CMPE 460 Laboratory Exercise 7

Op Amp and Filter Design

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Lab Section: 1
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Lecture Section: 1
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By submitting this report, you attest that you neither have given nor have received any assistance (including writing, collecting data, plotting figures, tables or graphs, or using previous student reports as a reference), and you further acknowledge that giving or receiving such assistance will result in a failing grade for this course.

Your Signature: _____

Lab Description

This laboratory exercise involved using an op amp as as DC inverting amplifier, DC non-inverting amplifier, AC inverting amplifier, AC non-inverting amplifier, and a summing amplifier. Each circuit was tested at different voltages where the result was both measured and calculated.
The op amp was also used to create a low pass filter, a high pass filter, and a band pass filter. The values of the required components were calculated and the circuits were tested at different frequencies. The results were measured and then graphed to show the frequency response and phase shift of each filter.

Schematics

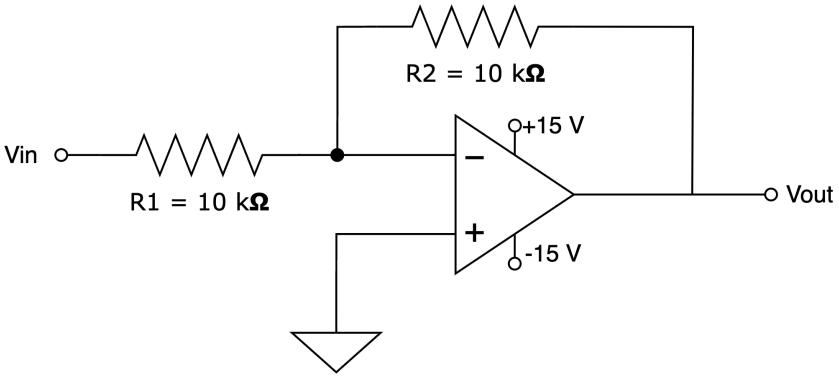

Figure 1: DC Inverting Amplifier

