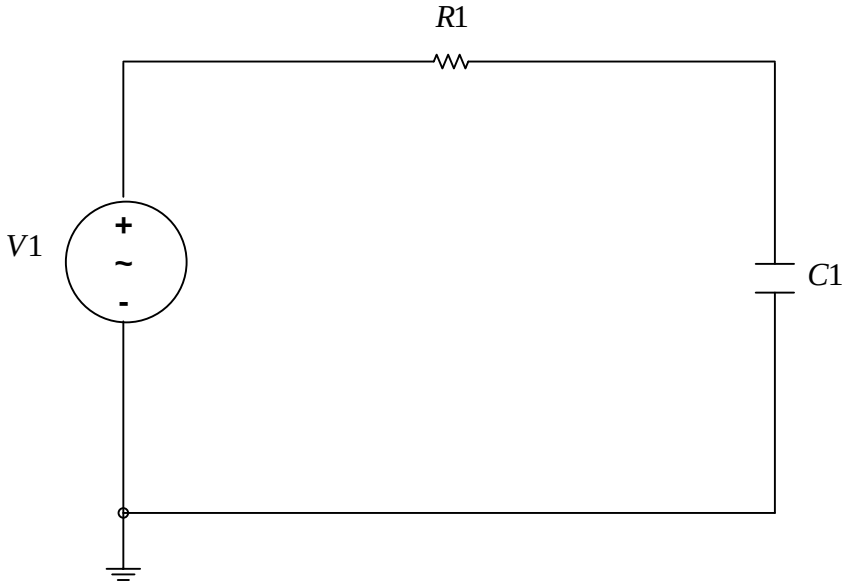
EE 221

Experiment #8: AC Steady-State Circuits

Problem: In our AC circuit labs, we will use the Agilent 33120A Function Generator to create a sinusoidal voltage source. The function generator is capable of creating numerous waveforms and is very user-friendly. This lab experiment will study the circuit shown below.



Let $R1 = 15k\Omega$, $C1 = 1.0\ \mu F$, and $V1 = 5\cos(\omega t)\ V$.

Calculate the values for the table shown below. State all phasors in polar form.

Next, construct the circuit. Setup the function generator to create the VI waveform – using the the following values for f: 10, 100, 1000 Hz. Measure both the capacitor and source voltages for each frequency using the oscilloscope. Print out copies of each plot with the waveforms clearly labeled.

Complete the table below, state the quantities in polar form using phasors. Let the input voltage source serve as the reference for all phasor angles.

Frequency (Hz)	Z_T (Ω) Calculated	I_S (mA) Calculated	V_{C1} (V) Calculated	V_{C1} (V) Simulated	V_{C1} (V) Measured
10					
100					
1000					

Simulation:

Construct the circuit in Multisim. (PROGRAMS-NATIONAL INSTRUMENTS-CIRCUIT DESIGN SUITE 11.0-MULTISIM). Simulate your circuit using the following values for f: 10, 100, 1000 Hz. For each frequency, use the oscilloscope to measure the voltage across the capacitor and compare it to the source voltage. Print out copies of each plot with the waveforms clearly labeled.

Follow-up Question:

1. If we swapped the location of the resistor and capacitor in the circuit, and the resistor was modeling a load (say for example an audio speaker), discuss and describe what this circuit would do for the load (from a frequency perspective).