國立雲林科技大學 107 學年度 碩士班招生考試試題

系所：電子系

科目：電子學

本試題共五題，每題得分如各題中所示，共計 100 分，請依題號作答並將答案寫在答案卷上，違者不予計分。

1. From the Voltage Transfer Characteristic (VTC), we can find four parameters of the VTC (V_{OH}, V_{OL}, V_{IL}, and V_{IH}). Determine the noise margins:
   (a) (5 分) NM_H and
   (b) (5 分) NM_L

2. For the instrumentation amplifier of Fig. P2:
   (a) (10 分) find the voltage v_1 and v_2.
   (b) (10 分) find the voltage v_3 and v_4.
   (c) (5 分) find the voltage v_O.

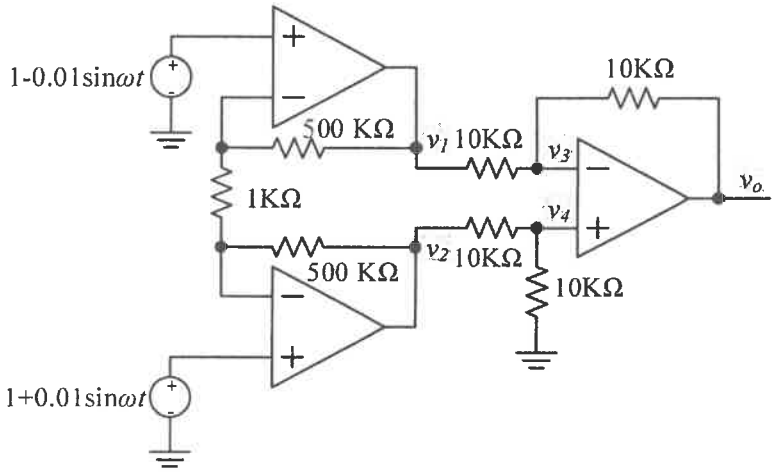

Fig. P2

3. Assume the forward voltage of the diode which shown in Fig. 3(a)(b)and(c) is 0.1V with no leakage current.
   (a) (5 分) Find the values of I_1 and V_1 in the circuits shown in Fig. P3(a).
   (b) (5 分) Find the values of I_2 and V_2 in the circuits shown in Fig. P3(b).
   (c) (5 分) Find the values of I_3 and V_3 in the circuits shown in Fig. P3(c).

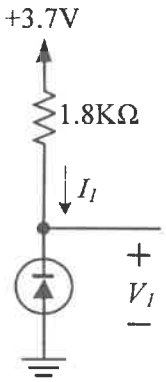

Fig. P3(a)

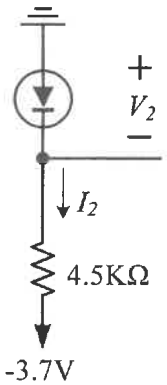

Fig. P3(b)

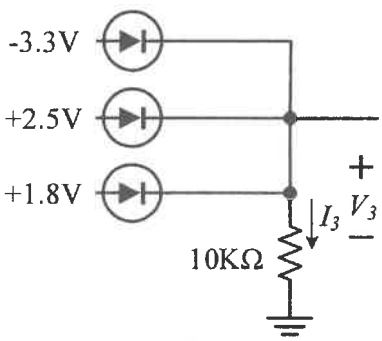

Fig. P3(c)

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4. (20 分) The operational amplifiers are ideal. Please (a) calculate the voltage gains of the circuits shown in Fig. P4(a), where R1=10kΩ and R2=100Ω. (b) Write down Vout in terms of V_A, V_B, R_A, R_B, and R_C, as shown in Fig. P4(b).

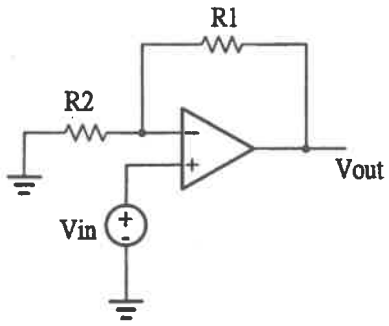

Fig. P4(a)

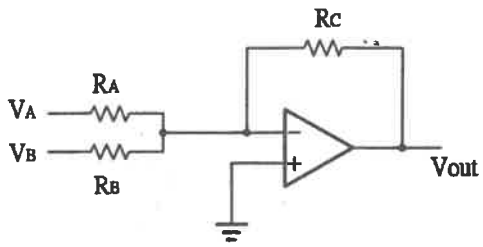

Fig. P4(b)

5. (30 分) All MOS transistors are biased in the saturation region. Neglect the body-effect of the NMOS transistors. Calculate (a) open-loop gain, (b) loop gain, and (c) closed-loop gain of the feedback amplifier shown in Fig. P5. $\lambda_N = \lambda_P = 0.1V^{-1}$. $g_{mN} = 10\times10^{-3}A/V$. $g_{mP} = 2.5\times10^{-3}A/V$. $I_{SS} = 2mA$. R1=100kΩ. R2=100kΩ.

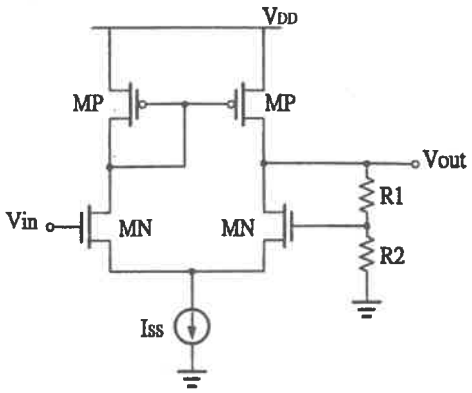

Fig. P5