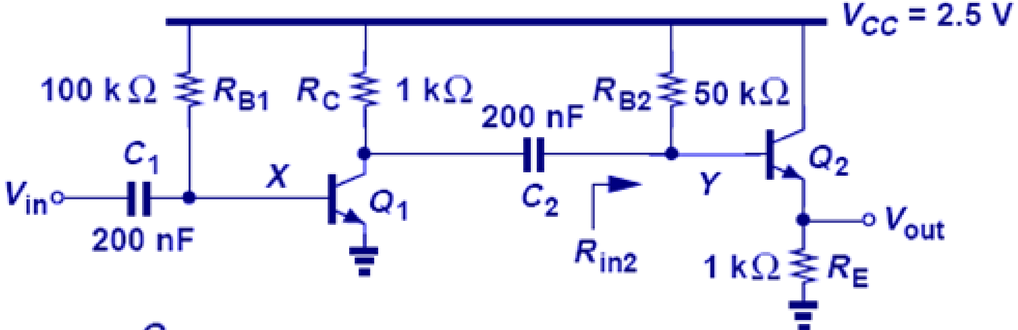
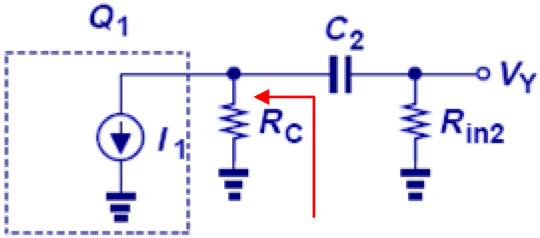
Example: Capacitive Coupling – cont'd



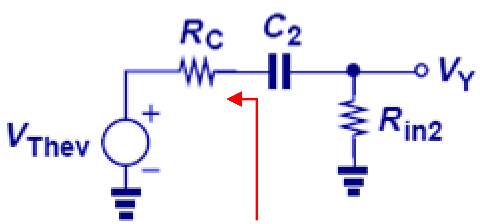
$$\omega_{L1} = \frac{1}{\left(r_{\pi 1} \parallel R_{B1}\right) C_1} = 2\pi \times \left(542\ \text{Hz}\right)$$



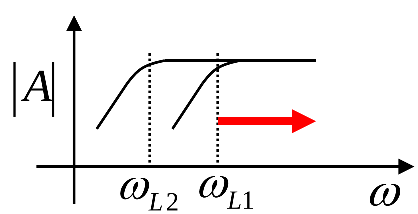
$$v_{be1} = \frac{\left(R_{B1} \parallel r_{\pi 1}\right)}{1/sC_1 + \left(R_{B1} \parallel r_{\pi 1}\right)} V_{in}$$

$$I_1 = g_{m1} v_{be1}$$

$$R_{in2} = R_{B2} \parallel \left[r_{\pi 2} + \left(\beta + 1\right) R_E\right]$$



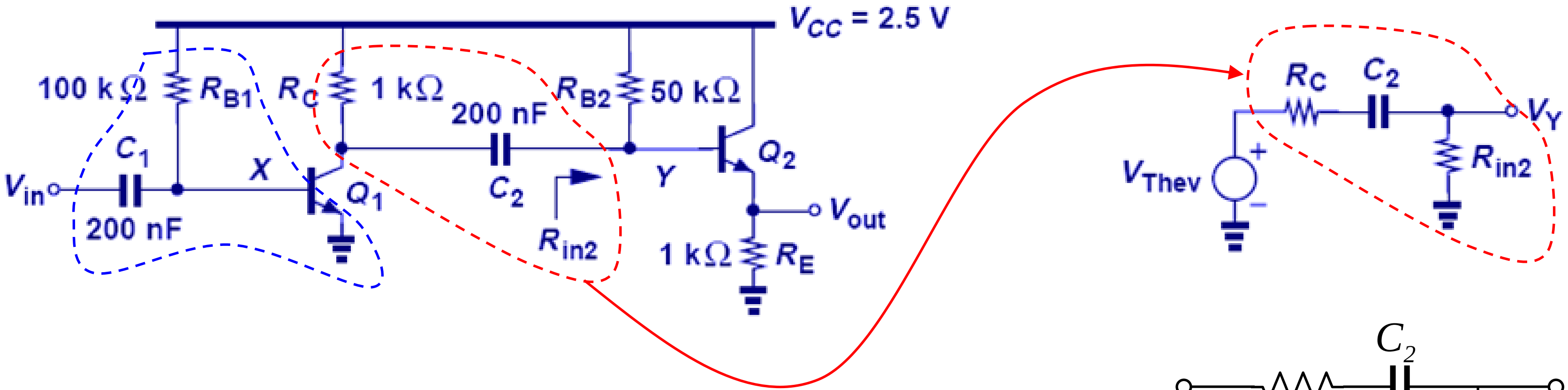
$$V_{Thev} = -I_1 R_C$$

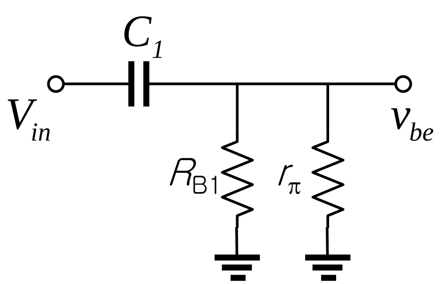


$$\omega_{L2} = \frac{1}{\left(R_C + R_{in2}\right) C_2} = \pi \times \left(22.9\ \text{Hz}\right)$$

ω_{L1} dominates the low-frequency response

Miller Multiplication

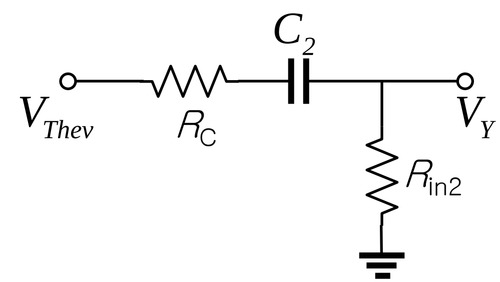




$$\frac{v_{be}}{V_{in}} = \frac{(R_{B1} \parallel r_\pi)}{(1/sC_1) + (R_{B1} \parallel r_\pi)}$$

$$= \frac{sC_1R}{1 + sC_1R} \quad \because R = R_{B1} \parallel r_\pi$$

$$\therefore \omega_{L1} = \frac{1}{(r_{\pi1} \parallel R_{B1})C_1}$$



$$\frac{V_Y}{V_{Thiv}} = \frac{R_{in2}}{R_C + (1/sC_2) + R_{in2}}$$

$$= \frac{sC_2R_{in2}}{1 + sC_1(R_C + R_{in2})}$$

$$\therefore \omega_{L2} = \frac{1}{(R_C + R_{in2})C_2}$$