Department of CSE

CSE209 Lab

Course Name: Electrical Circuits

Course Code: CSE209

Section No: 2

Experiment No: 02

Name of the Experiment: Series-Parallel DC Circuit and Verification of Kirchhoff's Laws.

Date of submission: 10/8/2021

Student's Name: Md Abdul Ahad Rifat

Student's ID: 2020-1-60-215

Submitted to

Rashedul Amin Tuhin

Senior Lecturer

Department of Computer Science and Engineering

East West University

Objectives:

1. To learn analysis of dc series-parallel circuit.
2. To verify Kirchhoff's Voltage Law (KVL).
3. To verify Kirchhoff's Current Law (KCL).

Circuit Diagram(s):

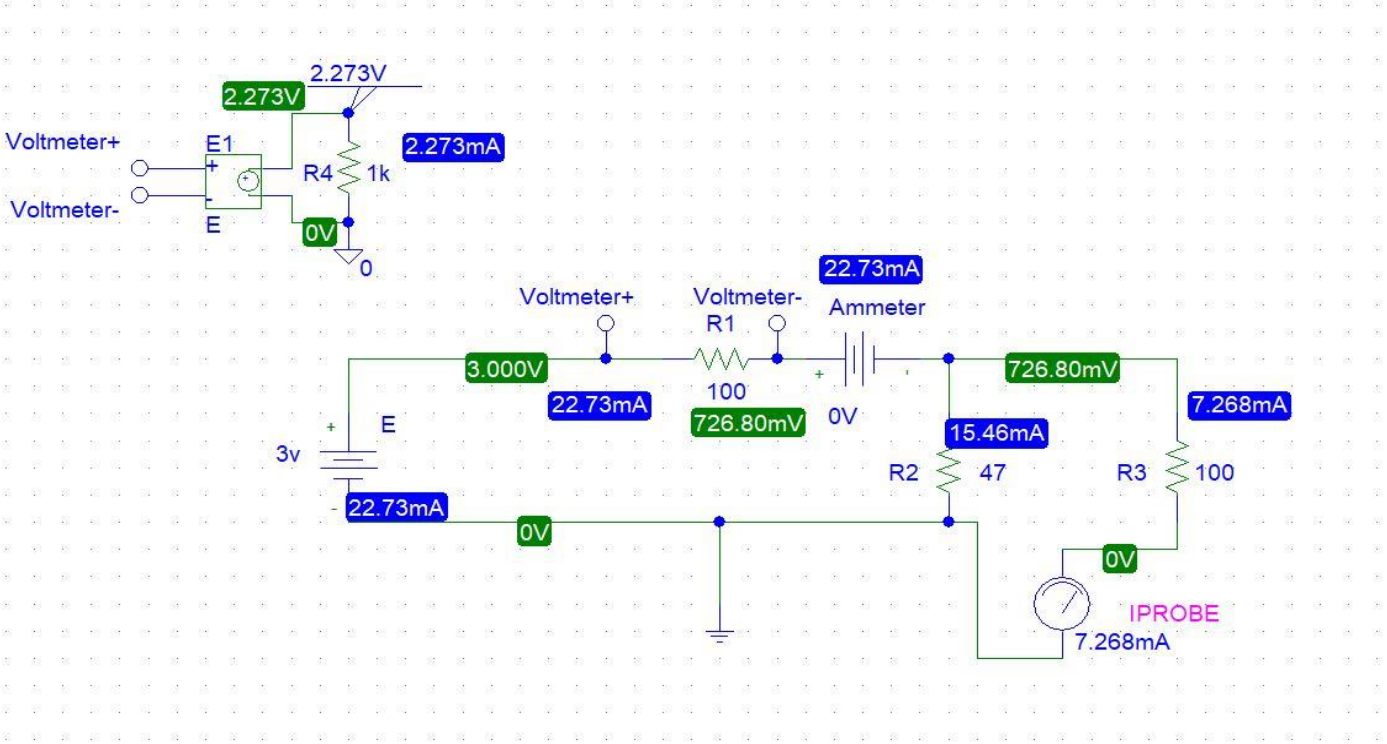

Figure 1. Circuit Diagram for Experiment 2

Experimental Datasheet:

