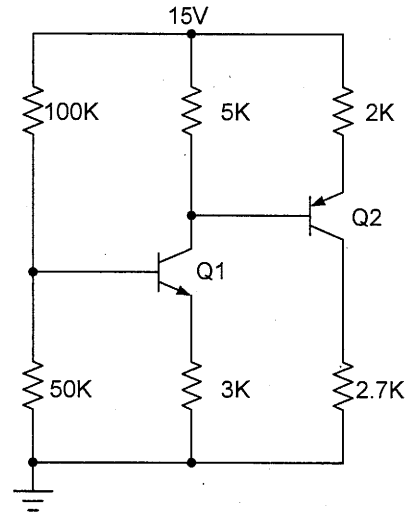


科目：電子學

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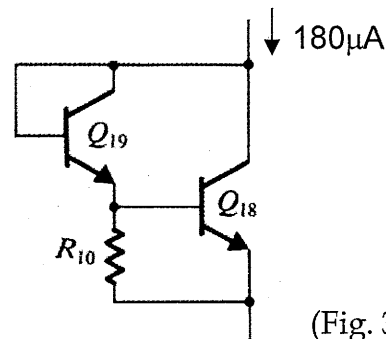
1. (a). How much is the current for a series circuit with an ideal forward-biased diode, a $5k\Omega$ resistor, and a $7.5V$ voltage source? (5%)
- (b). Calculate the current for the circuit of (a) if the voltage drop of the forward-biased diode is $0.7V$. (5%)
- (c). How much is the current for the 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 $15V$? (5%)

2. For the circuit shown in Fig. 2 given $V_{be(on)}=0.7V$, $\beta_1=145$, $\beta_2=45$. Calculate the currents through all branches. (15%)



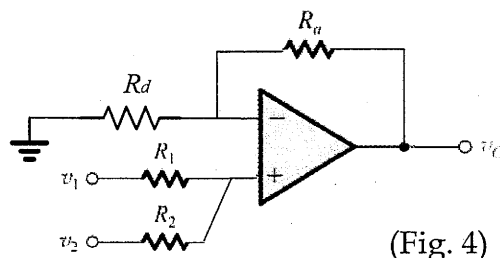
(Fig. 2)

3. Fig. 3 shows the bias-network for Class-AB operation. Calculate the voltage across it provided the current indicated is $180\mu A$ and $R_{10}=40k\Omega$, $\beta_N=200$, $V_T=25mV@300^\circ K$, $I_s=10^{-14}A$. (15%)



(Fig. 3)

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。

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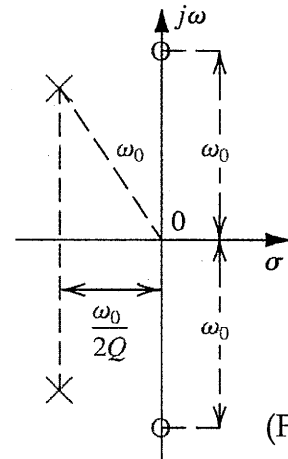
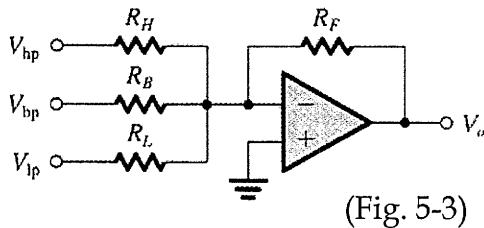
5. 選擇題 (45%)：請標明題號，作答於彌封答案卷內。

(1). If a BJT is in saturation mode, which operation is true? (A) B-E junction forward, B-C junction reverse (B) B-E junction forward, B-C junction forward (C) B-E junction reverse, B-C junction forward.

(2). Calculate the small-signal emitter resistance r_e for a BJT biased at $I_C=0.5mA$ with $V_T=25mV@300^\circ K$. (A) 30Ω (B) 40Ω (C) 50Ω .

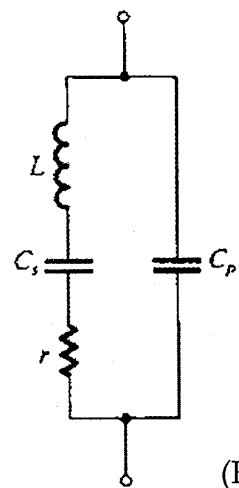
(3). Notch filters can be realized with a universal active filter as shown in Fig.5-3.

Which one is a correct implementation to obtain a notch filter by letting (A) $R_H=0$ and $\frac{R_H}{R_L} = \left(\frac{\omega_n}{\omega_0}\right)^2$ (B) $R_B=\infty$ and $\frac{R_H}{R_L} = \left(\frac{\omega_n}{\omega_0}\right)^2$ (C) $R_L=\infty$ and $\frac{R_H}{R_L} = \left(\frac{\omega_n}{\omega_0}\right)^2$



(4). The s-plane plot for a filter is shown in Fig. 5-4. What is the filter type? (A) low-pass filter (B) high-pass filter (C) notch filter.

(5). Fig. 5-5 shows the equivalent circuit of a piezoelectric crystal. The characteristics of the crystal oscillators do NOT include, (A) A piezoelectric crystal exhibits electromechanical resonance characteristics that are very stable and highly selective (B) Since C_p is larger than the other capacitance, it will dominant the resonance frequency (C) Crystals are available with resonance frequencies in the range of few kHz to hundreds of MHz.



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