

國立臺北科技大學
100 學年度研究所碩士在職專班入學考試

電機工程系碩士班

戊組：電工原理(含電子學及計算機專業實務)試題

填准考證號碼

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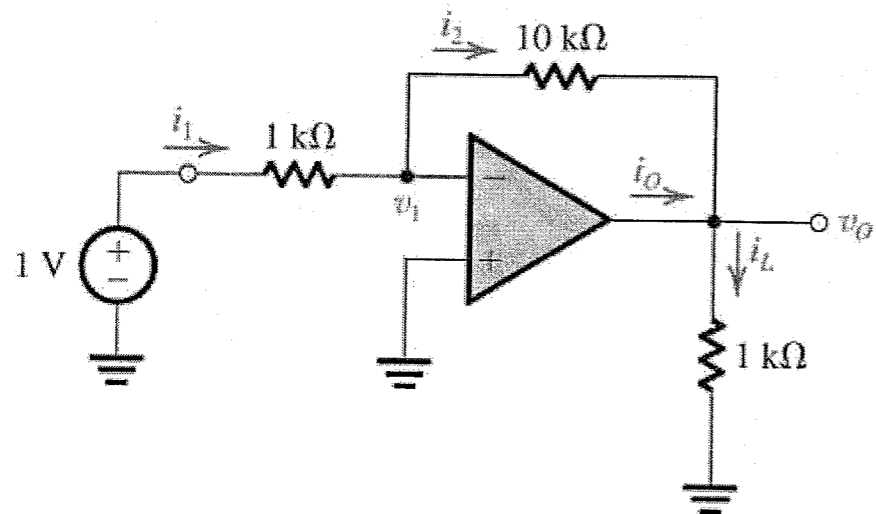
第一頁 共二頁

注意事項：

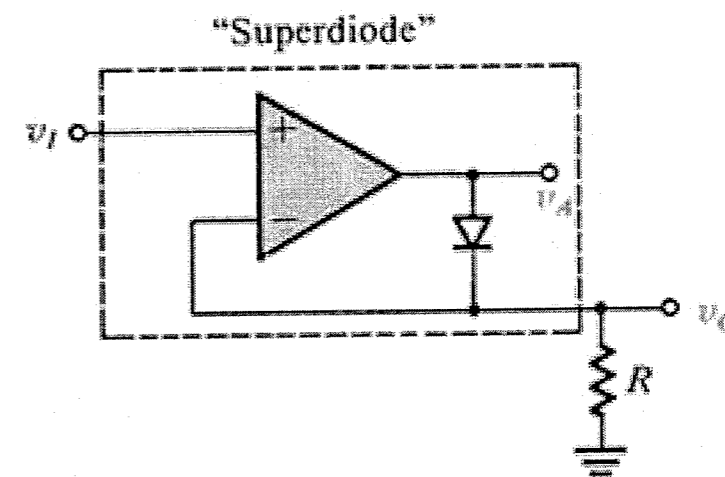
1. 本試題共【八】題，配分共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在試卷答案欄內，否則不予計分。

一、 Consider an amplifier operating from $\pm 10\text{-V}$ power supplies. It is fed with a sinusoidal voltage having 1 V peak and delivers a sinusoidal voltage output of 9 V peak to a $1\text{-k}\Omega$ load. The amplifier draws a current of 9.5 mA from each of its two power supplies. The input current of the amplifier is found to be sinusoidal with 0.1 mA peak. Find the voltage gain (dB) (3%), the current gain (dB) (3%) and the power gain (dB) (4%).

