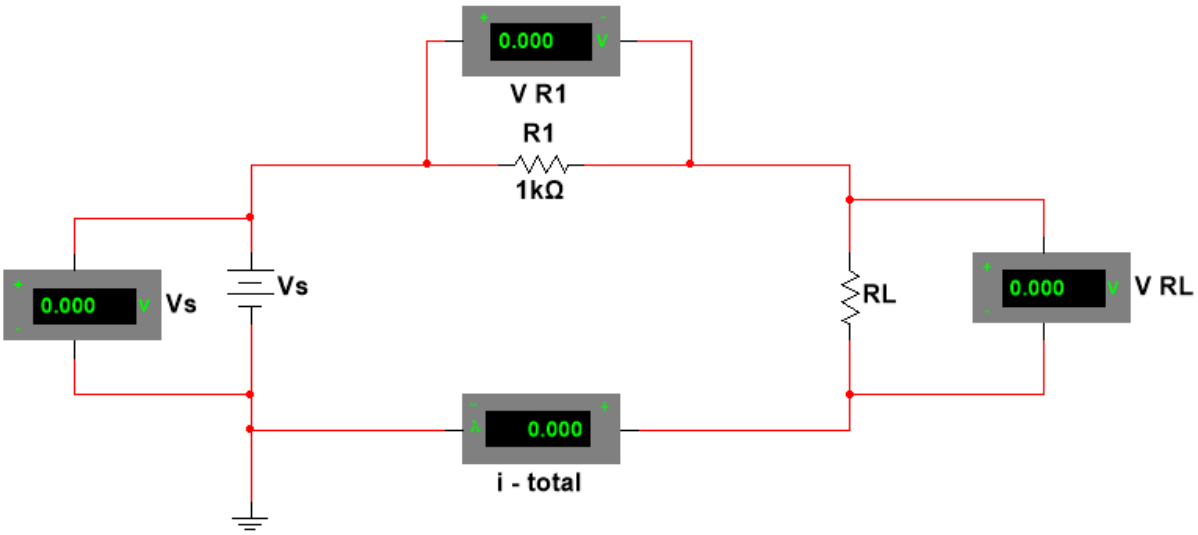
Introduction to DC Circuits and Analysis

Experiment #1 – Simple Series Circuit

Construct the circuit shown below in a manner to make measuring currents and voltages easy (hint: lay parts out in a similar manner as the circuit is drawn):

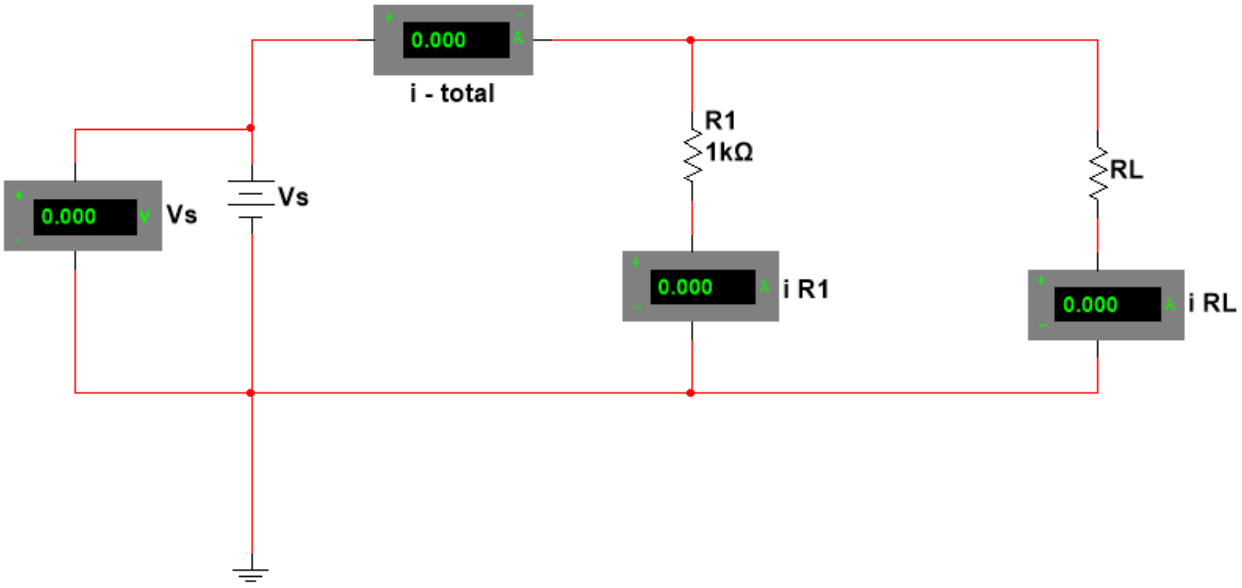


You will change RL and Vs to different values and complete the table (provided on the data sheets to be turned in) seeing how the voltages and currents change. To determine if Vs is correct use one of the voltmeters to set Vs and then it should stay stable, though checking each time you change parts is probably a prudent thing to do.

