

Final Exam for PC201

You did six labs for PC201. Try to recall what you did for each lab and answer your questions in a separated booklet.

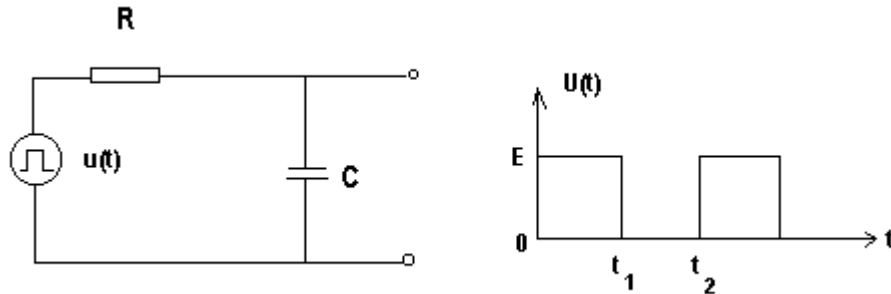


Figure 1 A RC circuit and its voltage source

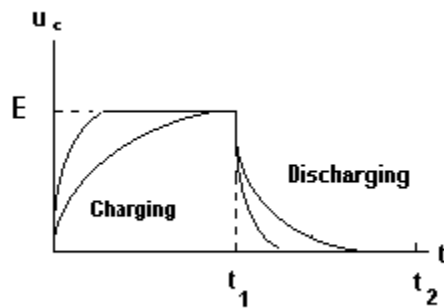


Figure 2 A waveform displayed on an oscilloscope

1. (20 ps) In figure 1, there are a resistor R and a capacitor C connecting in series.
 - a. What is a correct wave chosen from a function generator as a voltage applied on the circuit? Square wave or sine wave or triangular wave?
 - b. What is an expression of the time constant for the RC circuit?
 - c. What is the time constant if $R=100\Omega$ and $C=0.1\ \mu\text{F}$?
 - d. What is the waveform you can see on oscilloscope if RC very small? Sketch it!
 - e. What is the waveform you can see on oscilloscope if RC very large? Sketch it!
 - f. What is a suitable scale for vertical line, 10v/div or 1v/div or 10mv/div or 1mv/div if the $E=5\text{v}$ in Figure 2? Remember that the full size of screen is about 10cm wide and 8cm high.

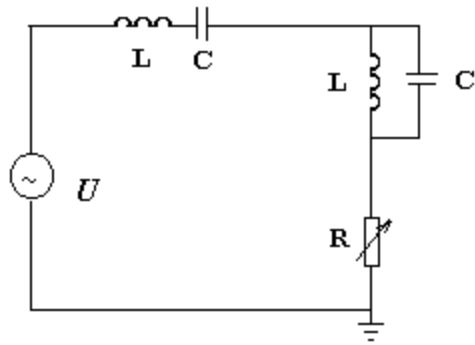


Figure 2. R,L and C connecting in combination of series and parallel

2. (20 ps) In Figure 3, there are L and C connecting in parallel and then with connecting L and C in series for observing steady-state performance.
 - a. What are impedances for each component individually?
 - b. What is the total impedance of this circuit?
 - c. What is a resonant frequency of this circuit?
 - d. What is correct wave for observing a resonant frequency, square wave or sine wave or triangular wave?
 - e. What the absolute value of Z of this circuit?
 - f. How did you measure the phase difference between R and C by an oscilloscope? Explain it clearly.

3. (15 ps) In the lab of dispersion, there are a prism and some lamp sources,
 - a. What does dispersion mean?
 - b. What did you measure in the lab? What is it for?
 - c. What was a polynomial to best fit to your data?
 - d. What are lamp sources you used?

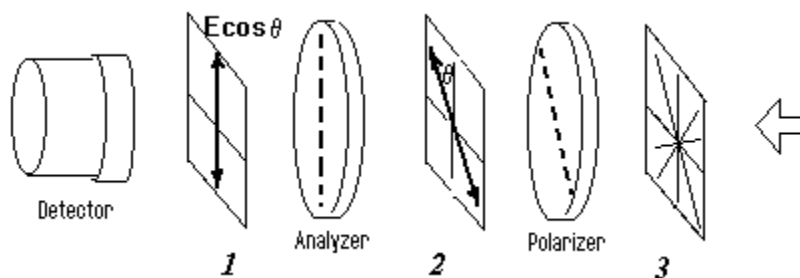


Figure 3 Lab for quantitative polarization

4. (15 ps) In the lab of quantitative polarization shown in Figure 3, you measured the polarization for light.
 - a. Where is polarized light? Location 1 or 2 or 3?
 - b. Where is unpolarized light? Location 1 or 2 or 3?
 - c. What happened if concentration of sugar increased ?
 - d. What would happen if the length of pipe contained the active material has increased?
5. (15 ps) In the lab of Interference, you studied Newton' ring and Michelson Interferometer.
 - a. What is the relationship between Δn (shifted number of fringes) and index of refraction of the cell?
 - b. Did you have same shifted number of fringes for different colours of light? Why?
 - c. How did you measure the distances between rings for the part of Newton's Ring?
 - d. Draw a diagram of the set-up for Newton ring experiment.
 - e. Draw a diagram of the set-up for Michelson interferometer.
6. (15 ps) In the lab of simulation by P-Spice, you learned how to simulate for an analog circuit.
 - a. How did you choose the applied source if you want to see a circuit responding to different frequencies? Sweep or single frequency?
 - b. How did set up for VSIN?
 - c. What did you use in horizontal scale for frequency? Linear or decade?
 - d. Where did you locate your voltage marker for simulating the circuit shown in Figure 2?
 - e. Draw a characteristic curve for a Zener diode (Dc current VS. DC voltage).