Jaeger 3rd ed

16.40 refer to prob 34

Q1 data

$\beta_o = 100$

$I_C = 1\,mA$

$g_m = 40\,mS$

$r_\pi = 2500\,\Omega$

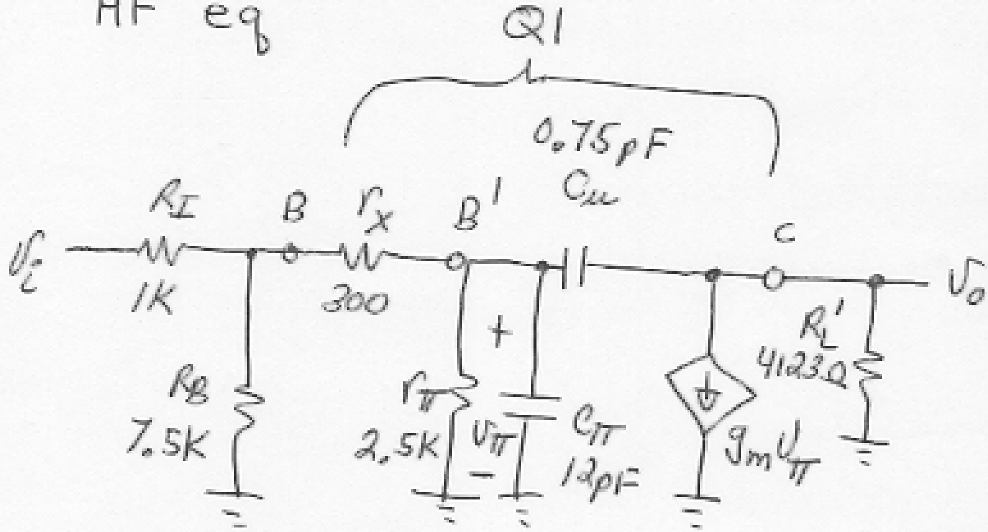
$r_x =$ [illegible]$00\,\Omega$ (rather large)

$f_T = 500\,MHz$

$C_\mu = 0.75\,pF$

$C_\pi = \dfrac{g_m}{\omega_T} - C_\mu = 12\,pF$

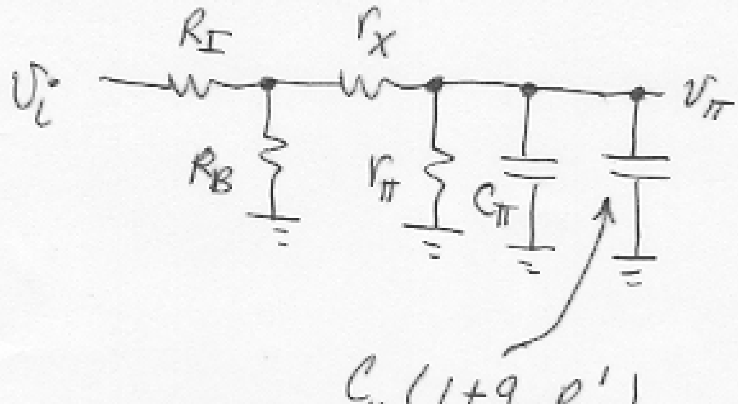
HF eq

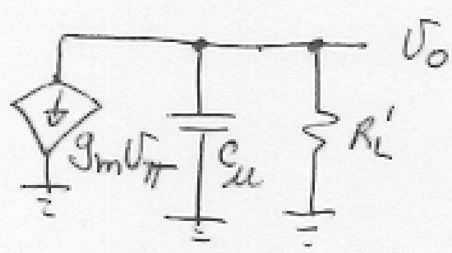


MB gain

$$\text{(a)}\quad A_m = \left.\frac{v_o}{v_i}\right|_{MB} = \frac{R_B}{R_I+R_B}\,\frac{r_\pi}{(R_I \| R_B)+r_x+r_\pi}\,(-g_m)\,R_L' = -99$$

Based upon (approximate) use of Miller's Theorem





— ω_{P1} — (very dominant pole)

— ω_{P2} — (much hf pole)

16.40 cont

$$f_{p1} = \frac{1}{2\pi} \frac{1}{R_{eq}\left[C_\pi + C_\mu(1+g_m R_L')\right]} = 1.45\ MHz$$

($g_m R_L'$: 166; $C_\pi + C_\mu(1+g_m R_L')$: 136 pF)

$$R_{eq} = \left[(R_I \parallel R_B) + r_x\right] \parallel r_\pi = 803\,\Omega \quad (r_{\pi o} \text{ in text})$$

$$f_{p2} = \frac{1}{2\pi} \frac{1}{R_L' C_\mu} = 51.5\ MHz$$

$$f_H \cong f_{p1} = 1.45\ MHz \quad (\text{dominant pole}) \quad \text{OR}$$

(a)

$$f_H \cong \frac{1}{2\pi} \frac{1}{R_{eq}\left[C_\pi + C_\mu(1+g_m R_L')\right] + R_L' C_\mu} \quad (16.87 \text{ in book})$$

$$= 1.41\ MHz$$

(The book eq. is OC time constants in disguise)

(b) $GBW = |A_m \cdot f_H| = 144\ MHz$