For Vtotal calculated add your measured values of V1 and VL, not your measured Vs. For Rtotal calculate it from Vtotal/i-total.

Experiment #2 – Simple Parallel Circuit

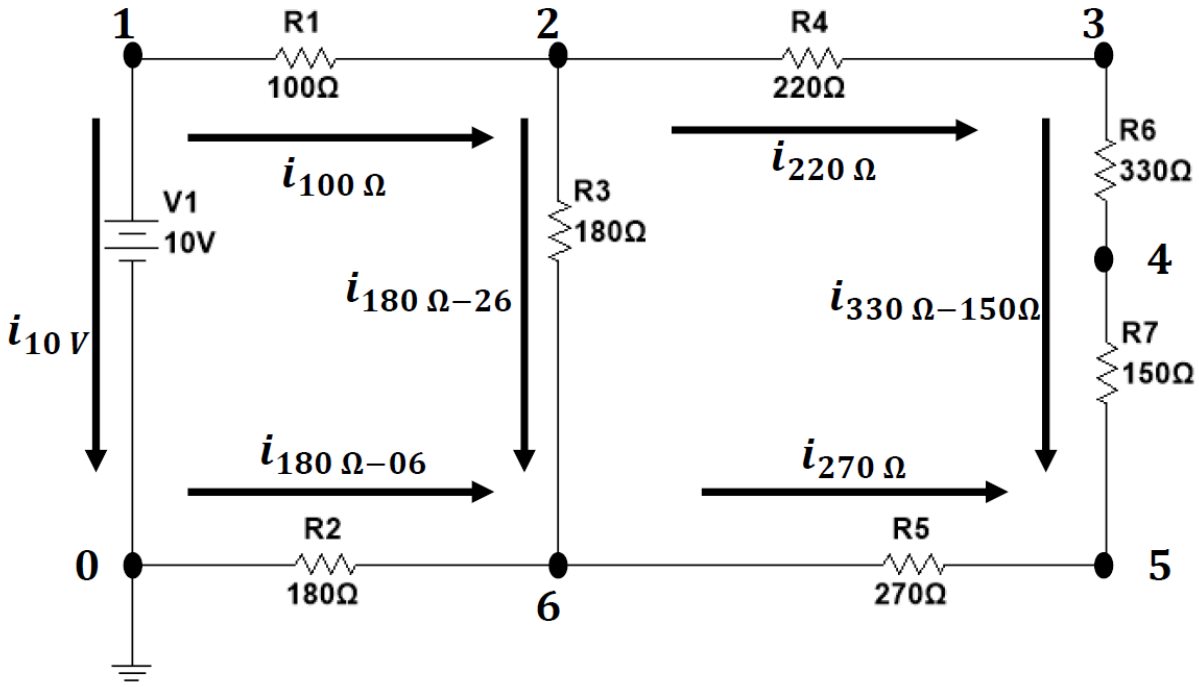
Construct the circuit shown below in a manner to make measuring currents and voltages easy (hint: lay parts out in a similar manner as the circuit is drawn):



You will change RL and Vs to different values and complete the table (provided on the data sheets to be turned in) seeing how the voltages and currents change. For i-total calculated, add your measured values of iR1 and iRL. For Rtotal calculate it from Measured Vs/i-total calculated.

Experiment #3 Multi-loop Circuit #1 – Single Power Supply

Construct the circuit shown below in a manner to make measuring currents and voltages easy (hint: lay parts out in a similar manner as the circuit is drawn):



