Laboratory Application Assignment

In this lab application assignment you will examine Kirchhoff's voltage and current laws (KVL and KCL). You will actually apply both KVL and KCL in a simple series-parallel circuit. You will also apply KVL when solving for the voltages in a circuit containing series-aiding voltage sources.

Equipment: Obtain the following items from your instructor.

- Dual output variable dc power supply
- Assortment of carbon-film resistors
- DMM

Applying KCL and KVL

Examine the circuit in Fig. 9–26. Calculate and record the following circuit values:

V_1 = ________, V_2 = ________, V_3 = ________,
V_4 = ________, V_5 = ________,
I_T = ________, I_3 = ________, I_{4-5} = ________

In Fig. 9–26, indicate the direction of all currents and the polarities of all resistor voltage drops.

Construct the circuit in Fig. 9–26. Measure and record the following circuit values:

V_1 = ________, V_2 = ________, V_3 = ________,
V_4 = ________, V_5 = ________,
I_T = ________, I_3 = ________, I_{4-5} = ________

Write the measured values of voltage and current next to their respective resistors in Fig. 9–26.

Using measured values, write a KCL equation for the currents entering and leaving point C. ________ Do the same for the currents entering and leaving point D. ________ Do these circuit values satisfy KCL? ________

Using measured values, write a KVL equation for the voltages in the loop ACDBA. Go clockwise around the loop beginning at point A. ________

Do these values satisfy KVL? ________

Using measured values, write a KVL equation for the voltages in the loop CEFDC. Go clockwise around the loop beginning at point C. ________ Do these values satisfy KVL? ________

Beginning at point C and going clockwise, add the measured voltages in the partial loop CEFD. ________ Is this value equal to the voltage across R_3? ________

Finally, using measured values, write a KVL equation for the voltages in the outside loop ACEFDBA. Go clockwise around the loop beginning at point A. ________ Do these values satisfy KVL? ________

Examine the circuit in Fig. 9–27. Calculate and record the individual resistor voltage drops V_{R_1}, V_{R_2}, and V_{R_3}.

V_{R_1} = ________, V_{R_2} = ________, V_{R_3} = ________

Figure 9–26

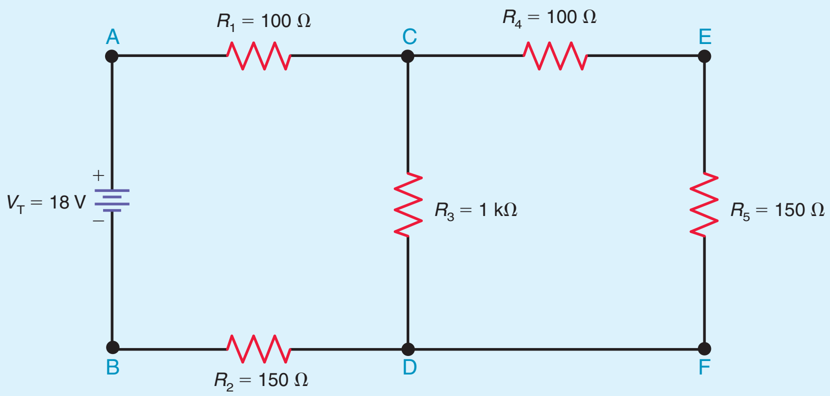
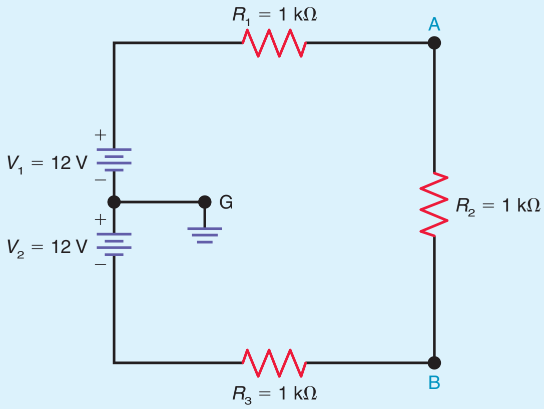


Figure 9–27



Indicate the direction of current and the polarity of each resistor voltage drop. Next, apply KVL and solve for the voltages V_{AG} and V_{BG}. Record your answers.

V_{AG} = __________, V_{BG} = __________

Construct the circuit in Fig. 9–27. Before turning on the power, however, have your instructor check the circuit to make sure the power supplies are wired correctly.

Measure and record the voltages V_{AG} and V_{BG}. V_{AG} = __________, V_{BG} = __________

Do the measured voltages match your calculated values? __________