

Microelectronics Circuit Analysis and Design

Homework(6th)

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4.15 For the NMOS common-source amplifier in Figure P4.15, the transistor parameters are: $V_{TN} = 0.8\text{V}$, $K_n = 1\text{mA/V}^2$, and $\lambda = 0$. The circuit parameters are $V_{DD} = 5\text{V}$, $R_S = 1\text{k}\Omega$, $R_D = 4\text{k}\Omega$, $R_1 = 225\text{k}\Omega$, and $R_2 = 175\text{k}\Omega$. (a) Calculate the quiescent values I_{DQ} and V_{DSQ} . (b) Determine the small-signal voltage gain for $R_L = \infty$. (c) Determine the value of R_L that will reduce the small-signal voltage gain to 75 percent of the value found in part (b).

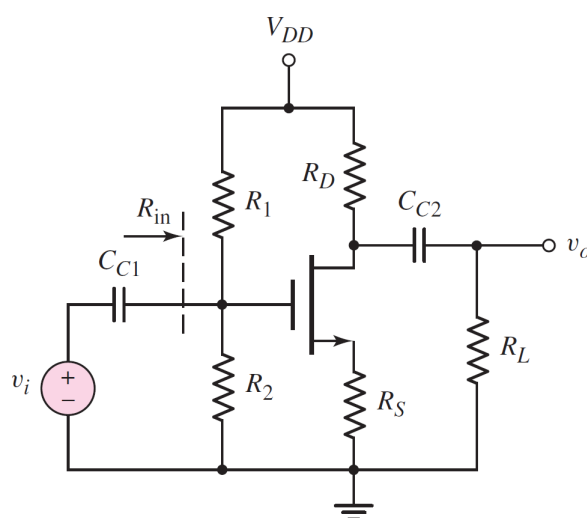


Figure 1: Problem 4.15/4.17

4.17 Repeat Problem 4.15 if the source resistor is bypassed by a source capacitor C_S .

D4.26 Design the common-source circuit in Figure P4.26 using an n-channel MOSFET with $\lambda = 0$. The quiescent values are to be $I_{DQ} = 6\text{mA}$, $V_{GSQ} = 2.8\text{V}$, and $V_{DSQ} = 10\text{V}$. The transcon-

ductance is $g_m = 2.2\text{mA/V}$. Let $R_L = 1\text{k}\Omega$, $A_v = -1$, and $R_{in} = 100\text{k}\Omega$. Find R_1, R_2, R_S, R_D, K_n , and V_{TN} .

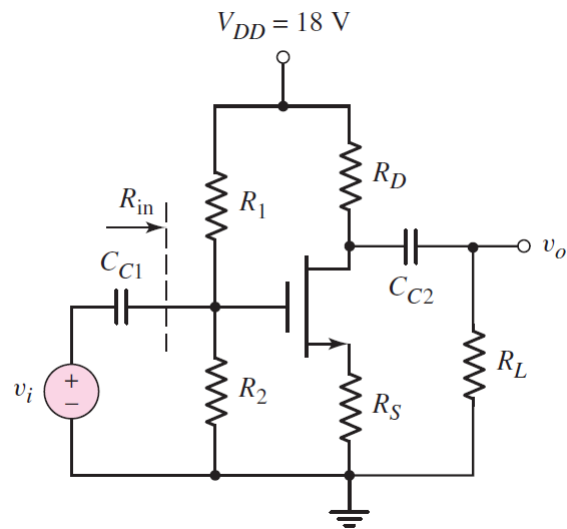


Figure 2: Problem 4.26