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

EEEB273 - Quiz 7
SEMESTER 2, ACADEMIC YEAR 2017/2018
Date: 17 January 2018 Time: 15 minutes .

Question:

Refer to **ideal** inverting op-amp in **Figure 1**. **Calculate** its absolute minimum and maximum values of the closed-loop voltage gain ($A_v = v_O/v_I$) when R_1 = **30 kΩ**, potentiometer R_{1V} = **0 to 30 kΩ**, and R_2 = **25 kΩ**.

Show your calculation clearly. [10 marks]

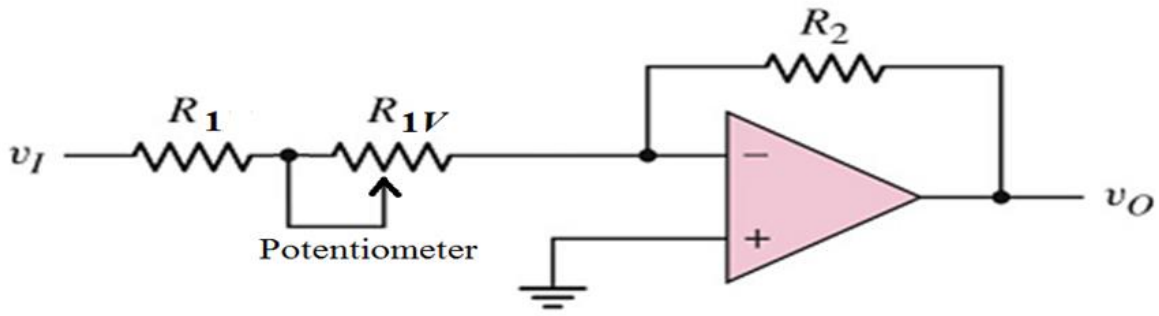

Figure 1

Answer:

$A_d = v_O / v_I = - R_2 / (R_1 + R_{1V})$ [1]

R_1 (min) = $R_1 + R_{1V}$ (min) = 30 kΩ [1]
R_1 (max) = $R_1 + R_{1V}$ (max) = 30 kΩ + 30 kΩ = 60 kΩ [1]
R_2 = 25 kΩ [1]

Absolute value of A_v is maximum when R_{1V} = 0.
A_v(max) = | - R_2 / R_1 (min) | [2]
⇨ A_v(max) = | -25k/30k | = 0.6 V/V [1]

Absolute value of A_v is minimum when R_{1V} = 30 kΩ.
A_v(min) = | - R_2 / R_1(max) | [2]
⇨ A_v(min) = = | -25k/60k | = 0.4167 V/V [1]

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Question:

Refer to **ideal** inverting op-amp in **Figure 1**. **Calculate** its absolute minimum and maximum values of the closed-loop voltage gain ($A_v = v_O/v_I$) when R_1 = **40 kΩ**, potentiometer R_{1V} = **0 to 30 kΩ**, and R_2 = **45 kΩ**.

Show your calculation clearly. [10 marks]

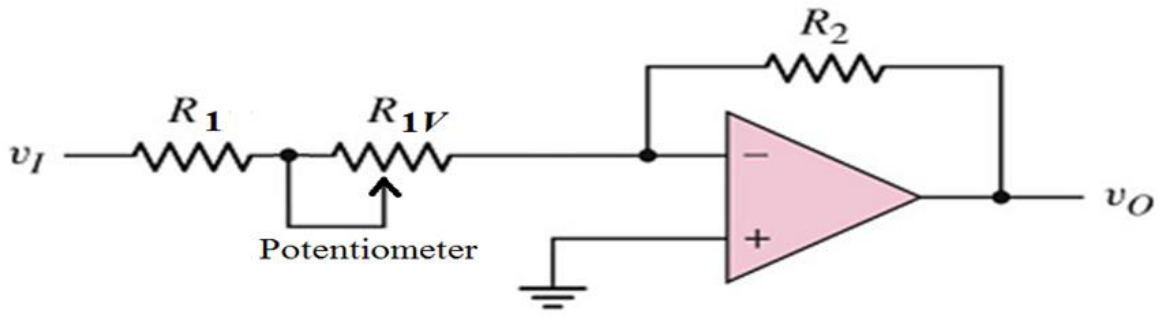

Figure 1

Answer:

$A_d = v_O / v_I = - R_2 / (R_1 + R_{1V})$ **[1]**

R_1 (min) = $R_1 + R_{1V}$ (min) = 40 kΩ **[1]**
R_1 (max) = $R_1 + R_{1V}$ (max) = 40 kΩ + 30 kΩ = 70 kΩ **[1]**
R_2 = 45 kΩ **[1]**

Absolute value of A_v is maximum when R_{1V} is minimum.
A_v(max) = | - R_2 / R_1 (min) | **[2]**
⇨ A_v(max) = | -45k/40k | = 1.125 V/V **[1]**

Absolute value of A_v is minimum when R_{1V} = 30 kΩ.
A_v(min) = | - R_2 / R_1(max) | **[2]**
⇨ A_v(min) = = | -45k/70k | = 0.6428 V/V **[1]**

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Question:

Refer to **ideal** inverting op-amp in **Figure 1**. **Calculate** its absolute minimum and maximum values of the closed-loop voltage gain ($A_v = v_O/v_I$) when R_1 = **20 kΩ**, potentiometer R_{1V} = **0 to 40 kΩ**, and R_2 = **75 kΩ**.

