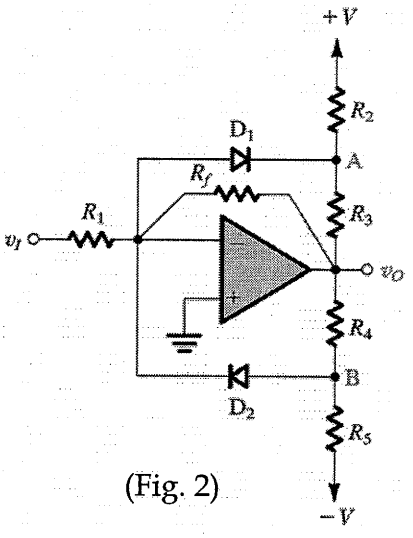
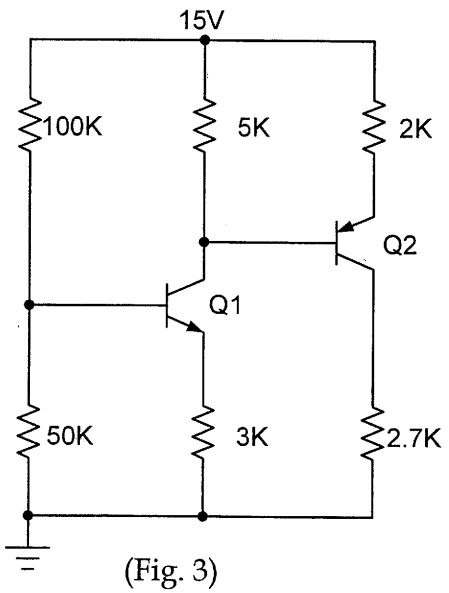
科目：電子學　　系所組：電機工程研究所乙組

1. (a). How much is the current for a series circuit with an ideal forward-biased diode, a 5kΩ resistor, and a 5V voltage source ? (5%)
   (b). Calculate the current for the circuit of (a) if the voltage drop of the forward-biased diode is 0.6V. (5%)
   (c). How much is the current for the series circuit if we connect the other diode with the same specification as in (b) back-to-back provided the breakdown voltage of the diode is greater than 10V ? (5%)

2. Fig. 2 shows a popular limiter circuit for amplitude control of oscillator circuits is shown in the right figure. Explain how does it operate. (15%)



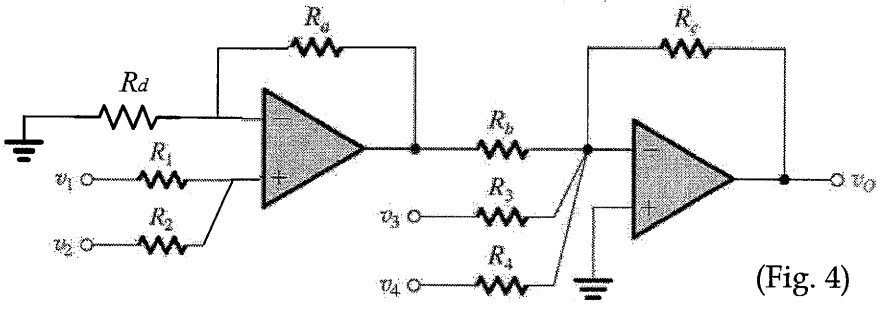
(Fig. 2)



(Fig. 3)

3. For the circuit shown in Fig.3 given $V_{be(on)}$=0.7V, β_1=150, β_2=50. Calculate the voltages at all nodes, currents through all branches and the DC power consumption ? (15%)

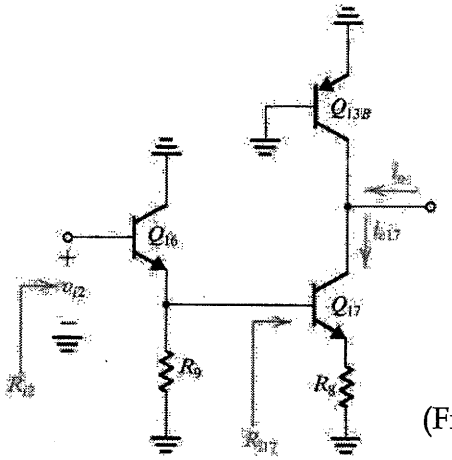
4. Fig. 4 shows the inverting configuration of an operating amplifier. What is the output voltage v_o ? (10%)



(Fig. 4)

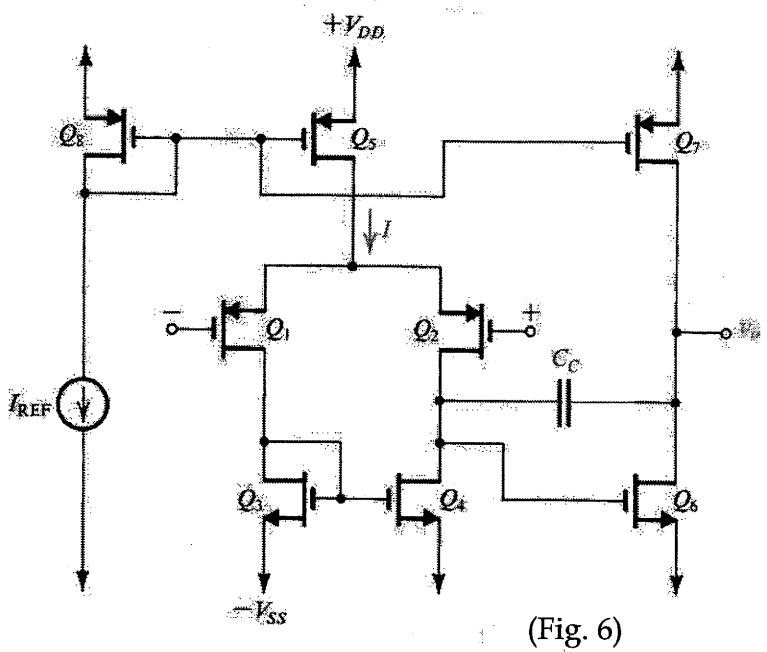
※ 注意：1.考生須在「彌封答案卷」上作答。
2.本試題紙空白部份可當稿紙使用。
3.考生於作答時可否使用計算機、法典、字典或其他資料或工具，以簡章之規定為準。

5. Fig.5 shows the 741 second stage circuit prepared for small-signal analysis. Describe the small-signal input impedance R_{i2} with small signal model parameters β, r_e and the component values shown in the figure. (15%)



(Fig. 5)

6. Fig. 6 shows a compensated two-stage CMOS operating amplifier
   (a). Calculate the pole/zero frequencies. (15%)
   (b). Explain the "pole-splitting compensation" for the two-stage amplifier with the bode plots. (15%)



(Fig. 6)

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