

## LAB 04 - VOLTAGE, CURRENT AND RESISTANCE (1)

### I. INTRODUCTION

**Objective of the lab:** Study how voltage and current are related in resistors.

### II. LAB FORMAT

#### 1) THEORY

#### 2) PROCEDURE

Maximum 2 paragraphs.

#### 3) EXPERIMENTAL DATA

**NO PRINT OUT IS REQUIRED FOR THIS LAB.**

#### *1. SECTION 7. Voltage From The 750 Interface*

Questions (5 V DC):

- 7.1) What is the meter reading ?
- 7.2) How does it compare with the programmed voltage?

Questions (5 V AC - positive only up ramp, 0.2 Hz) :

- 7.3) When changing the frequency to 100 Hz, describe the meter reading and explain your observations?
- 7.4) If your voltmeter was center zero, and you put a 100 Hz sinusoidal voltage across the meter, would it read anything?

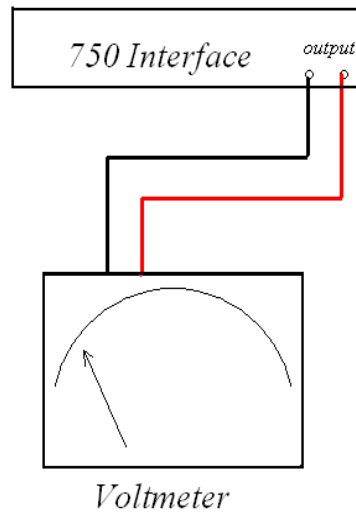


FIG. 1: Sketch of the circuit for the experiment in section 7.

2. SECTION 8. Internal measurements of voltage and current

Questions:

- 8.1) How do the readings of the voltage digital display, and the programmed voltage, compare?
- 8.2) What is the current through the analog voltmeter on the 25 V and 5 V scales?
- 8.3) What is the internal resistance of this voltmeter on these scales?
- 8.4) How do you think turning the sensitivity knob of the voltmeter changes the sensitivity of the meter?

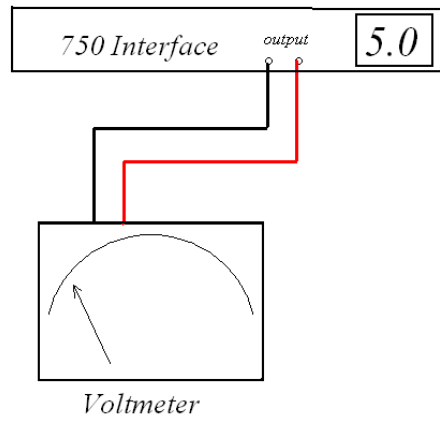


FIG. 2: Sketch of the circuit for the experiment in section 8.

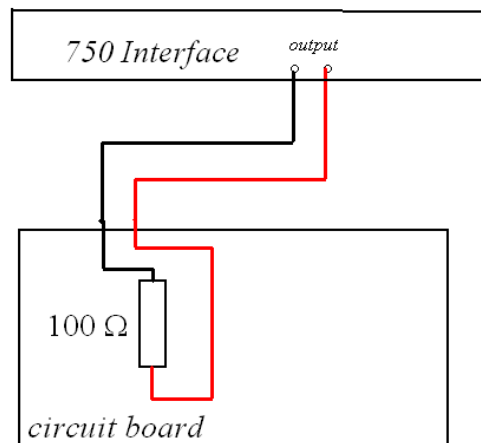


FIG. 3: Sketch of the circuit for the experiment in section 10.

3. SECTION 10. Voltage versus current for a resistor

Questions:

10.1) Write down the voltage and the current value given by the digit displays, and calculate

the resistance for 5 V DC?

10.2) Write down the voltage and the current value given by the digit displays, and calculate the resistance for 3 V DC and 1 V DC?

10.3) Compare your values for 5 V DC, 3 V DC and 1 V DC?

#### 4. SECTION 11. WAVEFORMS

Questions:

11.1) After observing the meter display window, sketch the output voltage as a function of time for a 5 V AC sine wave output, and 0.2 Hz.

11.2) Compare your sketch to the output of the graph display.

#### 5. SECTION 12. Voltage versus current for a resistor - AC Measurements

Questions:

12.1) Sketch the graph Voltage as function of time and Current as function of time: Discuss your graph.

12.2) Sketch the graph Voltage as function of current - Is Ohms law being obeyed?

12.3) Fit a straight line to your Graph V as function of I - What is the slope and is it what you expect?

#### 6. SECTION 13. Voltage versus current for a filament - Hysteresis

Questions:

13.1) Sketch the graph Voltage as function of time and Current as function of time: Discuss

your graph.

13.2) Sketch the graph Voltage as function of current - Can you explain the hysteresis?

13.3) Can you figure out which branch of the curve is taken with decreasing voltage magnitude and which is taken with increasing voltage magnitude?

13.4) With a frequency of 0.01 Hz, how is the hysteresis is affected? Explain.

13.5) With a frequency of 20 Hz, how is the hysteresis is affected? Explain.

#### *7. SECTION 14. Voltage sensor and Analog Current Meter*

### **SKIP THIS SECTION**

#### *8. SECTION 15. Using the Power Amplifier II*

Questions:

15.1) Give the value of the current. Does this sensor affect the current in this circuit?

### **5) CONCLUSION**

Did you reach the objective of the lab? What are the conclusions that you draw from those experiments?

(short discussion of few lines)