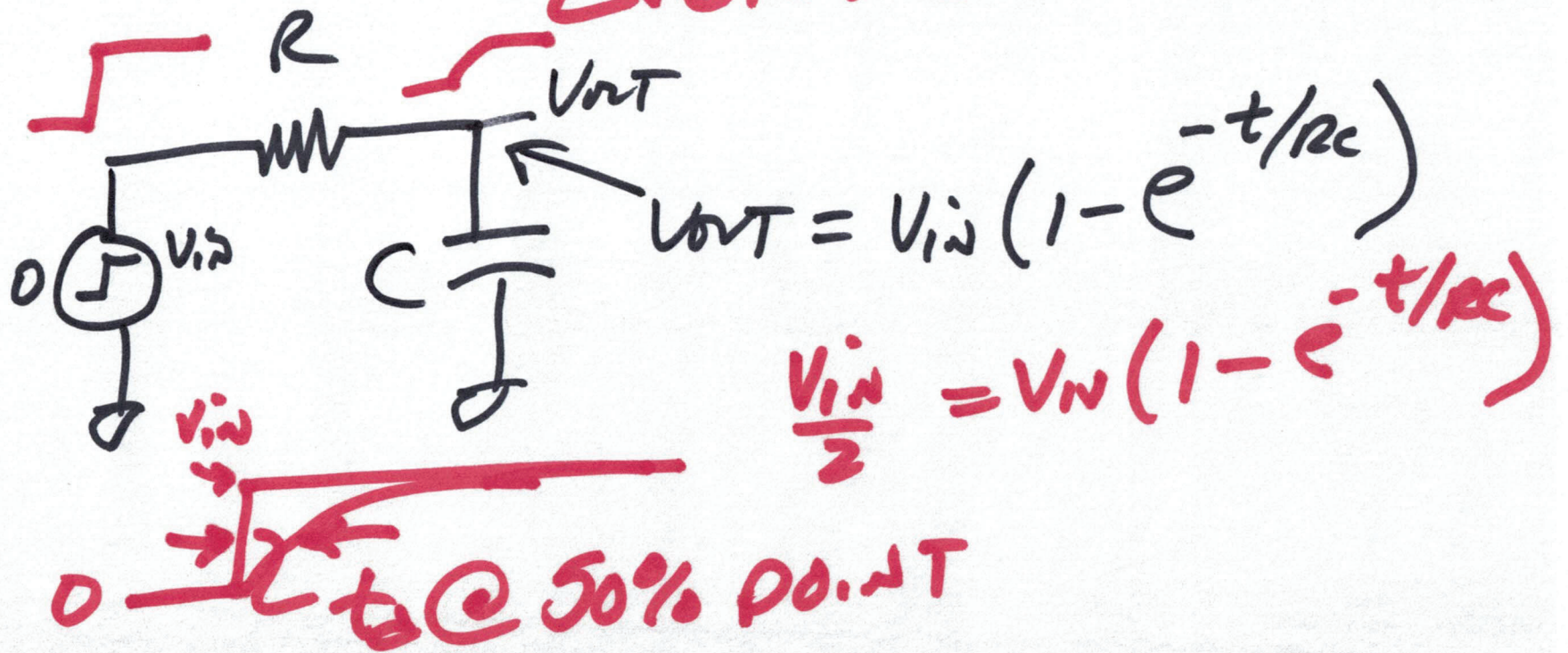


EE 421 / ECG 621  
Digital IC Design

Sept. 13, 2023

Lecture 5

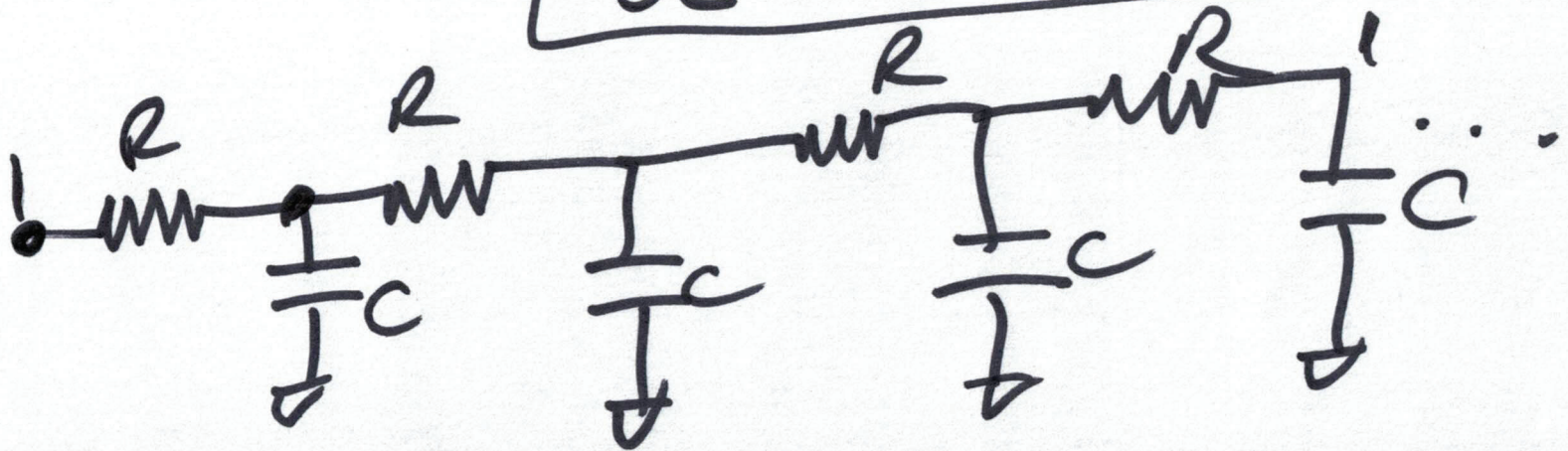


$$\frac{1}{2} = 1 - e^{-t/RC}$$

$$h(e^{-t/RC}) = h\left(\frac{1}{2}\right)$$

