

科目：電子學

適用：應光系

編號：393

考生注意：

1. 依次序作答，只要標明題號，不必抄題。
2. 答案必須寫在答案卷上，否則不予計分。
3. 限用藍、黑色筆作答；試題須隨卷繳回。

本 試 題

共 / 頁

第 / 頁

1. Consider the circuit shown in Fig.1, the Zener diode is ideal and the diode voltage  $V_Z$  is 3 V. Determine  $I_Z$ ,  $I_L$ , and power dissipated in the diode. ( 25 % )
2. For the amplifier circuit shown in Fig.2, the transistor parameters are:  $V_{TN} = 0.75$  V,  $K_n = 1$  mA/V<sup>2</sup>, and  $\lambda = 0$ .  
(a) Calculate the quiescent drain-to-source voltage  $V_{DSQ}$ . ( 10 % )  
(b) Determine the small-signal voltage gain  $A_v = v_o/v_i$ . ( 15 % )
3. For the CMOS amplifier circuit shown in Fig.3, the transistor parameters are:  $V_{TN} = +0.75$  V,  $V_{TP} = -0.75$  V,  $k'_n = 80$   $\mu$ A/V<sup>2</sup>,  $k'_p = 40$   $\mu$ A/V<sup>2</sup>, channel width/channel length  $(W/L)_n = 20$ ,  $(W/L)_p = 30$  and  $\lambda_n = \lambda_p = 0.01$  V<sup>-1</sup>,  $I_{Bias} = 0.2$  mA. Calculate the small-signal voltage gain  $A_v = v_o/v_i$ . ( 25 % )
4. For the transistor in the circuit in Fig.4,  $\beta = 100$  and  $V_A = \infty$ . Find the small-signal voltage gain  $A_v = v_o/v_s$ . ( 25 % )

Fig.1

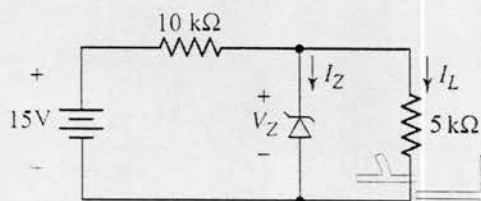


Fig.2

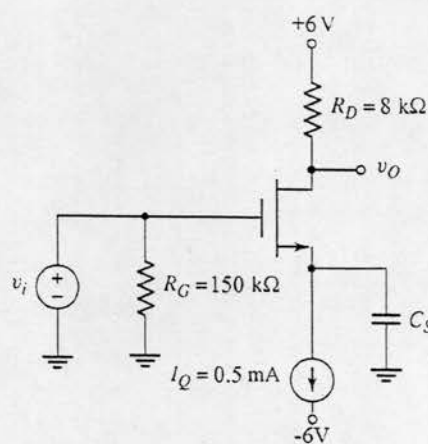


Fig.3

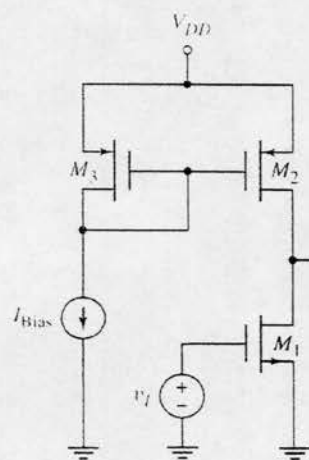


Fig.4

