

EE-241. Introductory Electronics Laboratory

Lab 1 Handout*

Resistor-Capacitor (RC) circuits

Fall 2009

Mandatory Reading

Background section in Experiment 6 of Y. Tsvividis *pg.* 46 - 49.

Objectives

- Charging and discharging of capacitor in first-order RC circuits
- Time constant of RC circuits
- Loading effect of a voltmeter
- How to take the loading effect of voltmeter into account
- Perform floating point voltage measurements with the scope

Prelab Problems

For questions given below, refer to Experiment 6 in *A First Lab in Circuits and Electronics* by Y. Tsvividis

1. Calculate V_{oc} and R in Fig. 5 on *page* 49 for the given values:

$$V_{oc} = 10V, R = 10M\Omega, C = 10\mu F$$

For the case where R_{VM} is (a) infinitely large (b) finite

2. Sketch a v_c vs. t curve for the circuit shown in Fig. 1(a) with switch positioned at 1 in MATLAB (using eq. 1 on *pg.* 47). Label quantitatively the max/min values of v_c and the value of the time constant.
3. Repeat above question for the switch positioned at 2 in Fig. 2 (a) using eq. 3 on *pg.* 47.
4. Explain in few words what happens when the probe is *overcompensated*, *undercompensated* and *properly compensated* for the parasitic capacitance (see Fig. 1 in Appendix B).

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