Name:	**Dr JBO**
Student ID Number:	**Model Answer**
Section:	01A / 01B
Lecturer:	Dr. Jamaludin Bin Omar

EEEB273 - Quiz 6 [Question Set 1]
SEMESTER 3, ACADEMIC YEAR 2011/2012
Date: 25 April 2012

Question:

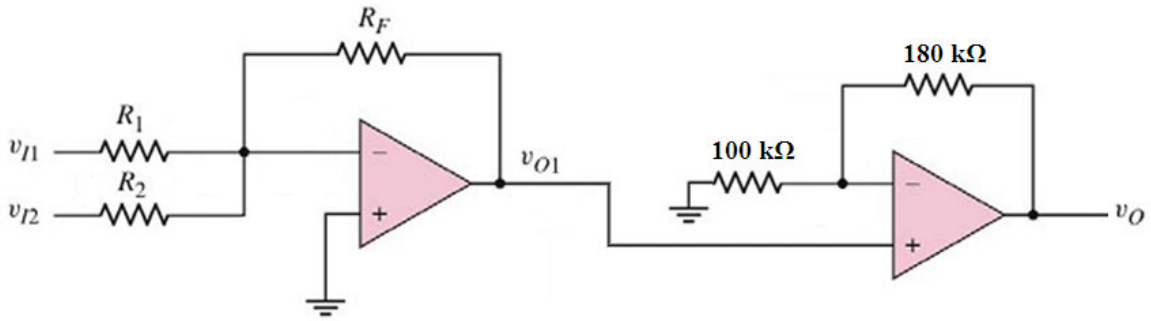

Figure 1

Refer to **Figure 1**.

(a) Using **superposition theorem** and **ideal op-amp properties**, determine v_{O1} when $R_1 = 10\ k\Omega$, $R_2 = 24\ k\Omega$, $R_F = 30\ k\Omega$, $v_{I1} = 25\ mV$, and $v_{I2} = -10\ mV$.

[8 marks]

(b) Find v_O.

[2 marks]

Show clearly all calculations in order to get full marks.

Answers:

(a)
Superposition theorem:

$v_{I2} = 0$, $v_{O1}(v_{I1}) = -(R_F / R_1)(v_{I1}) = -(30k/10k)(25m) = -75\ mV$ **[3]**

$v_{I1} = 0$, $v_{O1}(v_{I2}) = -(R_F / R_2)(v_{I2}) = -(30k/24k)(-10m) = 12.5\ mV$ **[3]**

$v_{O1} = v_{O1}(v_{I1}) + v_{O1}(v_{I2}) = (-75m) + (12.5m) = -62.5\ mV$ **[2]**

(b)

$v_O = (1+180k/100k)(v_{O1}) = (1+180k/100k)(-62.5m) = -175\ mV$ **[2]**

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EEEB273 - Quiz 6 [Question Set 2]
SEMESTER 3, ACADEMIC YEAR 2011/2012
Date: 25 April 2012

Question:

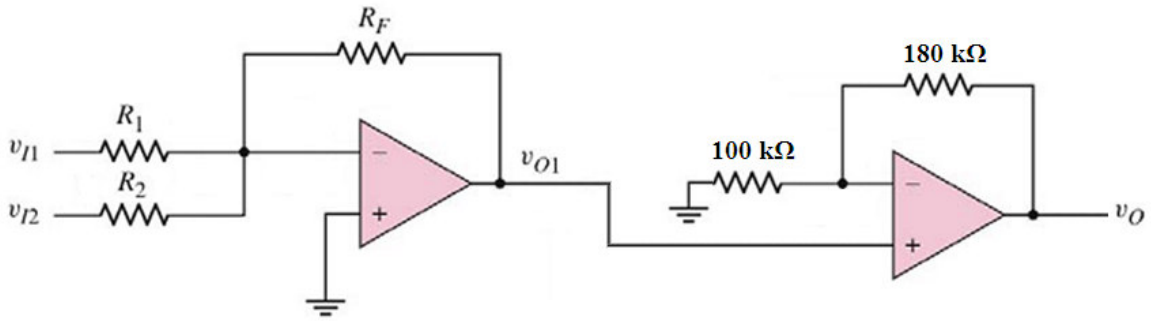

Figure 1

Refer to **Figure 1**.

(a) Using **superposition theorem** and **ideal op-amp properties**, determine v_{O1} when $R_1 = 15\ \text{k}\Omega$, $R_2 = 20\ \text{k}\Omega$, $R_F = 30\ \text{k}\Omega$, $v_{I1} = -25\ \text{mV}$, and $v_{I2} = 20\ \text{mV}$.

[8 marks]

(b) Find v_O.

[2 marks]

Show clearly all calculations in order to get full marks.

