

1. For the common-source amplifier shown in Fig. 1; $R_1 = 10\text{M}\Omega$, $R_2 = 10\text{M}\Omega$, $R_D = 6\text{K}\Omega$, $R_S = 6\text{K}\Omega$, $R_L = 10\text{K}\Omega$, $R_{\text{Sig}} = 100\text{K}\Omega$, $V_{DD} = 10\text{V}$, $V_A = 50\text{V}$, $V_T = 1\text{V}$ and $K' \left(\frac{W}{L} \right) = 1\text{mA/V}^2$. Find I_D , V_{DS} , V_{GS} , g_m , input resistance R_i , output resistance R_o , A_{vo} , A_v and the overall voltage gain G_v (v_o/v_s).

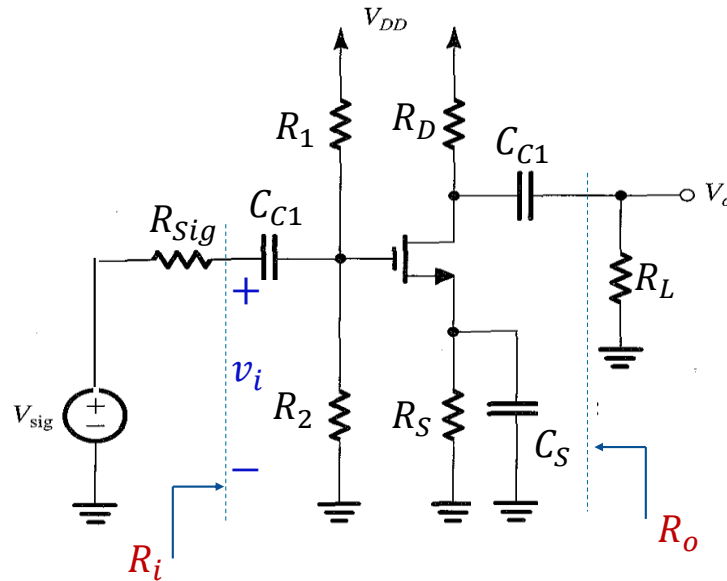


Fig. 1

2. The NMOS transistor in the CS amplifier circuit of Fig. 2 is biased to have $g_m = 1\text{ mA/V}$ and $r_o = 100\text{ k}\Omega$. Find the overall voltage gain, input resistance, and output resistance.

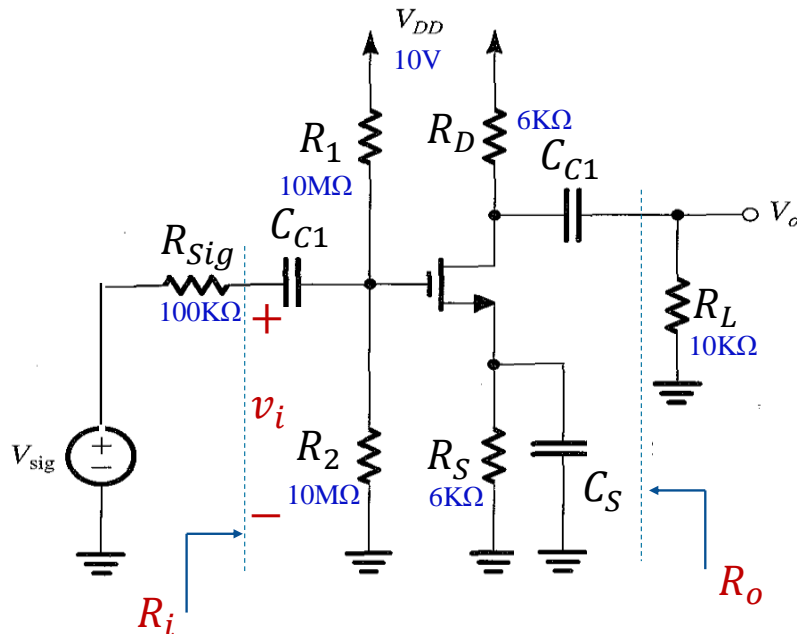


Fig. 2

3. In Fig. 3, a CS amplifier has $I = 5 \text{ mA}$, $R_G = 10 \text{ M}\Omega$, $R_{\text{sig}} = 100 \text{ k}\Omega$, $R_D = R_L = 10 \text{ k}\Omega$. Find the values of R_{in} , R_o , and the overall voltage gain (v_o/v_{sig}). Given, $\mu_n C_{ox} = 0.1 \text{ mA/V}^2$, $W/L = 4$, $V_A = 100 \text{ V}$.

