

Microelectronics Circuit Analysis and Design

Homework(9th)

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7.3 Consider the circuit in Figure P7.3. (a) Derive the expression for the voltage transfer function $T(s) = V_o(s)/V_i(s)$. (b) What is the time constant associated with this circuit? (c) Find the corner frequency. (d) Sketch the Bode magnitude plot of the voltage transfer function.

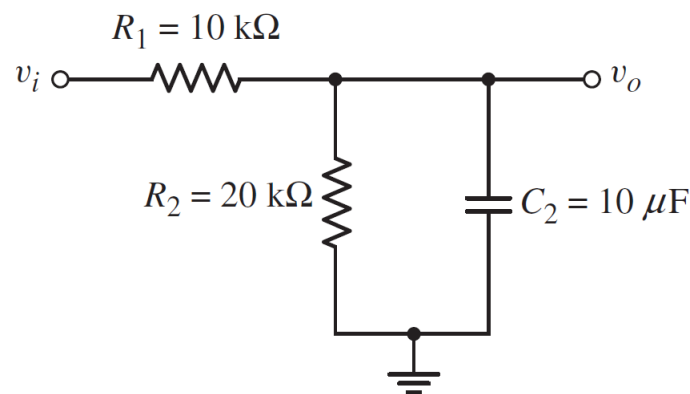


Figure 1: Problem 7.3

7.12 For the circuit shown in Figure P7.12, the parameters are $R_1 = 10 \text{ k}\Omega$, $R_2 = 10 \text{ k}\Omega$, $R_3 = 40 \text{ k}\Omega$, and $C = 10 \text{ }\mu\text{F}$. (a) What is the value of the voltage transfer function V_o/V_i at very low frequencies? (b) Determine the value of the voltage transfer function at very high frequencies. (c) Derive the expression for the voltage transfer function $T(s) = V_o(s)/V_i(s)$. Put the expression in the form $T(s) = K(1 + s\tau_A)/(1 + s\tau_B)$. What are the values of K , τ_A , and τ_B .

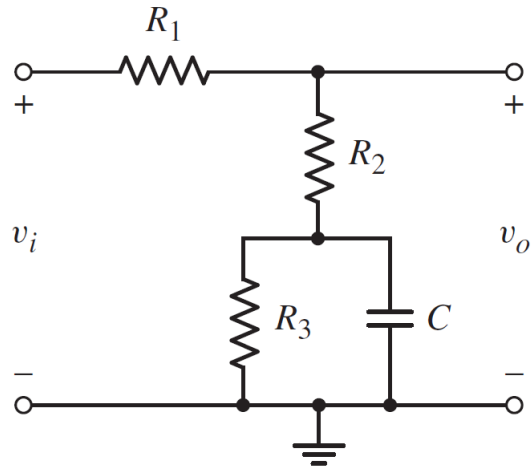


Figure 2: Problem 7.12

7.17 For the common-emitter circuit in Figure P7.17, the transistor parameters are: $\beta = 100$, $V_{BE(on)} = 0.7\text{V}$, and $V_A = \infty$. (a) Calculate the lower corner frequency. (b) Determine the midband voltage gain. (c) Sketch the Bode plot of the voltage gain magnitude.

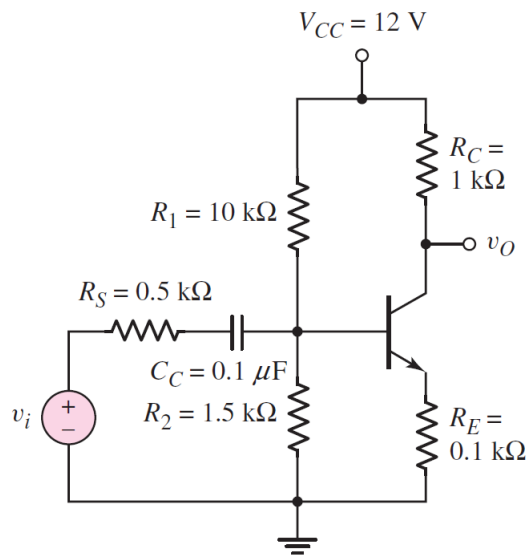


Figure 3: Problem 7.17

7.26 The parameters of the transistor in the circuit in Figure P7.26 are $K_p = 1\text{mA/V}^2$, $V_{TP} = -1.5\text{V}$, and $\lambda = 0$. (a) Determine the quiescent and small-signal parameters of the transistor. (b)

Find the time constants associated with C_{C1} and C_{C2} . (c) Is there a dominant pole frequency? Estimate the -3 dB frequency.

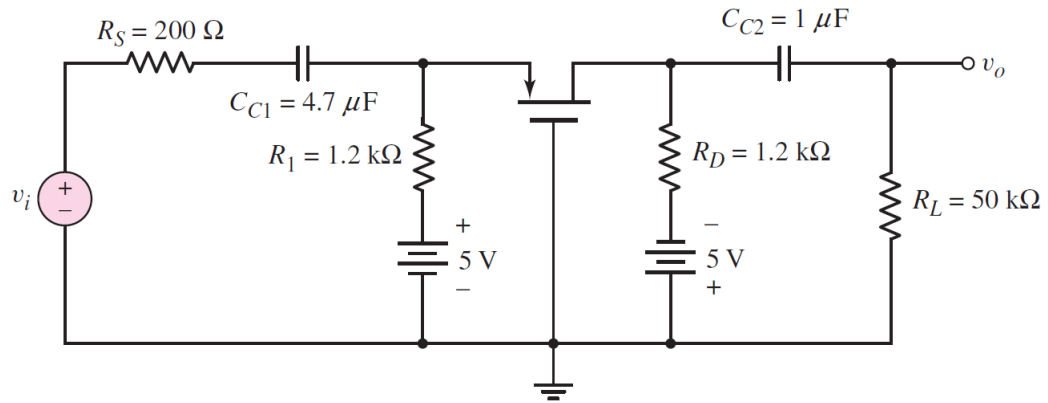


Figure 4: Problem 7.26