淡江大學 98 學年度進修學士班轉學生招生考試試題

系別：電機工程學系三年級　　科目：電　子　學

准帶項目請打「V」
V	計 算 機

本試題共 5 大題，2 頁

1. 20% Consider the difference-amplifier circuit of Fig. 1 (the op amp is ideal) for the case $R_1 = R_3 = 2\text{k}\Omega$ and $R_2 = R_4 = 200\text{k}\Omega$.
   (a) Find the value of the differential gain $A_d = (v_1\text{-}v_2)/v_o$.
   (b) Find the value of the differential input resistance R_{id} and the output resistance R_o.

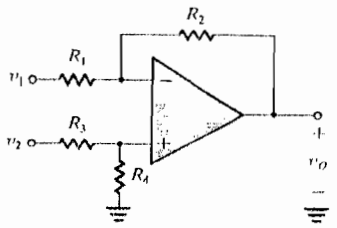

Fig. 1

2. 20% Find the values of the V and I as shown in Fig. 2. Assume the diodes are ideal.

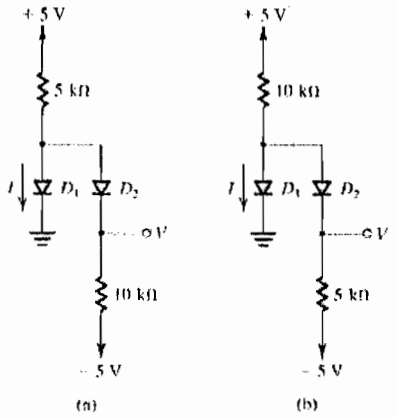

Fig. 2

3. 20% Assume $\lambda = 0$. In Fig. 3, what are the drain currents, I_D, in saturation and triode regions respectively of an NMOS transistor?

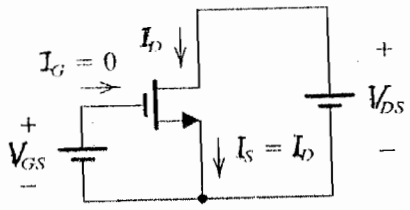

Fig. 3

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4. 20% In Fig. 4, the transistor has Vt = 1.5V, Kn'(W/L) = 0.25mA/V^2, and V_A = 50V. Assume the coupling capacitor to be sufficiently large so as to act as short circuits as the signal frequencies of interest. Find the small-signal voltage gain (A_v) and input resistance (R_{in}).

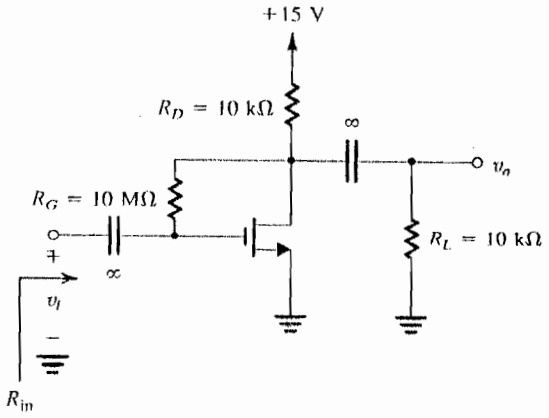

Fig. 4

5. 20% Analyze Fig. 5 to find I_C, I_B, V_C, and V_B. Assume $\beta = 100$.

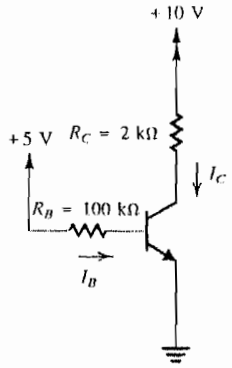

Fig. 5