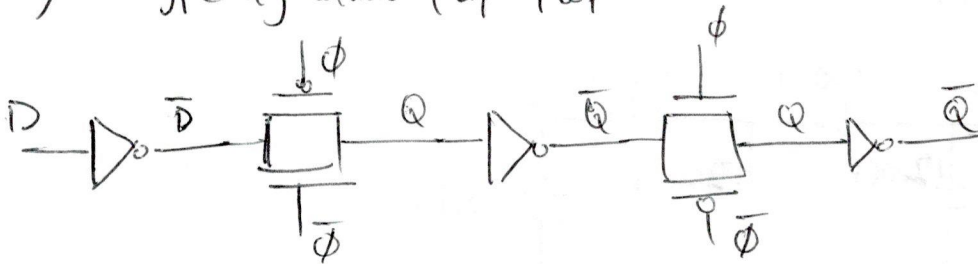
$$= 0.5 \times 0.5 = 0.25$$

$$= 0.375$$

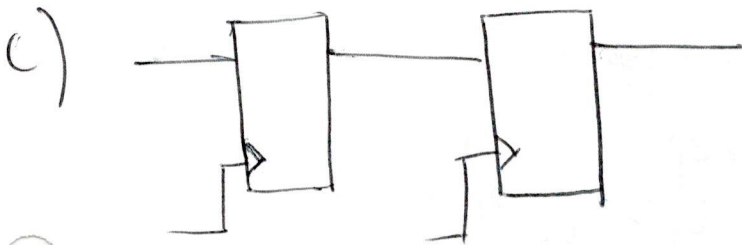


d)

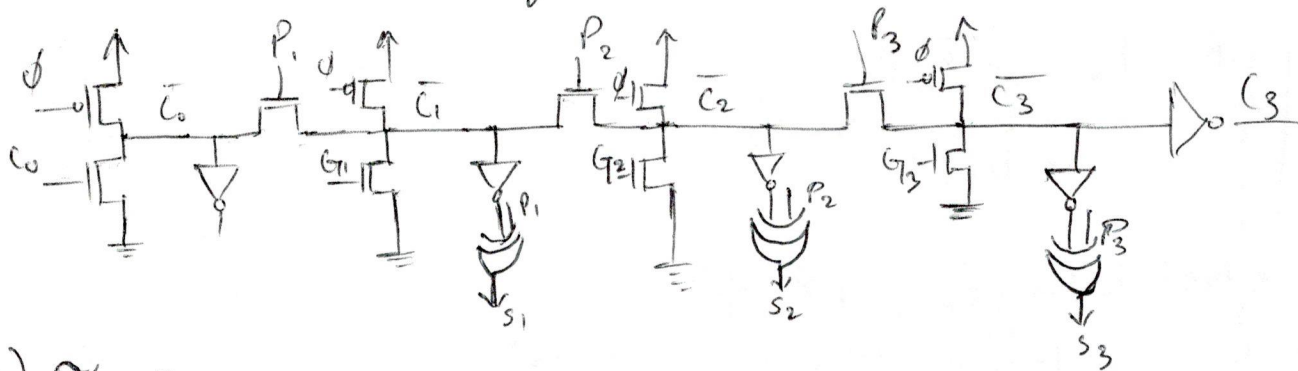
b) d-type dynamic flip flop



e)



