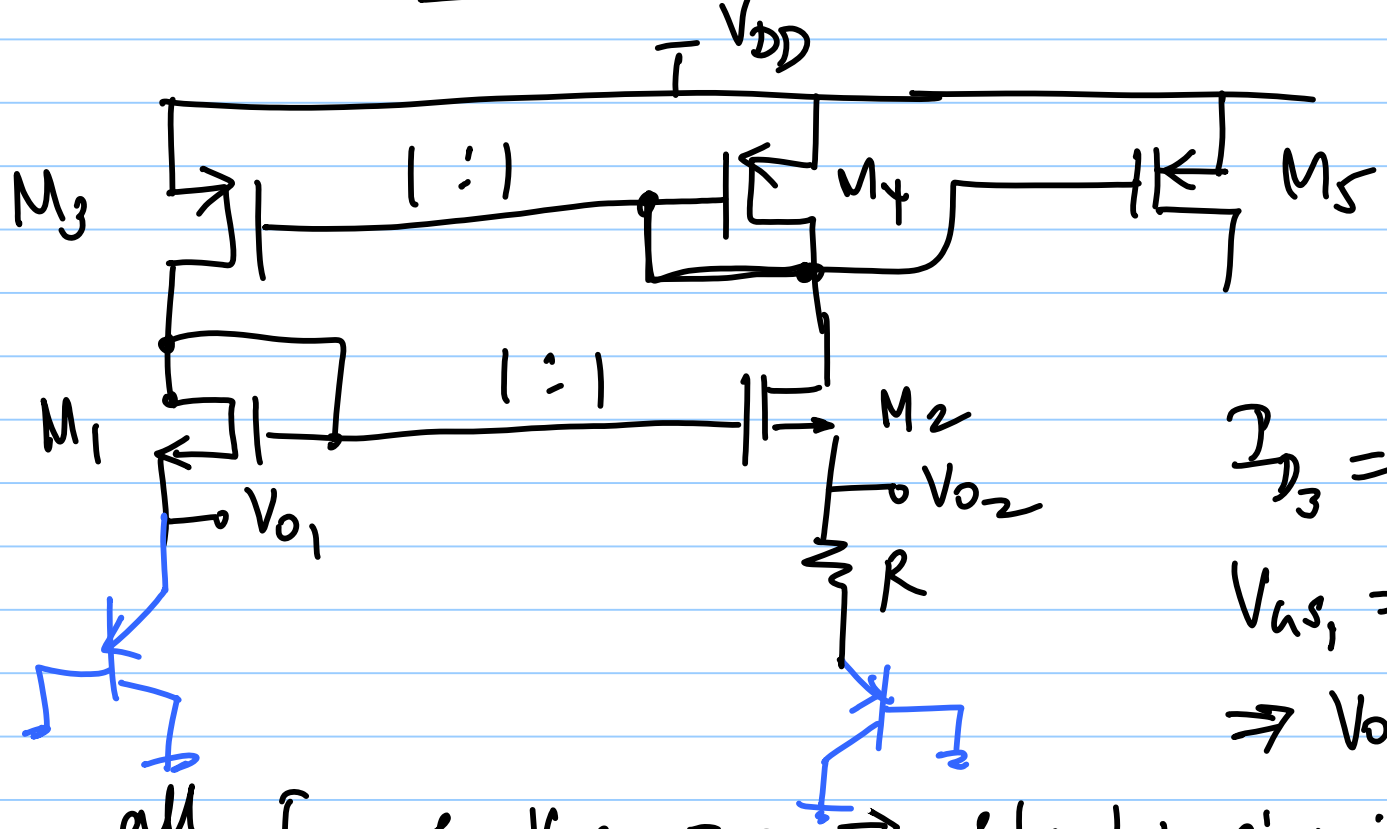
24/10/19

Lec 34

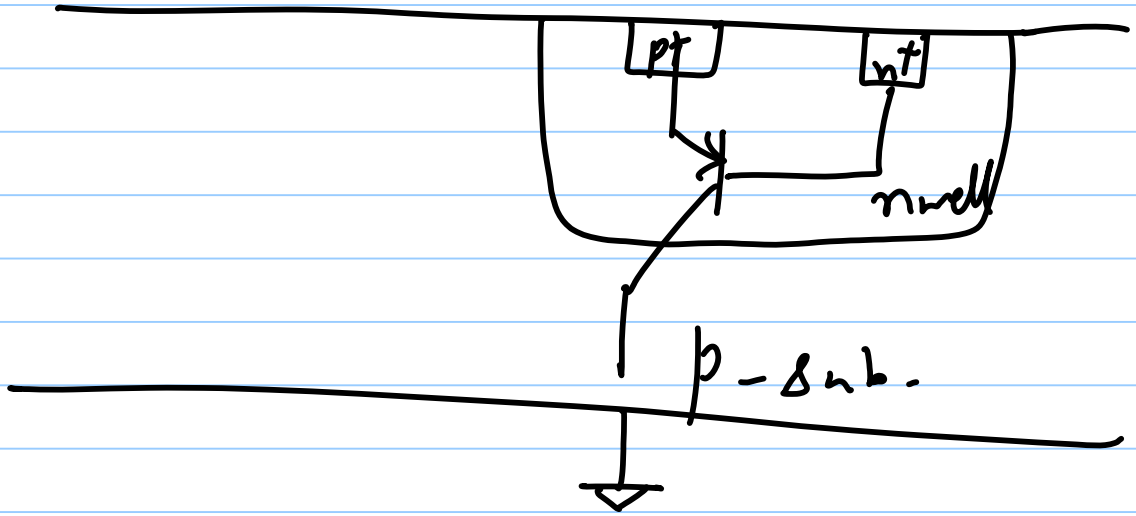


$I_{D_3} = I_{D_4} = I_{D_1} = I_{D_2}$

