

115AT03

國立臺北科技大學 115 學年度碩士班招生考試

系所組別：1502 自動化科技研究所

第二節 電子學 試題 (選考)

第 1 頁 共 2 頁

注意事項：

1. 本試題共 5 題，每題 20 分，共 100 分。
2. 不必抄題，作答時請將試題題號及答案依照順序寫在答案卷上。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

1. Assuming the op-amp is shown in Fig. 1, where $G(s) = \frac{100}{(1 + \frac{s}{10^4})^3}$, $R = 1 \text{ k}\Omega$ and $C = 100 \text{ nF}$. Please determine $\frac{V_o(s)}{V_s(s)}$. (20% in total)

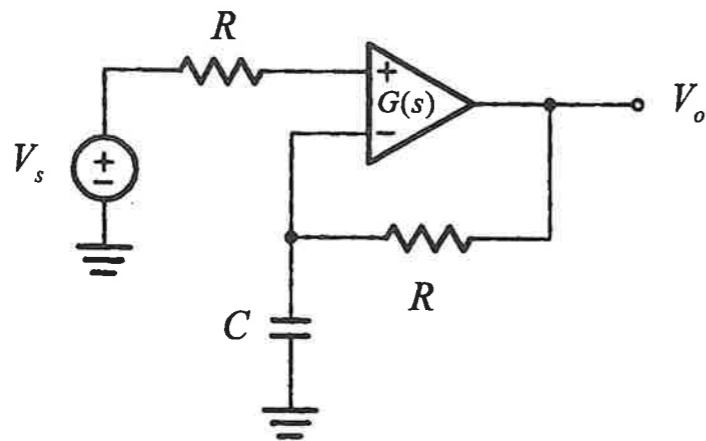


Fig. 1

2. A low-pass amplifier satisfies all of the following conditions: (20% in total)

Condition 1: Input resistance is $150 \text{ k}\Omega$.

Condition 2: DC gain is 40 dB.

Condition 3: 3-dB frequency is 10 kHz.

- (1) Please draw this low-pass amplifier. (※ You need draw this low-pass amplifier and calculate the component parameters in detail.) (10%)
- (2) What is the transfer function? (5%)
- (3) What is the unity-gain bandwidth f_T ? (5%)

3. For the ideal class B push-pull amplifier, please answer the following questions. (20% in total)

- (1) Please draw the circuit of an ideal class B push-pull amplifier. (6%)
- (2) What is the main disadvantage of an ideal class B push-pull amplifier? (4%)
- (3) Regarding question (2), you can improve this problem using an ideal op-amp. Please draw the improved circuit diagram. (10%)

4. Assuming that all op-amps in Fig. 2 are ideal. Please determine I and V_o . (20% in total)

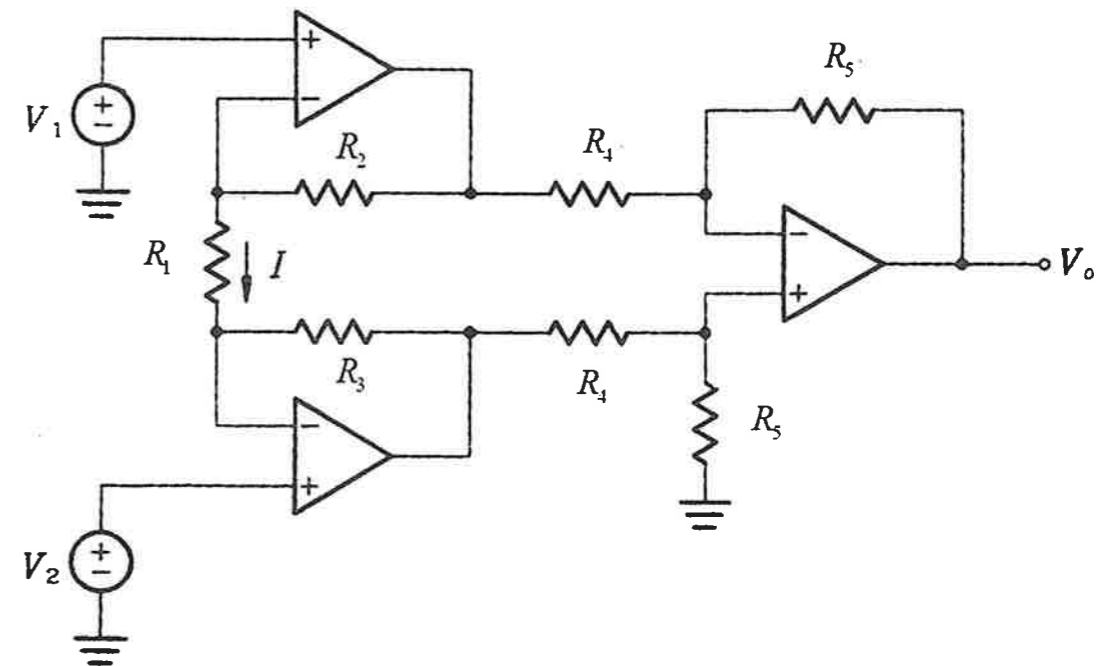


Fig. 2

5. In Fig 3, the transistor used has $\beta_o = 150$, $r_\pi = 1 \text{ k}\Omega$ and $r_o \rightarrow \infty$. (20% in total)

- (1) Determine the lower 3-dB frequency f_L . (10%)
- (2) Given the input current $i(t)$ is a 300 Hz square wave, determine the percentage tilt in the output. (10%)

注意：背面尚有試題

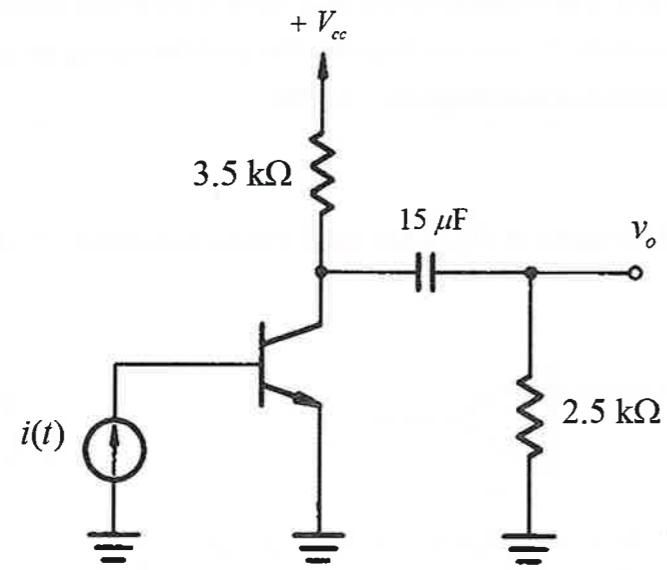


Fig. 3