國立臺灣師範大學104學年度碩士班招生考試試題

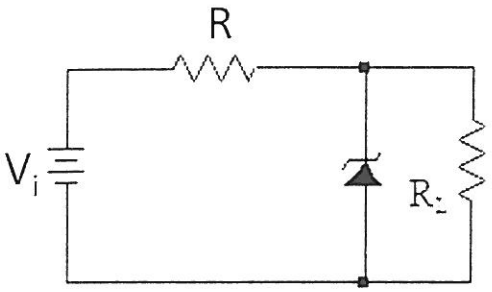
科目：電子學　　適用系所：光電科技研究所

注意：1.本試題共 3 頁，請依序在答案卷上作答，並標明題號，不必抄題。2.答案必須寫在指定作答區內，否則不予計分。

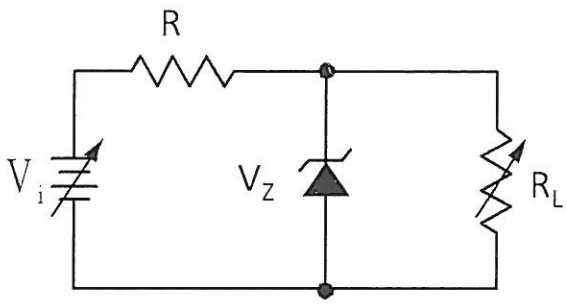
第 1-4 題，必需運算過程 第 5-9 題 選擇題，無需計算過程

1. The circuit including a Zener diode is shown as the following figure. (A)Please find the minimum R_L while the Zener diode is operated in the breakdown region. Here, R =0.5k Ω, r_z = 20Ω, I_{zk} = 2mA, V_z = 6.7 V. (7 分) (B)Please find the maximum power consumption of the Zener diode, operated in the breakdown region. (8 分) Here, R = 100 Ω, (the breakdown voltage of the Zener diode)V_z = 10V, 12 V ≤ V_i ≤15 V, 500 Ω≤ R_L ≤1000Ω.

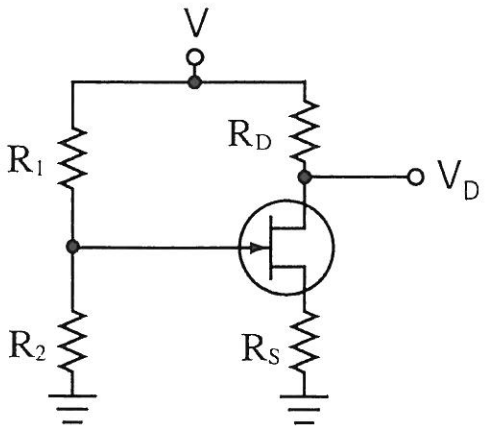
(A)



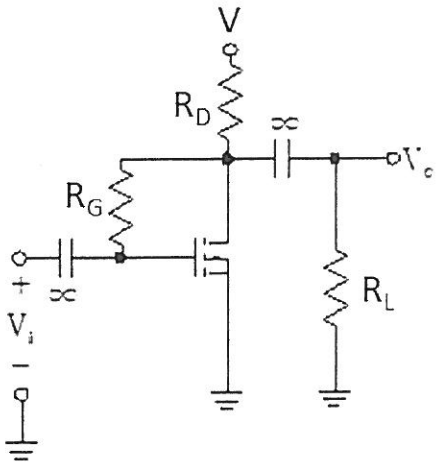
(B)



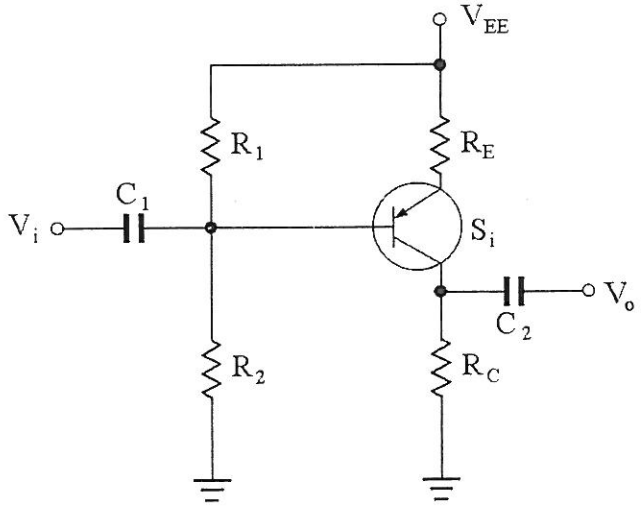
2. The circuit including a FET is shown as the following figure. Please find the R_S. Here, V= 15V, V_{GS} = -2V, V_D = 12V, R_1 = 90kΩ, R_2 = 45 kΩ, R_D = 1.5 kΩ(15 分)



3. The circuit including an N-channel MOSFET is shown as the following figure. Please find the voltage gain V_o/ V_i of small signal analysis. Here, in the operation point of the MOSFET, $I_D = 0.6$ mA, (threshold voltage) $V_T = 1$V. V = 5 V,$R_D = 5$k Ω, $R_L = 10$ kΩ, $R_G = 10$ MΩ. (15 分)



4. The circuit including a transistor is shown as the following figure. Please find V_{CE}. Here, $V_{EE} = 10$ V, $R_1 = 10$ kΩ, $R_2 = 40$ kΩ, $R_E = 2$ kΩ, $R_C = 1.5$ kΩ. (15 分)



5.The characteristics of the diode exclude which one？ (A)The effect of diffusion capacitance happens while the reverse bias is applied (B)The reverse current increases while the temperature rise (C)The cut-in voltage decreases while the temperature rise (D) The depletion capacitance decreases while the reverse bias increases(8 分)

6. The characteristics of the field effect transistor (FET) exclude which one ? (A)Low thermal stability (B)Low noise (C)High input impedance (D)The transportation of uni-polar carrier(8 分)

7. To fabricate the p-type semiconductor, which element could be doped into the intrinsic semiconductor? (A)Boron (B) phosphorous (C)Arsenic (D)Antimony(8 分)

8. To turn on a enhancement-mode p-channel MOSFET, the applied gate voltage is which one? (A) Negative voltage (B)Positive voltage (C) Both positive and negative voltage (D) Zero voltage(8 分)

9. The advantages of transformer-coupled amplifier exclude which one ? (A) Improvement of frequency response (B)Impedance matching between former and later components (C)DC isolation effect (D) Promotion of Power transfer efficiency (8 分)