Table 1 Experimental Datasheet

Measured Value of *E (V)*	Measured Value of V_1 *(V)*	Measured Value of V_2 *(V)*	Measured Value of V_3 *(V)*	Measured Value of I_1 *(mA)*	Measured Value of I_2 *(mA)*	Measured Value of I_3 *(mA)*	Measured Value of Resistances (Ω)
3	2.273	0.727	0.727	22.73	15.46	7.268	R_1 = 100 R_2 = 47 R_3 = 100

Post-Lab Report Questions and Answers:

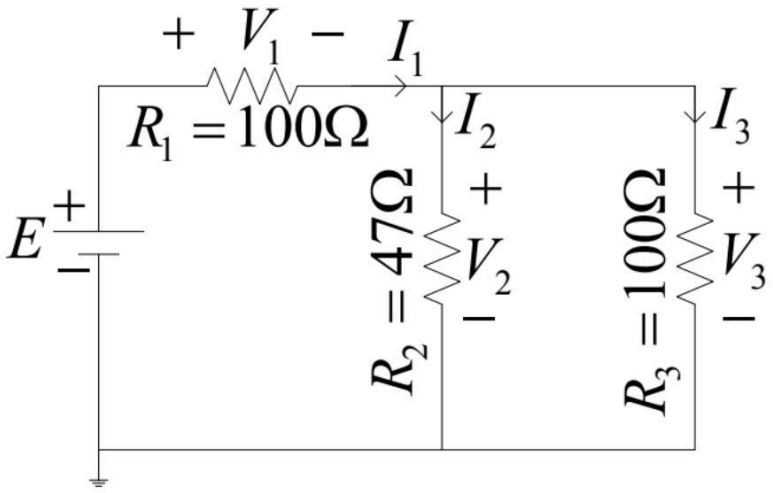

Figure 2.Circuit Diagram

Calculate the values of V_1, V_2, V_3, I_1, I_2, and I_3 of the circuit of Figure 2 using measured values of E, R_1, R_2, and R_3. Compare the calculated values with the measured values and give reason if any discrepancy is found.

Answer:

Here R_2 and R_3 resistors connected in parallel so

$R_p = R_2 + R_3$

$= 47 \| 100$

$= 31.973\ \Omega$

We know,

Ohm Law V=IR

Or, $E = I1\ R_{eq}$

Or, $I_1 = \frac{E}{R_1 + R_{eq}}$

$= \frac{3}{100+31.973}$ mA

$= 22.73$ mA

Using CDR,

$$I_2 = \frac{R_3 \times I_1}{R_2 + R_3}$$

$$= \frac{100 \times 22.73}{47+100} \text{ mA}$$

$$= 15.46 \text{ mA}$$

$$I_3 = \frac{R_2 \times I_1}{R_2 + R_3}$$

$$= \frac{47 \times 22.73}{47+100} \text{ mA}$$

$$= 7.268 \text{ mA}$$

$V_1 = I_1 \times R_1 = 100 \times 22.73 \times 10^{-3} = 2.273$ V

$V_2 = I_2 \times R_2 = 47 \times 15.46 \times 10^{-3} = 0.727$ V

$V_3 = I_3 \times R_3 = 100 \times 7.268 \times 10^{-3} = 0.727$ V

1. From the calculated values of V_1, V_2, V_3, I_1, I_2, and I_3, show that
   i. $V_1 = V_2$
   ii. $E = V_1 + V_2$ (KVL)
   iii. $I_1 = I_2 + I_3$ (KCL)

Answer:

i. Into this circuit R_2 and R_3 resistors are connected in parallel. We know that parallel circuit voltage same. So, $V_2 = V_3$ are the same value.

ii. Applying KVL $E = V_1 + V_2 = (2.273 + 0.727)$ V $= 3$ V

Or, $3 = 3$

iii. Applying KCL $I_1 = I_2 + I_3 = (15.46 + 7.268)$ mA $= 22.73$ mA

Or, $22.73 = 22.73$

Conclusion:

From this experiment we have learnt about Kirchhoff's Law of KVL and KCL and in this experiment we have learnt how to make a voltmeter to measure the voltage. Moreover, in this experiment we have used IPROBE and VDC to measure the current. Finally we have calculated the value of KVL and KCL through this experiment.