

Laboratory Session 1 – Voltage Divider Rule

Name: _____ Name: _____ Name _____

Introduction:

If you never used an oscilloscope, it is best if you think of the instrument as a real time plotter of electrical signals. As such, they are extremely useful tools. In this lab session, you will learn some of the basic features of the oscilloscope. You as well will learn how to use oscilloscope to measure electrical signals and record parameters.

In addition, you will be able to verify by practice one of the basic theoretical results in electronics – Voltage divider rule. Your task is to set up a simple circuit, measure the voltage and compare with theoretical result you have learnt in the class.

1. Connect two wires to the output of the function generator – RED wire to the RED terminal and BLACK wire to the BLACK terminal. Connect the oscilloscope probe to the red wire and the ground connection of the oscilloscope to the black one.
2. Turn on the power for the oscilloscope (top left) and the function generator (top left).
3. Push the frequency button on the function generator (under Function) and then enter 1000 into the display. Thereafter **push the button on the lower left of the unit marked “Hz”**.
4. Push the amplitude button on the function generator (under Function), enter 4, and then **push the button on the lower left of the unit marked “Vpp”**.
5. Push the **Autoset** button on the oscilloscope and observe the display. If you have any difficulties, ask the instructor for help.
6. Push the **Measure** button on the oscilloscope and from the **Menu** select **Peak-to-Peak, RMS, frequency** and **period**.

Record the readings below:

Peak-to-Peak voltage _____

RMS _____

Frequency in Hz _____

Period in seconds _____

7. Adjust the signal generator so that a sine wave with peak-to-peak voltage of 10 volts and a frequency of 1500 Hz is obtained. Use the oscilloscope to determine the peak-to-peak voltage – **do not rely on the amplitude displayed by the signal generator.**

Record the readings again:

Peak-to-Peak voltage _____

RMS _____

Frequency in Hz _____

Period in seconds _____

8. Connect resistors (to be provided by the instructor) on the board and with the function generator as in the below figure.
9. Connect two ends of oscilloscope wires to VL (figure), measuring voltages with different sets of resistor value and verify with theoretical values that you can calculate from the following equation. Record the result in the table.

Resistor Value (RL)	Resistor Value (RS)	Theoretical Value (VL)	Measured Value (VL)

Note: A method using the color codes that will help you determine the value of each resistor can be found at: <http://www.csgnetwork.com/resistcolcalc.html>

$$V_L = \frac{R_L V_S}{R_L + R_S}$$