$$-\frac{t_d}{RC} = -0.69 \dots \approx -0.7$$

$$t_d = 0.7RC$$



2)

$$t_d = 0.7RL + 0.72RC + 0.73RC$$

$$t_d = 0.7(1 + 2 + 3 + \dots + l)RC$$

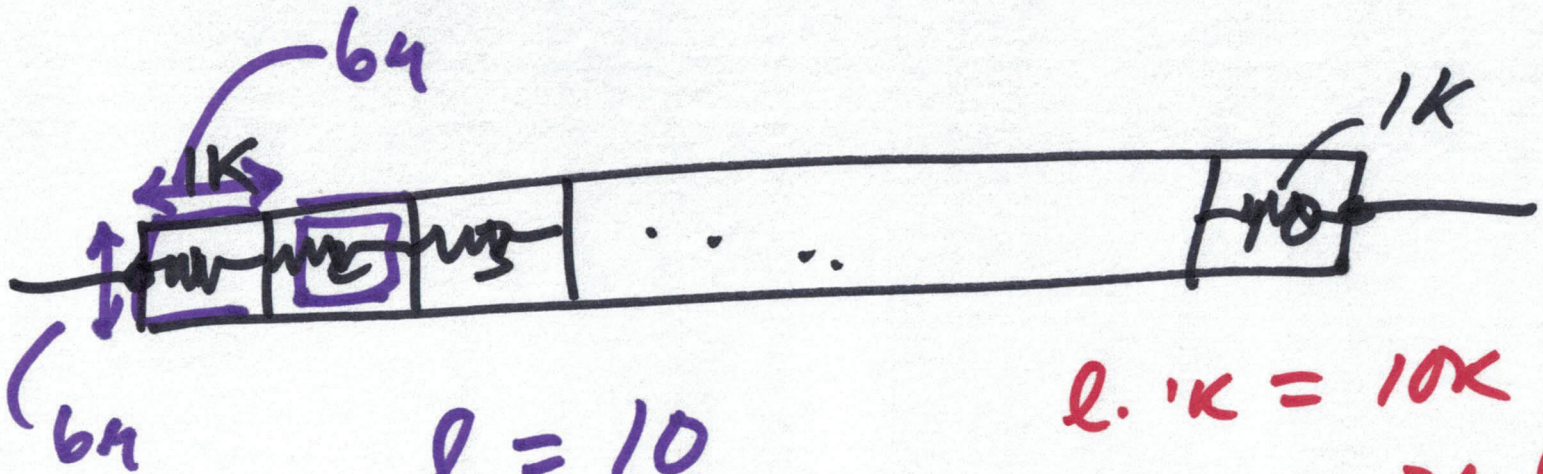
$\frac{l(l+1)}{2} \approx \frac{l^2}{2}$

