

ECE 109L - THE VERY BASICS - LAB 3

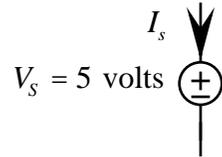
VOLTAGE SOURCES

FALL 2006

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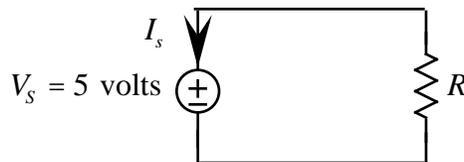
OBJECTIVE

The objective of this lab is to see how close real voltage sources like the following are to being ideal

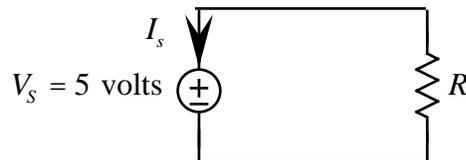


LAB

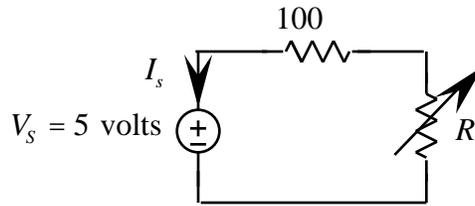
1. **PreLab** - Describe in words what it means for a voltage source like the one above to be ideal
2. **PreLab** - Draw a graph of V_s as a function of I_s for an ideal 5 volt voltage source. Describe your curve
3. **PreLab** - Obtain at least 5 resistors with different values in the range 100 Ω to 10K Ω available for free in the open lab on the fifth floor by the elevators.
4. We now take measurements to see how close the 5-volt source in the lab is to being ideal by measuring how much its voltage V_s changes as we change its current I_s . We get the current I_s to change by connecting different resistors R across the source as follows



- a. **PreLab** - Redraw the above circuit with the current meter inserted to measure I_s . Be sure to indicate the colors of the leads
- b. **PreLab** - Redraw the above circuit with the voltage meter connected to measure V_s . Be sure to indicate the colors of the leads
- c. Measure V_s and then I_s for each of your resistors R in your circuit as follows



- d. Plot your data points on a graph of V_s as a function of I_s . Draw a best fit line through your data points
 - e. Over what range of currents I_s is your source reasonably ideal
5. A good way to get an overview of how well a source is working is to connect it up to a **potentiometer** - a variable resistor - as follows



and then see how constant V_s stays as you vary the value of the potentiometer. The purpose of the 100 Ω resistor is to prevent the current I_s from getting too large.

- PreLab** - Draw the circuit with the current meter inserted to measure I_s
- Record how I_s varies as you turn the potentiometer. Record its largest and smallest values
- PreLab** - Draw the circuit with the voltmeter connected to measure V_s
- Record how V_s varies as you turn the potentiometer. Record its largest and smaller values.
- Make use of your results in parts (a) and (b) to sketch V_s as a function of I_s
- How well is your voltage source doing. Justify your answer