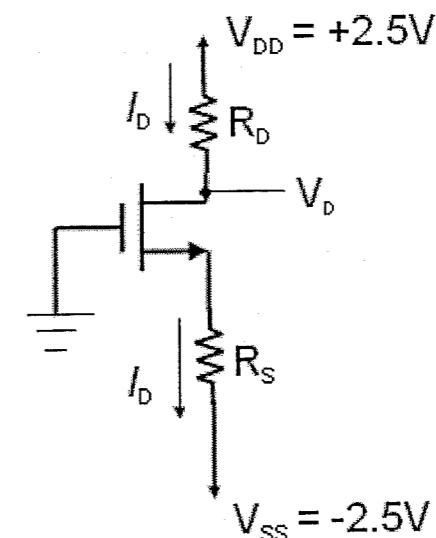
二、 For the circuit in the following figure determine the values of v_1 , i_2 , v_o , i_L , and i_o . (10%)



三、 Consider the super diode circuit of the following figure, with $R = 1\text{ k}\Omega$. For $v_1 = +1\text{ V}$, and -1 V , what are the voltage that result at the rectifier output and at the output of the op amp? Assume that the op amp is ideal and that its output saturates at $\pm 12\text{ V}$. The diode has a 0.7-V drop at 1-mA current, and the voltage drop changes by 0.1 V per decade of current change. (10%)

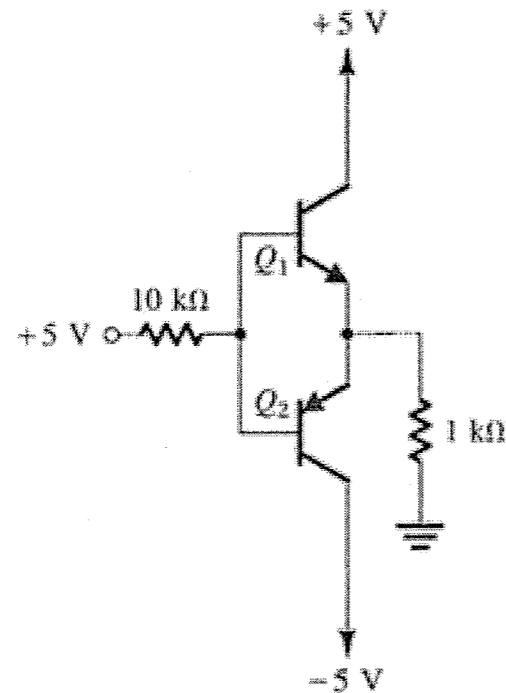


四、 Design the circuit (CKT) so that the transistor operates at $I_D = 0.4\text{ mA}$ and $V_D = +0.5\text{V}$. The NMOS transistor has $V_t = 0.7\text{V}$, $\mu_n C_{ox} = 100\text{ }\mu\text{A/V}^2$, $L = 1\text{ }\mu\text{m}$, and $W = 32\text{ }\mu\text{m}$. Neglect the channel-length modulation effect ($\lambda = 0$). (10%)



注意：背面尚有試題

五、 Evaluating the voltages at all nodes and the currents through all branches in the following circuit. Assume $\beta_2 = 100$. (10%)



- 六、 (a) What is the difference between an assembler and a compiler? (5%)
 (b) What is the difference between an interpreter and a compiler? (5%)
 (c) What is the difference between a transport layer based on the TCP protocol and another based on the UDP protocol? (5%)
 (d) What is the difference between class and object in an object-oriented programming language? (5%)
 (e) Why is SSH considered superior to telnet? (5%)
 (f) Briefly describe the principle of public key encryption. (5%)

七、 (a) What sequence of numbers is printed by the following algorithm if it is started with $Last \leftarrow 0$ and $Current \leftarrow 1$? (5%)

```

procedure mystery(Last, Current)
if (Current < 100) then {
    print the value assigned to Current;
    Temp  $\leftarrow$  Current + Last;
    mystery(Current, Temp);
}
    
```

(b) Modify the procedure mystery so that the values are printed in reverse order. (5%)

- 八、 For a 32 bit computer using 2's complement notation to represent integers,
 (a) Convert $FFFFFFFC_{16}$ to its equivalent base-10 representation. (5%)
 (b) To perform a signed arithmetic operation, what error will occur when we add 2 to $7FFFFFFF$? Explain your answer. (5%)