國立臺北科技大學 106 學年度碩士班招生考試

系所組別：2401 光電工程系碩士班

第二節　電子學　試題（選考）

注意事項：

1. 本試題共六題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

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1. Fig. 1 shows a circuit that provides an output voltage v_o whose value can be varied by turning the wiper of the 100 kΩ potentiometer. (a) Find the range over which v_o can be varied. (b) If the potentiometer is a "20-turn" device, find the change in v_o corresponding to each turn of the pot.　(5%, 5%)
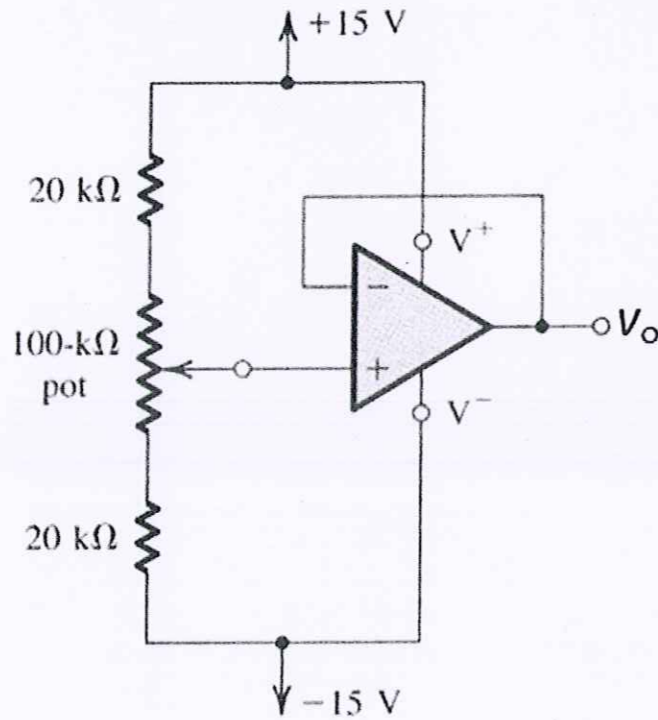

Fig. 1

2. For the bridge rectifier circuit of Fig. 2, the input is a sinusoidal signal $v_s(t)$ with a peak voltage V_S and the diode has a constant voltage drop V_D. Please derive (a) the average (or dc component) of the output voltage $v_o(t)$ (b) the peak diode current and (c) the peak inverse voltage (PIV).　(5%, 5%, 5%)
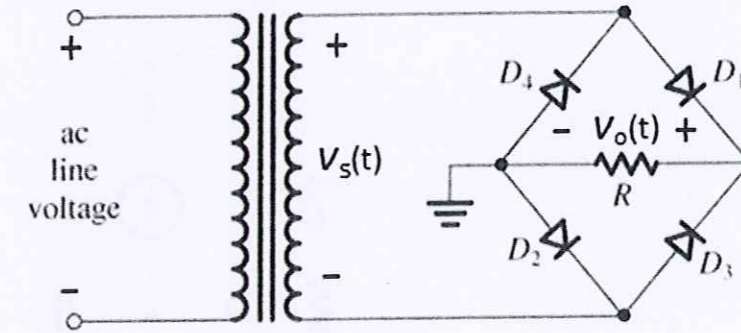

Fig. 2

3. A discrete MOSFET common-source amplifier, shown in Fig. 3, has R_{in}=2 MΩ, g_m=4 mA/V, r_o=100 kΩ, R_D=10 kΩ, C_{gs}=2 pF, and C_{gd}=0.5 pF. The amplifier is fed from a voltage source with an internal resistance R_{sig}=500 kΩ and is connected to a 10 kΩ load. Find (a) the overall midband gain A_M (b) the upper 3-dB frequency f_H. (5%, 10%)
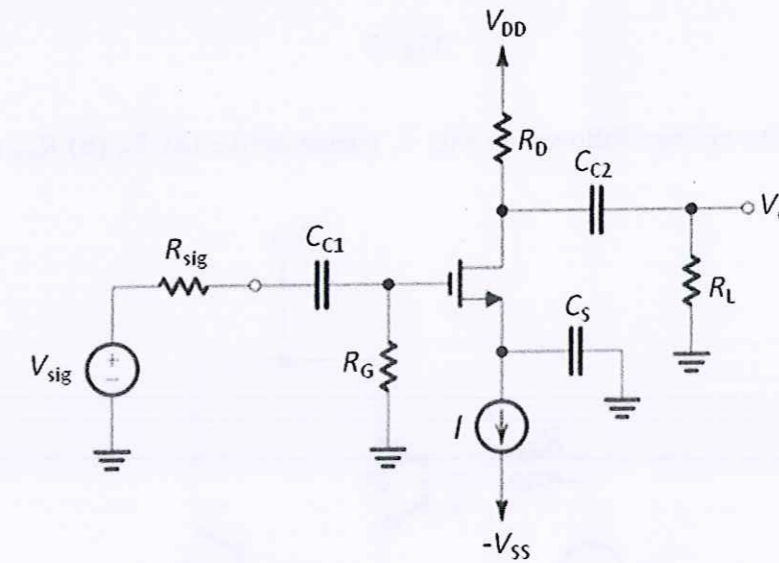

