ECET 102/CPET101
Lab 6
Series and Parallel Circuit Lab

By Prof. Paul I. Lin

Required Devices & Equipment:

Resistors: 1.5kΩ x 1, 1kΩ x 1, 820Ω x 1, 470Ω x 2
Bread board x 1 with wires, wire strippers and cutters
Variable Power Supply x 1
Digital Multimeter (DMM) x 1

Objectives:

1. Learn to calculate parameters of series and parallel resistor circuits and measurement.
2. Learn to use the Multisim (circuit simulation and design computer tool) for circuit analysis.
3. Learn to construct and measure the series and parallel circuit
4. Learn to compare the three methods of calculation, computer analysis and measurement.

Procedure:

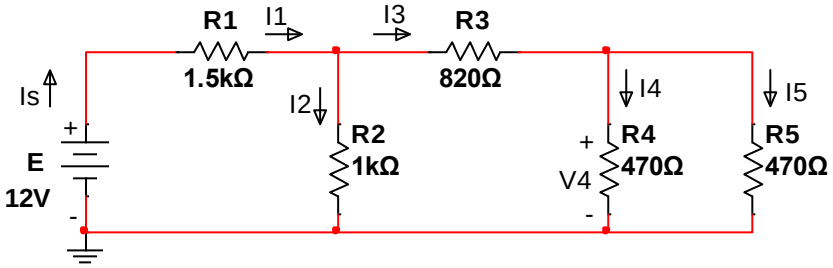

Figure 1. The Series-Parallel Circuit

Part 1. For the circuit shown in Figure 1, calculate Rt, Is, I2, I4, I5, V1, V2, V3, V4 and V5.

Rt Calculation Procedure

(a) Remove the power supply, then use the circuit as shown in Figure 2, without power supply to calculate Rt, then record the calculated Rt value in Table 1.

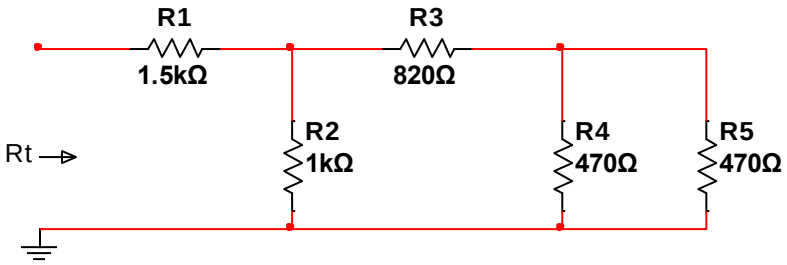

Figure 2. Sub-circuit for Rt calculation

(b) R45 = R4 || R5 = _____
(c) R234 = R3 + R45 = _____
(d) R2345 = R2 || R234 = _____
(e) Rt = R1 + R2345 = _____ Ohms

Is Calculation: Is = E/Rt = _____ mA

V1 Calculation: V1 = Is * R1 = I1* R1 = _____ Volts

V2 Calculation: V2 = E – V1 = _____ Volts

I2 Calculation: I2 = V2/R2 = _____ mA

I3 Calculation (KCL): I3 = I1 – I2 = _____ mA

V3 Calculation: V3 = I3 * R3 = _____ Volts

V4 = V5 Calculation: V4 = V2 – V3 = _____ Volts

I4 Calculation: I4 = V4/R4 = _____ mA

I5 Calculation: I5 = I4 = _____ mA

Part 2. Computer Analysis using Multisim

(a) Construct the following circuit for Rt measurement.

