逢甲大學101學年度碩士班招生考試試題 編號：071 科目代碼：

科目	電子學	適用系所	通訊工程學系	時間	100 分鐘

※請務必在答案卷作答區內作答。 共 3頁第 1頁

1. Assume the diodes are ideal, then find the values of I and V in the circuits shown in Fig. 1 (Describe carefully how to get the solutions for part (e) and part (f).) ((a) 2%, (b) 2%, (c) 2%, (d)2%, (e) 4%, and (f) 4%)

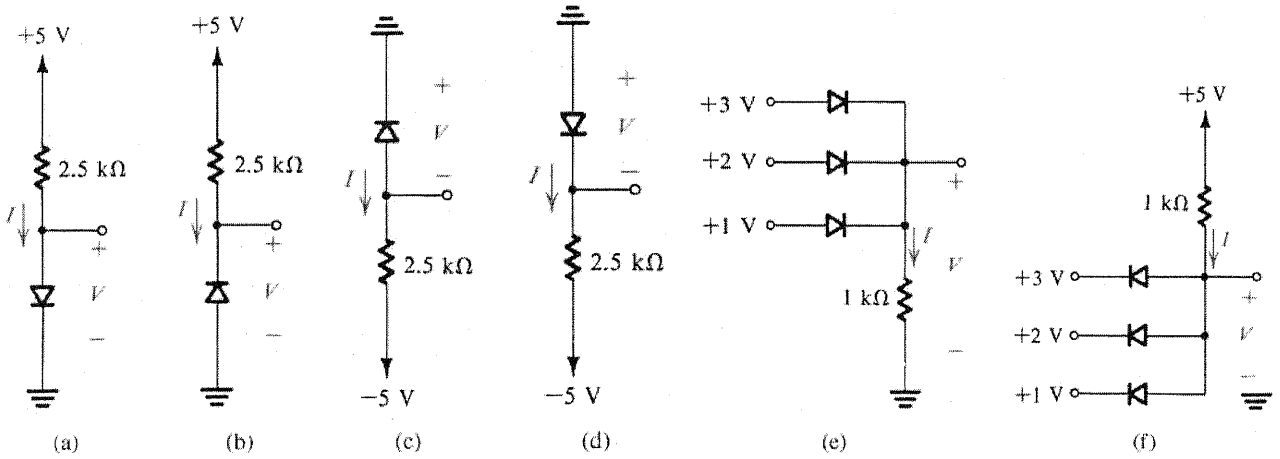


Fig. 1

2. Refer to Fig. 2 and assume ideal op amps,
   (a) Find the voltage gain v_o/v_i, (8%)
   (b) Find the input resistance R_{in}. (8%)
   (Describe carefully how to get all the solutions.)

