EE 421 / ECG 621

Lecture 10

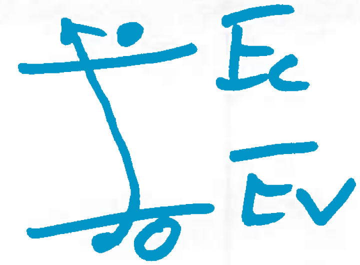
Sept. 26, 2018

$$\mu_N = \frac{\text{velocity}}{\text{Electric field}}$$

cm/s, V/cm → $cm^2/V \cdot s$

N = electron concentration $= N_D >> n_i$

Si ← No donor atoms



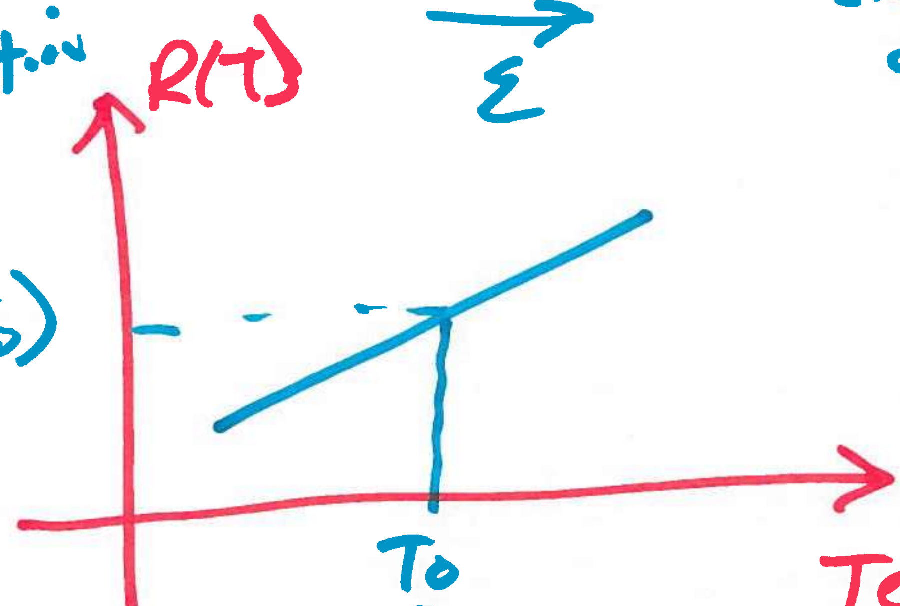
$n_i \nearrow T \nearrow$

$$R = \frac{1}{q(N\mu_n + p\mu_p)}$$