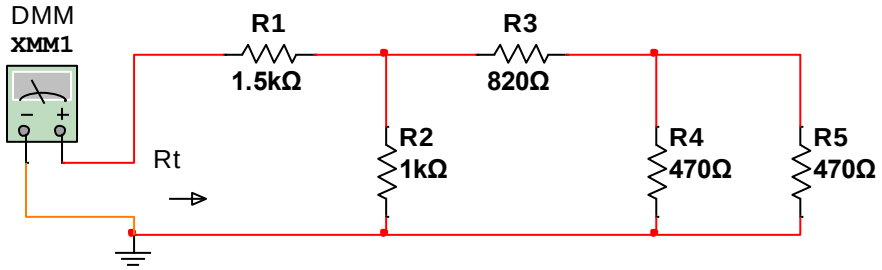

Figure 3. Rt Measurement through Multisim Simulation

(b) Voltage and Current Measurement

- Add DMM (set to DC mA) for measuring Is, I1, I2, I3, I4, and I5
- Add DMM (set to DC) for measuring V2
- Add 4 voltage probes by clicking Place => Probe => Voltage to measure other voltages: V2, V3, V4, and V5
- Run simulation
- Record all currents and voltages on to Table 1.

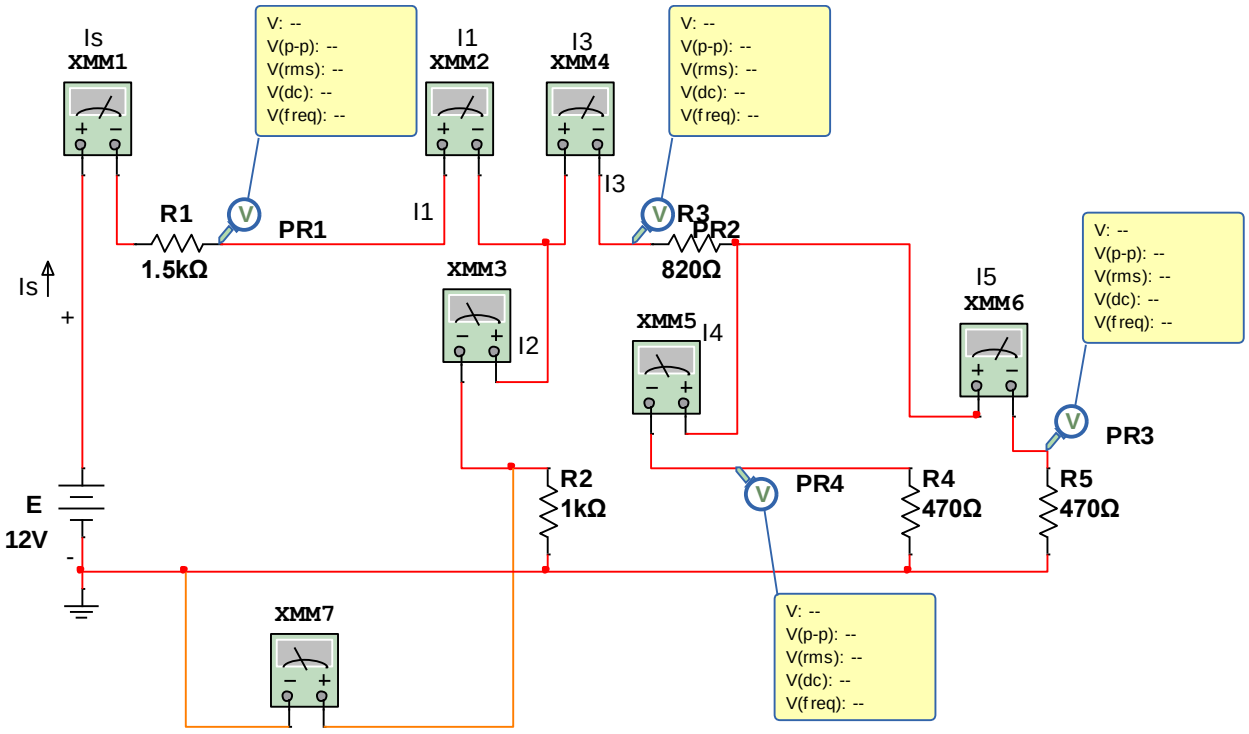

Figure 4. Computer Analysis using Multisim

Part 3. Construct the Circuit as shown in Figure 1 using breadboard.