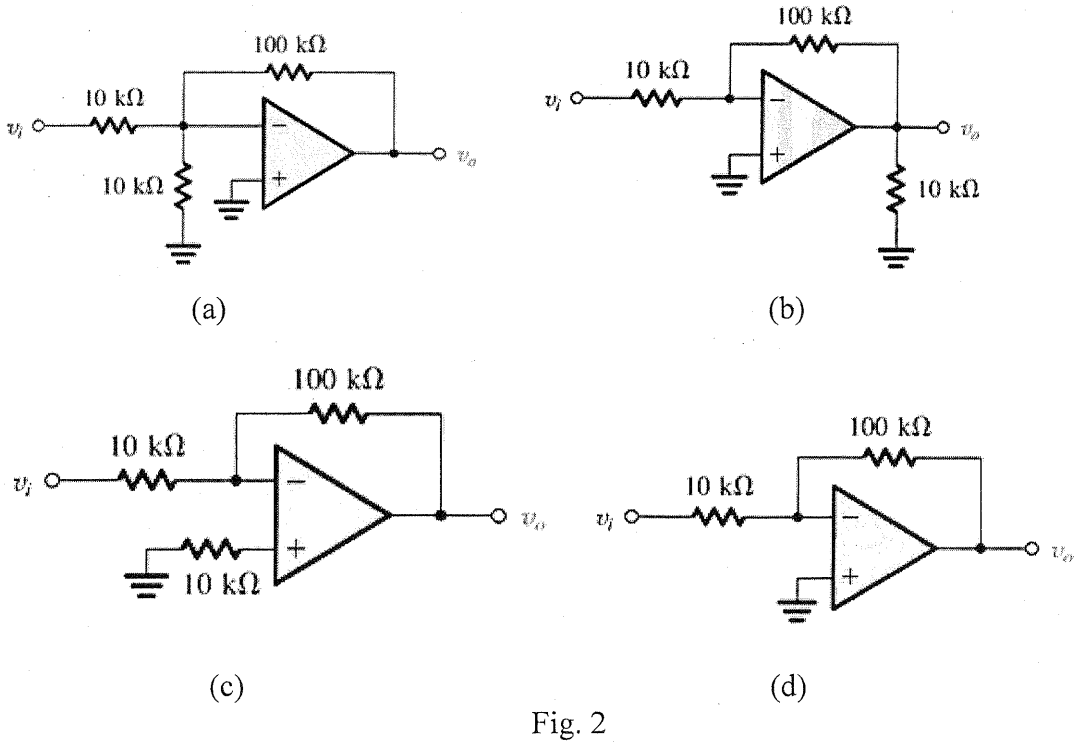
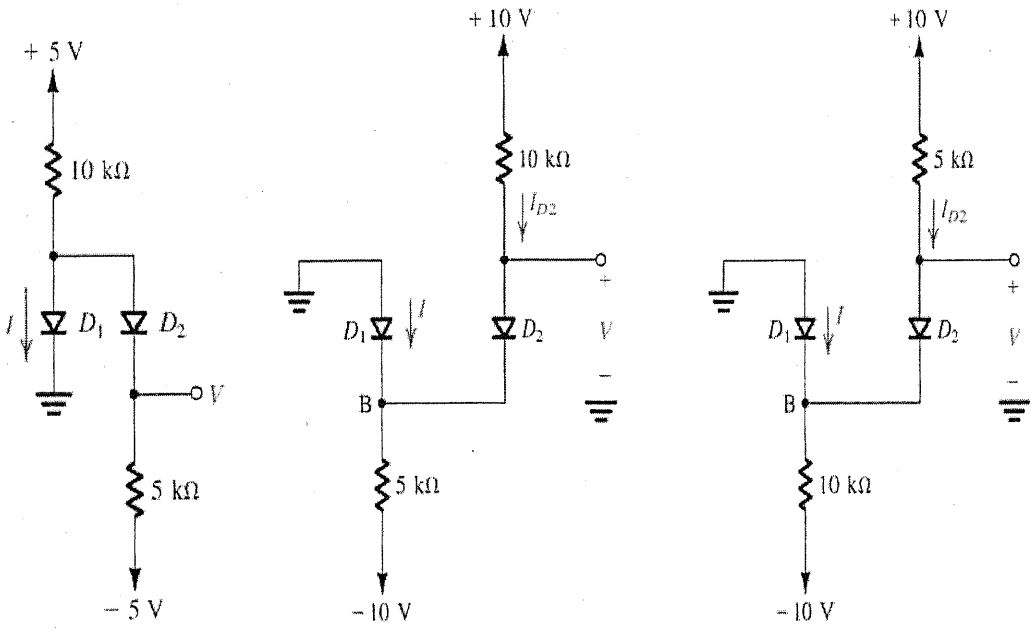


Fig. 2

3. Assuming that the diodes in the circuit of Fig. 3 are ideal, find the values of the labeled voltages and currents. ((a) 6%, (b) 6%, (c) 6%)



(a) (b) (c)

Fig. 3

4. If we use constant-voltage-drop diode model shown in Fig. 4(a) for the diode used in Fig. 4(b),
(a) plot v_O versus v_I for $-10V \le v_I \le 10V$. Indicate all breakpoints. (5%)
(b) plot i_D over the same range of input voltage. (5%)