Show your calculation clearly. [10 marks]

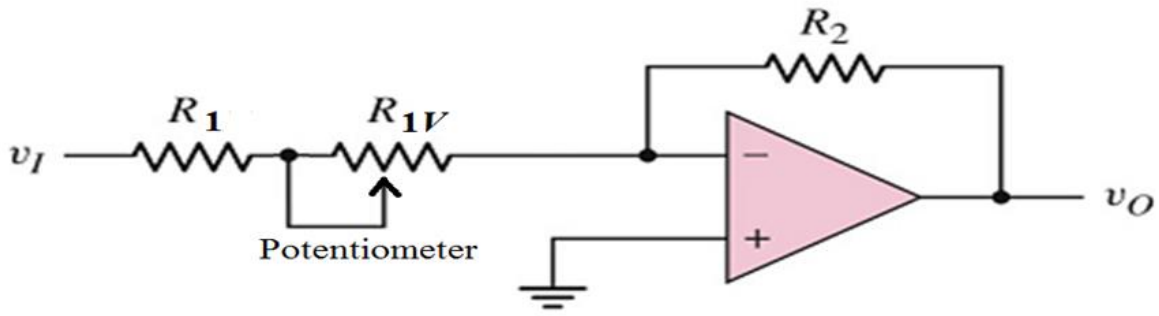

Figure 1

Answer:

$A_d = v_O / v_I = - R_2 / (R_1 + R_{1V})$ [1]

R_1 (min) = $R_1 + R_{1V}$ (min) = 20 kΩ [1]
R_1 (max) = $R_1 + R_{1V}$ (max) = 20 kΩ + 40 kΩ = 60 kΩ [1]
R_2 = 75 kΩ [1]

Absolute value of A_v is maximum when R_{1V} is minimum.
A_v(max) = | - R_2 / R_1 (min) | [2]
⇨ A_v(max) = | -75k/20k | = 3.75 V/V [1]

Absolute value of A_v is minimum when R_{1V} = 30 kΩ.
A_v(min) = | - R_2 / R_1(max) | [2]
⇨ A_v(min) = = | -75k/60k | = 1.25 V/V [1]

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Question:

Refer to **ideal** inverting op-amp in **Figure 1**. **Calculate** its absolute minimum and maximum values of the closed-loop voltage gain ($A_v = v_O/v_I$) when R_1 = **25 kΩ**, potentiometer R_{1V} = **0 to 35 kΩ**, and R_2 = **80 kΩ**.

Show your calculation clearly. [10 marks]

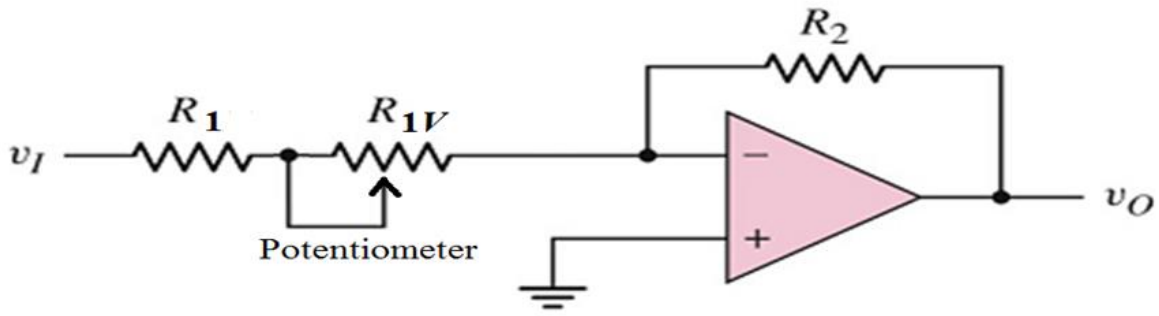

Figure 1

Answer:

$A_d = v_O / v_I = - R_2 / (R_1 + R_{1V})$ [1]

R_1 (min) = $R_1 + R_{1V}$ (min) = 25 kΩ [1]
R_1 (max) = $R_1 + R_{1V}$ (max) = 25 kΩ + 35 kΩ = 60 kΩ [1]
R_2 = 80 kΩ [1]

Absolute value of A_v is maximum when R_{1V} is minimum.
A_v(max) = | - R_2 / R_1 (min) | [2]
⇨ A_v(max) = | -80k/25k | = 3.2 V/V [1]

Absolute value of A_v is minimum when R_{1V} = 30 kΩ.
A_v(min) = | - R_2 / R_1(max) | [2]
⇨ A_v(min) = = | -80k/60k | = 1.333 V/V [1]