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

EEEB273 - Quiz 4 T
SEMESTER 1, ACADEMIC YEAR 2013/2014
Date: 2 September 2013 Time: 15 minutes

Question:

Refer to Figure 1.

(a) **Derive** the relationship (formula) between v_I and v_O in terms of R_1 and R_2. **[6 marks]**

(b) **Calculate v_O** when R_1 = **50 kΩ**, R_2 = **200 kΩ** and v_I = **0.5 V**. **[4 marks]**

Show clearly all calculations in order to get full marks.

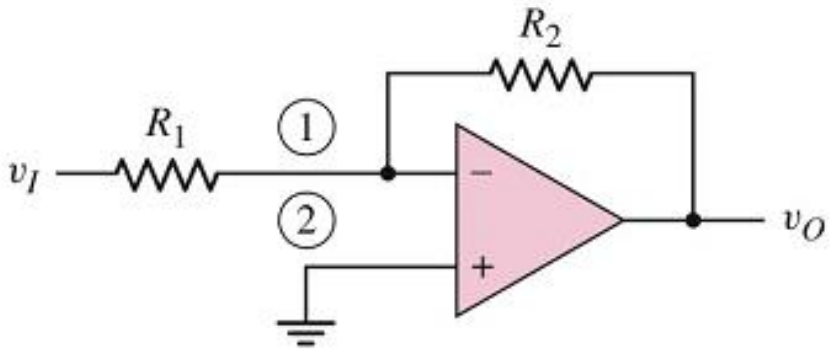

Figure 1

Answer:

(a)

$v_1 \cong v_2 = 0$	[1]
$i_1 = (v_I - v_1) / R_1 = v_I / R_1$	[2]
$i_I = i_2$	[0.5]
$v_O = v_1 - i_2 R_2 = 0 - (v_I / R_1) R_2$	[2]
$v_O = -(R_2 / R_1) v_I$	[0.5]

(b)

$v_O = -(R_2 / R_1) v_I$	[2]
$= -(200k / 50k)(0.5V) = -2$ V	[2]

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Question:

Refer to Figure 1.

(c) **Derive** the relationship (formula) between v_I and v_O in terms of R_1 and R_2. **[6 marks]**

(d) **Calculate v_I** when R_1 = **50 kΩ**, R_2 = **180 kΩ** and v_O = **2.5 V**. **[4 marks]**

Show clearly all calculations in order to get full marks.

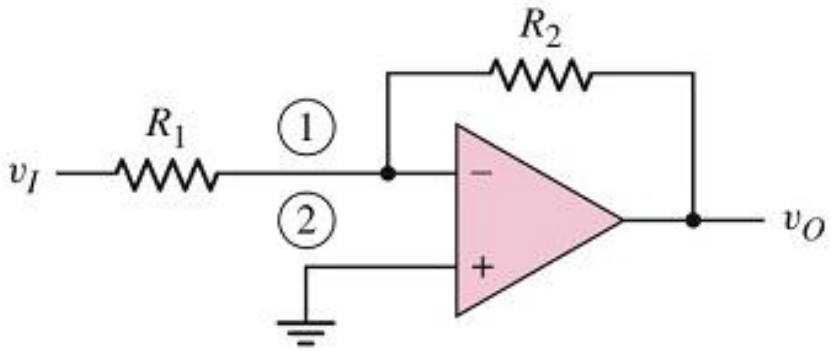

Figure 1

Answer:

(a)

$v_1 \cong v_2 = 0$	[1]
$i_1 = (v_I - v_1) / R_1 = v_I / R_1$	[2]
$i_I = i_2$	[0.5]
$v_O = v_1 - i_2 R_2 = 0 - (v_I / R_1) R_2$	[2]
$v_O = -(R_2 / R_1) v_I$	[0.5]

(b)

$V_I = -(R_1 / R_2) v_O$	[2]
$= -(50k / 180k)(2.5V) = -0.6944$ V	[2]

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Question:

Refer to Figure 1.

