

國立臺北科技大學

九十四學年度電資碩士在職專班招生考試

電子學試題

填准考證號碼

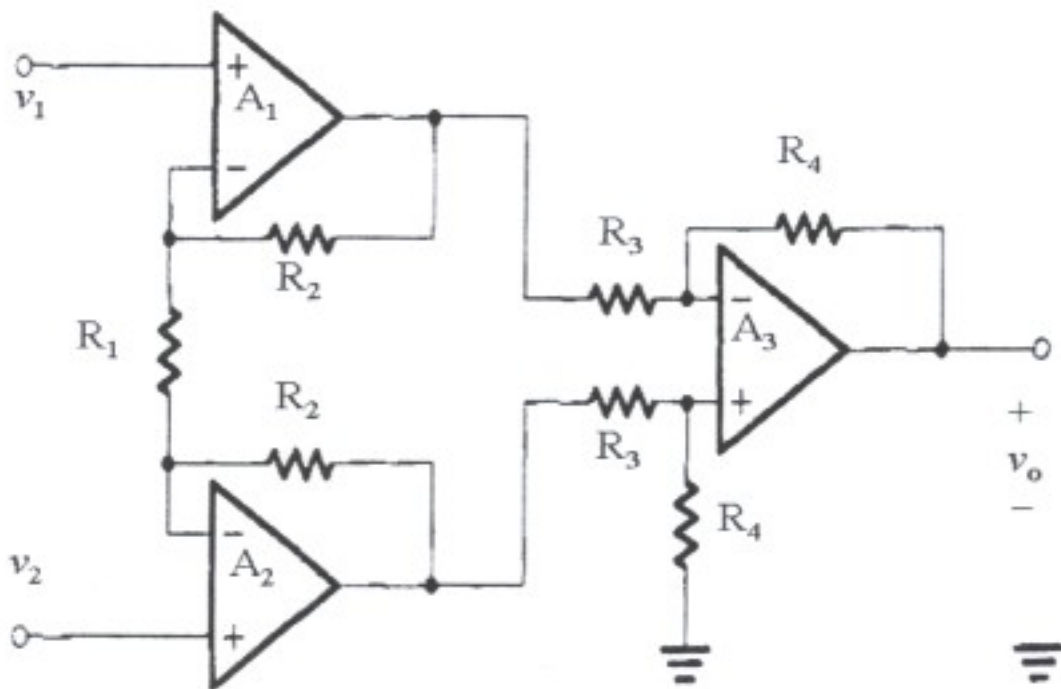
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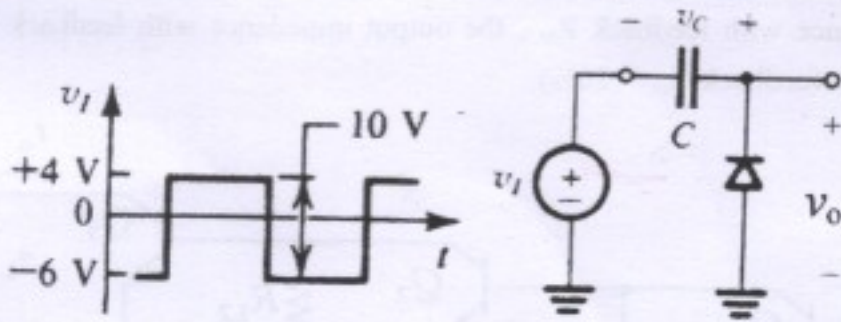
注意事項：

1. 本試題共【5】題，配分共100分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在答案卷之答案欄內，否則不予計分。

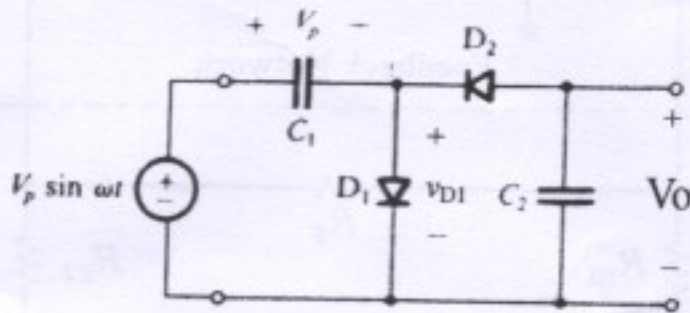
1. Analyze the instrumentation amplifier to determine v_o as a function of v_1 and v_2 , and determine the differential gain, A_d . (20%)



