

國立高雄師範大學 103 學年度學士班轉學生招生考試試題

系所別：光電與通訊工程學系三年級

科 目：電子學

※注意：1.不必抄題，作答時請將試題題號及答案依照順序寫在答案卷上，於本試題上作答者，不予計分。

2.限用藍色或黑色之鋼筆、原子筆作答，以鉛筆或其他顏色作答者不予計分。

1. For the circuit in Fig. 1, the Zener diode voltage is $V_z = 5.1$ V and the Zener diode incremental resistance is $r_z = 0$. Find I_z and the power dissipated in the diode. (16%)

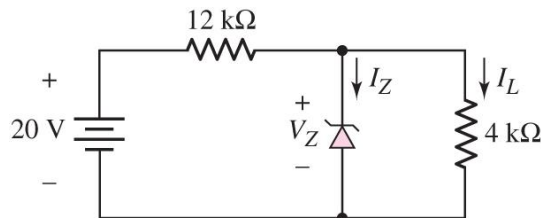


Fig. 1

2. For the circuit in Fig. 2, the transistor parameters are $\beta = 100$ and $V_{BE(on)} = 0.7$ V. (a) Find the collector current I_{CQ} and the C-E voltage V_{CEQ} . (b) Calculate the transistor power dissipation. (20%)

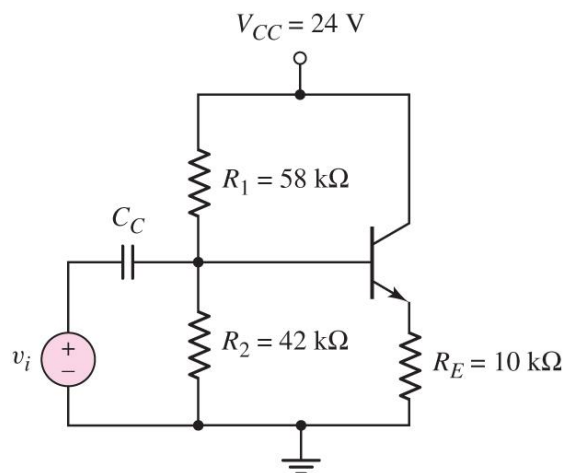


Fig. 2

(背面有題 續翻背面)

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3. The transistor parameters in Fig. 3 are $\beta = 100$, $V_{BE(on)} = 0.7$ V, and $V_A = \infty$. The thermal voltage is $V_T = 0.026$ V. Let $R_C = 6.5$ k Ω . (a) Find the dc voltage at the emitter terminal. (b) Assuming C_C and C_E act as short circuits, find the small-signal voltage gain $A_v = v_O / v_S$. (c) Find the input resistance R_i . (24%)

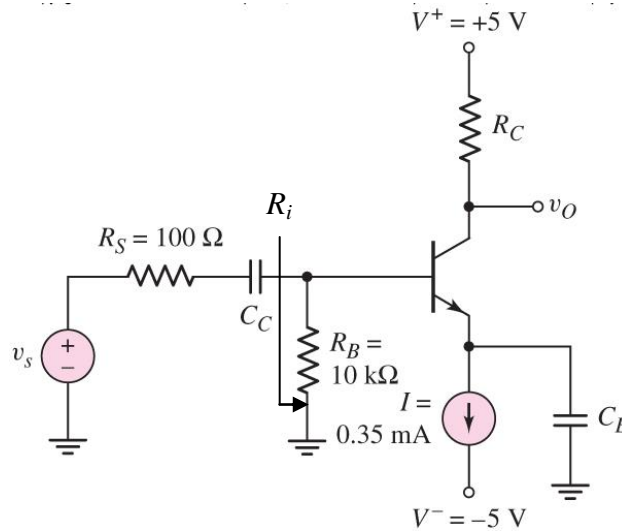


Fig. 3

4. For an NMOS transistor, the parameters are $V_{TN} = 0.4$ V and $K_n = 0.75$ mA/V². Find the drain currents I_D for $V_{DS} = 2$ V and (a) $V_{GS} = 2$ V; (b) $V_{GS} = 3$ V. (16%)
5. The transistor in Fig. 4 has the parameters of $V_{TN} = 0.4$ V, $K_n = 0.5$ mA/V², and $\lambda = 0$. The circuit parameters are $V_{DD} = 3$ V, $R_1 = 345$ k Ω , $R_2 = 2291$ k Ω , and $R_S = 6$ k Ω . (a) Find I_{DQ} and V_{DSQ} . (b) Find the small-signal voltage gain $A_v = v_O / v_i$. (c) Find the output resistance R_O . (24%)

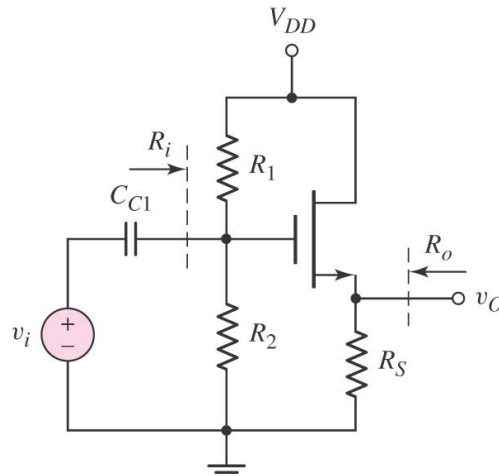


Fig. 4