

UNIVERSITY OF CALIFORNIA, BERKELEY

EE40 Summer 2008 Lab 3

Capacitors and Inductors Lab Report

Name : _____

Name : _____

TA : _____

Section : _____

This write-up follows along with the Hands On section of the lab. You should complete this report as you do the lab exercises.

1) Are you able to measure the value of the resistor? If not, explain the reason why you cannot make the measurement. (Explain how the DMM works.)

2) Explain how you got your ohmmeter reading for the circuit in Figure 4. Why does it take some time before the ohmmeter's reading stabilizes?

3) Can you determine the RC circuit configuration (series or parallel) using an ohmmeter? If so, how?

4) Which box contains a series RC circuit? Which box contains a parallel RC circuit?

Series RC Circuit Black Box

5) What is the time constant τ_1 ? Also measure and record RX1.

6) What is the time constant τ_2 ? Also measure and record RX2.

7) Find the resistance and capacitance R_B and C_B . Ask your TA for the resistance and capacitance of the resistor and the capacitor inside the black box. Are they in good agreement with the values you have obtained experimentally? Explain if there is (are) any significant difference(s).

Parallel RC Circuit Black Box

8) What is the value of the resistor R_B inside the black box?

9) What is the time constant of the circuit with R_x ? What is the value of the capacitor inside the black box? Ask your TA for the values of the resistor and the capacitor inside the black box. Are they in good agreement with the values you have obtained experimentally? Explain if there is (are) any significant differences.

4. Capacitors vs. Inductors

10)

Time shift: _____

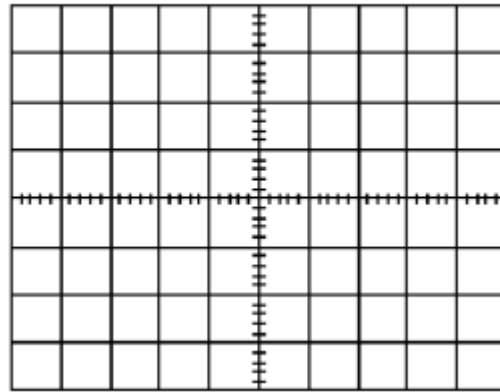
Period: _____

Calculated phase shift: _____

Directly measured phase shift: _____

Explain the phase shift:

Waveform



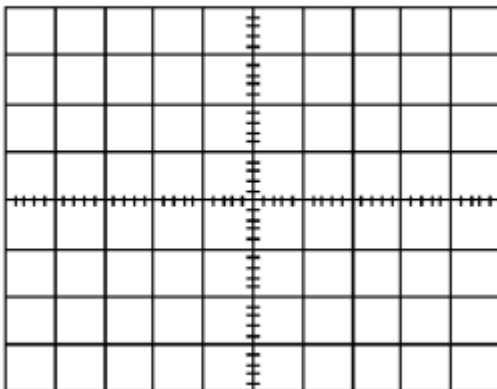
1.5 MHz graph

11)

What happens as you increase the input frequency?

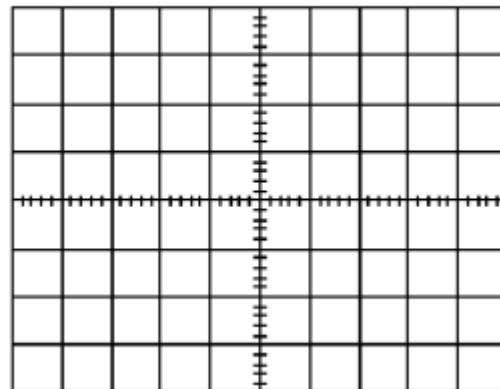
What happens as you decrease the input frequency?

Waveform



6 MHz graph

Waveform



100 KHz graph

12)

Time shift: _____

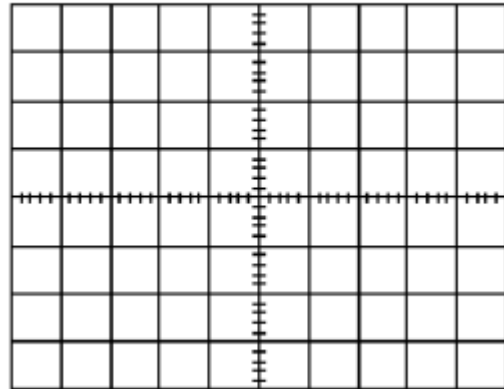
Period: _____

Calculated phase shift: _____

Directly measured phase shift: _____

Explain the phase shift:

Waveform



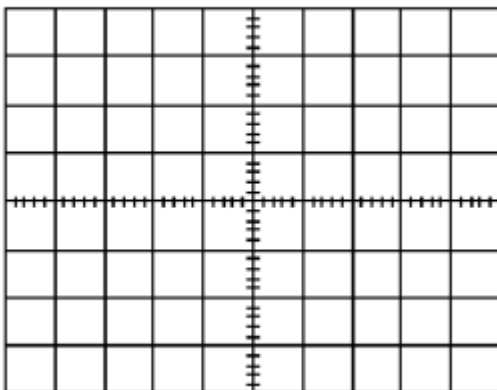
5 KHz graph

13)

What happens as you increase the input frequency?

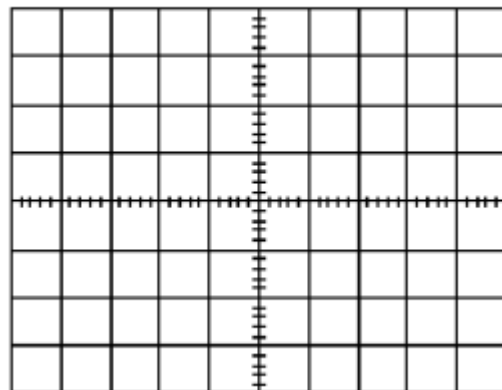
What happens as you decrease the input frequency?

Waveform



25 KHz graph

Waveform



2 KHz graph

14)

Explain why the circuit in Question 11 behaved differently than the circuit in Question 12. Using the corresponding graphs with the capacitor and with the inductor as a basis, explain the differences between how capacitors and inductors react to time varying input voltages.