Name:
Student ID Number:
Section:
Lecturer: Dr. Jamaludin Bin Omar

EEEB273 - Quiz 4
SEMESTER 3, ACADEMIC YEAR 2013/2014
Date: 3 April 2014 Time: 15 minutes

Question:

Refer to **Figure 1**. Assume ideal op-amp.

(a) **Show** that the gain for the circuit is given by: **[6 marks]**

$$A_v = \frac{v_O}{v_I} = \left(1 + \frac{R_2}{R_1}\right)\left(\frac{R_4 / R_3}{1 + R_4 / R_3}\right)$$

(b) **Calculate A_v** when R_1 = **50 kΩ**, R_2 = **250 kΩ**, R_3 = **40 kΩ**, and R_4 = **20 kΩ**. **[4 marks]**

Show clearly all calculations in order to get full marks.

(a)

$$v_O = \left(1 + \frac{R_2}{R_1}\right) v_1 \quad [1]$$

$$v_1 = v_2 = \frac{R_4}{R_3 + R_4} v_I = \left(\frac{R_4 / R_3}{1 + R_4 / R_3}\right) v_I \quad [2]$$

$$v_O = \left(1 + \frac{R_2}{R_1}\right)\left(\frac{R_4 / R_3}{1 + R_4 / R_3}\right) v_I \quad [2]$$

$$A_V = \frac{v_O}{v_I} = \left(1 + \frac{R_2}{R_1}\right)\left(\frac{R_4 / R_3}{1 + R_4 / R_3}\right) \quad [1]$$

(b)

$$A_V = \frac{v_O}{v_I} = \left(1 + \frac{R_2}{R_1}\right)\left(\frac{R_4 / R_3}{1 + R_4 / R_3}\right) \quad [1]$$

$$A_V = \left(1 + \frac{250k}{50k}\right)\left(\frac{20k / 40k}{1 + 20k / 40k}\right) = 2 \text{ V/V} \quad [2,1]$$

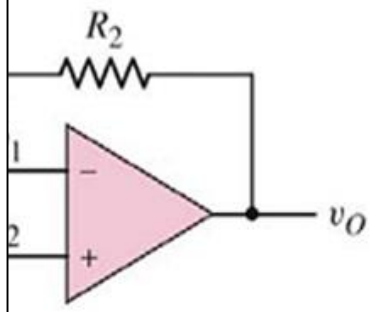

Figure 1