Fig. 3

注意：背面尚有試題

4. In the circuit shown in Fig. 4, the transistor has a β of 200. (a)What is the dc voltage at the collector? Find the input resistance (b) R_{ib} (c) R_{in} and (d) the overall voltage gain. (5%, 5%, 5%, 5%)
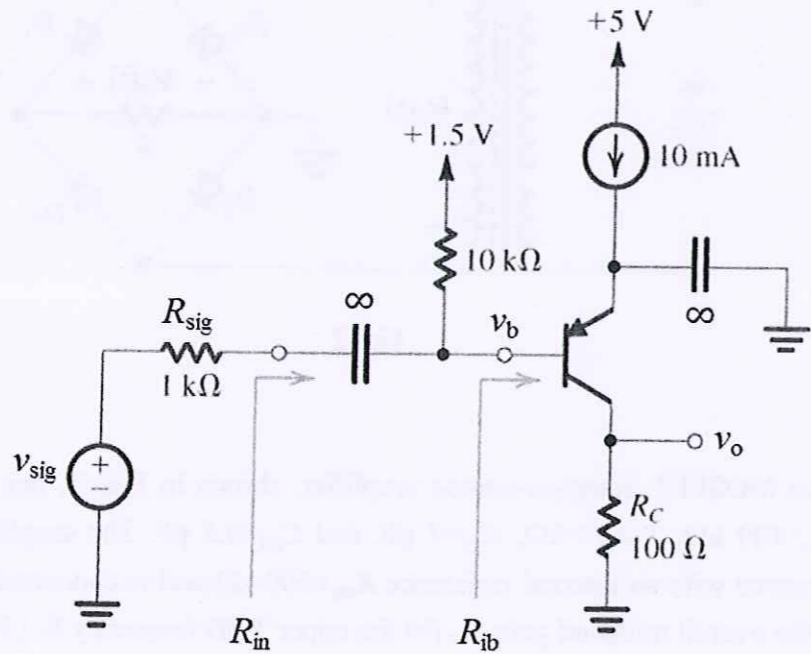

Fig. 4

5. For the Darlington voltage follower in Fig. 5, please derive (a) R_{in} (b) R_{out} and (c) v_o/v_{sig} (5%, 5%, 10%)
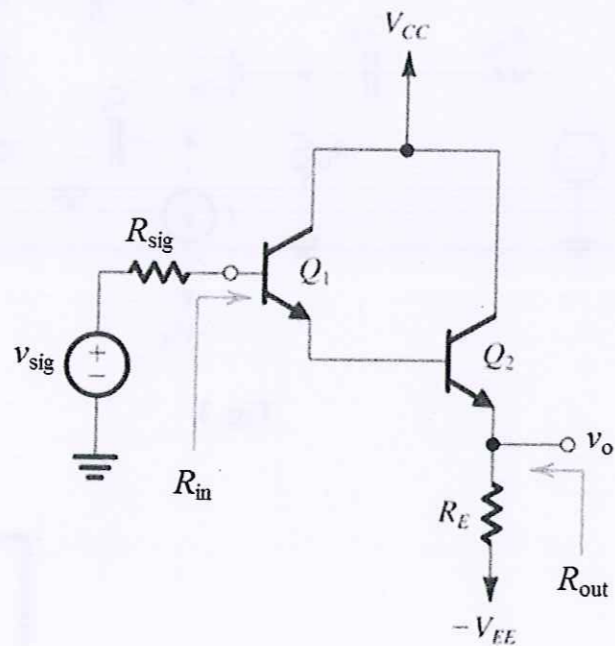

Fig. 5

6. For the circuit of Fig. 6, use the feedback method to find (a) the voltage gain v_o/v_s (b) the input resistance R_{in} and (c) the output resistance R_{out}. The op amp has open-loop gain $\mu = 10^4$ V/V, R_{id}=100 kΩ, and r_o=1 kΩ. (10%, 5%, 5%)
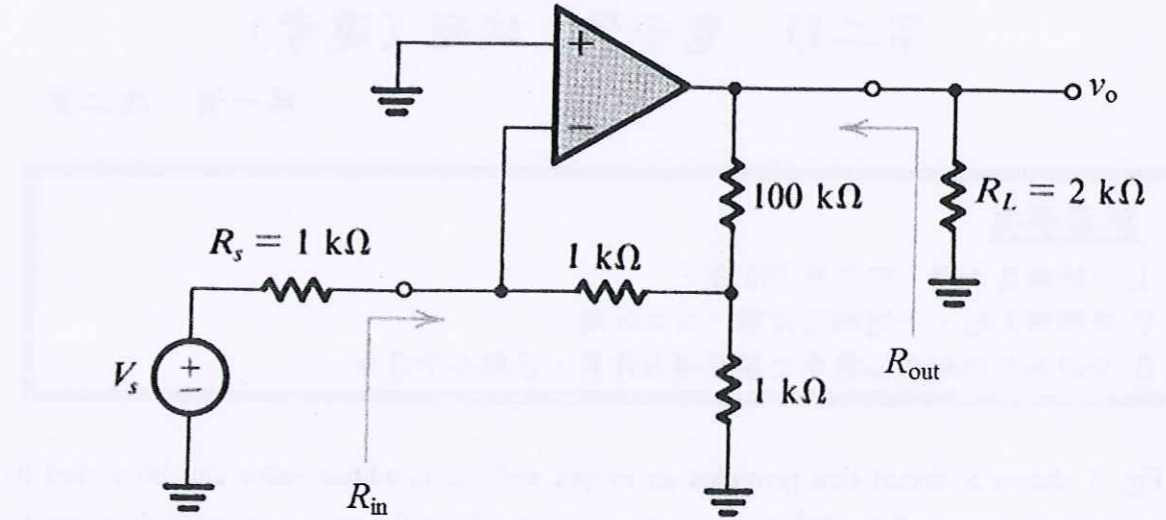

Fig. 6