

國立高雄應用科技大學
105 學年度研究所碩士班招生考試
光電與通訊工程研究所碩士班
電子學

試題 共 2 頁第 1 頁

注意：a.本試題共 5 題、每題 20 分，共 100 分。

b.作答時不必抄題，但必須書寫計算過程否則不予計分。

c.各試題答案必須依題號順序寫在試卷指定的答案欄；寫錯位置不予計分。

1. Please write two alternative representations of a signal source (請畫出二種信號源表示法): (a) the Thévenin form (戴維寧), and (b) the Norton form (諾頓). (20%)
2. Please write the small-signal circuit model for a bipolar junction transistor (BJT). (請畫出 BJT 電晶體小信號電路模型) (20%)
3. For the circuit in **Fig. 1**, derive an expression for the voltage gain (求圖 1 電路電壓增益表示式), v_O/v_I . (20%)

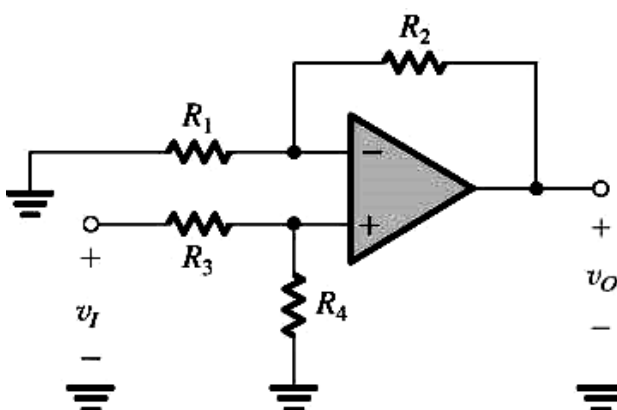


Fig.1

4. Consider the FET circuit shown in **Fig. 2** for the case $V_t = 2$ V, $k_n'(W/L) = 1$ mA/V², $V_{GS} = 4$ V, $V_{DD} = 10$ V, and $R_D = 3.6$ k Ω . (a) Find the dc quantities I_D and V_D . (b) Calculate the value of g_m at the bias point (偏壓點). (c) Calculate the value of the voltage gain (電壓增益). (20%)

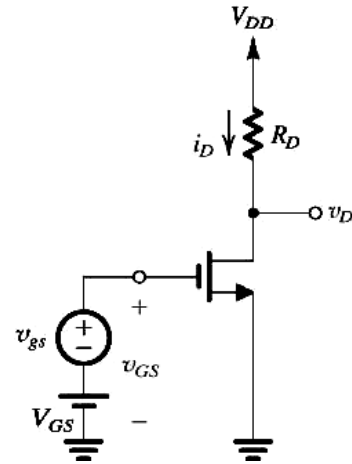


Fig. 2

5. The BJTs in the circuit of **Fig. 3** have $\beta = 100$. Find V_B and V_E for $v_I =$ (a) +3V, (b) -5V. (20%)

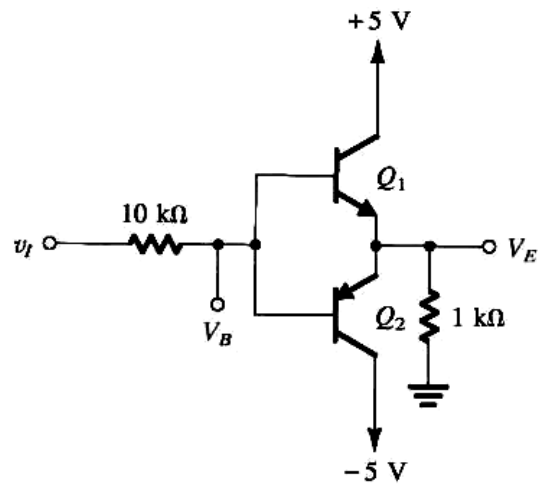


Fig. 3