

國立臺北科技大學
九十八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

第一頁 共二頁

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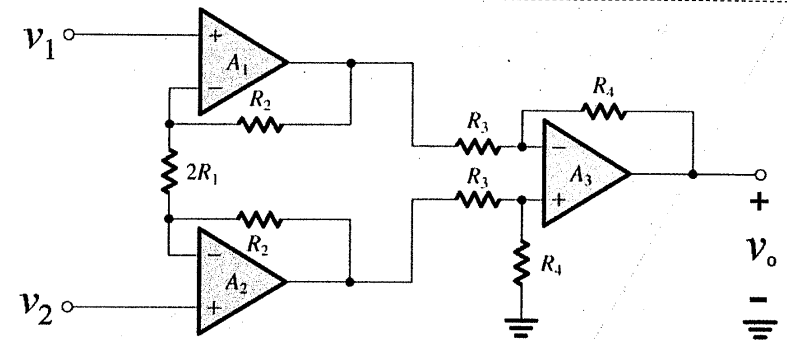
注意事項：

1. 本試題共【五】題，每題各 20 分，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。

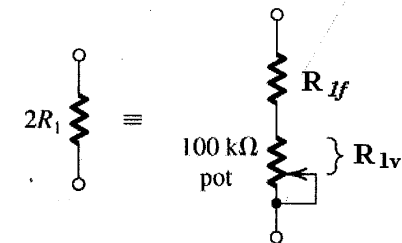
一、Consider an amplifier operating from $\pm 10\text{-V}$ power supplies. It is fed with a sinusoidal voltage having 1 V peak and delivers a sinusoidal voltage output of 9 V peak to a 1-k Ω load. The amplifier draws a current of 9.5 mA from each of its two power supplies. The input current of the amplifier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

二、(a). Find the output of the instrumentation amplifier as shown in the following figure.

(b). Design the instrumentation amplifier circuit to provide a gain that can be varied over the range of 2 to 1000 with a 100-k Ω variable resistance of R_1 , R_{1v} . That is, you need to find the fixed resistance of R_1 , R_{1f} , and resistance of R_2 with $R_3 = R_4 = 10\text{ k}\Omega$.

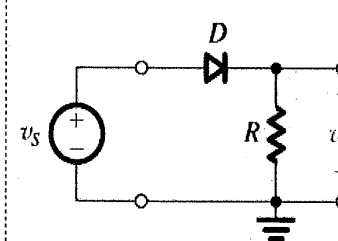


(II(A))

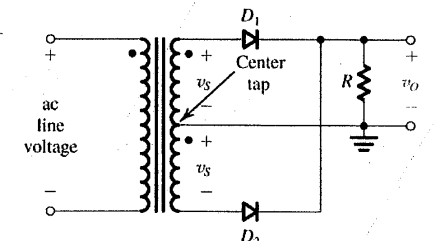


(II(B))

三、Find the peak inverse voltage (PIV) of the following three figures with respect to the voltage drop of diode, V_{D0} , and voltage source, v_s . Assume all diodes are identified.



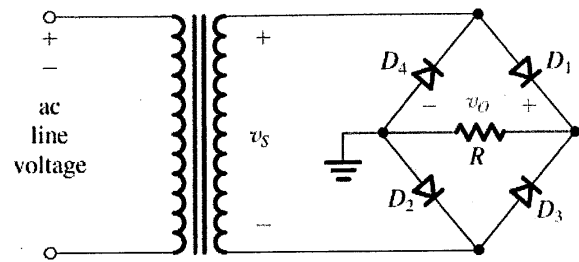
(III(A))



(III(B))

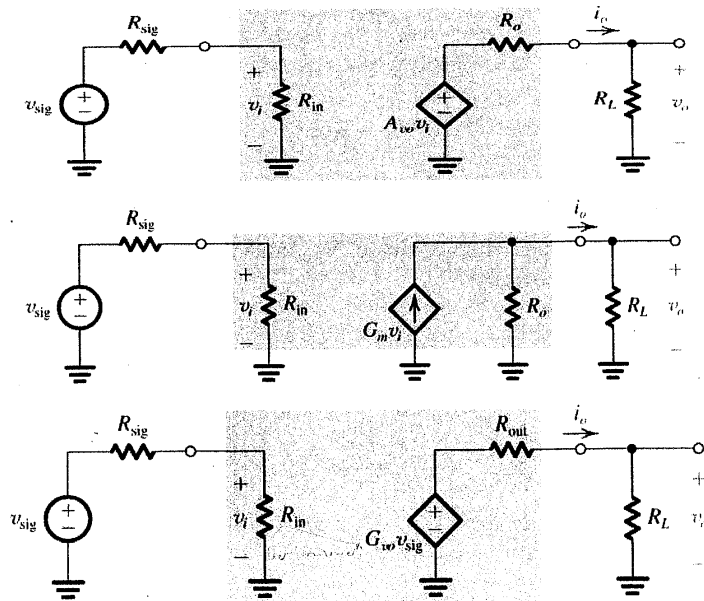
注意：背面尚有試題

第二頁 共二頁

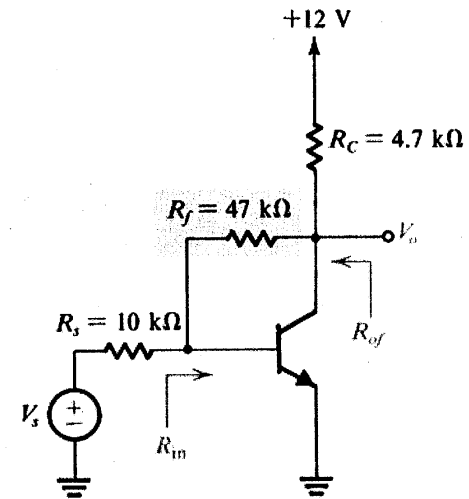


(三(C))

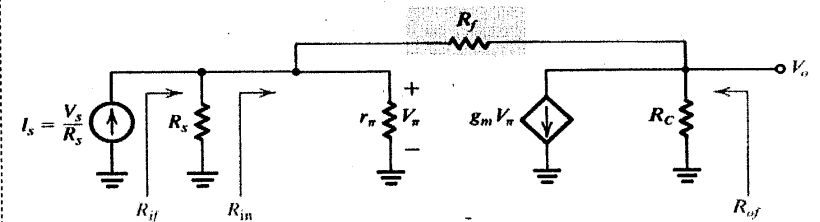
四、A transistor amplifier is fed with a signal source having an open-circuit voltage v_{sig} of 10 mV and an internal resistance R_{sig} of 100 k Ω . The voltage v_i at the amplifier input and the output voltage v_o are measured both without and with a load resistance $R_L = 10$ k Ω connected to the amplifier output. The measured results are that $v_i = 9$ mV and $v_o = 90$ mV without R_L , and $v_i = 8$ mV and $v_o = 70$ mV with R_L . Find the amplifier parameters: A_{vo} ($R_L = \infty$), G_{vo} ($R_L = \infty$), A_v , G_v , R_o , R_{out} , R_{in} , G_m ($R_L = 0$).



五、Analyze the following circuits with feedback concept to determine the small-signal voltage gain V_o/V_s , the input resistance R_{in} , and the output resistance $R_{out} = R_{of}$. The transistor has $\beta = 100$.



(五(A))



(五(B))