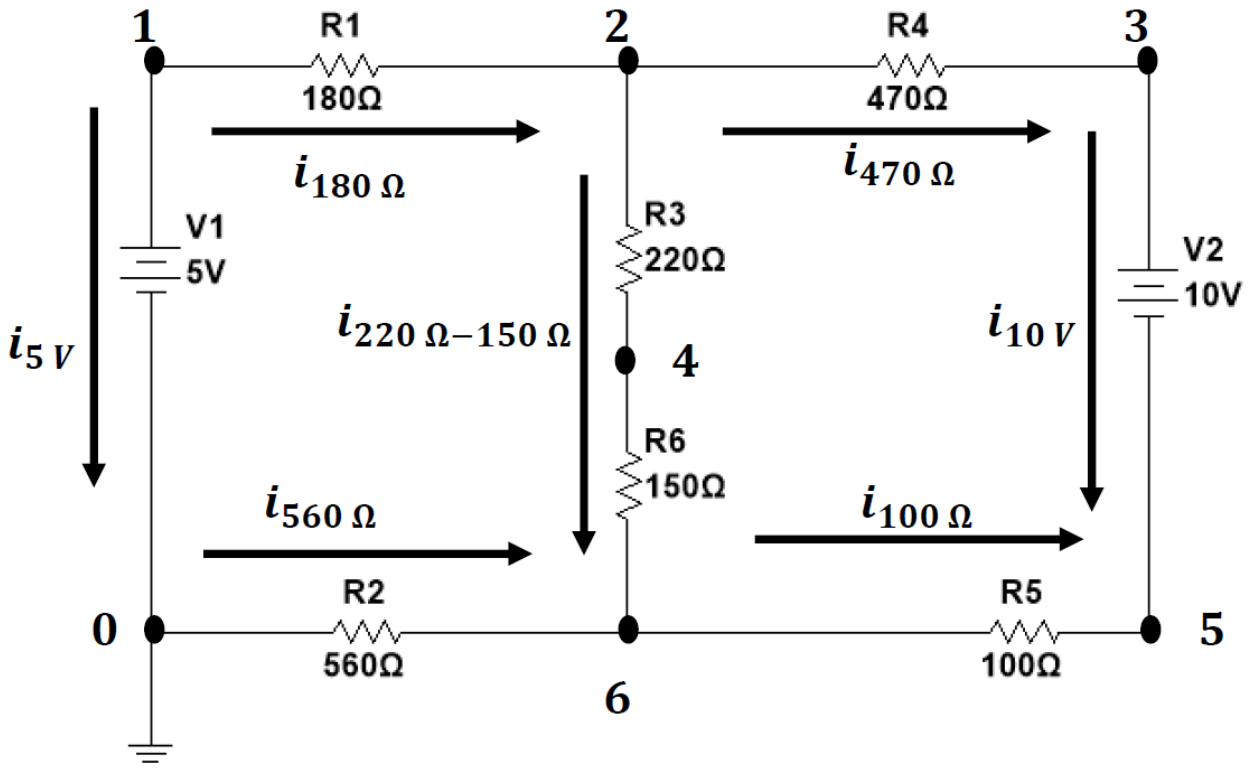
Complete the table (provided on the data sheets to be turned in). Under Experimental, use the meters and find these values, be careful to put the proper signs in. V10 means (V1 – V0), which means in this case V10 in theory is +10.0 V. Currents, which go to the right or towards the bottom, are positive. Currents, which go to the left, or up, are negative. In the space indicated in the data sheets to be turned in, write out a set clean Kirchhoff equations for this circuit. Use MATLAB to calculate the currents and voltage differences asked for. Include the m-file and the clean output from the command window. For the MATLAB calculations please use the nominal 10 V value, even though your supplies are likely different from that value.

For % differences use MATLAB values as your Theory Values and calculate

$$\%-\boldsymbol{diff} = \frac{\boldsymbol{Theory} - \boldsymbol{Experimental}}{\boldsymbol{Theory}}\ \boldsymbol{x}\ \mathbf{100}\%$$

Experiment #4 Multi-loop Circuit #2 – Multiple Power Supplies

Construct the circuit shown below in a manner to make measuring currents and voltages easy (hint: lay parts out in a similar manner as the circuit is drawn):



Complete the table (provided on the data sheets to be turned in). Under Experimental, use the meters and find these values, be careful to put the proper signs in. V10 means (V1 – V0), which means in this case V10 in theory is +10.0 V. Currents, which go to the right or towards the bottom, are positive. Currents, which go to the left, or up, are negative. In the space indicated in the data sheets to be turned in, write out a set clean Kirchhoff equations for this circuit. Use MATLAB to calculate the currents and voltage differences asked for. Include the m-file and the clean output from the command window. For the MATLAB calculations please use the nominal 10 V value, even though your supplies are likely different from that value.

For % differences use MATLAB values as your Theory Values and calculate

$$\%-diff = \frac{Theory - Experimental}{Theory}\ x\ 100\%$$