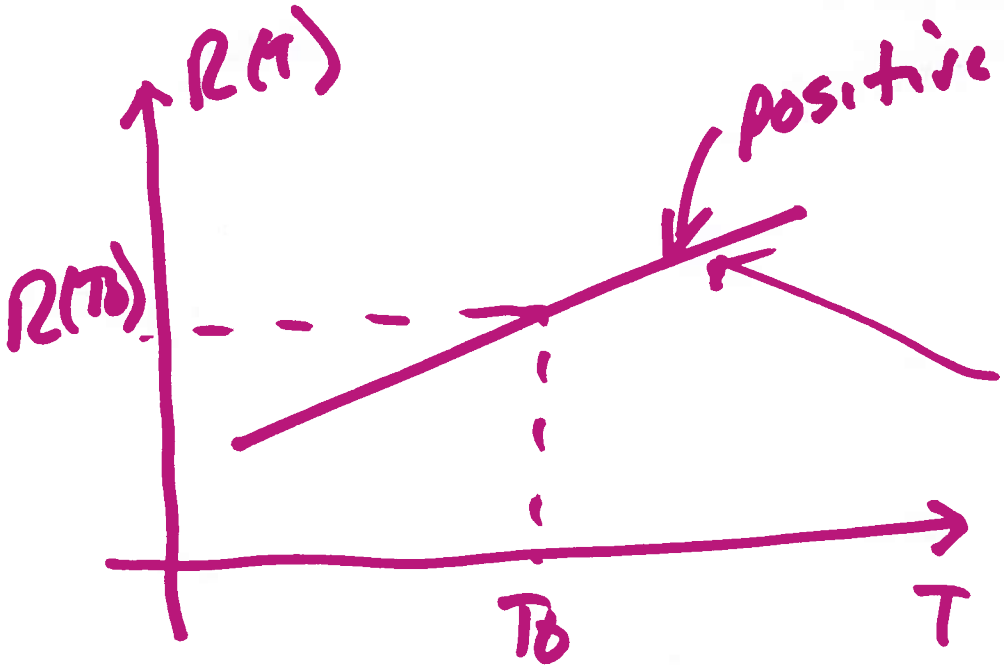
electron density

# of holes
hole density

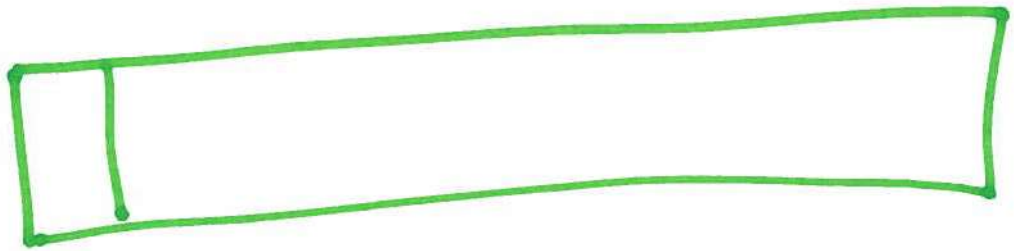
R(T)

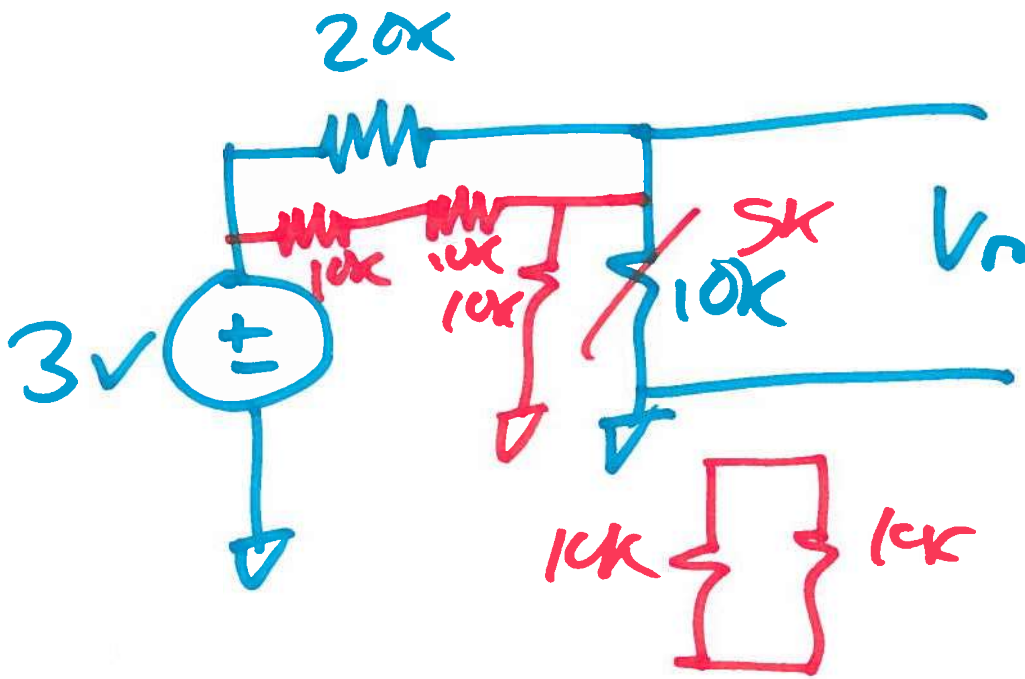


T0 ← room temp



$$R(T) = R(T_0)(1 + TCR(T - T_0))$$





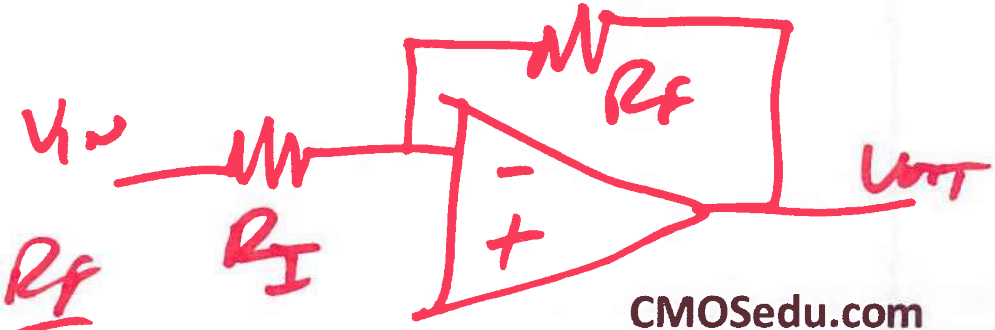
$$V_{OUT} = 3 \cdot \frac{10K}{10K + 20K}$$

