EXPERIMENT 3

KIRCHOFF'S LAWS

OBJECTIVE: To verify Kirchoff's voltage and current laws and to validate the conservation of power in linear resistive networks.

EQUIPMENT

Digital Multimeter (DMM)
Avometer (AVO8)
Power Supply
Resistors

PRELIMINARY WORK

P1 Calculate all voltages and currents related with each element in the circuit given in Figure 3.1. Indicate the current direction and polarity of the voltages.

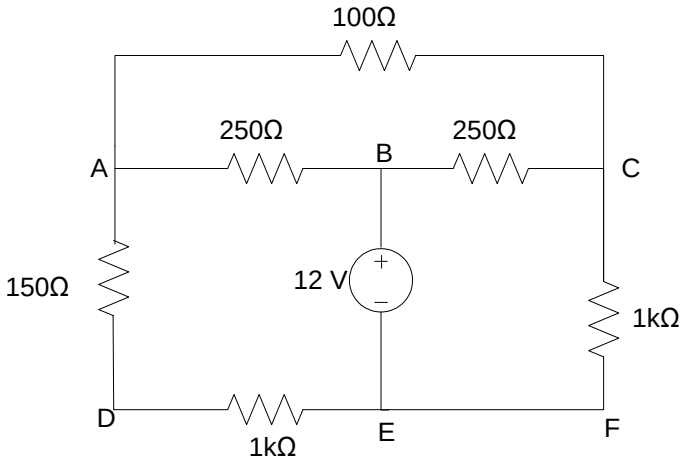


Figure 3.1

P2 Calculate the power of each element. Compare the power delivered to the power consumed.

P3 Show that Kirchoff's voltage law is satisfied around the loops ABED, BCFE, ABC, ABCFED. (Show that sum of the voltages around these paths are zero)

P4 Show that Kirchoff's current law is satisfied at nodes A, B, C, E (Show that sum of the currents at these nodes is zero)

P5 Calculate the currents in each branch for the Figure 3.2 using the current divider rule

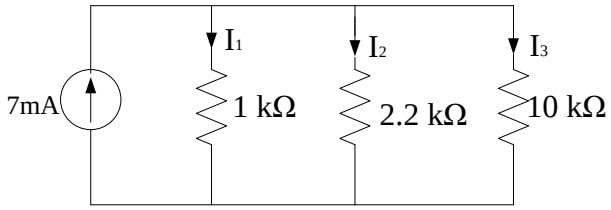


Figure 3.2

P6 Calculate the voltages in each element of the Figure 3.3 using voltage divider rule

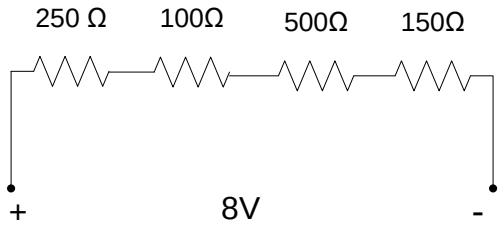


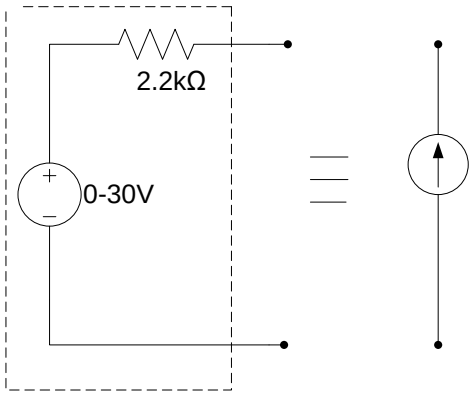
Figure 3.3

EXPERIMENTAL WORK

E1

- **a)** Measure component voltages and currents in Figure 3.1 Indicate the polarity of voltages and directions of currents.
- **b)** By using the results obtained in E1.a calculate the power absorbed or delivered by each element.
- **c)** Verify the Kirchoff's voltage law in the loops ABED, BCFE, ABC, ABCFED
- **d)** Verify the Kirchoff's current law at nodes A, B, C, E

E2 Record the currents in each branch of the circuit in Figure 3.2 by simulating the current source given below



E3 Setup the circuit given in Figure 3.3. Record circuit current and measure all voltages of circuit

CONCLUSIONS

C1 Consider Figure 3.1, verify the conservation of power in the circuit by tabulating all voltages and currents. State the reasons for the discrepancies

C2

- **a)** Compare the calculated and measured loop voltages ABED, BCFE, ABC, ABCFED Comment on the possible reasons for errors in the measured results.
- **b)** Compare the calculated and measured node currents at nodes A, B, C, and E. Comment on the possible reasons for errors in the measured results.