(a) Using the DMM, set to DC V measurement, then measure
voltage across R1 => V1 = _____
voltage across R2 => V2 = _____
voltage across R3 => V3 = _____
voltage across R4 => V4 = _____
voltage across R5 => V5 = _____
Also record all measured voltage in Table 1.

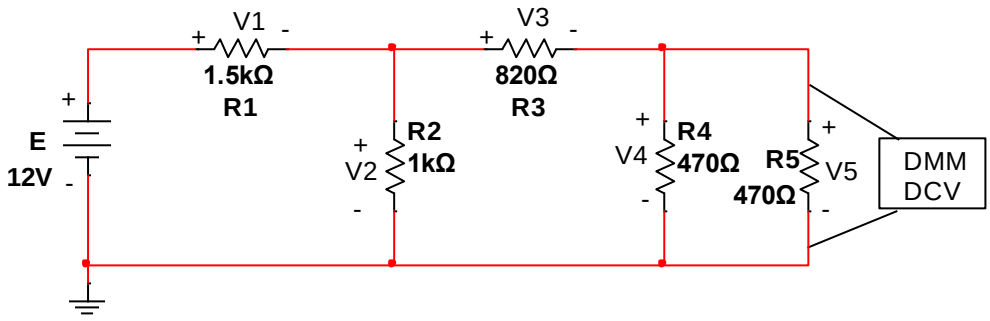

Figure 5. Voltage Measurement using DMM

(b) Current measurement

Use the DMM, set to DC I measurement, then measure and record all currents Is, I1, I2, I3, I4, and I5.

