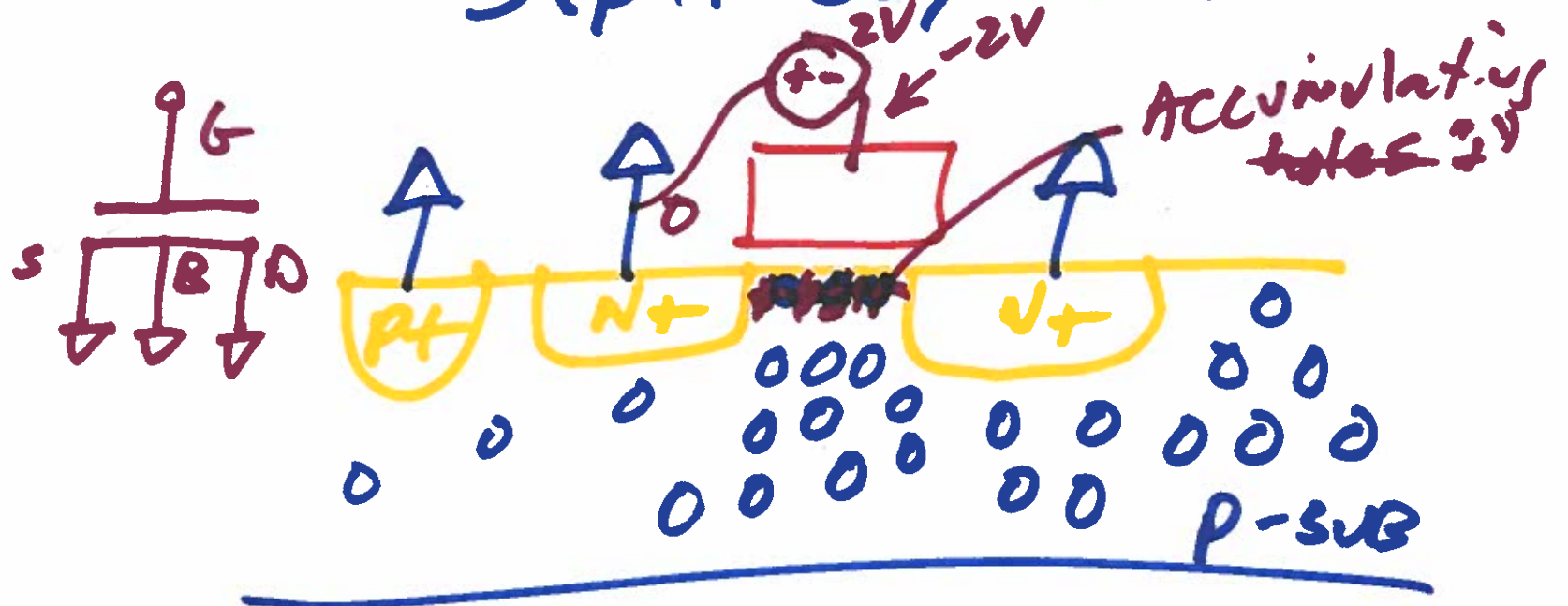


# EE421/ELG 621 Digital IC Design

Lecture 10

Sept. 30, 2019



$$L - 2LD = L_{eff}$$

$$L - L_{drawn}$$



lateral diffusion

$$C'_{ox} = 2.7 \text{ ff} / \mu\text{m}^2$$

$$C = \frac{\epsilon_{ox}}{t_{ox}} \cdot W \cdot LD$$

overlap capacitance

