Lab Report

CSE-1113 (Electrical Circuit Lab)

Submitted By:	**Submitted To:**
MD. Marsadul Islam	Abdullah Al Shiam
Roll: 09	Lecturer
Dept. of CSE	Dept. of CSE
1st Year	Sheikh Hasina University Netrokona
1st Semester	

Department Of Computer Science & Engineering

Sheikh Hasina University

Netrokona-2400, Bangladesh

Experiment No.1:

Name of the Exp. : Verification of Kirchhoff's Current and Kirchhoff's Voltage law (KCL and KVL).

Objective : To verify Kirchhoff's current law (KCL) and Kirchhoff's voltage law (KVL) theoretically and experimentally for the given circuits.

Theory :

- KVL states that in any closed path / mesh, the algebraic sum of all the voltages is zero.
- KCL states that the algebraic sum of the currents meeting at a node is equal to zero.

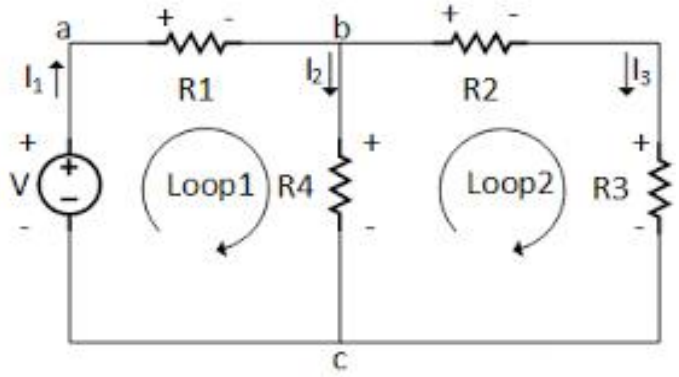


Fig-1: Circuit diagram for Kirchhoff's voltage and Kirchhoff's current law.

Apparatus :

1. DC power supply
2. Resistors
3. Digital Multi-meter
4. Bread Board
5. Connecting wires

Procedure :

a. KVL :

1. Check the values of the resistor using multi-meter (ohm section of multi-meter). Record the values in Table -1.
2. Give the connection as per the circuit diagram shown in Fig.1.
3. Set a particular value in DC power supply.
4. Measure the voltage drops in the circuit and record their values in Table -2.
5. Sum up the voltmeter readings i.e., voltage drops that should be equal to applied voltage.
6. Repeat the same for different voltages.
7. Verify KVL for each set of data.

b. KCL :

1. Check the values of the resistor using multi-meter (ohm section of multi-meter). Record the values in Table -1.
2. Give the connection as per the circuit diagram shown in Fig.2.
3. Set a particular value in DC power supply.
4. Measure circuit current and branch currents and record their values in Tabel-3.
5. Sum up the ammeter readings (I1 , I2 …) that should be equal to the total currents.
6. Repeat the same for different voltages.
7. Verify KCL for each set of data.

For Theoretical & Measured Value (TV & MV) :

Here , $V = 30V$, $R_1 = R_2 = R_3 = R_4 = 9\Omega$

Applying KCL at node - 2

$I_1 = I_2 + I_3$

$I_1 - I_2 - I_3 = 0$…….(1)

Applying KVL in Loop - 1

$9I_1 + 9I_2 - 30 = 0$

$I_1 + I_2 = 30/9$

$I_1 + I_2 = 3.333$……..(2)

Applying KVL in Loop - 2

$9I_3 + 9I_3 - 9I_2 = 0$

$9(2I_3 - I_2) = 0$

$2I_3 - I_2 = 0$……..(3)

Solving equations (1, 2 & 3) We get ,

$I = I_1 = 1.9998$ A

$I_2 = 1.33335$ A

$I_3 = 0.666675$ A

Therefore,

$V_1 = 9I_1 = 17.9998$ V

$V_2 = 9I_3 = 6.00075$ V

$V_3 = 9I_3 = 6.00075$ V

$V_4 = 9I_2 = 12.0015$ V

Observations :

Tabel-1 : Resistor values

Resistor	R_1	R_2	R_3	R_4
Ohm meter reading	9Ω	9Ω	9Ω	9Ω

Table-2 : Experimental & Theoretical Data for KVL

TV = Theoretical Value , MV = Measured Value

SL.No.	V(V)	V_1(V)		V_2(V)		V_3(V)		V_4(V)		$V=V_1+V_4$		$V_2+V_3+V_4=0$	
		TV	MV	TV	MV	TV	MV	TV	MV	TV	MV	TV	MV
	30	17.9998	18	6.00075	6	6.00075	6	12.0015	12	30.0013	30	0	0

Table-3 : Experimental & Theoretical Data for KCL

TV = Theoretical Value , MV = Measured Value

SL.No.	V(V)	I(A)		I_1(A)		I_2(A)		I_3(A)		$I_1=I_2+I_3$(A)	
		TV	MV	TV	MV	TV	MV	TV	MV	TV	MV
	30	1.9998	2	1.9998	2	1.3335	1.333	0.666675	0.66667	2.000025	2.00

Model Calculation :

$I = I_1 = 1.9998A$, $I_2 = 1.3335A$, $I_3 = 0.666675A$

And ,

$V_1 = 17.9998V$, $V_2 = 6.00075V$, $V_3 = 6.00075V$,

$V_4 = 12.0015V$

Therefore ,

$I_2 + I_3 = I_1$

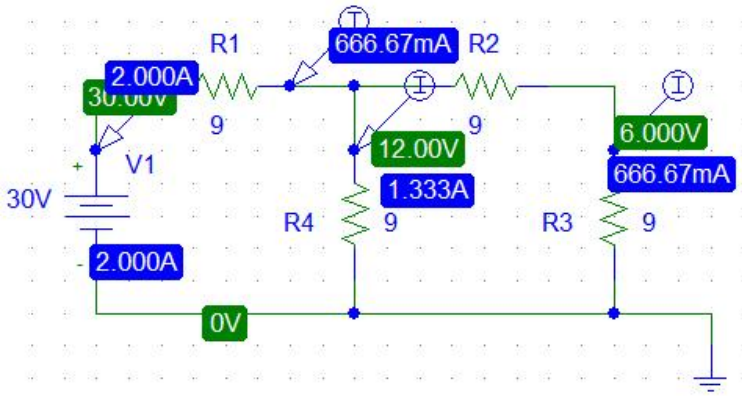
$(1.3335 + 0.666675)\ A = 2.000025A = I_1 = I$

And ,

$V_1 + V_4 = (17.9998+12.0015)\ V = 30.0013V = V$

$V_2 + V_3 + V_4 = (6.00075 + 6.00075 - 12.0015) = 0\ V$

Result :



Precautions :

1. Check for proper connections before switching ON the power supply.
2. Take care of the reading the apparatus.
3. The terminal of the resistance should be properly connected.