Answers:

(a)
Superposition theorem:

$v_{I2} = 0$, $v_{O1}(v_{I1}) = -(R_F / R_1)(v_{I1}) = -(30\text{k}/15\text{k})(-25\text{m}) = 50\ \text{mV}$ **[3]**

$v_{I1} = 0$, $v_{O1}(v_{I2}) = -(R_F / R_2)(v_{I2}) = -(30\text{k}/20\text{k})(20\text{m}) = -30\ \text{mV}$ **[3]**

$v_{O1} = v_{O1}(v_{I1}) + v_{O1}(v_{I2}) = (50\text{m}) + (-30\text{m}) = 20\ \text{mV}$ **[2]**

(b)

$v_O = (1+180\text{k}/100\text{k})(v_{O1}) = (1+180\text{k}/100\text{k})(20\text{m}) = 56\ \text{mV}$ **[2]**

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EEEB273 - Quiz 6 [Question Set 3]
SEMESTER 3, ACADEMIC YEAR 2011/2012
Date: 25 April 2012

Question:

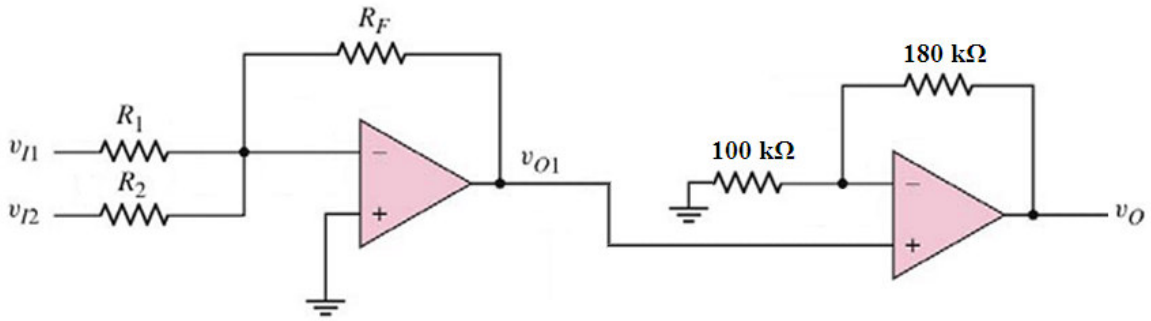

Figure 1

Refer to **Figure 1**.

(a) Using **superposition theorem** and **ideal op-amp properties**, determine v_{O1} when $R_1 = 12\ k\Omega$, $R_2 = 20\ k\Omega$, $R_F = 24\ k\Omega$, $v_{I1} = 15\ mV$, and $v_{I2} = -20\ mV$.

[8 marks]

(b) Find v_O.

[2 marks]

Show clearly all calculations in order to get full marks.

Answers:

(a)
Superposition theorem:

$v_{I2} = 0$, $v_{O1}(v_{I1}) = -(R_F / R_1)(v_{I1}) = -(24k/12k)(15m) = -30\ mV$ **[3]**

$v_{I1} = 0$, $v_{O1}(v_{I2}) = -(R_F / R_2)(v_{I2}) = -(24k/20k)(-20m) = 24\ mV$ **[3]**

$v_{O1} = v_{O1}(v_{I1}) + v_{O1}(v_{I2}) = (-30m) + (24m) = -6\ mV$ **[2]**

(b)

$v_O = (1+180k/100k)(v_{O1}) = (1+180k/100k)(-6m) = -16.8\ mV$ **[2]**

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EEEB273 - Quiz 6 [Question Set 4]
SEMESTER 3, ACADEMIC YEAR 2011/2012
Date: 25 April 2012

Question:

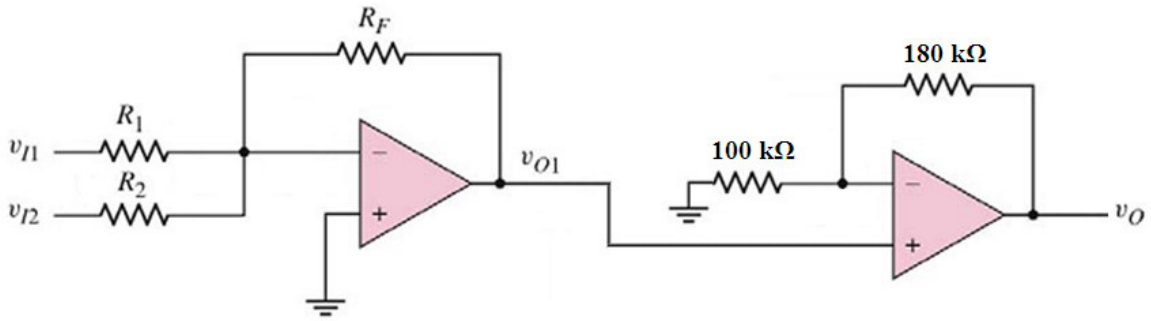

Figure 1

Refer to **Figure 1**.

(a) Using **superposition theorem** and **ideal op-amp properties**, determine v_{O1} when $R_1 = 20\ \text{k}\Omega$, $R_2 = 10\ \text{k}\Omega$, $R_F = 33\ \text{k}\Omega$, $v_{I1} = -15\ \text{mV}$, and $v_{I2} = 40\ \text{mV}$.

[8 marks]

(b) Find v_O.

[2 marks]

Show clearly all calculations in order to get full marks.

Answers:

(a)
Superposition theorem:

$v_{I2} = 0$, $v_{O1}(v_{I1}) = -(R_F / R_1)(v_{I1}) = -(33\text{k}/20\text{k})(-15\text{m}) = 24.75\ \text{mV}$ **[3]**

$v_{I1} = 0$, $v_{O1}(v_{I2}) = -(R_F / R_2)(v_{I2}) = -(33\text{k}/10\text{k})(40\text{m}) = -132\ \text{mV}$ **[3]**

$v_{O1} = v_{O1}(v_{I1}) + v_{O1}(v_{I2}) = (24.75\text{m}) + (-132\text{m}) = -107.25\ \text{mV}$ **[2]**

(b)

$v_O = (1+180\text{k}/100\text{k})(v_{O1}) = (1+180\text{k}/100\text{k})(-107.25\text{m}) = -300.3\ \text{mV}$ **[2]**