# of sections

$$t_d \approx 0.7 \cdot \frac{l^2}{2} \cdot R \cdot C$$

$$t_d \approx 0.35 \cdot l^2 \cdot R \cdot C$$

$$t_d = 0.35 \cdot l \cdot R \cdot l \cdot C$$



$$l = 10$$

$$r = 1K$$

$$C = 100 \frac{fF}{\mu m} \cdot \frac{64 \cdot 64}{4 \mu m} = 3.6 fF$$

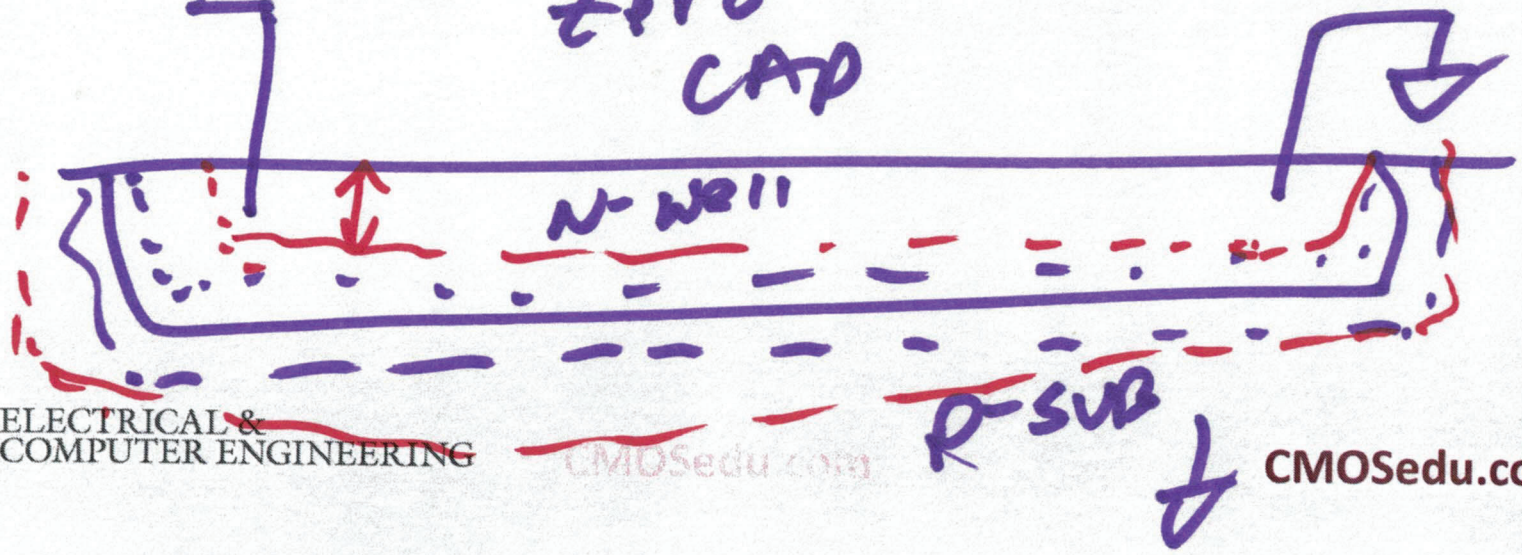
$$l \cdot 1K = 10K$$

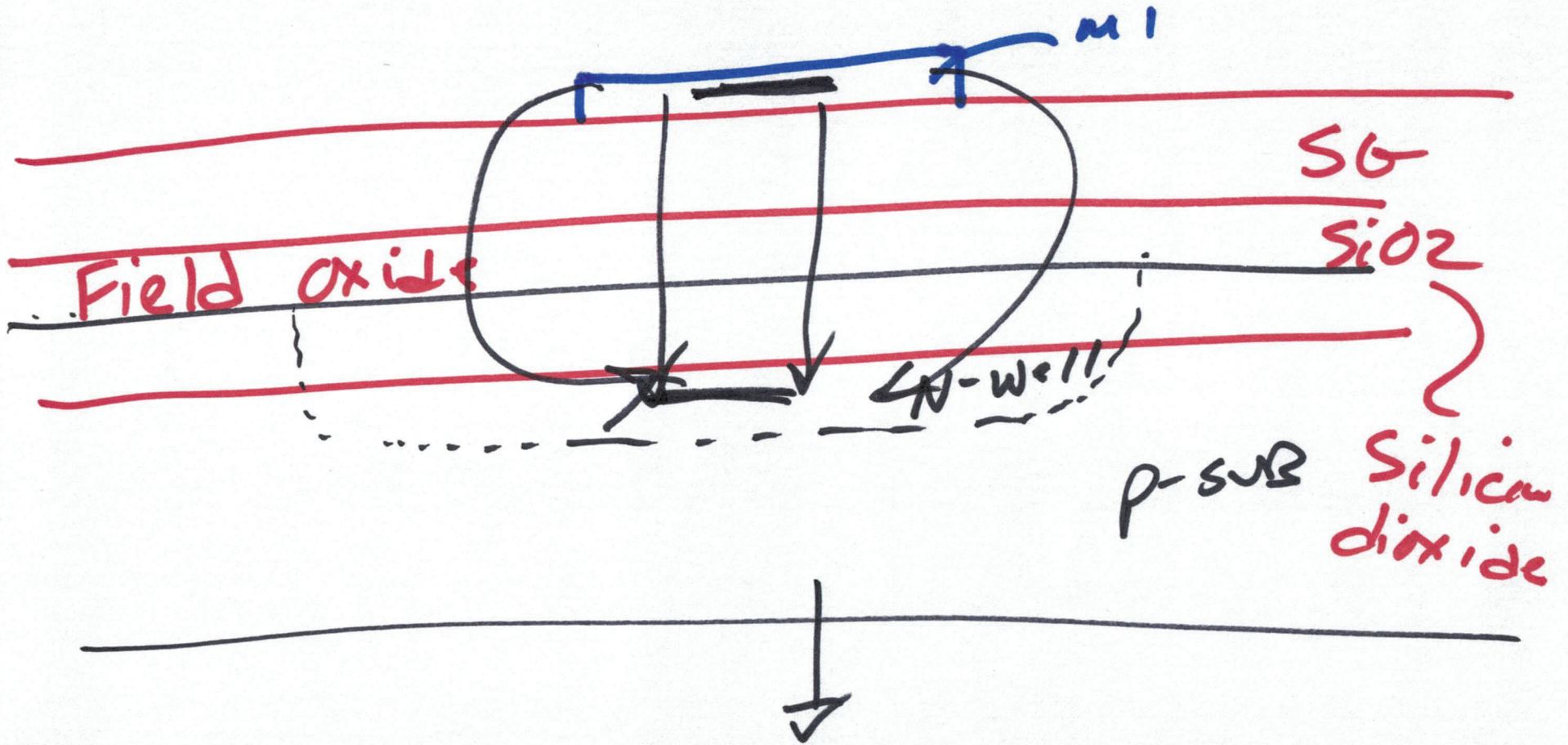
$$l \cdot c = 36 fF$$

