

Experiment Report RC Circuits

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 R_{X1} .

6) What is the time constant τ_2 ? Also measure and record R_{X2} .

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 difference(s).

10) Fill in the following with determined values, and plot the observed waveforms.
 (Remember to label the axes). For V_f , determine the final voltage that the wave decays to.

Values

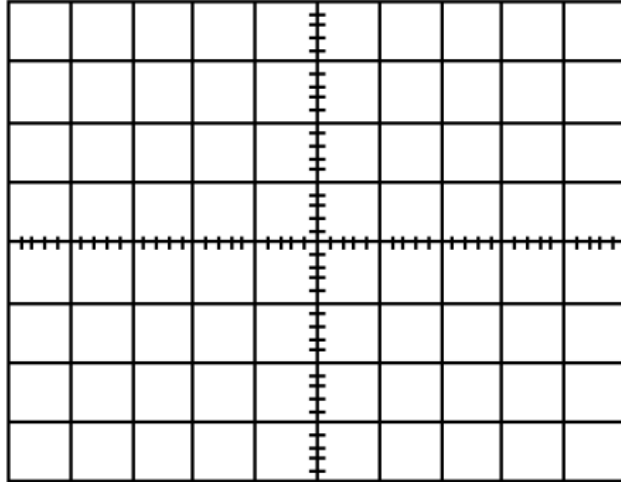
Waveform

Overdamped

R : _____

α : _____

V_f : _____

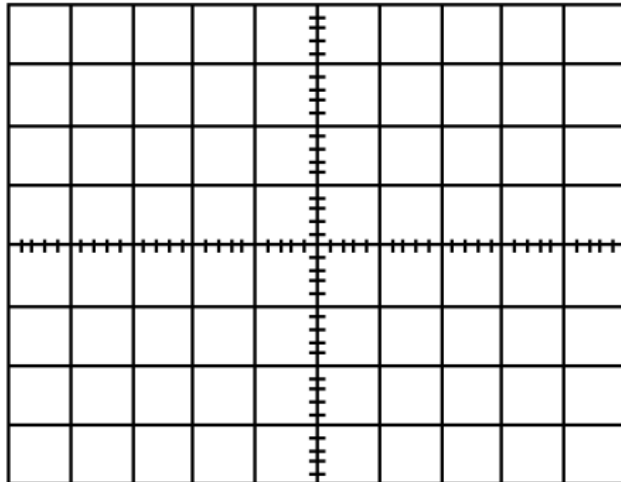


Critically damped

R : _____

α : _____

V_f : _____



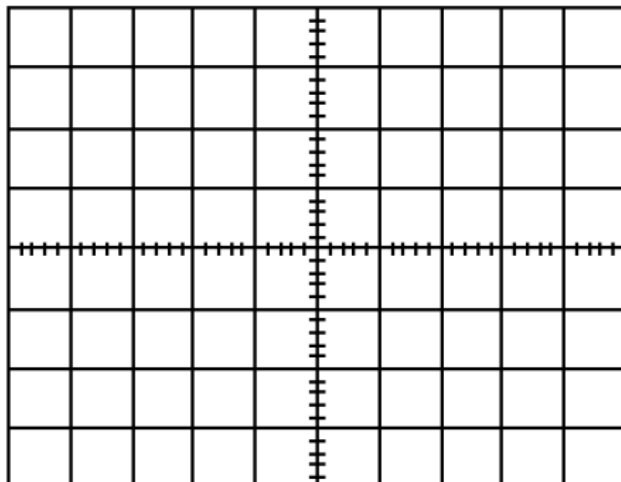
Underdamped

R : _____

α : _____

ω_n : _____

V_f : _____



11) For the underdamped case, what is the measured observed oscillation frequency in Hz and rad/s? (Show your calculations) How does this compare to the resonant frequency, ω_0 ? How does it compare to the natural frequency, ω_n ?

12) According to the 3 observed peaks in voltage, do the consecutive values decay as predicted? List your observed values and predicted values based on the first reference value. Explain why or why not the predictions are observed.