BME 212 Electronics Laboratory

Experiment #8 OPAMP Characteristics and Basic OPAMP Circuits

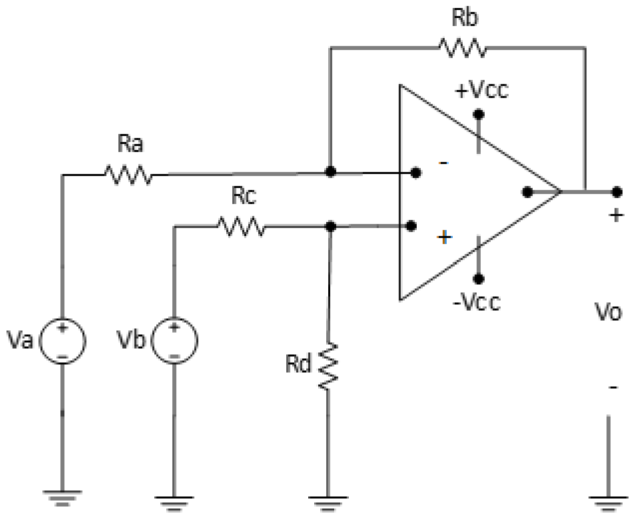
Objective

- The objective of this experiment is understanding applications of inverting, non-inverting, summing and differantial amplifer circuits.

Preliminary Work

1. Design an inverting-summing amplifier by choosing resistors Rf, Ra, Rb, Rc and Rd so that $v_o = -(3v_a + 5v_b + 4v_c + 2v_d)$. Then, draw your final circuit diagram.
   (Hint : Start by choosing a feedback resistor (Rf).)

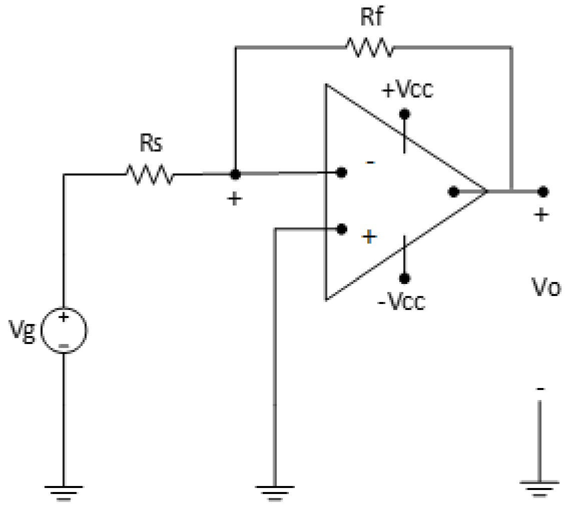
2. Ra = 22kΩ
   Rb = 75kΩ
   Rc = 130kΩ
   Rd = 100kΩ
   Va = 10V
   Vb = 8V
   +Vcc = +15V
   -Vcc = -15V



a. Find Vo
b. What is the resistance seen by the signal source Va?
c. What is the resistance seen by the signal source Vb?

Preliminary Work (Cont.)

3. The input resistance and output resistance of the opamp shown in the figure x (inverting amplifier) are 400kΩ and 4kΩ respectively. Also open loop gain is 200,000. If this opamp is operating in its linear region;



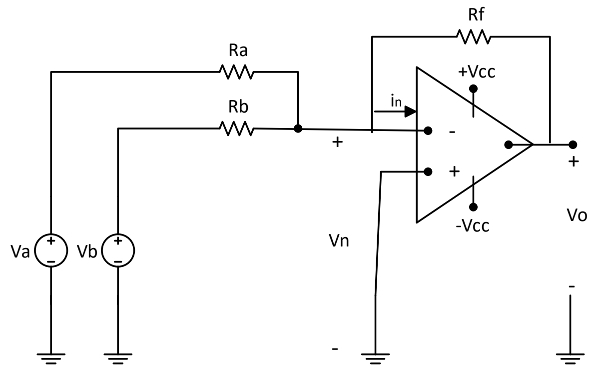
Rs = 5kΩ
Rf = 100kΩ
+Vcc = +20V
-Vcc = -20V

- Calculate the voltage gain (Vo/Vg)
- If Vg = 1V calculate the value of Vn in microvolts
- Calculate the resistance seen by the signal source (Vg)
- Repeat (a)-(c) using the ideal model for the opamp.