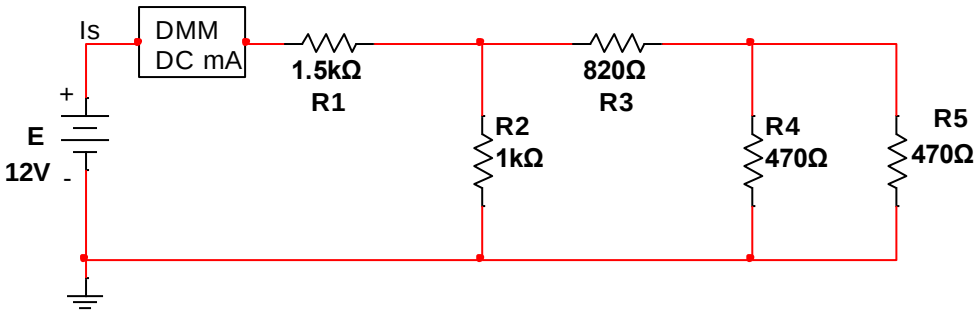

Figure 6. Is Current Measurement

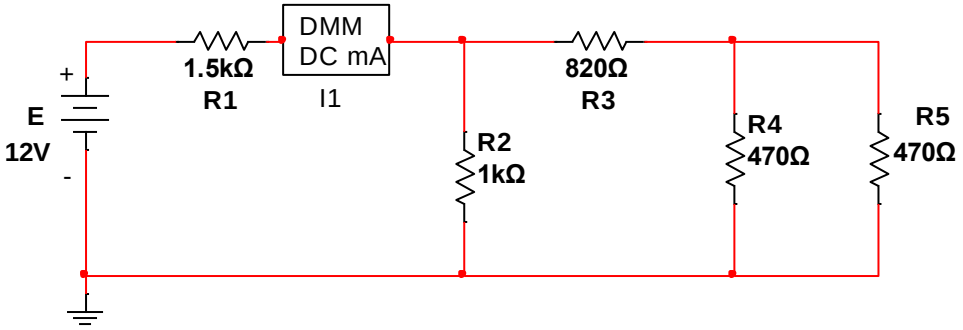

Figure 7. I1 Current Measurement

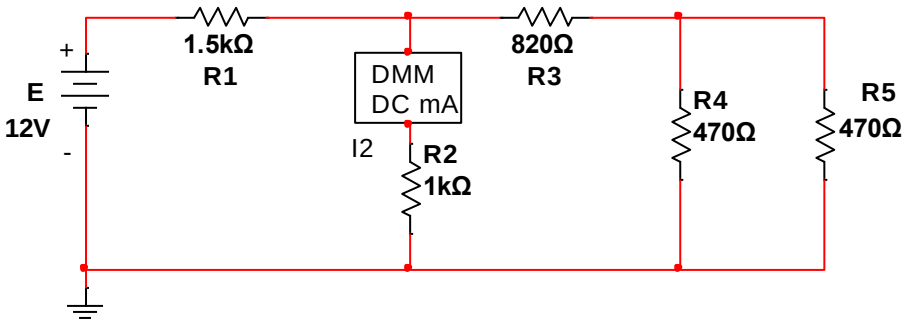

Figure 8. I2 Current Measurement

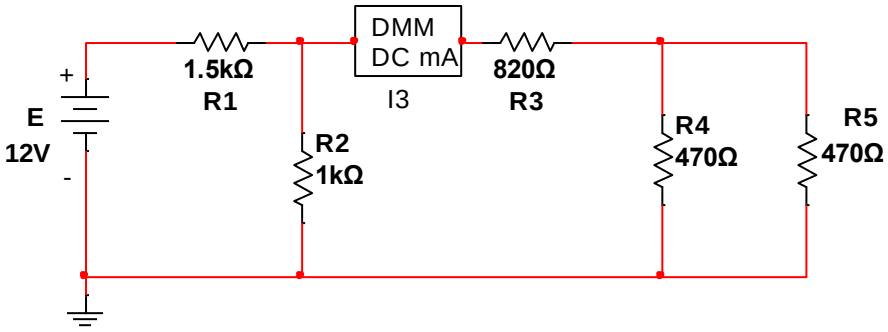

Figure 9. I3 Current Measurement

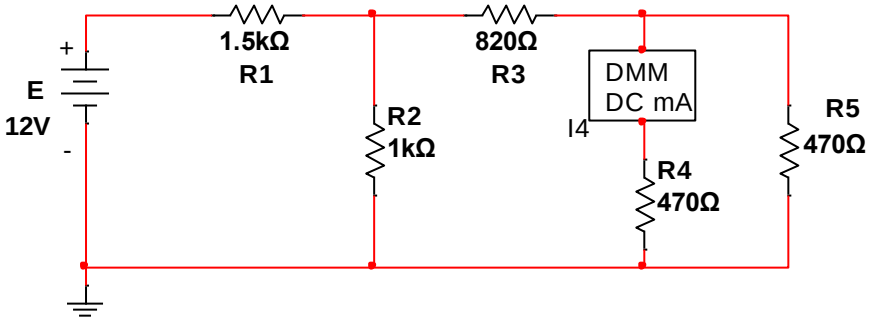

Figure 10. I4 Current Measurement

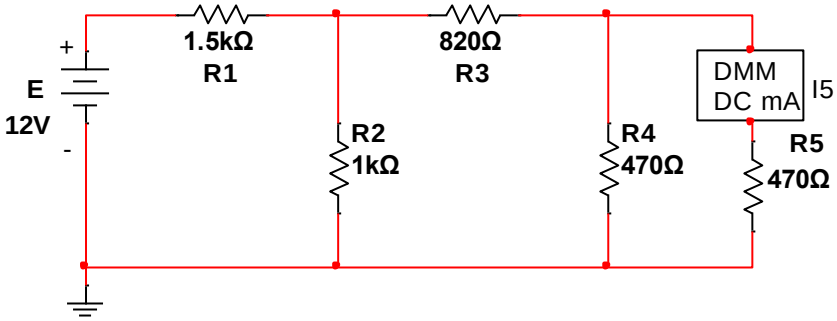

Figure 11. I5 Current Measurement

Table 1. Measured and calculated currents

	Rt	Is	I2	I3	I4	I5
Calculated values						
Measured values						
Simulated values						

	V1	V2	V3	V4	V5
Calculated values					
Measured values					
Simulated values					

Part 4. Compare the three methods of calculation, computer analysis and measurement.