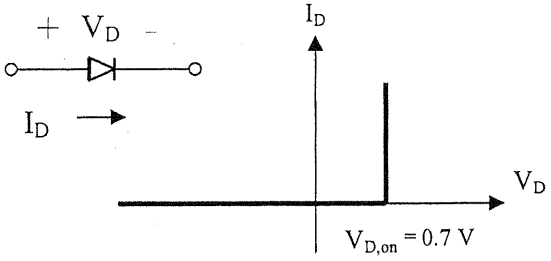


Fig. 4(a)

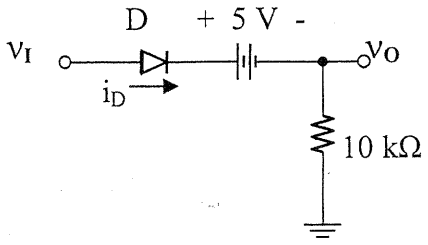


Fig. 4(b)

5. For the circuit shown in Fig. 5, if λ= 0, K_n = 60 mA / V^2, V_{TN} = 0.4 V.
   (a) Determine the quiescent values V_{GSQ} and V_{DSQ}. （8%）
   (b) Find the small-signal parameters g_m and r_o. （8%）
   (c) Find Rin, Rout, and νout / νin. （8%）
   ** For NMOS in saturation region, $i_D = K_n(v_{GS} - V_{TN})^2(1 + \lambda v_{DS})$

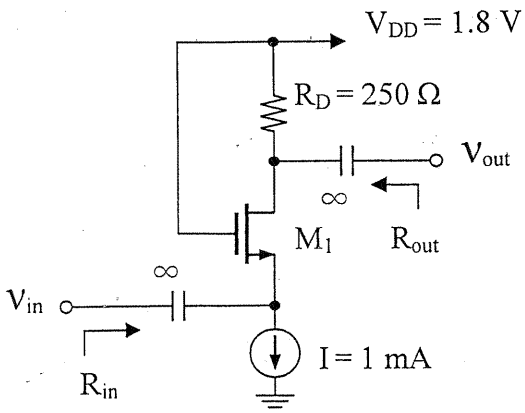


Fig. 5

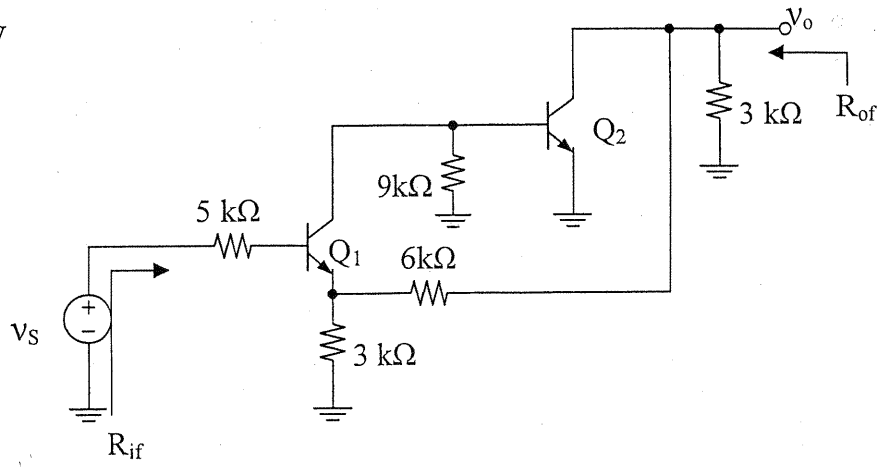


Fig. 6

6. The circuit shown in Fig. 6 is an AC circuit for a feedback amplifier, transistors Q1 and Q2 have the following parameters: $r_{\pi 1} = 5k\Omega$, $r_{\pi 2} = 2.5k\Omega$, and $\beta_{o1} = \beta_{o2} = 100$.
   (a) Find the input resistance R_{if} and the output resistance R_{of}. （8%）
   (b) Find the voltage gain $\frac{v_O}{v_S}$. （8%）