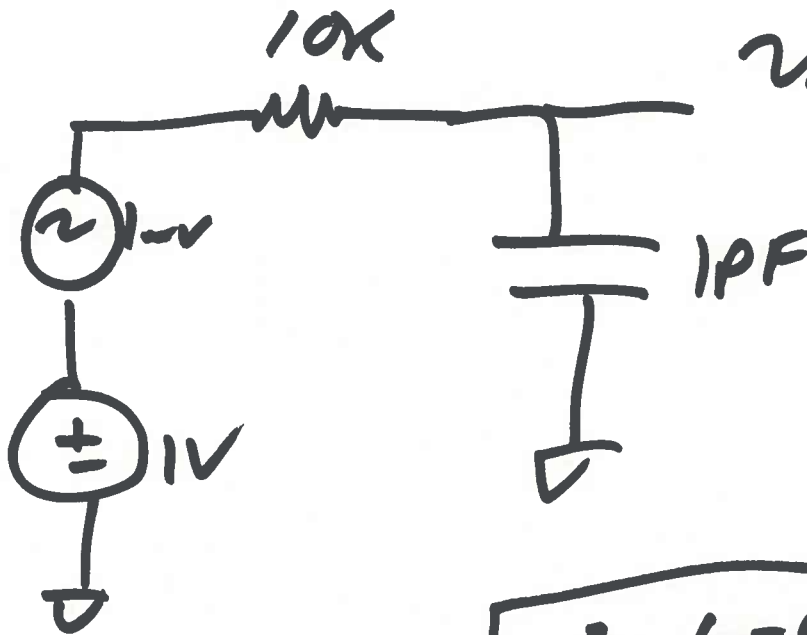


EE 421 / ECG 621

Lecture 4

Sept. 10, 2018



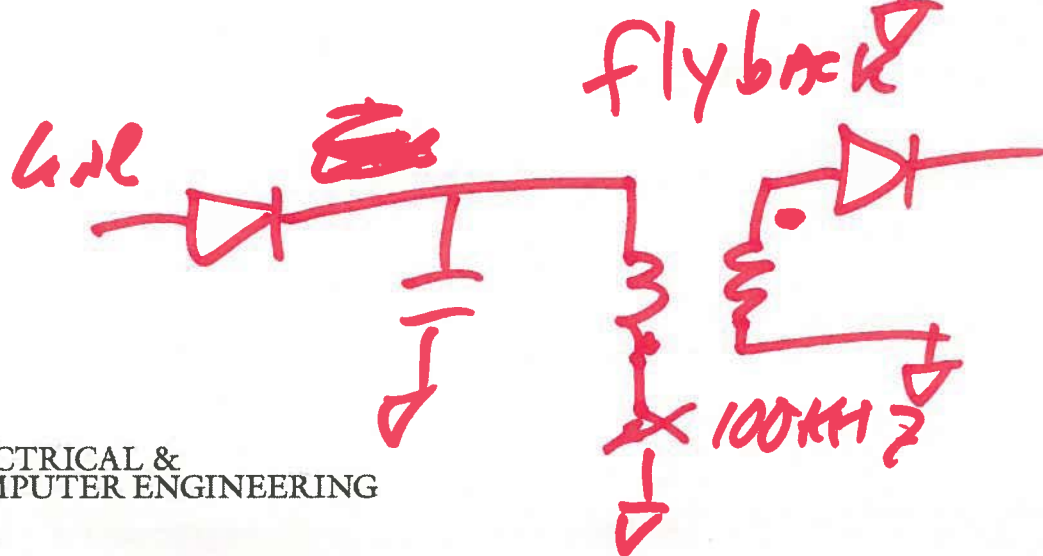
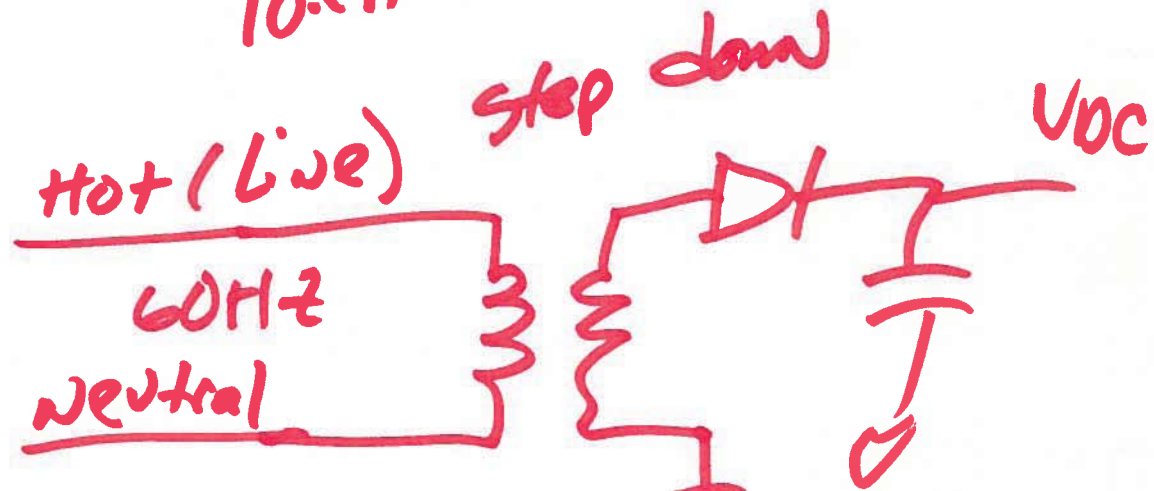
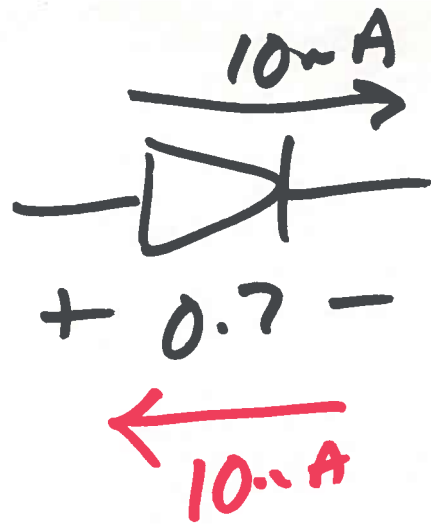
$$V_{out} = \frac{1 \text{ V} \cdot \frac{1}{j2\pi f \cdot 10^{-12}}}{10^4 + \frac{1}{j2\pi f \cdot 10^{-12}}}$$

$$.707 = \left| \frac{1}{1 + j2\pi f \cdot 10^{-8}} \right|$$

$$\sqrt{(1)^2 + (2\pi f \cdot 10^{-8})^2} = .707 = \frac{2}{\sqrt{2}}$$

$$f = \frac{1}{2\pi \cdot 10^{-8}} = 15.9 \text{ GHz} = \sqrt{2} \cdot 11.25 \text{ GHz}$$