$$= 3 \cdot \frac{1}{3}$$

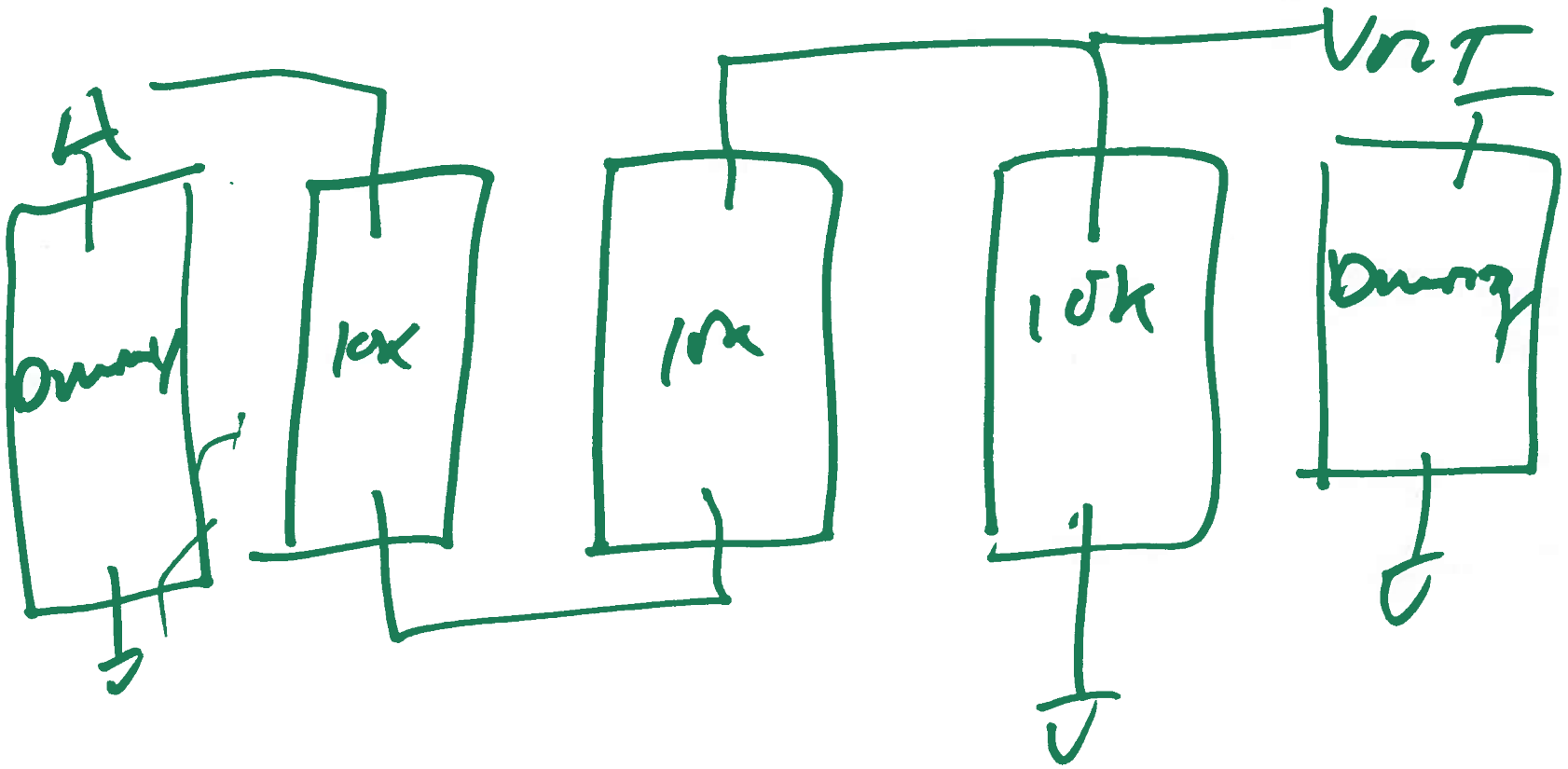
$$= 1V$$

$$V_{OUT} = 3 \cdot \frac{10k(1+TCR(T-20))}{10k(1+TCR(T-20)) + 10k(1+\quad) + 10k(1+\quad)}$$