(e) **Derive** the relationship (formula) between v_I and v_O in terms of R_1 and R_2. **[6 marks]**

(f) **Calculate R_1** when R_2 = **150 kΩ**, v_I = **-0.5 V** and v_O = **2.5 V**. **[4 marks]**

Show clearly all calculations in order to get full marks.

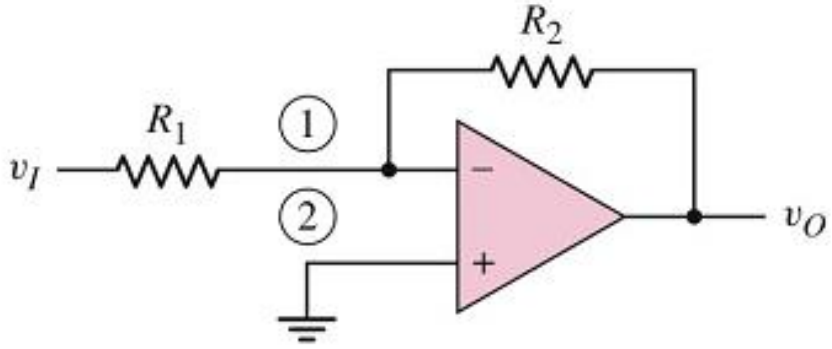

Figure 1

Answer:

(a)

$v_1 \cong v_2 = 0$	[1]
$i_1 = (v_I - v_1) / R_1 = v_I / R_1$	[2]
$i_I = i_2$	[0.5]
$v_O = v_1 - i_2 R_2 = 0 - (v_I / R_1) R_2$	[2]
$v_O = -(R_2 / R_1) v_I$	[0.5]

(b)

$R_1 = -(R_2 V_I) / v_O$	[2]
$= -$ **(150k x (-0.5)) / (2.5V) = 30 kΩ**	[2]

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Question:

Refer to Figure 1.

(g) **Derive** the relationship (formula) between v_I and v_O in terms of R_1 and R_2. **[6 marks]**

(h) **Calculate R_2** when R_1 = **50 kΩ**, v_1 = **-0.6 V** and v_O = **3.8 V**. **[4 marks]**

Show clearly all calculations in order to get full marks.

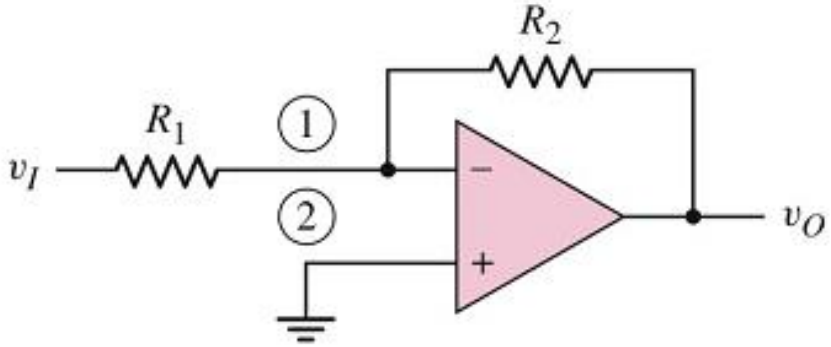

Figure 1

Answer:

(a)

$v_1 \cong v_2 = 0$	[1]
$i_1 = (v_I - v_1) / R_1 = v_I / R_1$	[2]
$i_I = i_2$	[0.5]
$v_O = v_1 - i_2 R_2 = 0 - (v_I / R_1) R_2$	[2]
$v_O = -(R_2 / R_1) v_I$	[0.5]

(b)

$R_2 = -(R_1 v_O) / v_I$	[2]
$= -$ **(50k x 3.8V)/(-0.6V) = 316.67 kΩ**	[2]