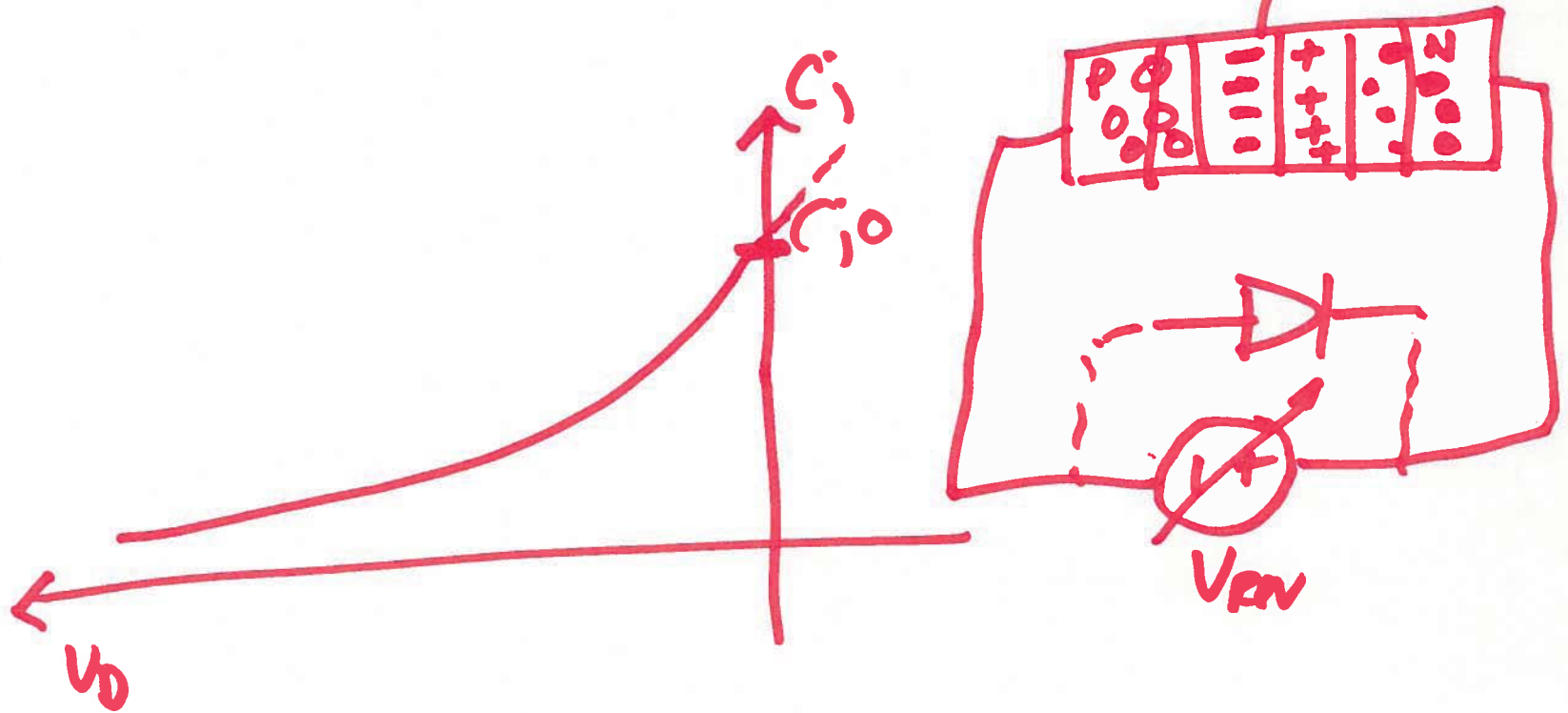
1)



