

# Department of Computer and Electronics Engineering Technology

## CEET 1140

### Lab 1

Title: Measuring Voltage, Current and Resistance.

Objective: The Student will be able to use lab equipment to generate a source of voltage or current and be able to measure voltage, current and resistance. The student will also become familiar with reading the resistance value and tolerance from the color bands.

Equipment: Power Supply  
Clip Lead (optional)  
Digital Multimeter (2)  
Proto Board

Parts: 1 47  $\Omega$  ¼ Watt Resistor, 5% tolerance  
1 100  $\Omega$  ¼ Watt Resistor, 5% tolerance  
1 160  $\Omega$  ¼ Watt Resistor, 5% tolerance

Preparation: Write the title and a short description of this lab in your lab book. Make sure the page is numbered and make an entry in the table of contents for this lab.

For each resistor in the parts list, above, determine which color bands that each resistor should have. Enter this data in a table in your lab book. Remember to include the color band for the tolerance.

Bring your lab notebook and the parts, above, to your lab period.

Set up: Configure the digital multimeter as an ohm meter and measure each of the resistors in the parts list and compute the error (in percent) relative to the labeled resistance. Record these data (labeled, actual and error) in a table in your lab book.

Configure the multimeter as an ammeter using the 10A scale. You will have to move one of the leads to the 10A socket. With the power supply off, connect leads (a) from the (+) terminal of the power supply to one terminal of the multimeter, (b) from the other terminal of the multimeter to one lead of the 47  $\Omega$  resistor, and (c) from the other lead of the resistor to the (-) terminal of the power supply. Turn the voltage and current knobs of the power supply all the way counterclockwise and switch the display to volts.

Safety Precaution: in a minute, you will be turning on the power supply. Be aware that even 10mA of current through your body can be lethal. Fortunately, the voltages we are dealing with in this lab are too low to create that much current through your body (unless your skin is damp). Still, it is a good safety precaution never to touch more than one conductor at a time,

Procedure: Double check that both voltage and current knobs are turned all the way to the left and turn on the power.

Turn the current knob clockwise a half turn. Then carefully turn the voltage knob clockwise until the voltage reads 3.0 volts. The C.V. (Constant Voltage) LED should be ON. Using a second multimeter configured to read volts DC, measure the voltage directly across the resistor (not the power supply). Make note of the resistance, voltage and current (on the multimeter). Record these values in a table in your lab book.

Without adjusting the power supply (except to turn it off while you replace the resistor), repeat these measurements using the 100  $\Omega$  then the 160  $\Omega$  resistors.

Turn the current knob to 0 and turn the voltage knob half a turn to the right. With the 47  $\Omega$  resistor back in place, adjust the current knob until the multimeter reads about 40mA. The C.C. (Constant Current) LED should be ON. Again, using a second multimeter, measure the voltage directly across the resistor. Make note of the resistance, voltage and current (on the multimeter). Record these values in a table in your lab book.

Without adjusting the power supply (except to turn it off while you replace the resistor), repeat these measurements using the 100  $\Omega$  then the 160  $\Omega$  resistors.

Cleanup: Turn off the power. Then on the first multimeter return the lead to the V/ $\Omega$  Socket and configure it to read volts.

Conclusions: What can you say about the relationship of current and resistance if the voltage is kept constant?

What can you say about the relationship of voltage and resistance if the current is kept constant?

Why should we leave multimeters configured to read voltage when they are not in use?