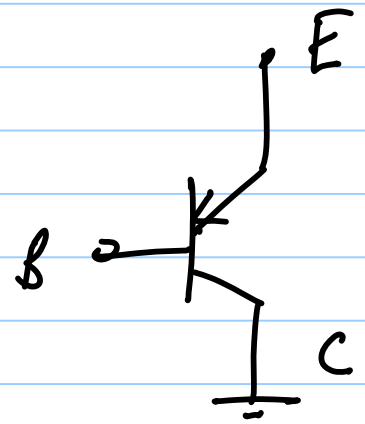
$V_{GS_1} = V_{GS_2}$

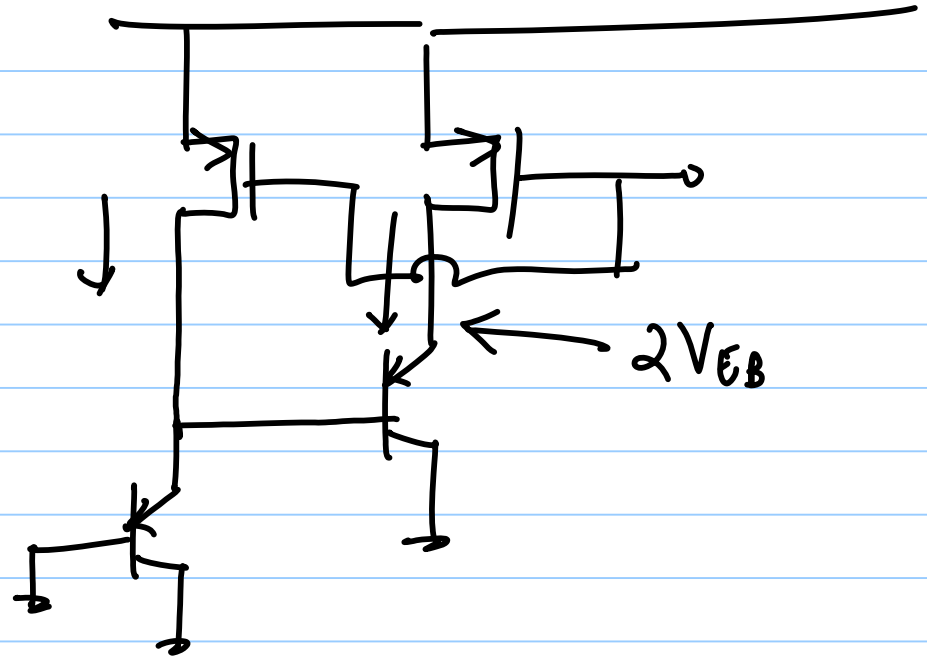
$\Rightarrow V_{O_1} = V_{O_2} = V_{reg}$