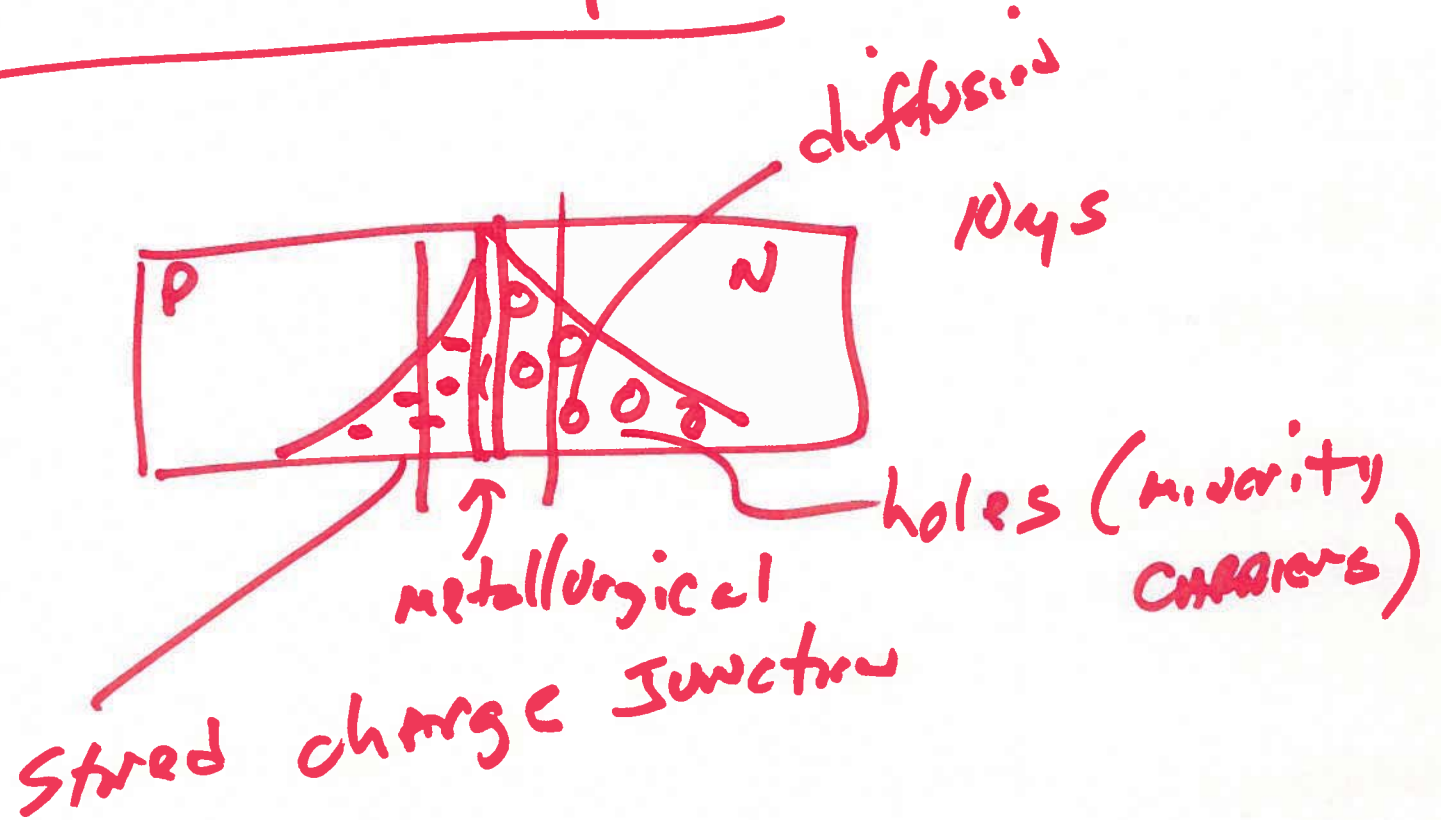
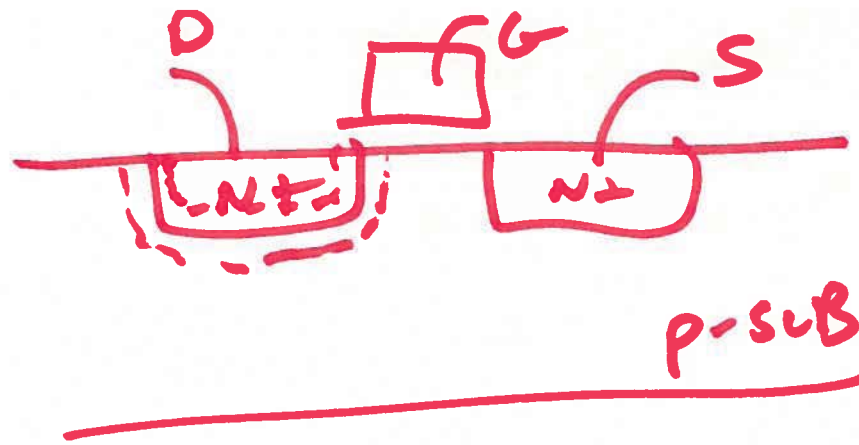
2)

$$C_j(V_D) = \frac{C_{j0}}{\left(1 + \frac{|V_D|}{\phi_{bi}}\right)^{m_j}} \quad V_D \leq 0$$

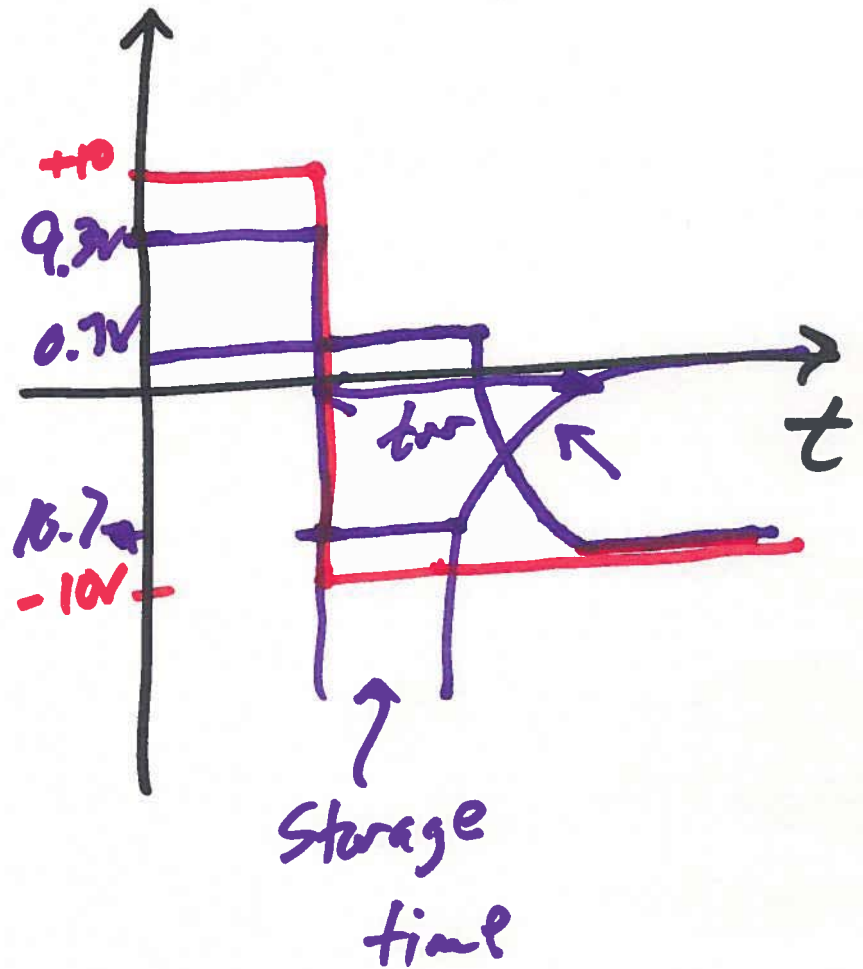
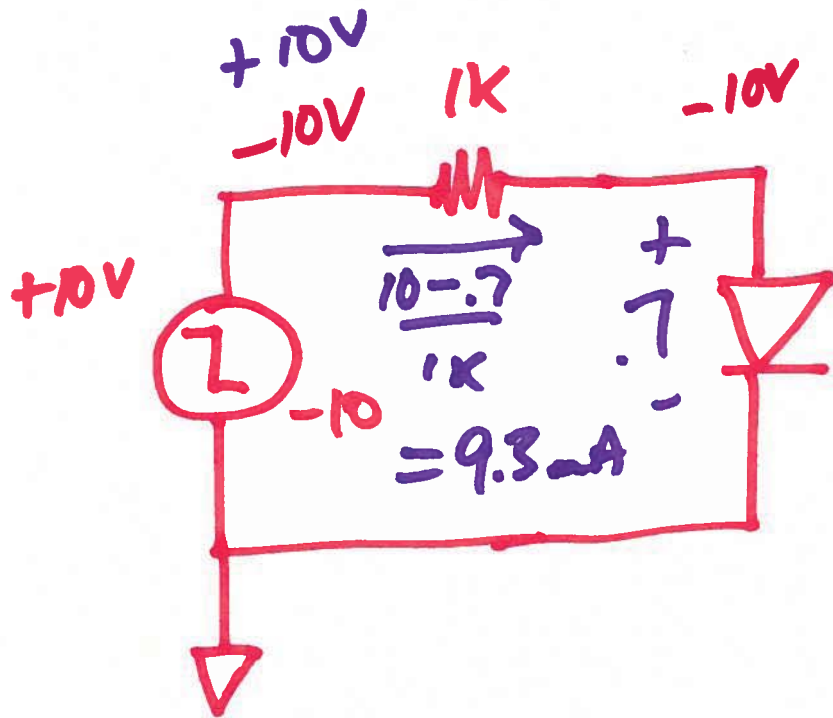
depletion