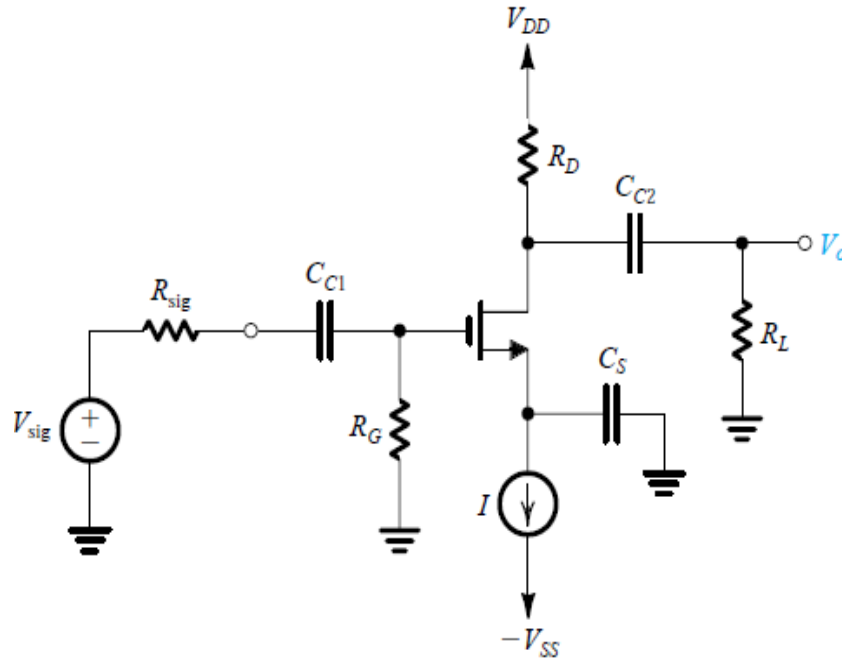


Fig. 3

4. In Fig. 4, a CD amplifier has $g_m = 1 \text{ mA/V}$ and $r_o = 150 \text{ K}\Omega$. Let $R_{\text{sig}} = 1 \text{ M}\Omega$, $R_G = 4.7 \text{ M}\Omega$, and $R_L = 15 \text{ K}\Omega$. Find R_{in} , R_o , the voltage gain (v_o/v_i), and the overall voltage gain (v_o/v_{sig}) without and with r_o taken into account.

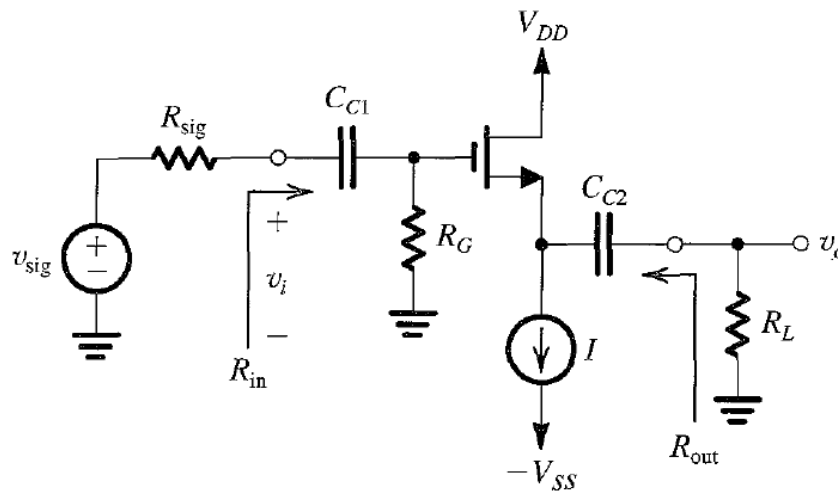


Fig. 4

5. In Fig. 5, a CG amplifier has $I = 0.5 \text{ mA}$, $R_D = 15 \text{ k}\Omega$, $R_L = 15 \text{ k}\Omega$, $R_{\text{sig}} = 50 \Omega$. Find the values of R_{in} , R_o , A_{VO} , A_V , G_V . Given $K'_n(W/L) = 1 \text{ mA/V}^2$.

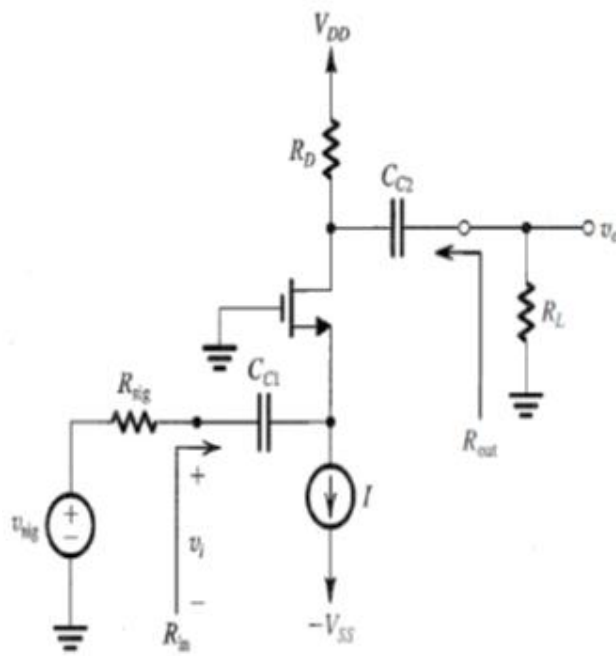


Fig. 5

Best Wishes

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