$$= C_{G-D} \cdot W$$

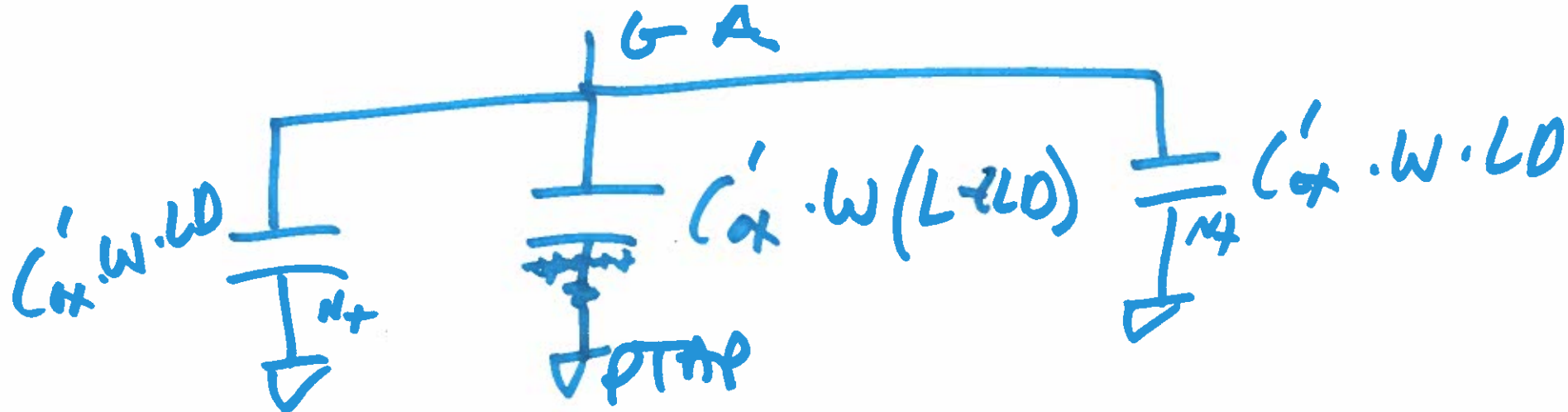
$$\Downarrow$$

$$\frac{\epsilon_{ox}}{t_{ox}} \cdot LD$$

$$\frac{\epsilon_{ox}}{t_{ox}} \cdot W \cdot (L - 2LD)$$

$$\frac{\epsilon_{ox}}{t_{ox}} \cdot W \cdot L_{eff}$$

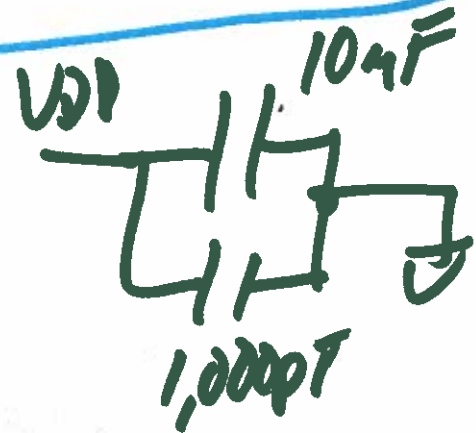
2)