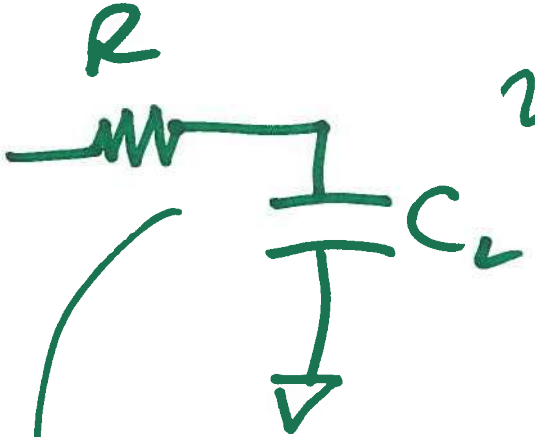
$$= 1V$$



$$-\frac{R_f}{R_I}$$



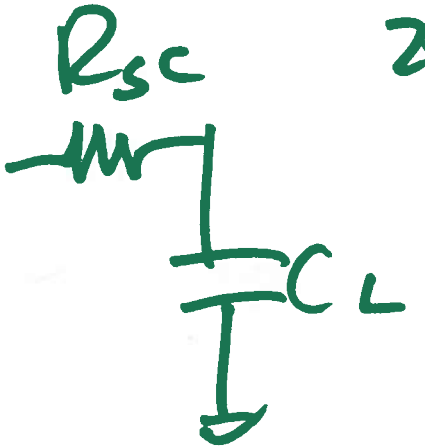
4)

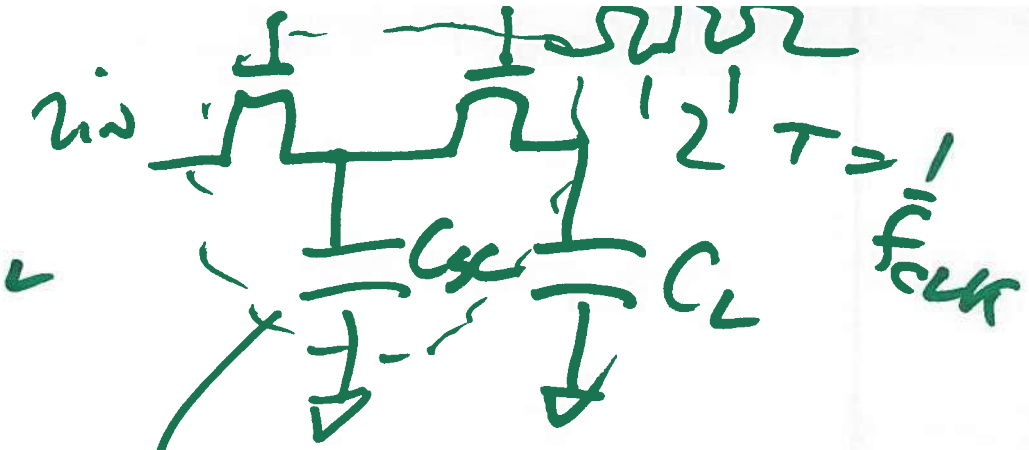


$$f_{3dB} = \frac{1}{2\pi R C_L}$$

$$\frac{1}{2\pi f \cdot C_L}$$

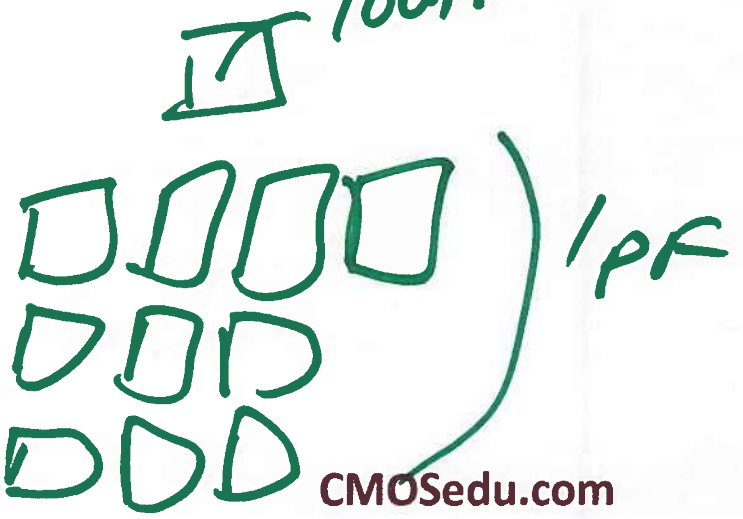
$$\frac{f_{CLK}}{f_{CLK} \cdot C_{SC}}$$