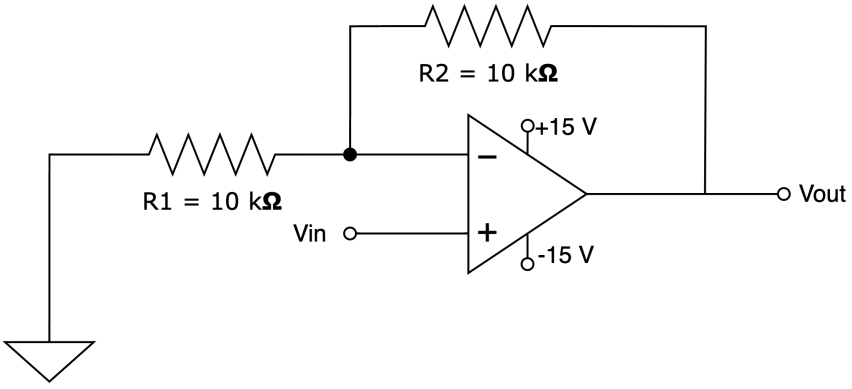

Figure 2: DC Non-Inverting Amplifier

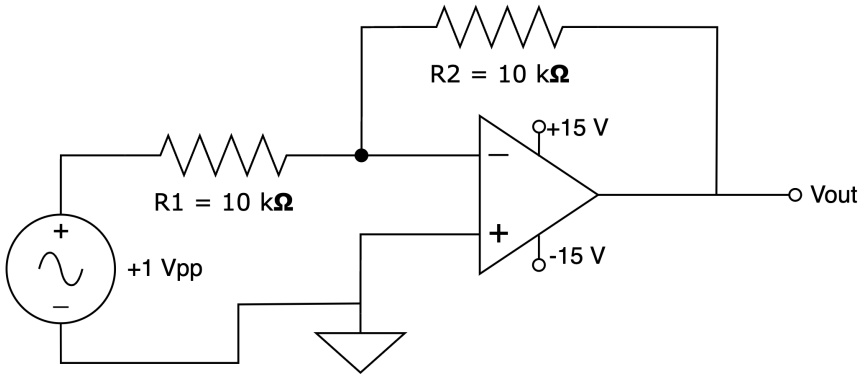

Figure 3: AC Inverting Amplifier

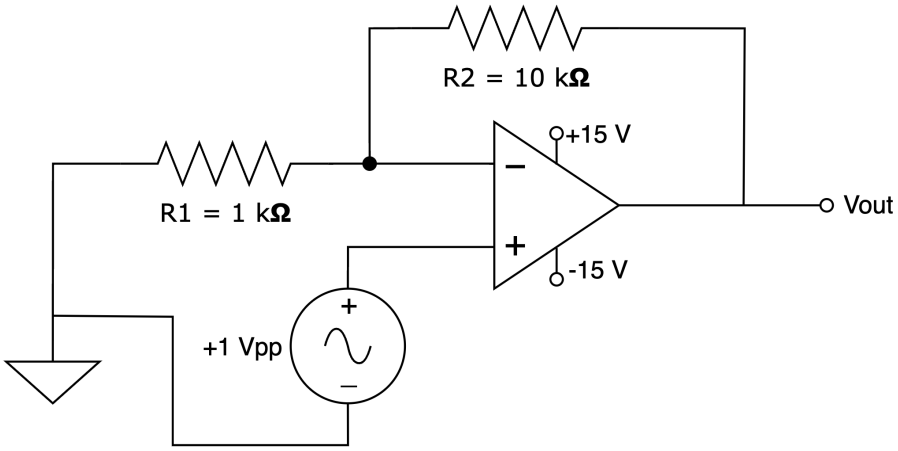

Figure 4: AC Non-Inverting Amplifier

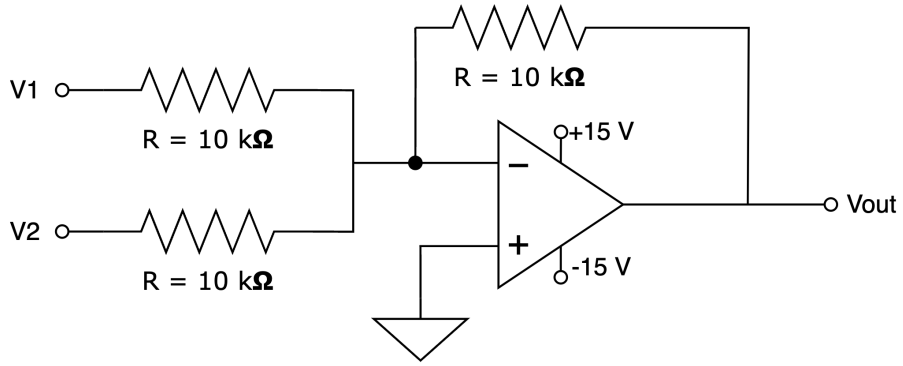

Figure 5: Summing Amplifier

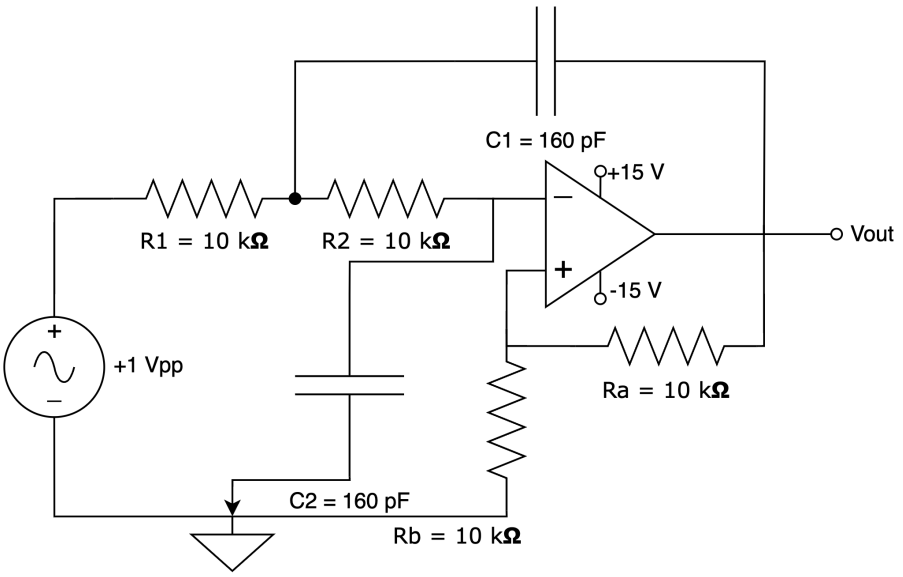

Figure 6: Low Pass Filter

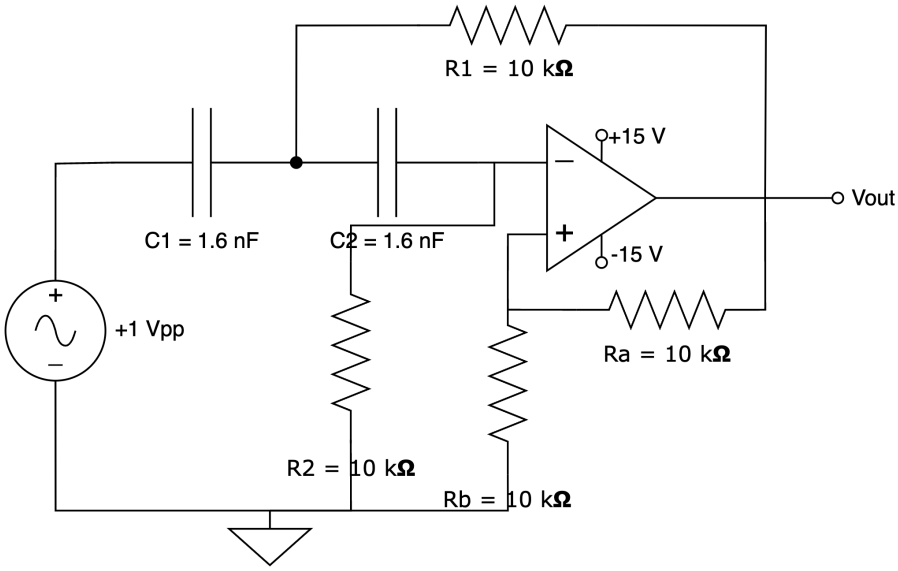

Figure 7: High Pass Filter

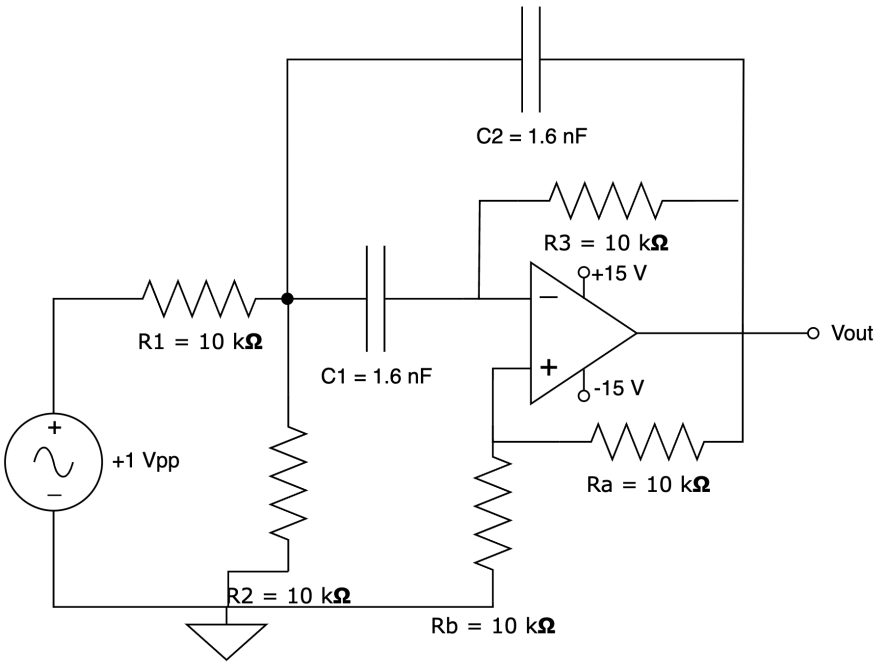

Figure 8: Band Pass Filter

Filters Calculations

Low Pass Filter

$$R_1 = R_2 = 10k\Omega$$

$$f_c = \frac{1}{2\pi\sqrt{R_1 R_2 C_1 C_2}} = \frac{1}{2\pi(10k\Omega)C} = 100KHz$$