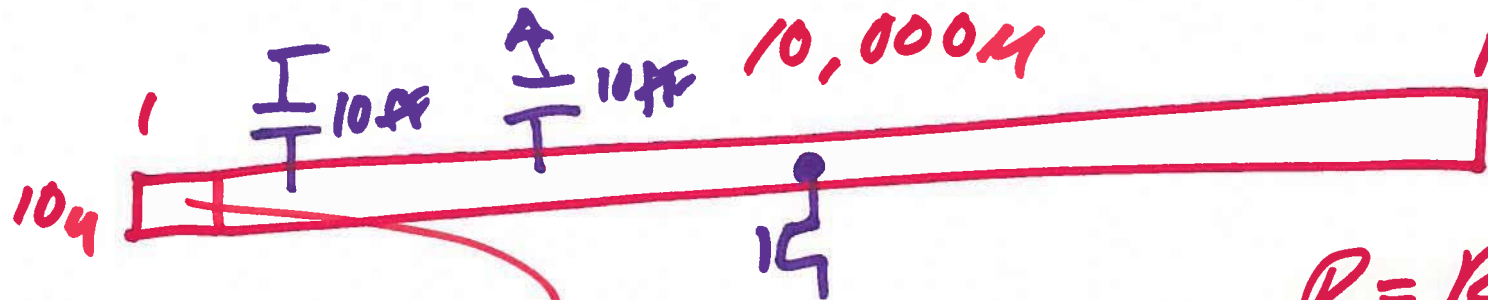
3)



4)



RC delay



$$R_D = 1 \Omega$$

$$C_D = 10 \text{ aF} =$$

~~$$5 \cdot 10^{-18} \text{ s}$$~~

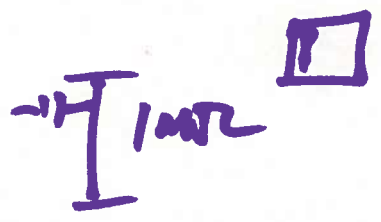
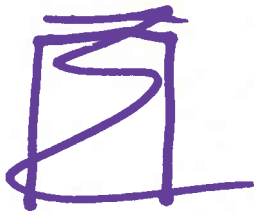
$$1 \mu^2 = 4 \mu \times 4 \mu$$

$$C_D = \frac{10 \text{ aF}}{4 \mu^2} \cdot 10 \mu \times 10 \mu = 10 \text{ fF}$$

$$R = R_D = \frac{L \cdot \rho}{W \cdot t}$$

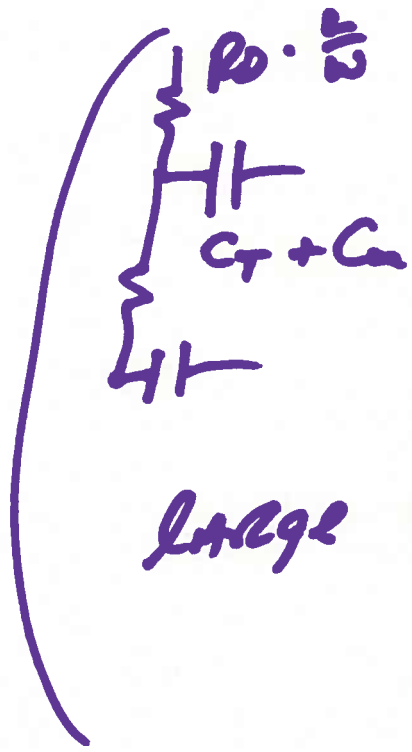
$$l = \# \text{ of squares} = 1,000$$

$$10^{-12} \text{ m}^2$$



$D_{min} = \frac{10,000 \mu m}{100}$

10,000 μm



large RC delay