all I_{D_S} & $V_{GS_S} = 0 \Rightarrow$ Startup circuit required

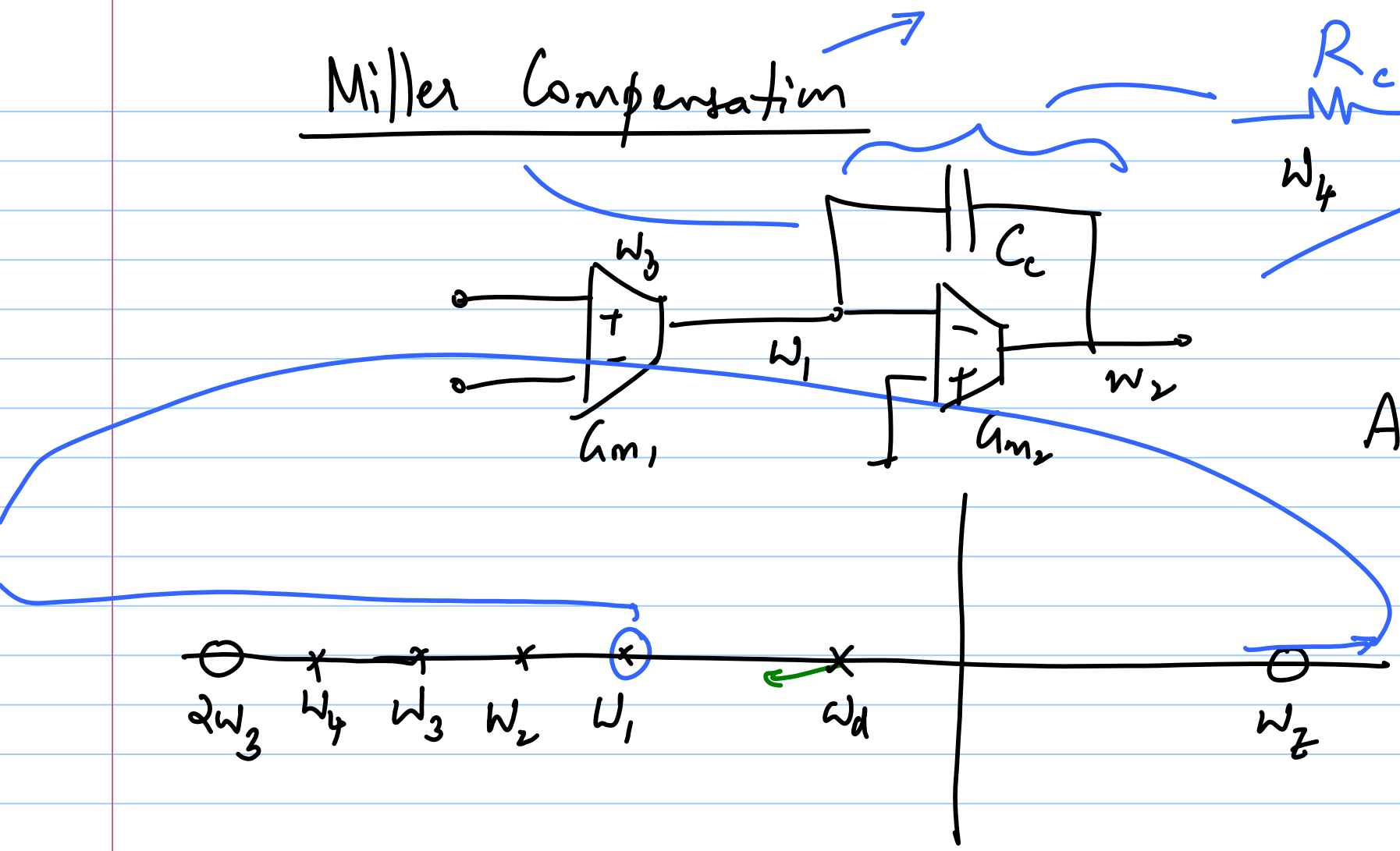


p-n-p device

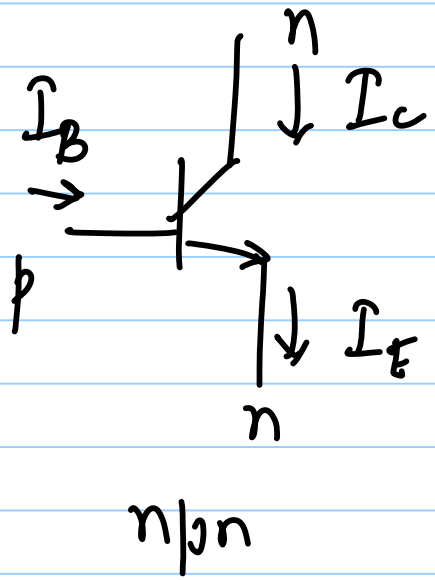



$2V_{EB}$

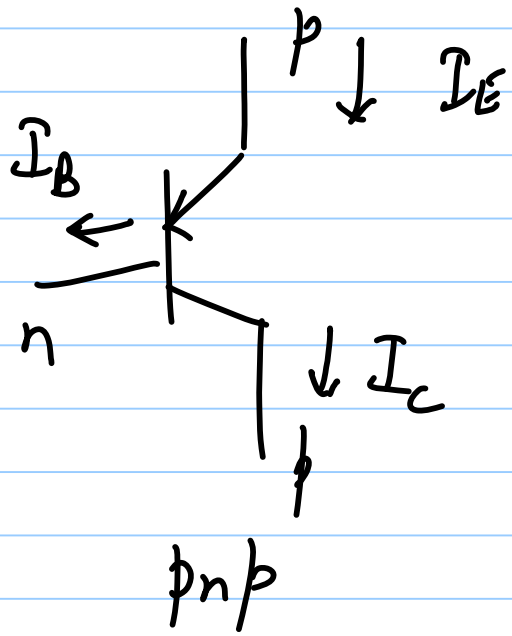
Miller Compensation



Bipolar Junction Transistor



n|pn



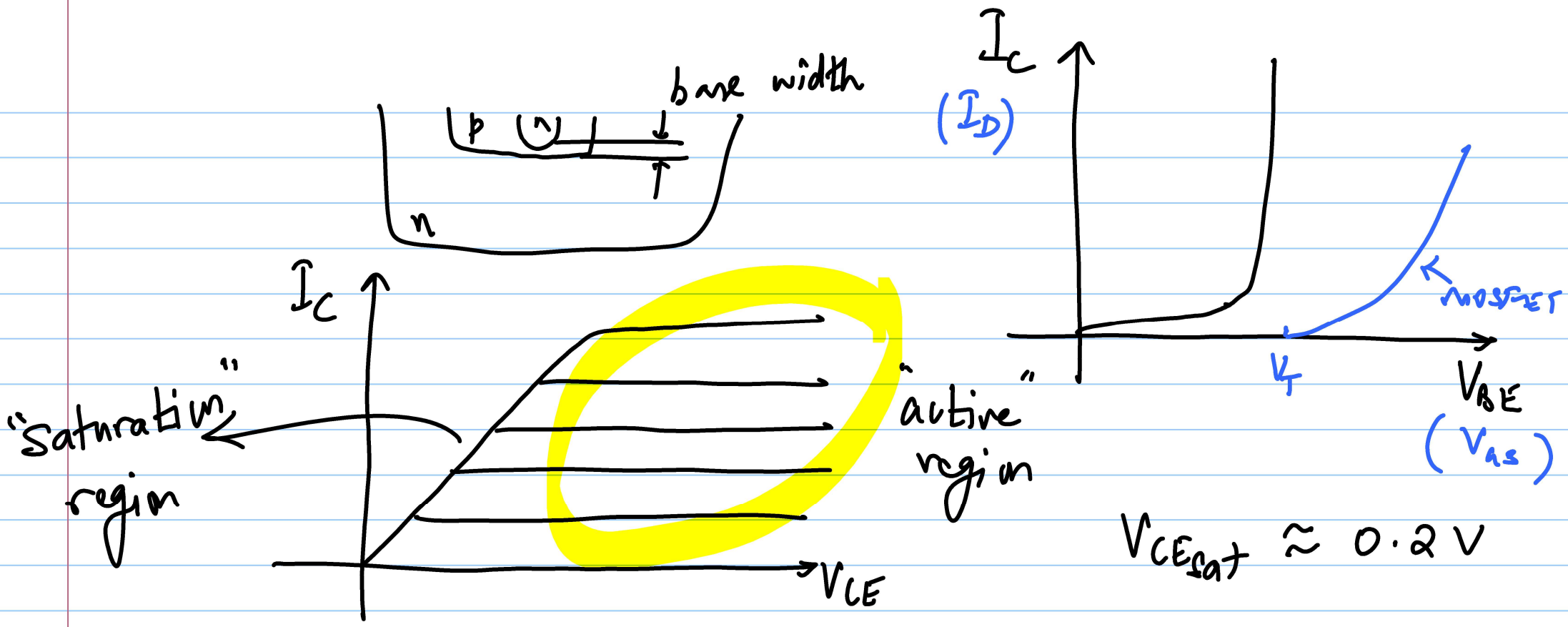
pnp

$$I_E = I_B + I_C$$

$$I_C = \beta \cdot I_B$$

$$I_C = I_S \exp\left[\frac{V_{BE}}{V_t}\right]$$

$$V_t = kT/q$$


base width
p
n
I_C
"saturation" region
"active" region
V_{CE}
I_C
(I_D)
MOSFET
V_T
V_{BE}
(V_{GS})
$V_{CE_{sat}} \approx 0.2\,V$

$$y_{12} = y_{22} = 0$$

$$g_m = y_{21} = \frac{\partial I_C}{\partial V_{BE}} = \frac{1}{V_t} I_S \exp\left(\frac{V_{BE}}{V_t}\right) = \frac{I_C}{V_t}$$

$$y_{11} = \frac{\partial I_B}{\partial V_{BE}} = \frac{1}{\beta} \cdot \frac{\partial I_C}{\partial V_{BE}} = \frac{g_m}{\beta} = \frac{1}{r_\pi}$$