ET 350L Name:
Lab D
Capacitive Reactance, Impedance, Phase Shift

Assemble the circuit in Fig. 1. Set the signal generator for a sine wave of 10k Hz and maximum amplitude but no D.C. offset. Also connect the oscilloscope as shown.

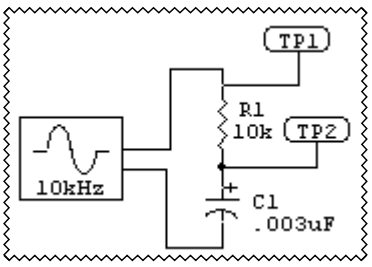

Fig. 1

1. Calculate capacitive reactance ($X_C = {}^{1}/_{2\pi fC}$)

X_C = _____

2. Calculate impedance using the vector diagram in Fig. 2; label the appropriate quantities.

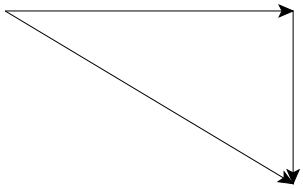
Fig. 2

3. Calculate the phase angle using the vector diagram in Fig. 2. ($\theta = \arctan {}^{X_C}/_{R}$)

θ = _____

4. Measure the voltage across the entire circuit: V_T = _____

5. Calculate total current: ($I = {}^{V_T}/_{Z}$) I = _____

6. Measure total current: I_T = _____
Do the calculated and measure values match?

7. Draw the observed waveforms in Fig. 3, label the axes and label the waveforms. What appears to be happening to the sine wave across the capacitor?

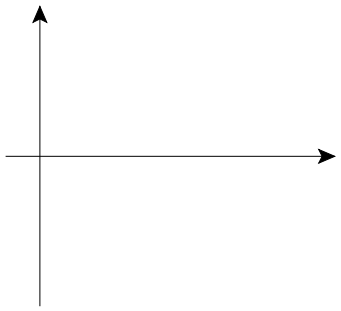
Fig. 3

8. Connect the circuit in Fig. 4 and apply a 10k Hz sine wave and maximum amplitude and connect the oscilloscope as shown.

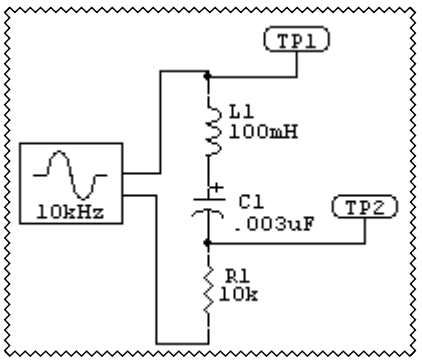

Fig. 4

9. Rotate the frequency control knob on the signal generator, above and below 10k Hz. What happens to the observed sine waves? At what frequency are the sine waves in phase?