

1. (5%) Please derive an expression for v_o/v_s for the circuit shown in Fig. 1.

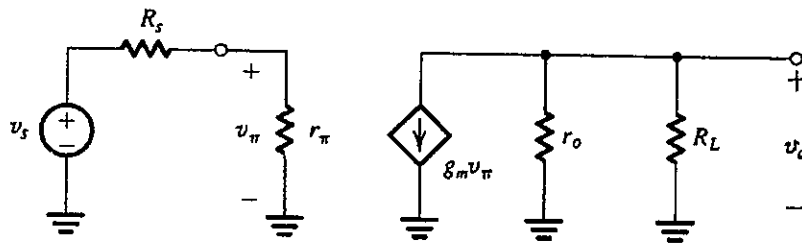


Fig. 1.

2. In Fig. 2, (5%) (a) Please derive an expression for $V_i(s)/V_s(s)$. (5%) (b) Find the 3-dB frequency for the case $R_s = 10 \text{ k}\Omega$, $R_i = 40 \text{ k}\Omega$, and $C_i = 5 \text{ pF}$.

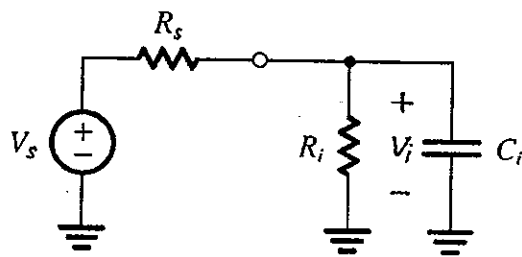


Fig. 2.

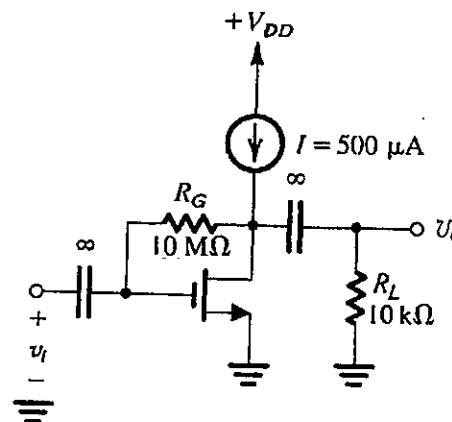


Fig. 3.

3. In the circuit of Fig. 3, the NMOS transistor has $|V_t| = 0.5 \text{ V}$ and $V_A = 50 \text{ V}$ and operates with $V_D = 1 \text{ V}$. (10%) (a) What is the voltage gain v_o/v_i ? (10%) (b) What do V_D and the gain become for I increased to 1 mA ?
4. Assume the op amp to be ideal. In Fig. 4, (8%) (a) Find the resistances looking into node 1, R_1 ; node 2, R_2 ; node 3, R_3 ; and node 4, R_4 . (10%) (b) Find the currents I_1 , I_2 , I_3 , and I_4 , in terms of the input current I . (8%) (c) Find the voltages at nodes 1, 2, 3, and 4, that is, V_1 , V_2 , V_3 , and V_4 in terms of (IR) .

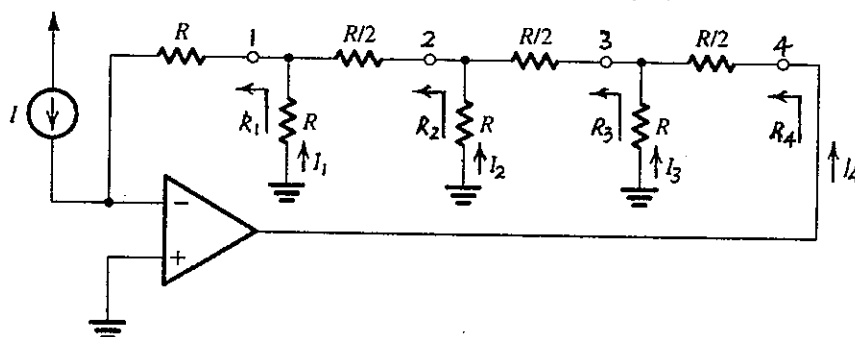


Fig. 4.

見背面

5. In the circuit shown in Fig. 5, the transistor has a β of 200. (10%) (a) What is the dc voltage at the collector? (15%) (b) Please find the input resistances R_{ib} and R_{in} and the overall voltage gain (v_o/v_{sig}) (neglecting r_o).

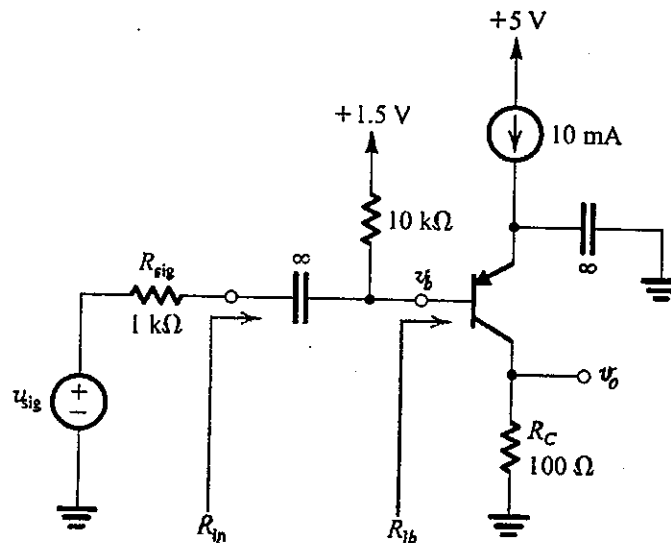


Fig. 5.

6. (14%) Please find the Thévenin equivalent with respect to the terminals a, b in the circuit in Fig. 6.

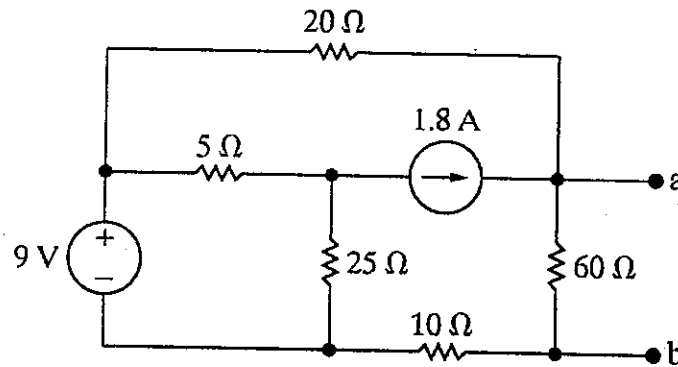


Fig. 6.

試題隨卷繳回