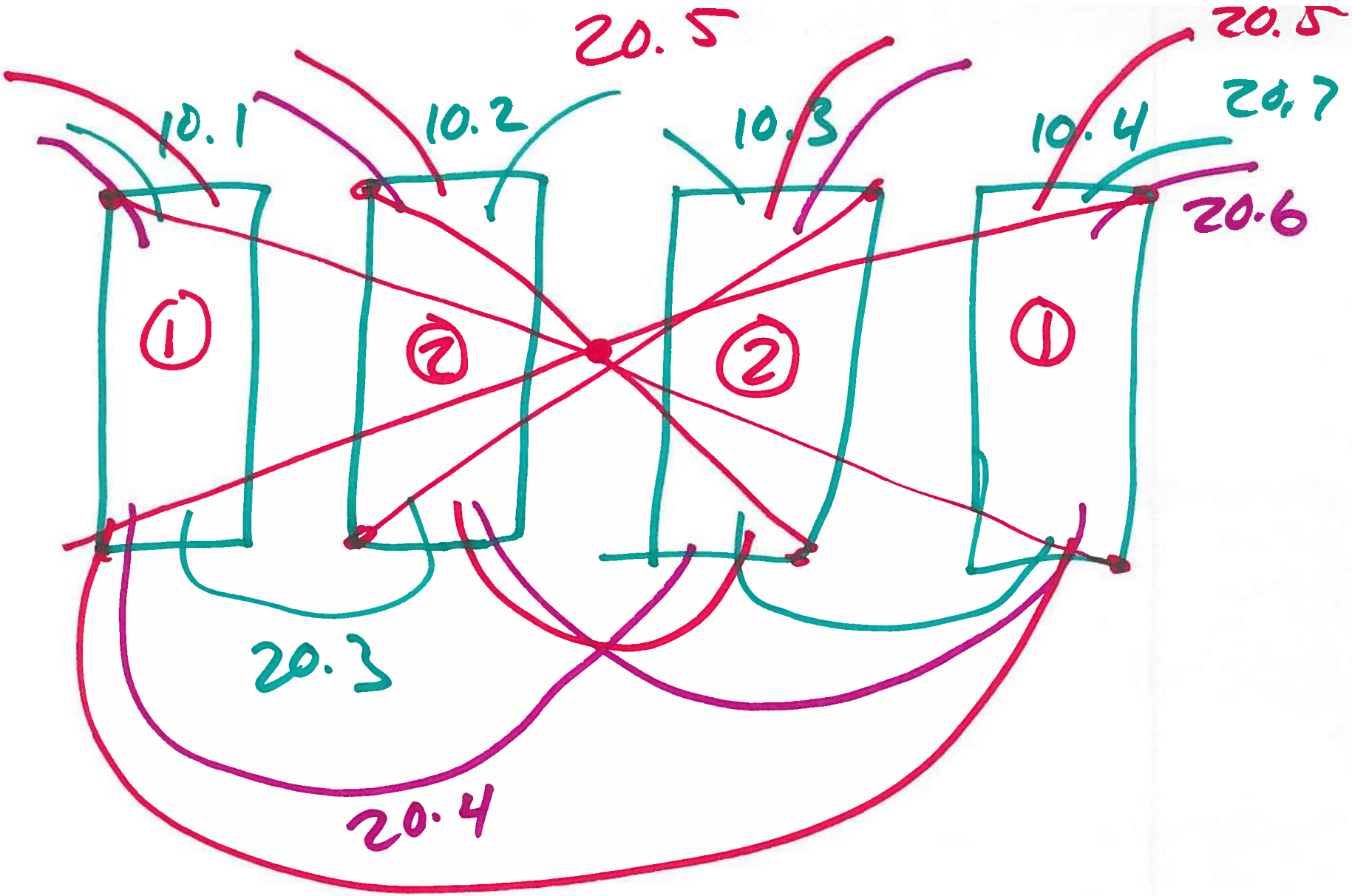


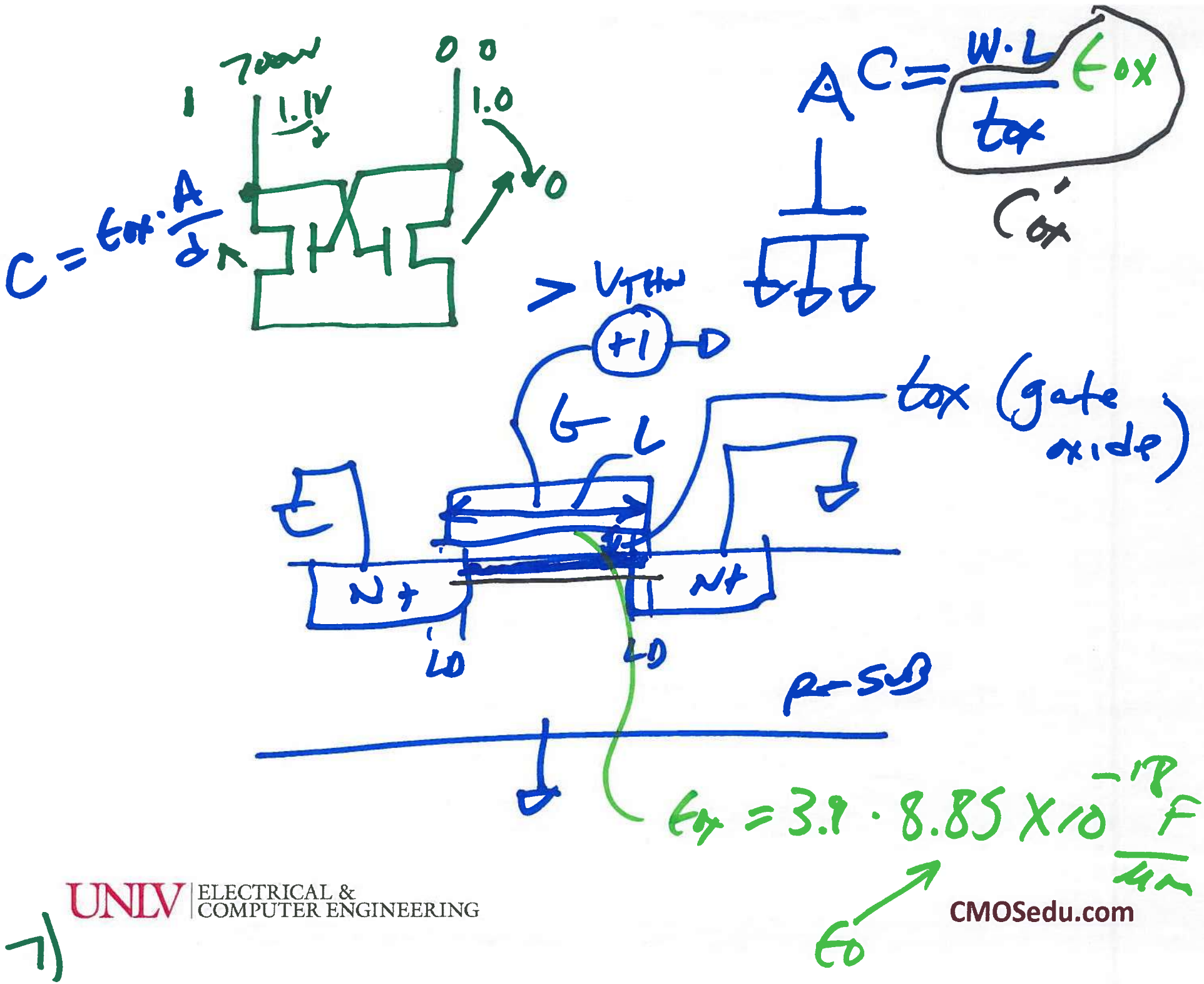


Switched-Capacitor Resistor

$$R_{SC} \quad \frac{1}{f_{CLK} C_{SC}}$$




20.5
20.5
10.1
10.2
10.3
10.4
20.7
20.6
1
2
2
1
20.3
20.4


1
700W
1.1V
0
0
1.0
0
$C = t_{ox} \cdot \frac{A}{d}$
$AC = \frac{W \cdot L}{t_{ox}} \epsilon_{ox}$
C_{ox}
$> V_{THN}$
+1
D
G
L
t_{ox} (gate oxide)
S
N+
N+
LD
LD
p-SUB
$\epsilon_{ox} = 3.9 \cdot 8.85 \times 10^{-12} \frac{F}{\mu m}$
ϵ_0