國立暨南國際大學九十四學年度碩士班研究生入學考試試題　第 1 節

科目：電子學甲　適用：電機所電子組

編號：421

考生注意：
1.依次序作答，只要標明題號，不必抄題。
2.答案必須寫在答案卷上，否則不予計分。
3.限用藍、黑色筆作答；試題須隨卷繳回。

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1. For the circuit shown in Fig. 1, find the labeled node voltages for $\beta = \infty$. (10 points)

2. Assuming $\beta = 100$, find the voltage gain v_o / v_i and the input resistance R_i of the amplifier shown in Fig. 2. (20 points)
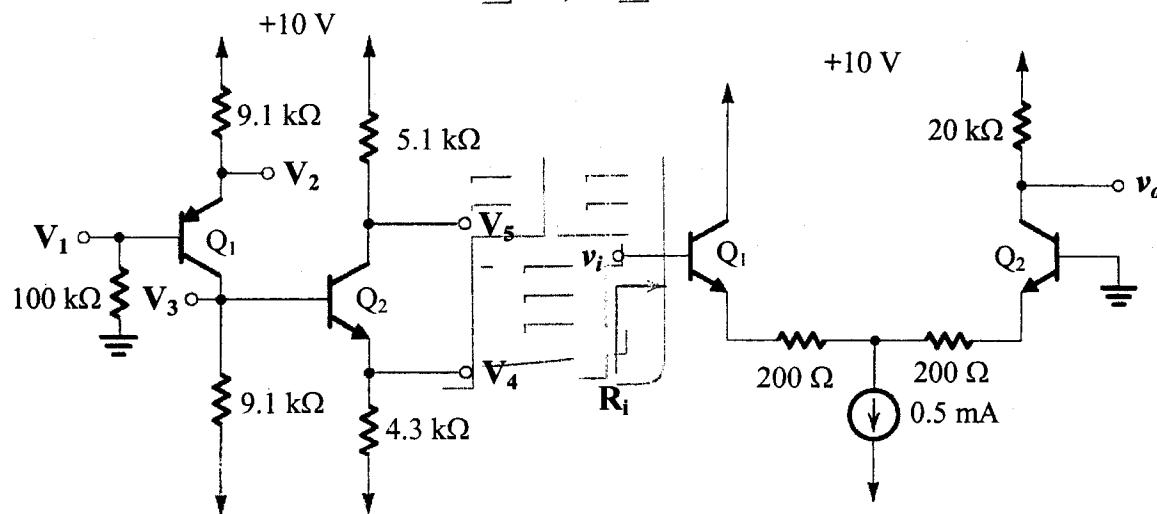
Fig. 1

Fig. 2

3. Assuming the op amp to be ideal, express v_o as a function of v_1 and v_2 for the circuit shown in Fig. 3. What is the input resistance seen by v_1 alone? By v_2 alone? (20 points)
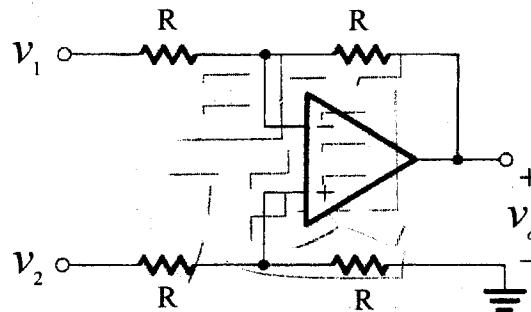
Fig. 3

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4. The amplifier in Fig. 4 is biased to operate at $I_D = 1$ mA and $g_m = 1$ mA/V. Neglecting the output resistance r_o, find the midband gain. (20 points)


Fig. 4
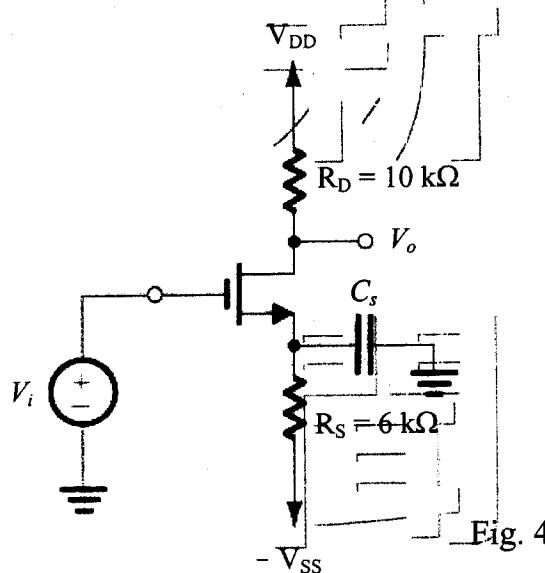
5. For the circuit shown in Fig. 5, use the feedback method to find the voltage gain V_o / V_s. The op amp has open-loop gain $\mu = 10^4$ V/V, $R_{id} = 100$ kΩ, and $r_o = 1$ kΩ. (20 points)

Fig. 5
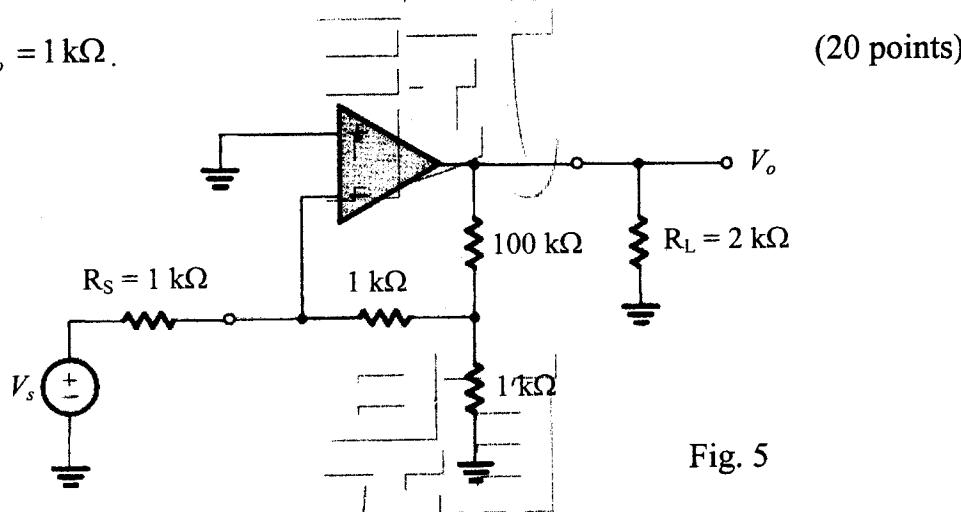
6. Estimate the total charge stored in a 0.1-μm depletion layer on one side of a 10-μm × 10-μm junction. The doping concentration on that side of the junction is 10^{16}/cm³. (10 points)