$$C_g = C'_{ox} (W \cdot LD + W(L - 2LD) + W \cdot LD)$$

$$C_g = C'_{ox} \cdot W \cdot L$$

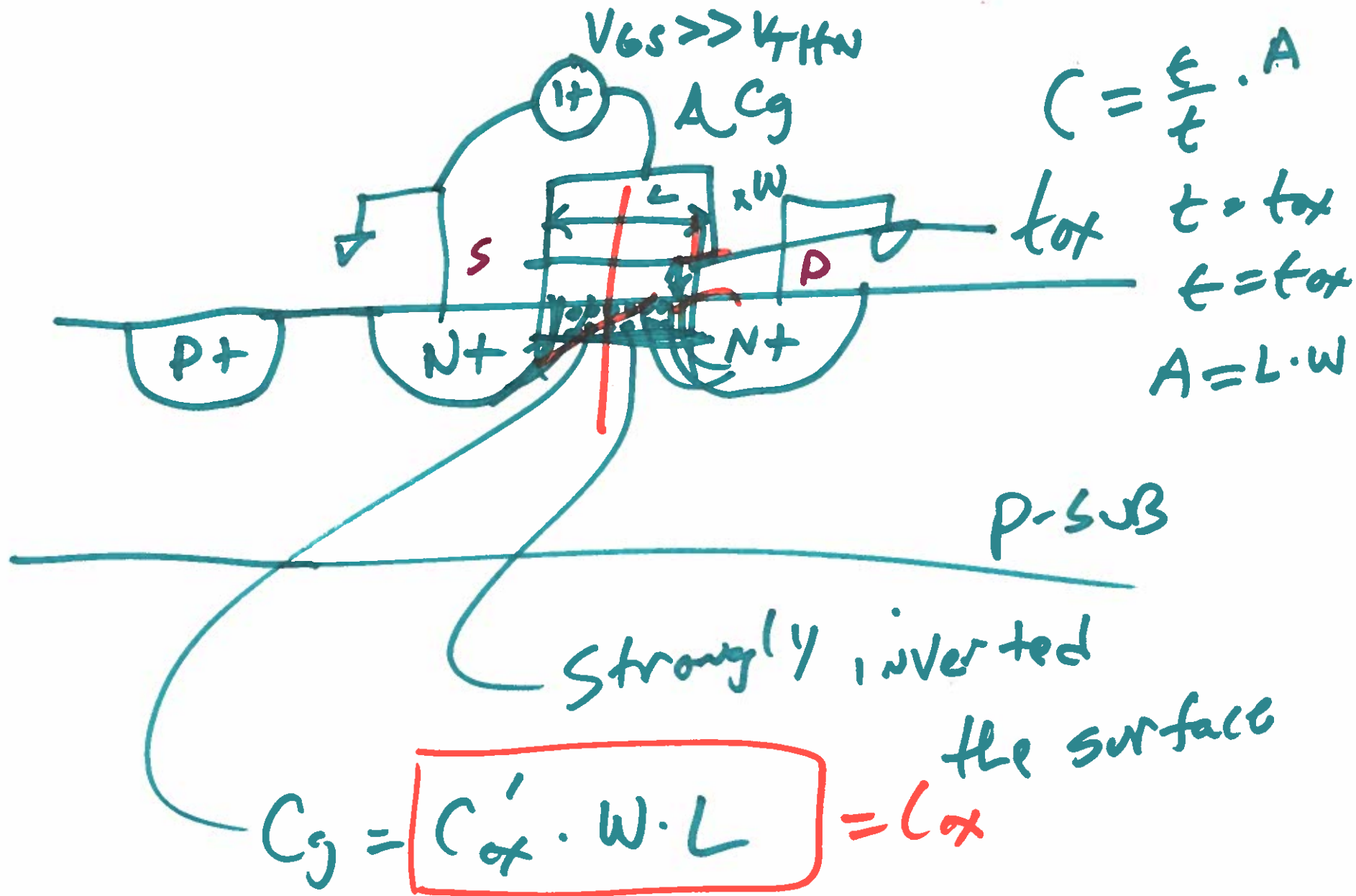
$$C_{ox} = C'_{ox} \cdot W \cdot L$$



