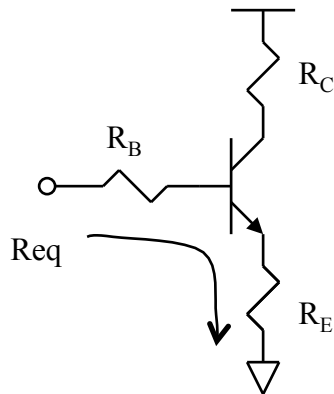
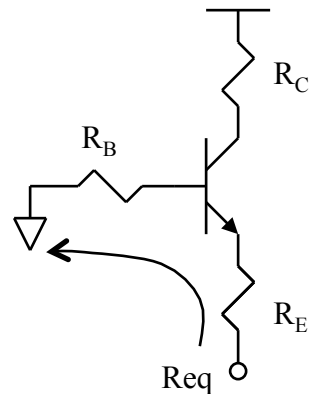


ECE-323 Reference Sheet



$$R_{eq} = R_B + r_{\pi} + R_E (1 + \beta)$$



$$R_{eq} = \frac{R_B + r_{\pi}}{(1 + \beta)} + R_E$$

$$C_{\pi} \rightarrow \text{“}R_{\pi}\text{”} = \{ (R_B + R_E) / (1 + g_m R_E) \} \parallel r_{\pi}$$

$$C_{\mu} \rightarrow \text{“}R_{\mu}\text{”} = \underbrace{\{ R_B \parallel \text{“looking_into_base”} \}}_{\text{(same as using Miller Effect)}} (1 - \text{Gain}) + R_C$$

MOSFET:

$$I_D = (1/2) \mu c_{ox} (W/L) (V_{GS} - V_{TN})^2 \quad \text{or} \quad I_D = \mu c_{ox} (W/L) [(V_{GS} - V_{TN}) V_{DS} - V_{DS}^2 / 2]$$

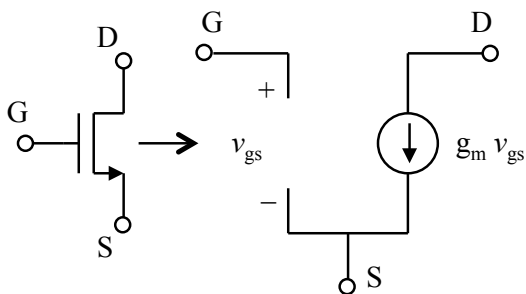
$$g_m = \mu c_{ox} (W/L) (V_{GS} - V_{TN}) = \sqrt{2 \mu c_{ox} (W/L) I_D}$$

BJT:

$$I_C = I_S \exp \{ V_{BE} / V_T \} ; \quad V_T = kT/q \approx 25 \text{mV (@RoomTemp)} ; \quad I_S = \text{Device Parameter}$$

$$g_m = I_C / V_T ; \quad r_{\pi} = \beta / g_m ; \quad I_C / I_B = \beta$$

MOSFET



BJT

