EXPERIMENT # 2

KIRCHHOFF'S LAWS

OBJECTIVE:

To verify Kirchhoff's voltage and current laws experimentally.

Pre-Lab Assignment:

For the circuit shown in Figure 1, calculate:

1- V_{AB} , V_{BC} , V_{AD} , V_{DC} , V_{BD} , and V_{AC}.
2- I_1 , I_2 , I_3 , I_4 and I_5.

APPARATUS: DC Power Supply
Digital Multimeter
Carbon Resistors: 100 Ω, 150 Ω, 220 Ω, and 330 Ω

THEORY:

Kirchhoff's Voltage Law (KVL):

The algebraic sum of all voltages around any closed path is equal to zero.

Kirchhoff's current Law (KCL):

The algebraic sum of all currents at a junction point is equal to zero.

Procedure:

1- Check the values of the resistors, used in the circuit of Figure1, using a multimeter. Record the values in Table 1.
2- Connect the circuit as shown, and have it checked by the instructor. Adjust the supply voltage Vs to 10 V, using a dc voltmeter.
3- Measure the voltages V_{AB}, V_{BC} , V_{AD} , V_{DC} , V_{BD} , and V_{AC}. Record their values (including the signs) in Table 2
4- Measure the currents I_1 , I_2 , I_3 , I_4 and I_5 and record their values (including the signs) in Table 3

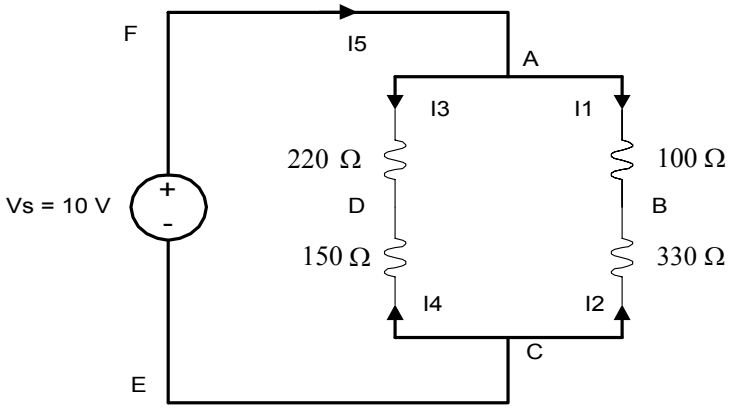

Figure 1

Report:

1- Verify KVL by adding the experimental values of voltages around the loops :

   a) ABCEFA
   b) ABDA
   c) CDAC

2- Verify KCL by adding the <u>experimental values</u> of current at nodes:

   a) A
   b) B
   c) C

QUESTIONS:

1- Do the experimental and theoretical values of voltages and currents agree? Indicate the percentage of differences.
2- Give possible reasons for any discrepancies.

<u>TABLE 1</u>

Resistor Values:

Resistor	R1	R2	R3	R4
Nominal value (Ohm)	100	150	220	330
Ohmmeter reading				

TABLE 2

Voltages:

Voltage	V_{AB}	V_{BC}	V_{AD}	V_{DC}	V_{BD}	V_{AC}
Theory						
Experiment						
% Error						

TABLE 3

Currents:

Current	I_1	I_2	I_3	I_4	I_5
Theory					
Experiment					
% Error					