$\rightarrow$  ESR

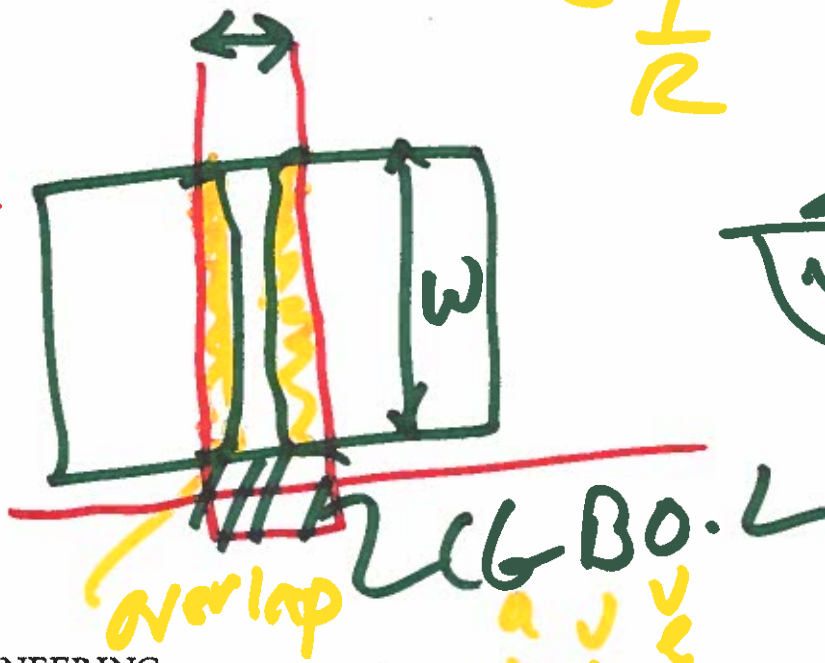
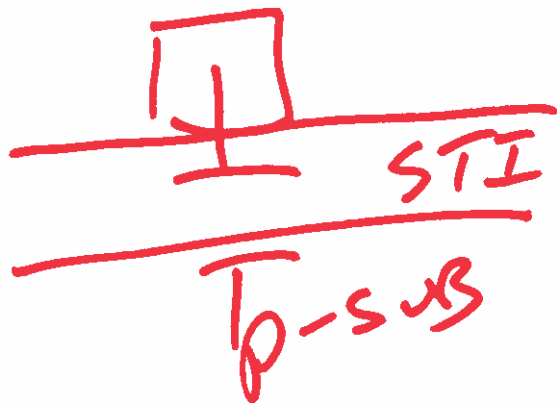
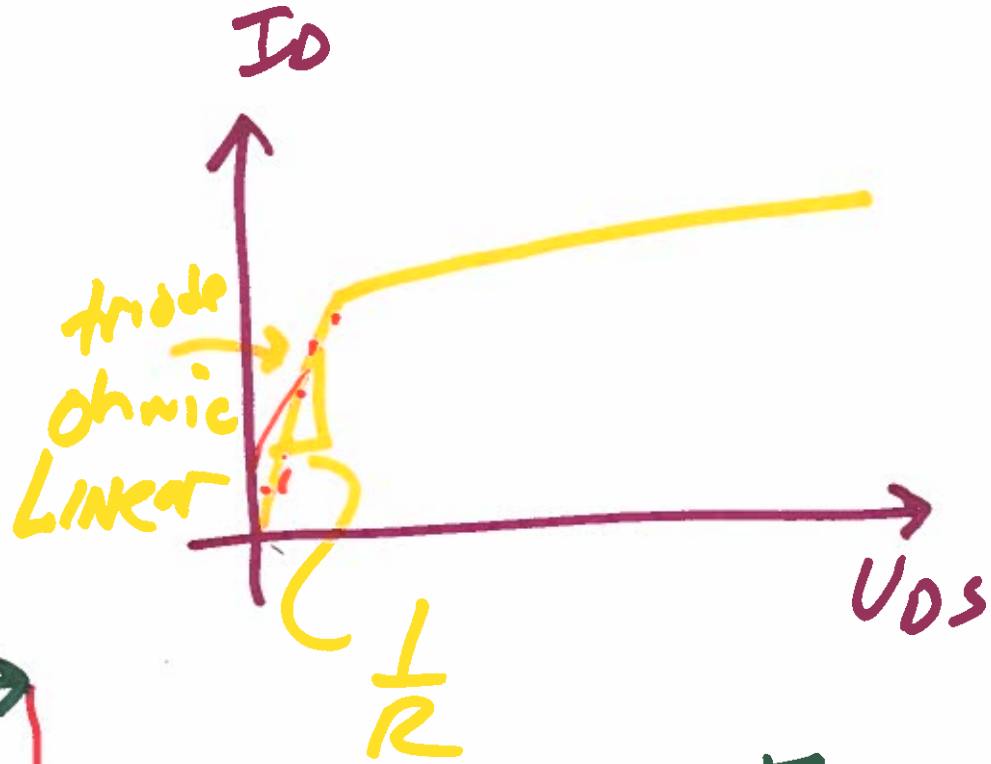
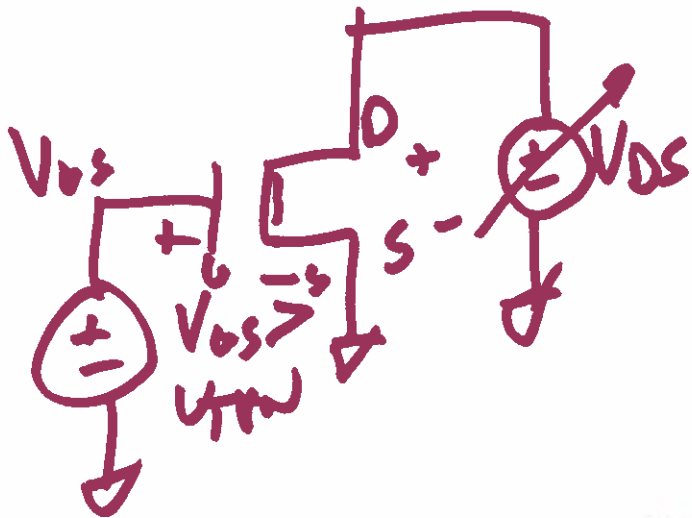