Procedure

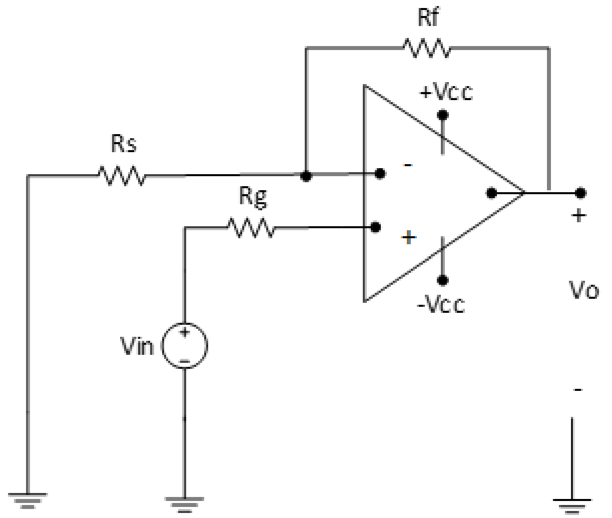
1) Set up the circuits a, c, and c given below. For all circuits observe $v_{in}(t)$ and $v_{\mathrm{o}}(t)$ then draw into the graph paper and calculate closed-loop gains (A_{CL}) . Also for circuit b plot the Vout vs. Vin using the X-Y plot function on the oscilloscope and draw the graph into the result paper.

a) Va = 0.1 sin($2000\pi t$) V
Vb = 0.2 sin($2000\pi t$) V
Vcc = +-15V
Rf = 100kΩ, Ra = 1kΩ
Rb = 2.2kΩ

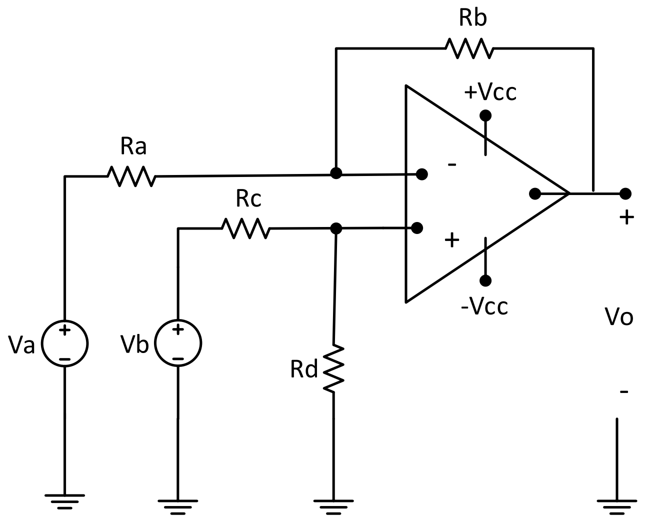


Procedure (Cont.)

b) $v_{in}(t)$ = 0.1 sin($2000\pi t$) V
Vcc = +-15V
Rs = 1kΩ, Rf = 100kΩ, Rg = 1kΩ



c) Va = 0.1 sin($2000\pi t$) V
Vb = 0.1 sin($2000\pi t$) V
Vcc = +-15V
Ra = 1kΩ, Rb = 100kΩ
Rc = 1kΩ, Rd = 100kΩ



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Results

1) Draw input vs. output voltages

A.

A_{CL}	

Comment:

B.

A_{CL}	

Comment:

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Results (Cont.)

C.

A_{CL}	

Comment: