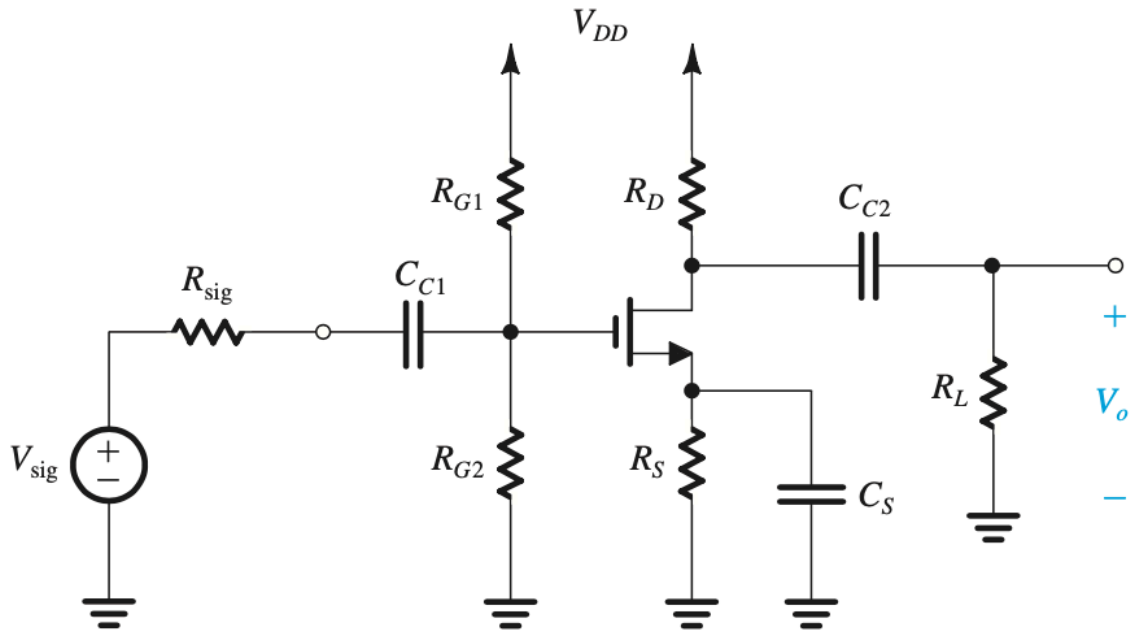
Problem 10.4 [S&S 7/e]

10.4 The amplifier in Fig. 10.3(a) is biased to operate at $g_m = 5$ mA/V, and has the following component values: $R_{sig} = 100$ kΩ, $R_{G1} = 47$ MΩ, $R_{G2} = 10$ MΩ, $C_{C1} = 0.01$ μF, $R_S = 2$ kΩ, $C_S = 10$ μF, $R_D = 4.7$ kΩ, $R_L = 10$ kΩ, and $C_{C2} = 1$ μF. Find $A_M, f_{P1}, f_{P2}, f_Z, f_{P3}$, and f_L.



(a)

Problem 10.7 [S&S 7/e]

D 10.7 Figure P10.7 shows a current-biased CE amplifier operating at 100 μA from ±3-V power supplies. It employs $R_C = 20$ kΩ, $R_B = 200$ kΩ, and operates between a 20-kΩ source and a 10-kΩ load. The transistor $\beta = 100$. Select C_E first, for a minimum value specified to one significant digit and providing up to 80% of f_L where f_L is to be 100 Hz. Then choose C_{C1} and C_{C2}, each specified to one significant digit, and each contributing about 10% of f_L. What f_L results? What total capacitance is needed?

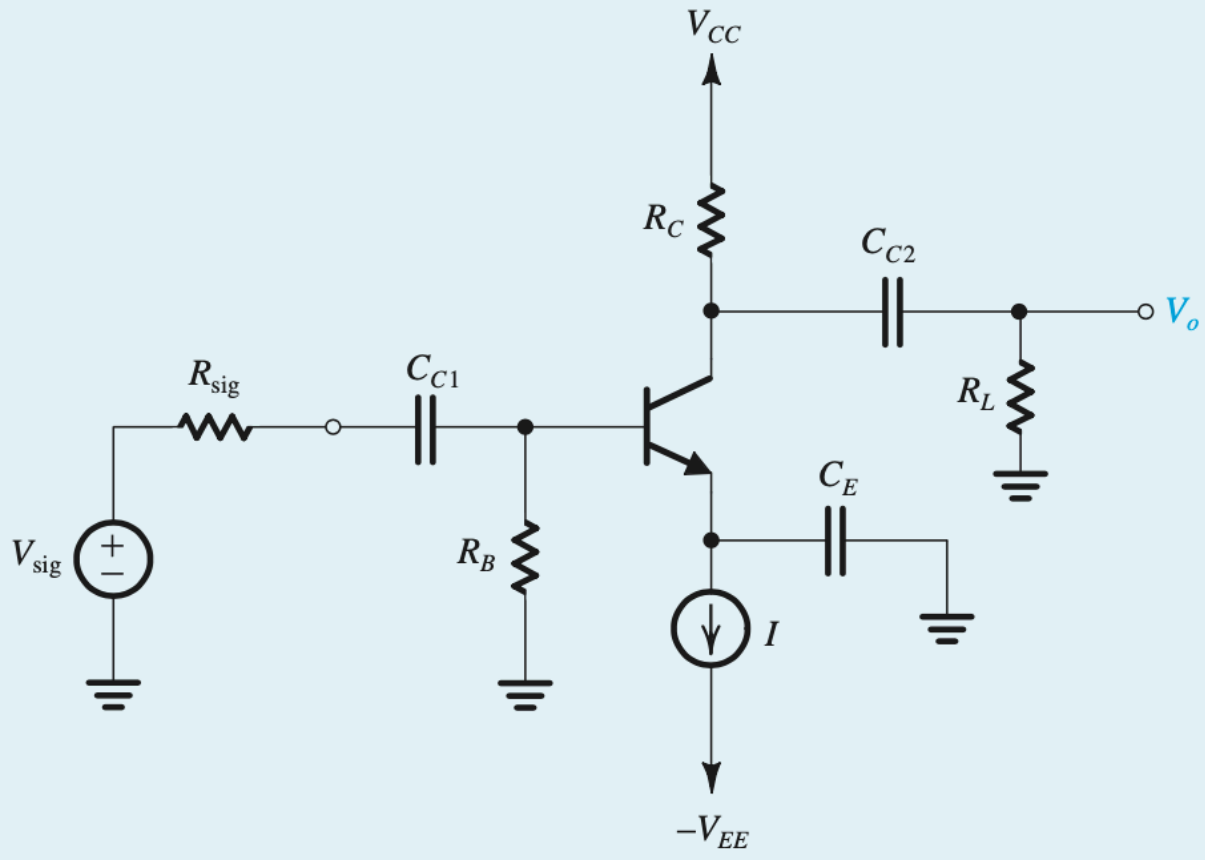


Figure P10.7

Problem 10.34 [S&S 7/e]

10.34 Consider the integrated-circuit CS amplifier in Fig. P10.34 for the case $I_{BIAS} = 100\ \mu A$, Q_2 and Q_3 are matched, and $R_{sig} = 200\ k\Omega$. For Q_1: $\mu_n C_{ox} = 90\ \mu A/V^2$, $V_A = 12.8\ V$, $W/L = 100\ \mu m/1.6\ \mu m$, $C_{gs} = 0.2\ pF$, and $C_{gd} = 0.015\ pF$. For Q_2: $|V_A| = 19.2\ V$. Neglecting the effect of the capacitance inevitably present at the output node, find the low-frequency gain, the 3-dB frequency f_H, and the frequency of the zero f_Z.