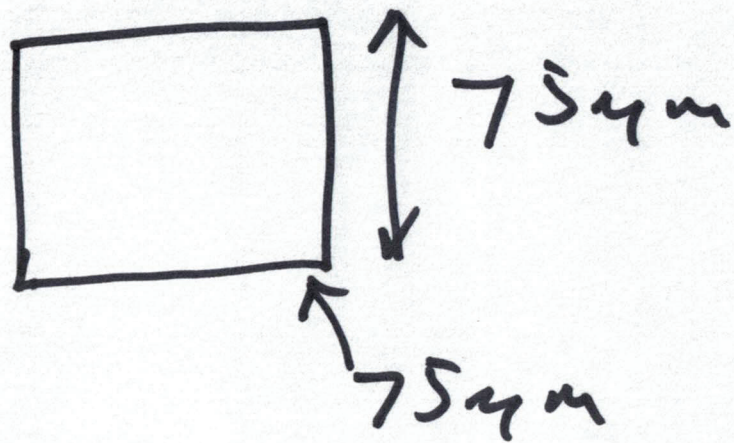
$$t_d = 0.35 l \cdot c \cdot r$$

+5V

Zero CAP

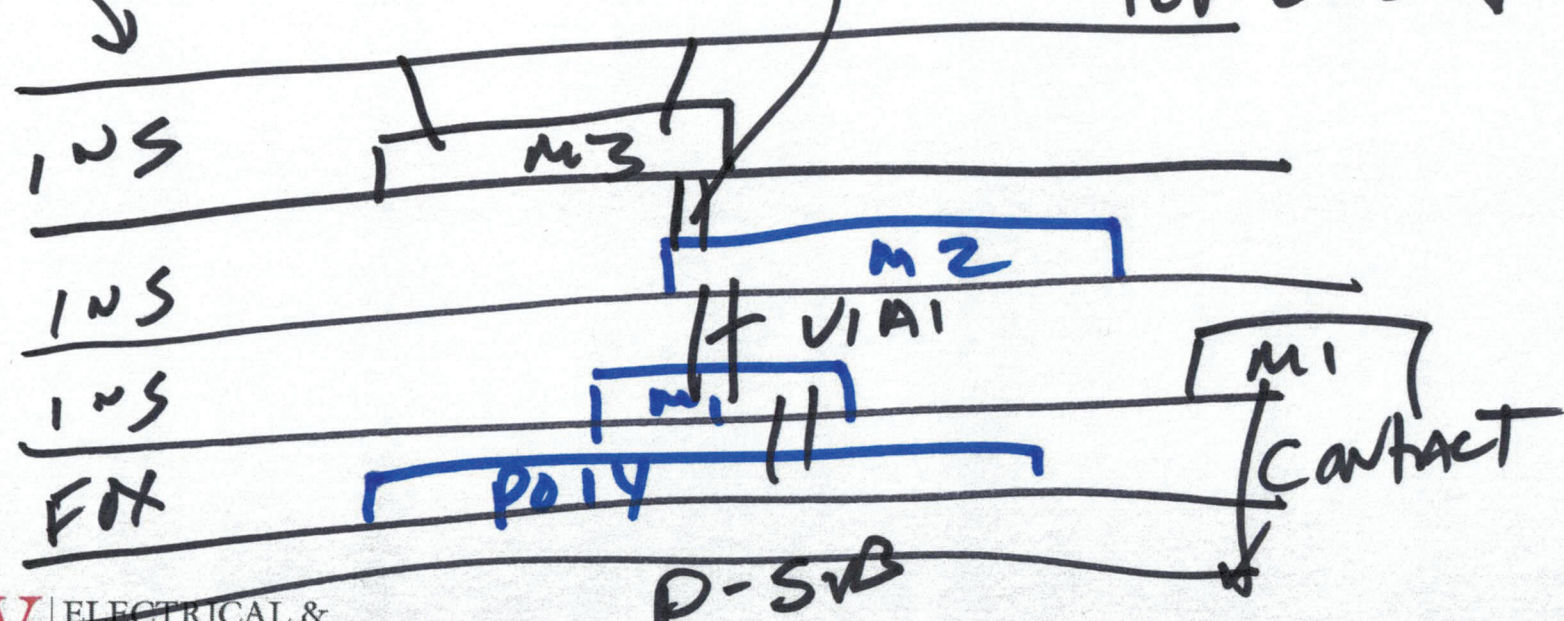






1micron  
 = 1um  
 =  $10^{-6}$  m  
 top of clip

Passivation Layer



6)