$$C = C_1 = C_2 = \frac{1}{2\pi(10k\Omega)(100KHz)} = 159.15pF$$

High Pass Filter

$$R_1 = R_2 = 10k\Omega$$

$$f_c = \frac{1}{2\pi\sqrt{R_1 R_2 C_1 C_2}} = \frac{1}{2\pi(10k\Omega)C} = 10KHz$$

$$C = C_1 = C_2 = \frac{1}{2\pi(10k\Omega)(10KHz)} = 1.5915nF$$

Band Pass Filter

$$R_1 = R_2 = R_3 = 10k\Omega$$

$$f_r = \frac{1}{2\pi\sqrt{R_1 R_2 R_3 C_1 C_2}} = \frac{1}{2\pi(10k\Omega)C} = 10KHz$$

$$C = C_1 = C_2 = \frac{1}{2\pi(10k\Omega)(10KHz)} = 1.5915nF$$

Filters Plots

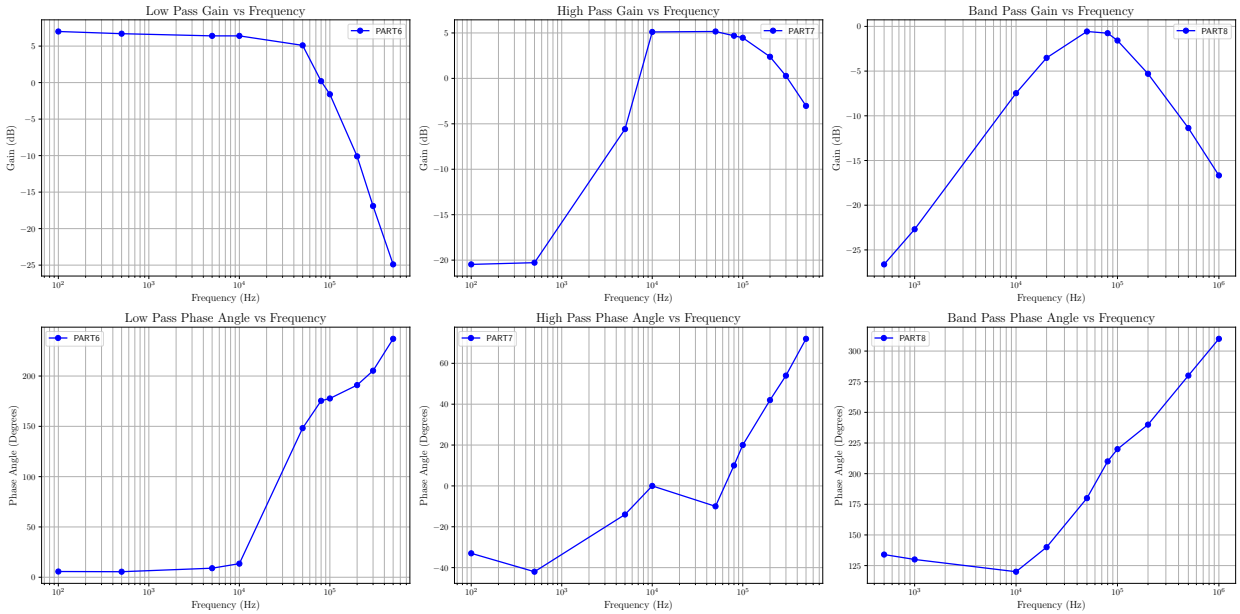

Figure 9: Filters Plots

Questions

Question 1.
Answer.

Question 2.
Answer.

Exercise 6: Motor Control

Student's Name: Mohammed Fareed Trent Wesley Section: 1

PreLab		Point Value	Points Earned	Comments
PreLab	Motor Calculations	10	10	~~AJT~~ 10/17
	H-Bridge Questions	10	10	~~AJT~~ 10/17

Demo		Point Value	Points Earned	Date
Demo	20% Duty Cycle at 10kHz	10	10	~~AJT~~ 10/25
	DC Motor Functionality	5	5	MT 10/30
	Stepper Motor Functionality	5	5	MT
	Servo Motor Functionality	5	5	MT 10/30
	Simultaneous TI Car Motors-Servo Motor	15	15	AJT 11/1

To receive any grading credit students must earn points for both the demonstration and the report.