ME03

國立臺北科技大學108學年度碩士班招生考試

系所組別：1111 機械工程系機電整合碩士班甲組

第二節　電子學　試題（選考）

注意事項：

1. 本試題共四題，每題25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. For the circuit in Fig. 1, please derive an expression for the transfer function $V_o(s)/V_i(s)$. Show the transfer function is that of a low-pass circuit, and find the dc gain and the 3-dB frequency. (25%)

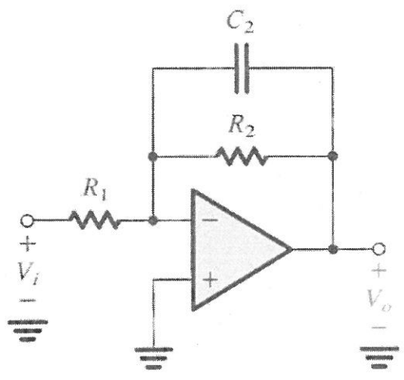

Fig. 1.

2. The op amp in the circuit of Fig. 2 is ideal with output saturation levels of ±12V. The diodes exhibit a constant 0.7 -V drop when conducting. Find v_-, v_+, and v_o for $v_I = +1V, +3V, -1V,$ and $-3V$. (25%)

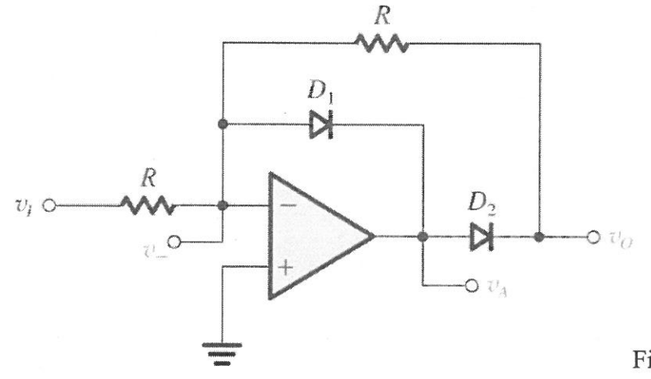

Fig. 2.

3. For the circuit in Fig. 3, find V_B and V_E for $v_I = 0V, +2V, -2.5V,$ and $-5V$. The BJTs have $\beta = 50$. (25%)

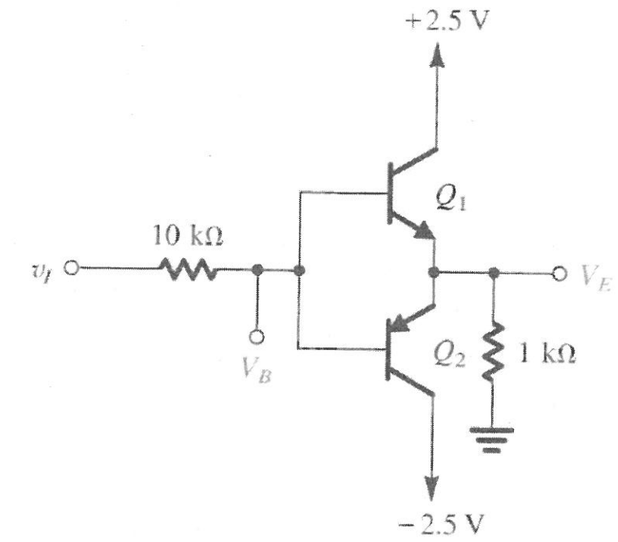

Fig. 3.

4. In the circuit of Fig. 4, transistors Q_1 and Q_2 have the threshold voltage $V_t = 0.7V$, and the process transconductance parameter $k_n' = 125\mu A/V^2$. Find V_1, V_2 and V_3 for each of the following cases:

(a) $(W/L)_1 = (W/L)_2 = 20$ (10%)

(b) $(W/L)_1 = 1.5(W/L)_2 = 20$ (15%)

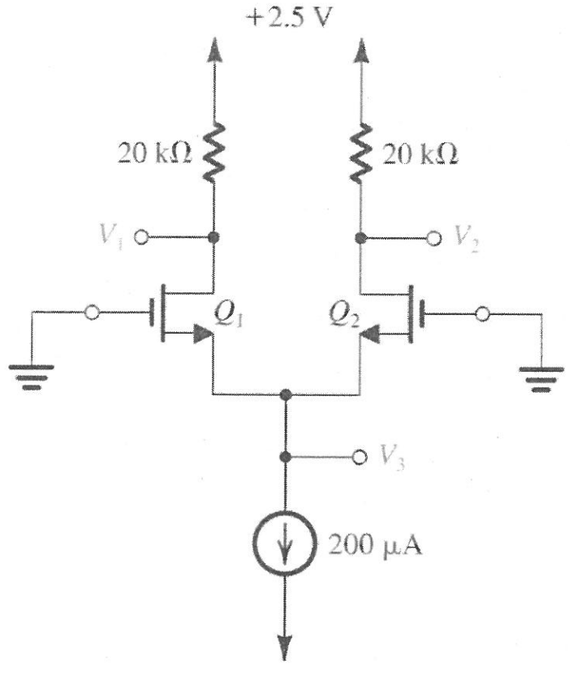

Fig. 4.