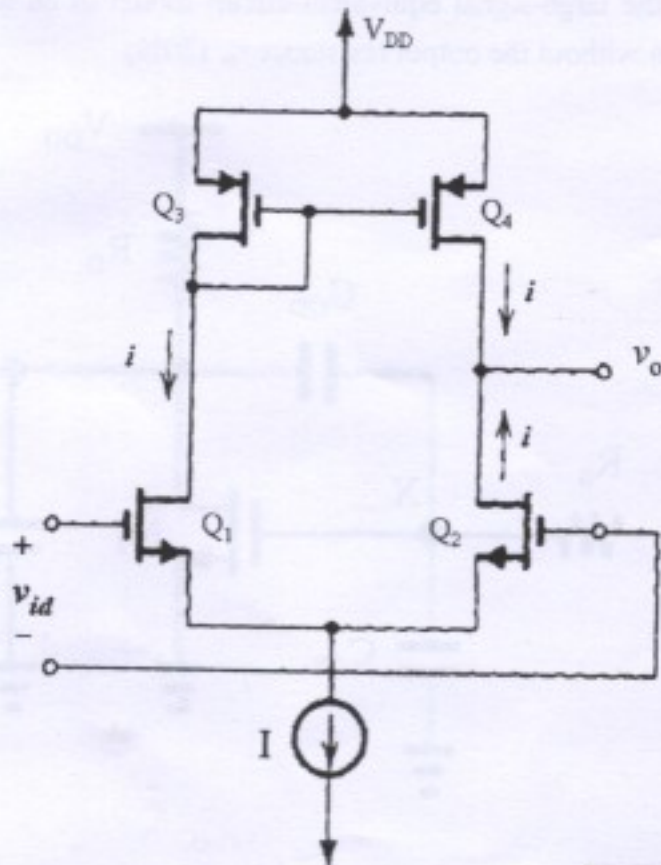
2. (a) Find the output voltage v_o with a square-wave input and no load. (10%)



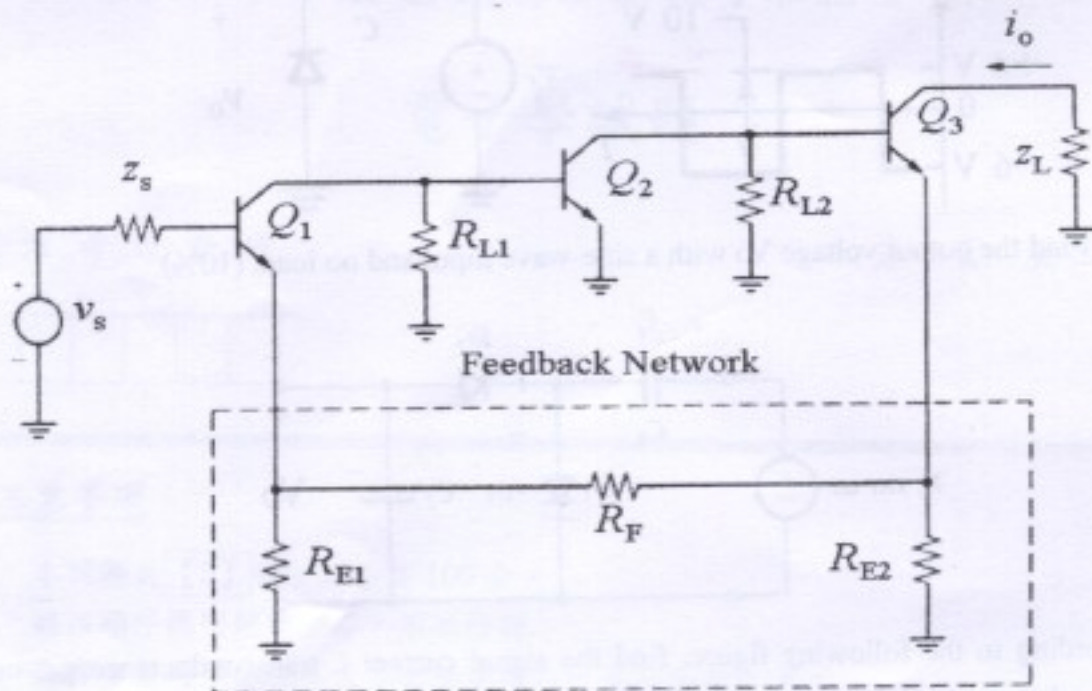
(b) Find the output voltage V_o with a sine-wave input and no load. (10%)



3. According to the following figure, find the signal current i , transconductance g_m , output impedance $r_o (= r_{o2} = r_{o4})$, signal voltage v_o , and the voltage gain A_v under the conditionals that $I = 25 \mu\text{A}$, $V_t = 1\text{V}$, $W_1 = W_2 = 120 \mu\text{m}$, $L_1 = L_2 = 6 \mu\text{m}$, $\mu_n C_{ox} = 20 \mu\text{A}/\text{V}^2$, $V_A = 20\text{V}$, and $v_{id} = 10 \text{mV}$. (20%)



4. According to the following figure (ignoring the resistance z_s), find the feedback factor β , the input impedance with feedback $R_{in,f}$, the output impedance with feedback $R_{out,f}$, and the total gain with feedback $G_{m,f}$. (20%)



5. According to the common source circuit, find the two poles ω_{p1} and ω_{p2} , if we assume $|\omega_{p1}| \ll |\omega_{p2}|$ and use the large-signal equivalent-circuit model of an n-channel MOSFET operating in saturation without the output resistance r_o . (20%)

