

國立勤益科技大學 100 學年度研究所碩士班招生筆試試題卷

所別：電子工程系碩士班

組別：電子組

科目：電子學

准考證號碼：□□□□□□□□ (考生自填)

考生注意事項：

一、考試時間 100 分鐘。

二、應考人不得自行攜帶電子計算器，一律由本校統一提供

三、

試題一：〈15 分〉

For the high-pass STC circuit in Figure 1, find the smallest coupling capacitor C that will result a 3-dB frequency no greater than 10 Hz.

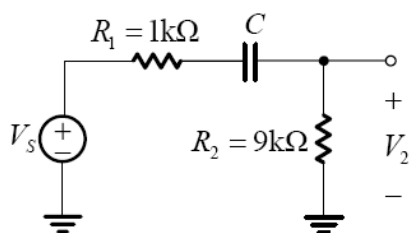


Figure 1

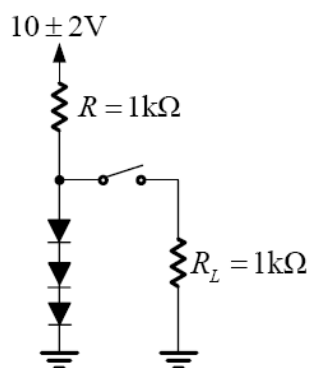


Figure 2

試題二：〈15 分〉

The circuit shown in Figure 2 is used to provide a constant voltage of about 1.95V. Calculate the change in output voltage caused by (a) a $\pm 2V$ change in the power-supply voltage and (b) connection of a $1k\Omega$ load resistance.

試題三：〈15 分〉

An NMOS FET has $\mu_n C_{ox} = 100\mu A/V^2$, $W/L = 40$, $V_t = 1V$, and $V_A = 10V$, find g_m and r_o when (a) $V_{GS} = 2V$, and when (b) $I_D = 1mA$.

試題四：〈5分〉

The best feedback way to increase the input impedance and decrease the output impedance is:

- (a) Series-Shunt feedback
- (b) Series-Series feedback
- (c) Shunt-Series feedback
- (d) Shunt-Shunt feedback

試題五：〈15分〉

Assuming the op amp to be ideal, derive an expression of the circuit shown in Figure 3 for the voltage gain $V_o/(V_1-V_2)$.

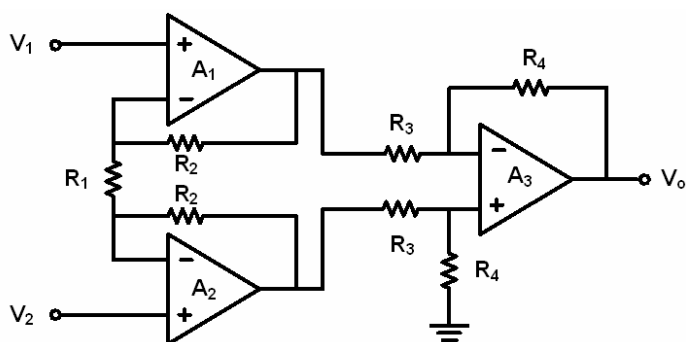


Figure 3

試題六：〈15分〉

For the circuit shown in Figure 4, the transistors have $V_{BE}(\text{on}) = V_{EB}(\text{on}) = 0.7\text{V}$ and $\beta=100$. Find the value of V_{B1} , V_{C1} , and V_{C2} .

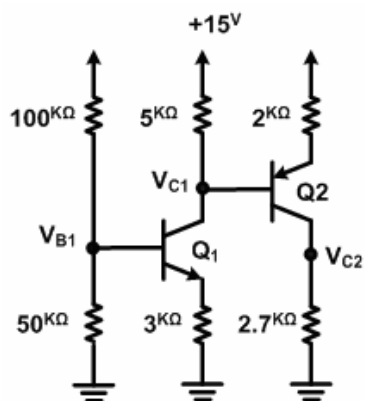


Figure 4

試題七：〈20分〉

Figure 5 shows a MOSFET differential amplifier circuit. The transistors have $V_t=1V$, $K_1=K_2=0.1 \text{ mA/V}^2$, $K_3=K_4=0.3 \text{ mA/V}^2$, and $\lambda=0$. Determine the maximal voltage range for the common-mode input signal. (Here $i_D=K(V_{GS}-V_t)^2$)

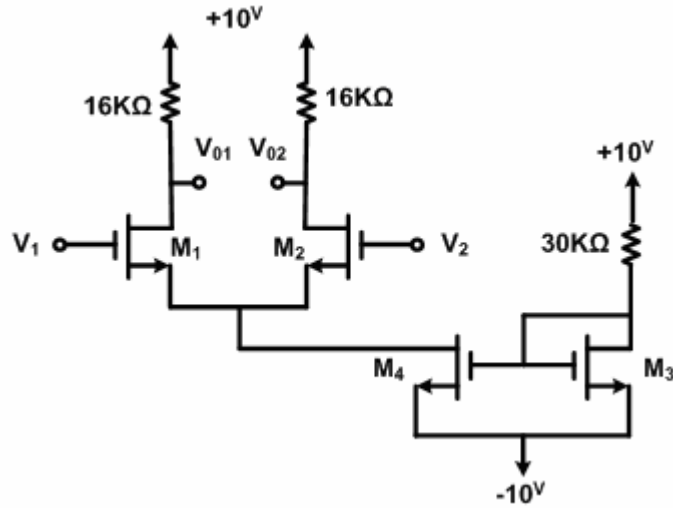


Figure 5