3)



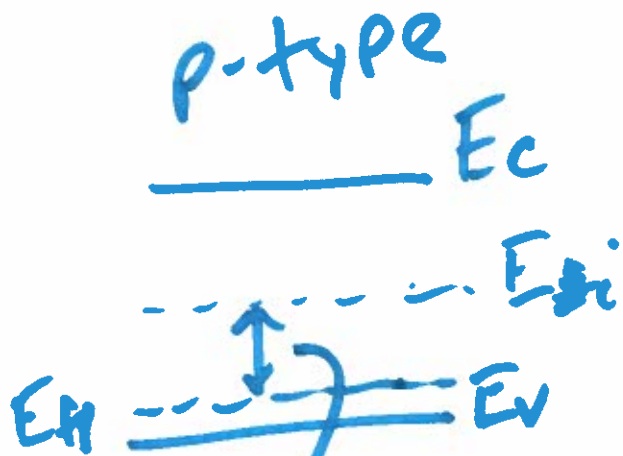
4)

# NMOS



5)

at the top



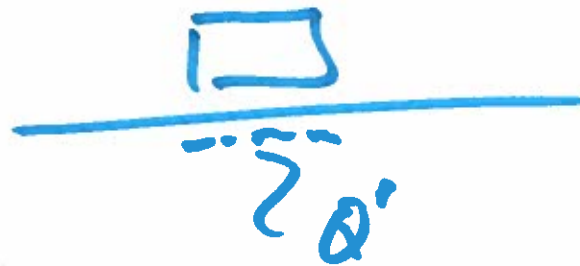
$$V_{fp} = \frac{E_{fi} - E_{fp}}{q}$$

p-sub

$$V_{fp} = \frac{-KT \ln \frac{N_A}{N_i}}{q} = \frac{q \ln \frac{N_A}{N_i}}{q}$$

n-type

$$V_{fn} = \frac{E_{fn} - E_i}{q} = \frac{KT \ln \frac{N_D}{N_i}}{q}$$



$$Q_{TOT} = W \cdot L \cdot Q'$$