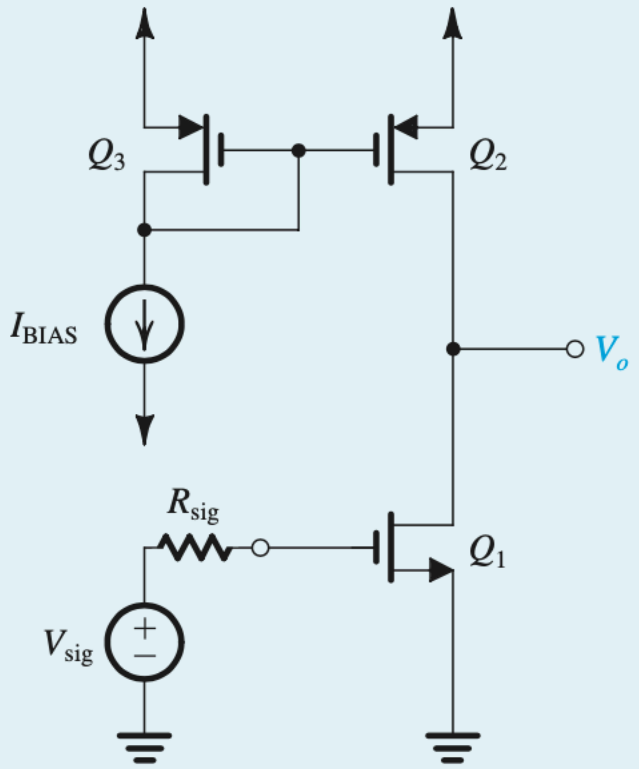


Figure P10.34

Problem 10.44 [S&S 7/e]

***10.44** The amplifier shown in Fig. P10.44 has $R_{sig} = R_L = 1\ \text{k}\Omega$, $R_C = 1\ \text{k}\Omega$, $R_B = 47\ \text{k}\Omega$, $\beta = 100$, $C_\mu = 0.8\ \text{pF}$, and $f_T = 600\ \text{MHz}$. Assume the coupling capacitors to be very large.

(a) Find the dc collector current of the transistor.
(b) Find g_m and r_π.
(c) Neglecting r_o, find the midband voltage gain from base to collector (neglect the effect of R_B).
(d) Use the gain obtained in (c) to find the component of R_{in} that arises as a result of R_B. Hence find R_{in}.
(e) Find the overall gain at midband.
(f) Find C_{in}.
(g) Find f_H.

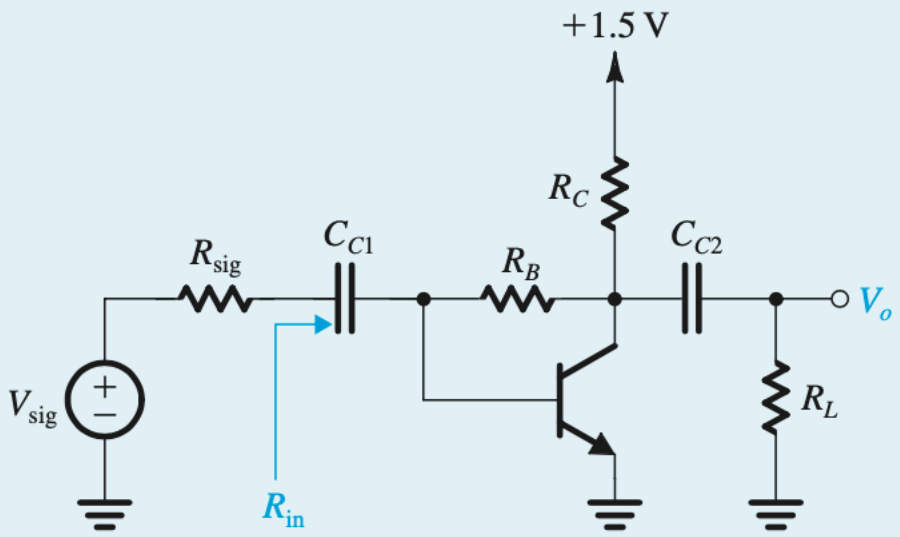


Figure P10.44