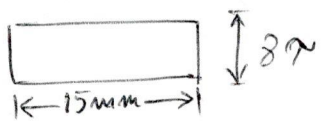
f) 4-bit Manchester Carry Chain



g) $\gamma = \frac{0.6 \mu m}{2}$

$\gamma = 0.3 \mu m$

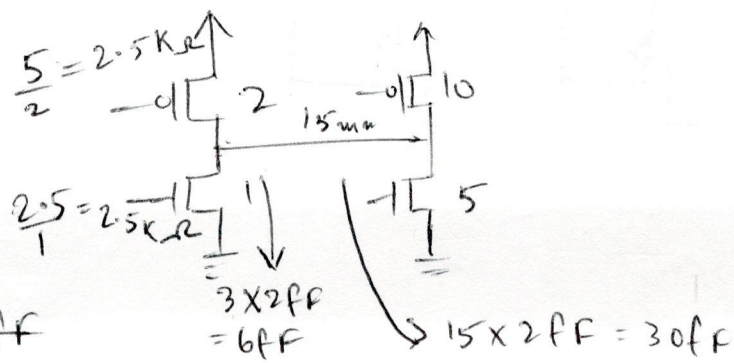
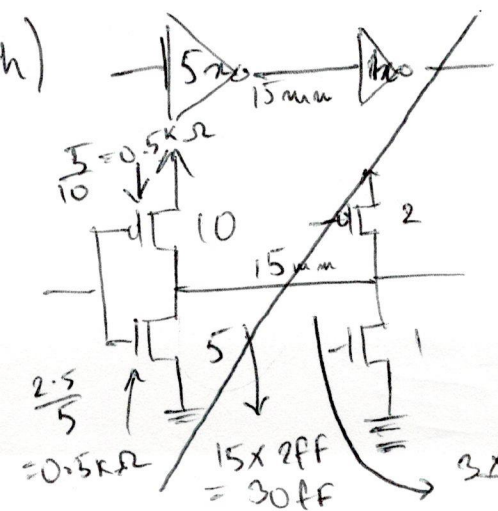
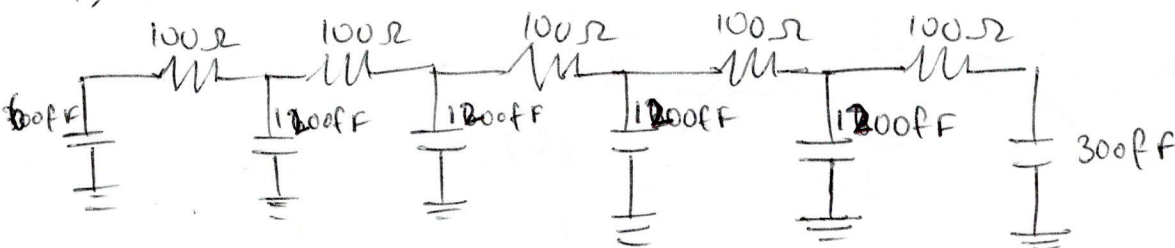
$2\gamma = 2 \times 0.3 = 0.6 \mu m$



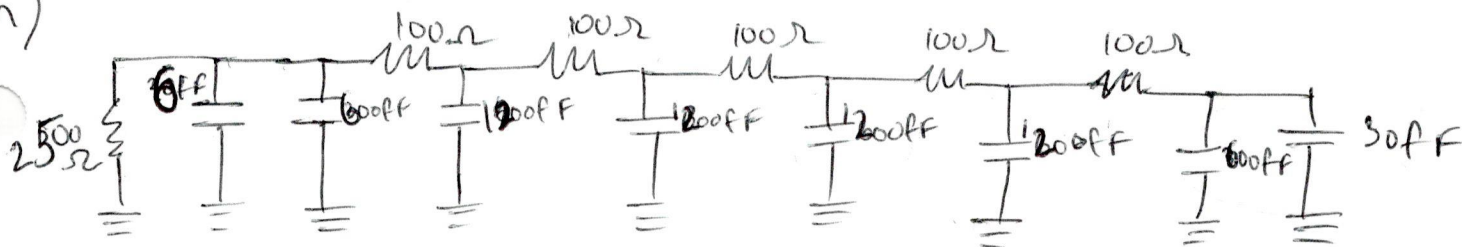
$\frac{15 mm}{0.6 \mu m} = \frac{15 \times 10^{-3}}{2.4 \times 10^{-6}} = 6250 \text{ k} \square$

$6250 \text{ k} \square \times \frac{0.08 \Omega}{\square} = 500 \Omega$

$\frac{15 mm}{1 \mu m} \times 0.4 \text{ fF}/\mu m = 6000 \text{ fF}$



h)



$$\begin{aligned}
 \text{Propagation delay} &= (600 + 30 \text{ fF}) \times (100 \times 5 + 2500) + (1200 \text{ fF}) (100 \times 4 + 2500) \\
 &\quad + (1200 \text{ fF}) (100 \times 3 + 2500) + (1200 \text{ fF}) (100 \times 2 + 2500) \\
 &\quad + (1200 \text{ fF}) (100 + 2500) + (606 \text{ fF} \cdot 2500) \\
 &= \left(\begin{matrix} 1.89 & 3.48 & 3.36 & 3.24 & 3.12 & 1.52 \\ 0.99 & 1.74 & 1.62 & 1.62 & 1.56 & 0.765 \end{matrix} \right) \\
 &= \cancel{2.355 \text{ ns}} \quad 16.61 \text{ ns}
 \end{aligned}$$

i)

