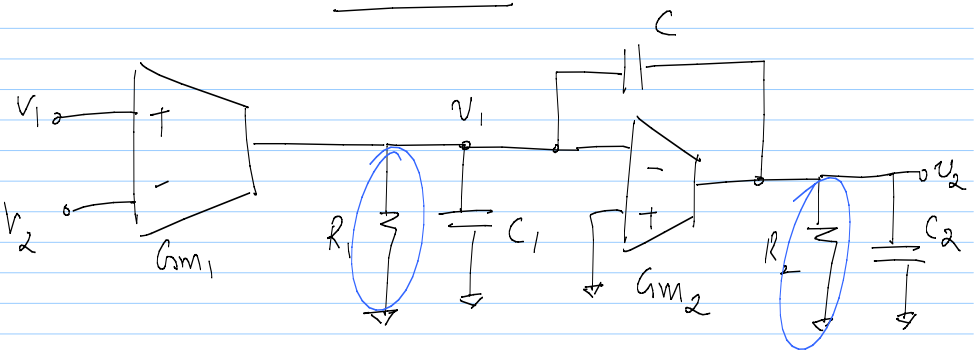
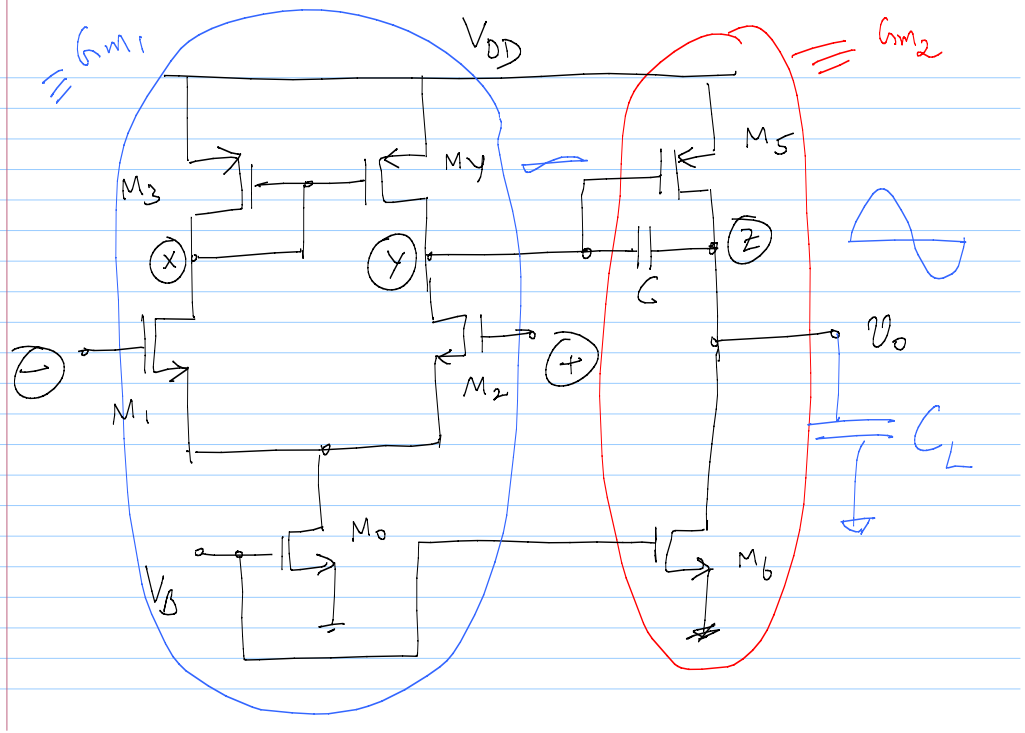
7/11/14

