

ECE 2100

Lab. IV – Dependent Sources and Op Amp: Voltage Amplifier, Transimpedance Amplifier

Pre-Lab

Important notes: this is the pre-Lab of Lab IV. You can print out, answer the questions (or type in answers) and submit at the start of Lab IV. To answer the questions, you need to go to the full Lab-IV description on this web page:

We do this (not having the full lab description along with the pre-Lab) in order to avoid printing out pages and pages of stuffs that no one will read anyway.

1. For Circuit B, with input resistance $1\text{ k}\Omega$, enter the expect signal gain for each of the following feedback resistance:

R_{fb}	$10\text{ k}\Omega$	$27\text{ k}\Omega$	$100\text{ k}\Omega$
Linear gain			
Gain in dB			

2. What are the supply voltage values that you will use to power your LM741 op amp?
3. We have only positive voltage power supply, how do we get negative voltage?
4. What instrument do we use to get a voltage that is time-varying, i. e. AC signal?
5. What instrument do we use to “look at” or more precisely, measure an AC voltage?
6. What are the three parameters that we need to uniquely specify a sinusoidal voltage signal?
7. Sketch (or use the app, copy and paste) a sinusoidal signal that has 3 Volt peak-to-peak, 1200 Hz, and $+0.5\pi$ phase shift relative to a reference signal (see the app on the convention of the sign of relative phase shift). You have to show BOTH the signal and the reference. The reference signal is - of course - of the same frequency, let its amplitude be 2-V pp.

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8. Sketch (or use the app, copy and paste) the expected output signal from Circuit B with $27\text{ k}\Omega$ feedback resistor, according to its equation, given the input signal be sinusoidal with 2.5-kHz frequency and 0.2-V peak-to-peak. Plot both the input and output signal

9. What will happen if you increase the input signal amplitude from 0.2 V to 2 V in question 8 above? (just a few words will be sufficient)

10. What will happen if you increase the input signal frequency from 2.5 kHz to 2.5 MHz in question 8 above? (if you are not sure, write "*not sure, to be researched*" and plan to find out experimentally when you have the circuit).

11. For Circuit A, if the photodiode current under 1000 lux light is $80\text{ }\mu\text{A}$ as its datasheet claims, for $10\text{-k}\Omega$ feedback resistance, what is the expected output voltage?

12. How will we test the optical receiver (both Circuit A and B together) in the lab? (just write one or two short sentences, no need for details).