

Assignment 03

Multisim Circuit Simulation

ECEN 222, Spring 2026

University of Nebraska-Lincoln

Overview

This assignment will introduce you to circuit simulation using Multisim. You will complete two tutorials that teach you the fundamentals of building and simulating circuits in the software. This is a hands-on assignment designed to help you become comfortable with Multisim, which you'll use throughout the course for labs and future assignments.

Submission Requirements

Submit a **single PDF document** containing all requested screenshots and reported values. Your PDF should include:

- Clear, legible screenshots with proper labels where appropriate
- All requested numerical values with appropriate units
- Organized sections corresponding to Parts 1 and 2 below

Software Requirements

- **Multisim:** Available through the NI Academic Site License. Download from <https://www.ni.com/> or use computers in the lab.

Part 1: DC Analysis [50 points]

Complete the “**Multisim Basics Tutorial: Building and Simulating Passive Circuits**” document. This tutorial covers DC circuit analysis with voltage dividers and current measurements.

DC Voltage Divider

After completing Tutorial 1, provide the following in your submission:

1.1 Screenshot [15 points]: Include a screenshot of your complete circuit showing:

- The DC voltage source (12V)
- Both resistors (R1 and R2 with values visible)
- Ground symbol
- Voltage probes placed at appropriate nodes

1.2 Screenshot [15 points]: Include a screenshot showing the voltage probe readings clearly visible.

DC Current Measurements

After completing Tutorial 2, provide:

2.1 Screenshot [10 points]: Include a screenshot of your circuit with current probes (ammeter) placed in the circuit.

2.2 Measured Values [10 points]: Include a screenshot showing the ammeter readings clearly visible. Report the current flowing through the circuit.

- Total current from the source.
- Does this value match your hand calculation using Ohm's law?
- Show your hand calculation.

Note on Screencaptures

When taking screenshots, make sure component values are clearly visible. You can zoom in or adjust the view in Multisim to make your circuit easier to read. Use the Windows Snipping Tool or similar to capture clean screenshots.

Part 2: Transient Analysis [50 points]

Complete the “**Multisim Transient Analysis Tutorial: Time-Domain Analysis of Passive Circuits**” document. This tutorial covers AC circuits and oscilloscope measurements.

Tutorial 1: RC Circuit with Oscilloscope

After completing the transient analysis tutorial, provide the following:

3.1 Circuit Screenshot [10 points]: Include a screenshot of your complete RC circuit showing:

- AC voltage source (function generator)
- Resistor and capacitor with values visible
- Oscilloscope connected with probes
- Ground connections

3.2 Oscilloscope Screenshot [15 points]: Include a screenshot of the oscilloscope display showing:

- Both input voltage (Channel A) and output voltage (Channel B) waveforms
- Time scale and voltage scale settings clearly visible
- At least 2-3 complete periods of the sine wave
- Make sure the oscilloscope window is large enough to read

3.3 Waveform Measurements [15 points]: From your oscilloscope display, report:

- Input voltage amplitude (peak voltage).
- Output voltage amplitude (peak voltage).
- Period of the waveform.
- Frequency (calculated from period).
- Phase shift between input and output.

3.4 Verification with Hand Calculations [10 points]:

- Using the component values (R, C) and frequency from your circuit, calculate the expected output voltage magnitude using impedance analysis. Show your work.
- Compare your calculated output voltage to the measured value from the oscilloscope. What is the percent error?
- Does the measured frequency match the source frequency you set?