

**Khwaja Yunus Ali University**

***LAB Report***

**Name of the Department: Computer Science and Engineering**

**Course Code: CSE 0713-1104**

**Course Title: Electrical Circuit Lab**

**Report No.: 02**

**Topic: Verification of Kirchhoff's Current Law**

**Semester: Summer 2024**

**Submission Date: 29-01-2025**

**Instructor Signature & Date**

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No. of experiment: 02

Name of the experiment: Verification of Kirchhoff's Current Law.

Objective: To verify Kirchhoff's Current Law using digital simulator.

Theory: Kirchhoff's Current Law (KCL) is a fundamental concept in electrical engineering, and it states that the total current entering a circuit in an electrical circuit must equal the total current leaving that circuit, and if the resistance This principle is important for analyzing complex circuits and it helps in understanding the behavior of electrical networks.

Kirchhoff's Current Law can be expressed as,

Where indicates the current flow, & n is the total number of nodes.

List of apparatus:

A working computer.

Software: Proteus 8 professional.

Tools: 1. Resistor, 2. Cell, 3. Grounding, 4. Wires, 5. DC Ammeter

Procedure:

1. Let’s add a DC voltage source, a resistor (R1), an DC Ammeter and connect them in a series connection with wires.
2. Now let’s add two more resistors (R2 & R3) and two more DC Ammeter in a parallel connection.
3. Let’s Complete the circuit by adding and connecting a grounding.
4. Let’ assign some value to the resistor and power supply to observe and record the current flow after passing through each resistor with the help of DC Ammeter.

Circuit diagram:

A diagram of a circuit

Description automatically generated

Circuit diagram of KCL in a circuit

Calculations:

Given that,

R1 =30 Ω

R2 =15 Ω

R3 =25 Ω

We know that,

R = R1  Ω

= Ω

=39.375 Ω

Let, V=320 v

Now,

ITotal = = = 8.126 A

Applying Current Divider Law:

I2 = I

= 8.126

= 3.047A

Again,

I1 = I

= 8.126

= 5.078 A

Now, by the definition of Kirchhoff's Current Law,

Total current entering the circuit = Total current leaving that circuit

= 3.047 + 5.078 = 8.126 ITotal

Table:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| SL NO. | Provided voltage (v) | Observed Current,(A) | Calculated  Current,(A) | Total current Observed (A) | Total current calculated (A) |
| 1 | 140 | 2.22 | 1.33 | 3.56 | 3.56 |
| 2 | 250 | 3.97 | 2.38 | 6.35 | 6.35 |
| 3 | 100 | 1.59 | 0.95 | 2.54 | 2.54 |
| 4 | 200 | 3.17 | 1.90 | 5.08 | 5.08 |
| 5 | 320 | 5.078 | 3.047 | 8.126 | 8.126 |

Table: Tabulated calculations using Kirchhoff's Current Law

Result and Discussions: After throw observation and calculation we can see that the total current input current (observed & calculated) in the circuit is equal to the current output (observed & calculated) which is 8.126 A.

Conclusion: The total current incoming is same as total current outgoing at a node. Hence we can confirm that the experiment is successful and of Kirchhoff's Current Law is verified.