lec 42

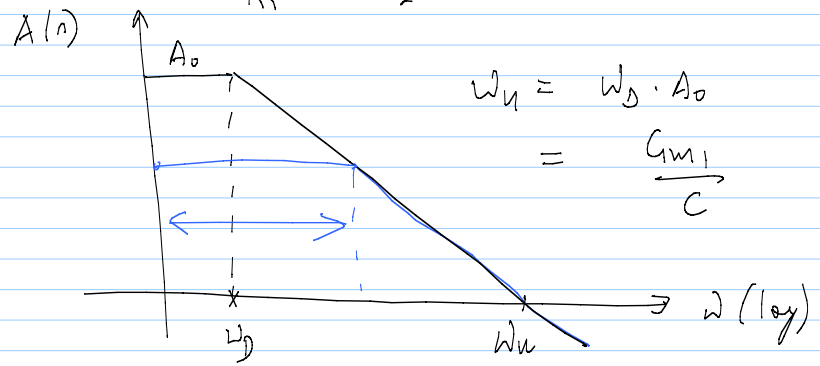




$$R_1 = r_{ds2} \| r_{ds4} \qquad G_{m1} = g_{m1}$$

$$R_2 = r_{ds5} \| r_{ds6} \qquad G_{m2} = g_{m5}$$

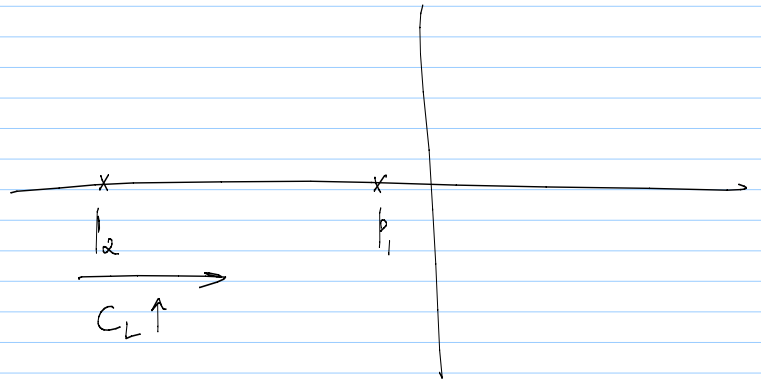
$$\omega_D = \frac{1}{R_1 \cdot G_{m2} R_2 \cdot C} \; ; \; A_0 = G_{m1} R_1 \cdot G_{m2} R_2$$



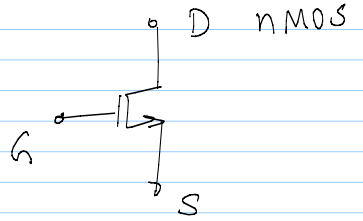
$$\omega_u = \omega_D \cdot A_0 = \frac{G_{m1}}{C}$$

$$V_{out,min} = V_{DSAT_6}$$

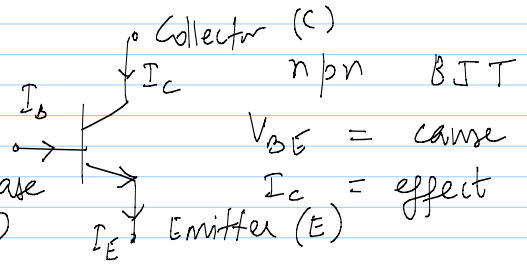
$$V_{out,max} = V_{DD} - V_{DSAT_5}$$



Bipolar Junction Transistors



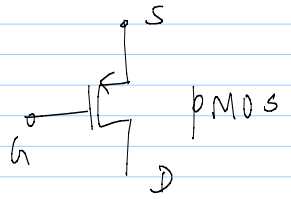
nMOS



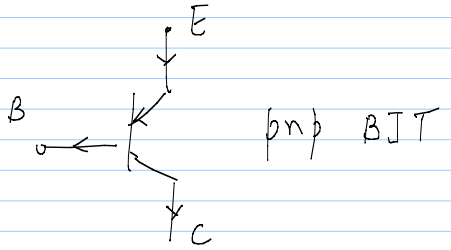
npn BJT

V_{BE} = cause

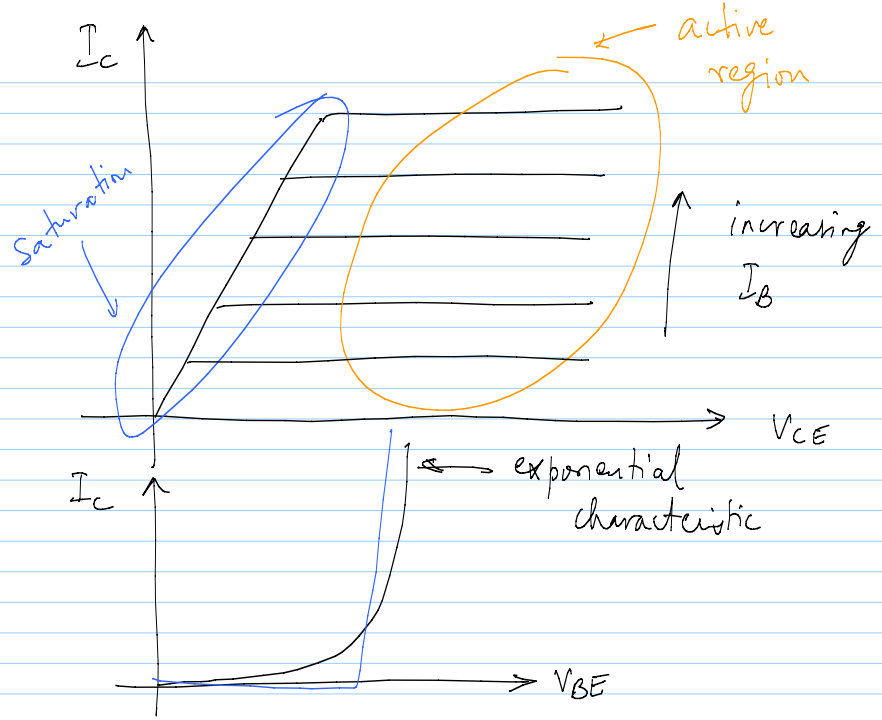
I_C = effect



pMOS



pnp BJT



$$I_C = I_S \left[\exp\left\{ \frac{V_{BE}}{V_t} \right\} - 1 \right]$$

$$\simeq I_S \exp\left\{ \frac{V_{BE}}{V_t} \right\} \quad \text{if} \quad V_{BE} >> V_t$$

$$V_t = \frac{kT}{q} \simeq 26\,mV \; @ \; RT$$

$$V_{BE} = V_t \ln\left(\frac{I_C}{I_S} \right)$$

β = current gain

$\sim 50 - 200$

$$I_B + I_C = I_E \; ; \; I_C / I_B = \beta$$