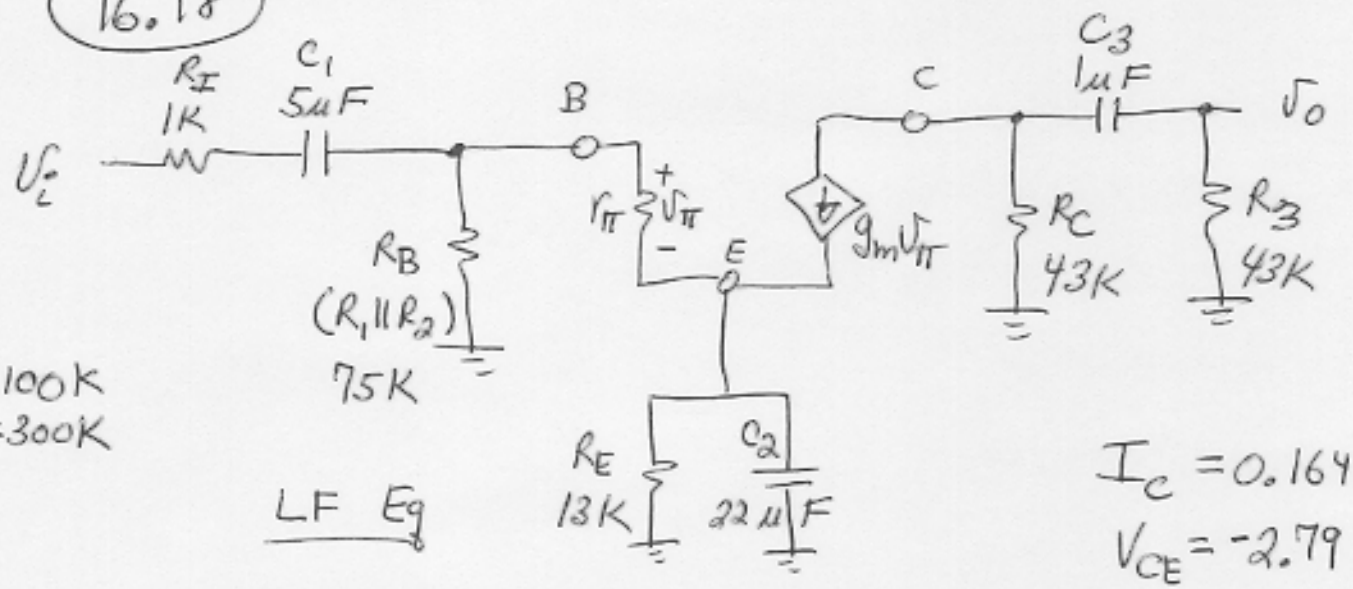
Jaeger 3rd ed

16.18



$R_1 = 100K$
$R_2 = 300K$

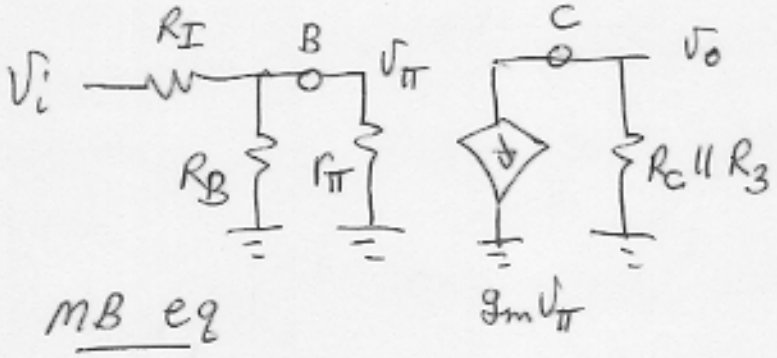
LF Eq

(a)

$I_C = 0.164\,mA$

$V_{CE} = -2.79\,V$

$\beta_o = 100$



mB eq

$$g_m = \frac{I_c}{V_T} = 6.56\,mS$$

$$r_\pi = \frac{\beta_o}{g_m} = 15.24\,K\Omega$$

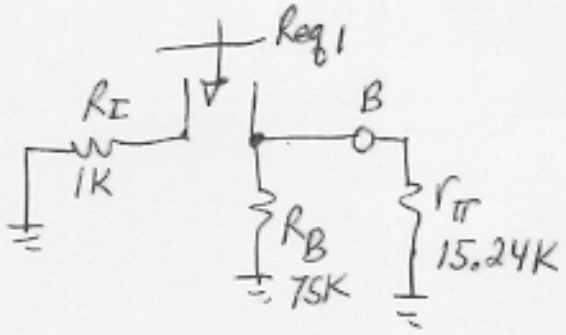
(b) $$A_m = \left.\frac{V_o}{V_i}\right|_{midband} = \frac{(R_B \| r_\pi)}{R_I + (R_B \| r_\pi)} \left(-g_m \cdot (R_C \| R_3)\right) = -131$$

$(+42dB)$

16.18 cont Method of S.C. time constants

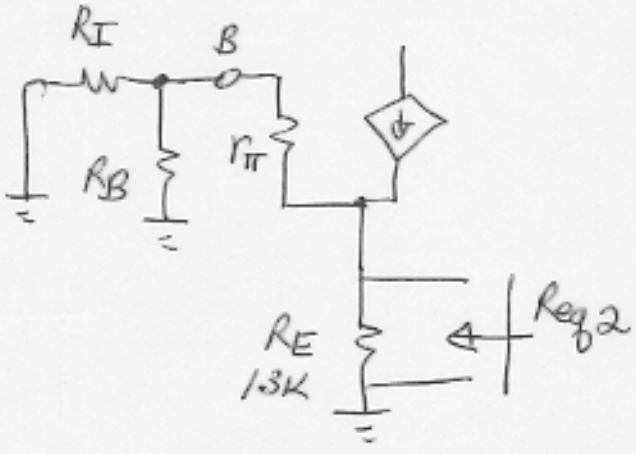
$$\omega_L \cong \sum_j \left(\frac{1}{R_j C_j}\right)$$

summation of reciprals of R-C products (not poles) for j capacitors w/ all other capr. shorted



$$Req_1 = 13.67\ K\Omega$$

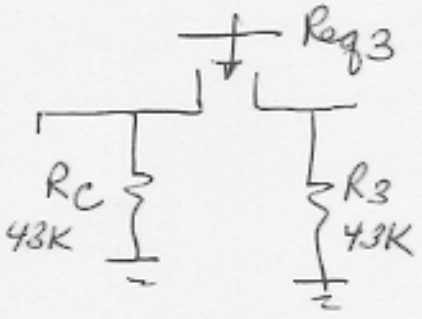
$$\frac{1}{Req_1 C_1} = 14.6\ rad/s$$



$$Req_2 = \left[\frac{(R_I \| R_B) + r_\pi}{1+\beta_o}\right] \| R_E$$

$$= 159\ \Omega$$

$$\frac{1}{Req_2 C_2} = 286\ rad/s$$



$$Req_3 = R_C + R_3 = 86\ K\Omega$$

$$\frac{1}{Req_3 C_3} = 11.6\ rad/s$$

$$\omega_L \cong \frac{1}{Req_1 C_1} + \frac{1}{Req_2 C_2} + \frac{1}{Req_3 C_3} = 312\ rad/s$$

$$f_L \cong 50\ Hz$$