

---

## **Introduction of Active and Passive Components and Verification of Kirchhoff's Laws using circuit simulation**

**OBSERVATION TABLE:****1) Resistance**

Sr. No.	Value of R using colour code	Wattage capacity	Value of R using multimeter	%Error
1	22Ω	-	22.7	3.18
2	2200Ω	-	2170	1.36

**2) Inductor**

Sr. No.	Value of L using colour code	Type of Inductor
1	10000μH	Axial
2	15mH	Bobbin

**3) Capacitor**

Sr. No.	Value of C	Type of Capacitor
1	1000μF	Electrolyte
2	100μF	Electrolyte
3	1500F	Ceramic
4	1μF	Ceramic

**4) Active Components**

Sr. No.	Name of the component	Symbol	Identification of pins form observation	No. printed on component to refer datasheet
1	Diode		Ring = n side of diode and other side is p side	007114
2	Diode		Ring = n side of diode and other side is p side	007144
3	Transistor		Left Terminal = Emitter if flat side of transmitter is facing observer	5479

## **Introduction of Active and Passive Components & Verification of Kirchoff's Laws using circuit simulation**

**AIM:**

- 1) To differentiate active and passive components from the given components.
- 2) To identify the value of resistors using colour codes and wattage according to size of the resistors. Also verify the value using multimeter.
- 3) To find different types of capacitors and their values.
- 4) To identify the pins of transistor and diodes.
- 5) To verify Kirchhoff's Laws using circuit simulation with the help of SEQUEL.

**APPARATUS & COMPONENTS REQUIRED:**

Different active and passive components, Digital Multimeter, Sequel simulator

**THEORY: Write theory related with following questions.**

- 1) Define active and passive components. Give examples of each.

Ans) An active component is an electronic component which supplies energy to a circuit. Common examples of active components include: Voltage sources, Current sources, Generators (such as alternators and DC generators), All different types of transistors (such as bipolar junction transistors, MOSFETS, FETs, and JFET), Diodes (such as Zener diodes, photodiodes, Schottky diodes, and LEDs).

- 2) Write statement of Kirchhoff's laws.

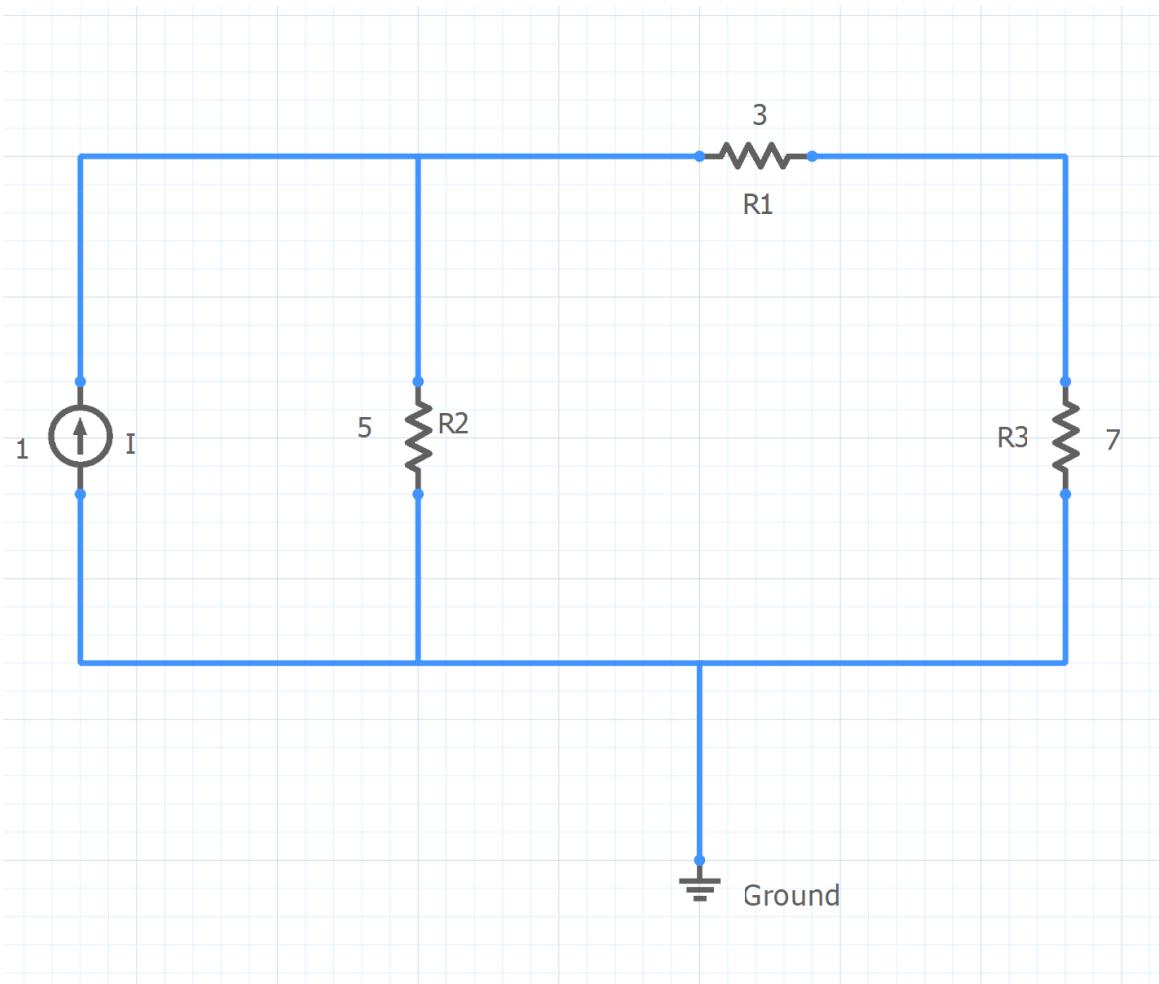
Ans) Statement of KCL :The algebraic sum of all currents entering and exiting must equal 0

Statement of KVL :In any closed loop network, the total voltage around the loop is equal to the sum of all the voltage drops within the same loop

**Procedure:**

- 1) Find the value of given resistors using color code also verify it using multimeter.
- 2) Find the value of the given inductor.
- 3) Find the value of given capacitor also identify types of capacitors.
- 4) Identify the terminals in case of Diode and Transistor. Also write down the number given on transistor and diode and refer its datasheet.
- 5) Download SEQUEL Simulator.
- 6) For verification of Kirchhoff's Laws, built the circuit in simulator.
- 7) Simulate the circuit and obtain current flowing through each resistor and voltage across each resistor.
- 8) Verify the result using Kirchhoff's current equation for the respective node.

- 
- 9) Verify the result using Kirchhoff's voltage equation for the present 3 loops in the circuit.
  - 10) Verify them with theoretical values.

**CIRCUIT DIAGRAM:**

output.dat - Output Variabl...

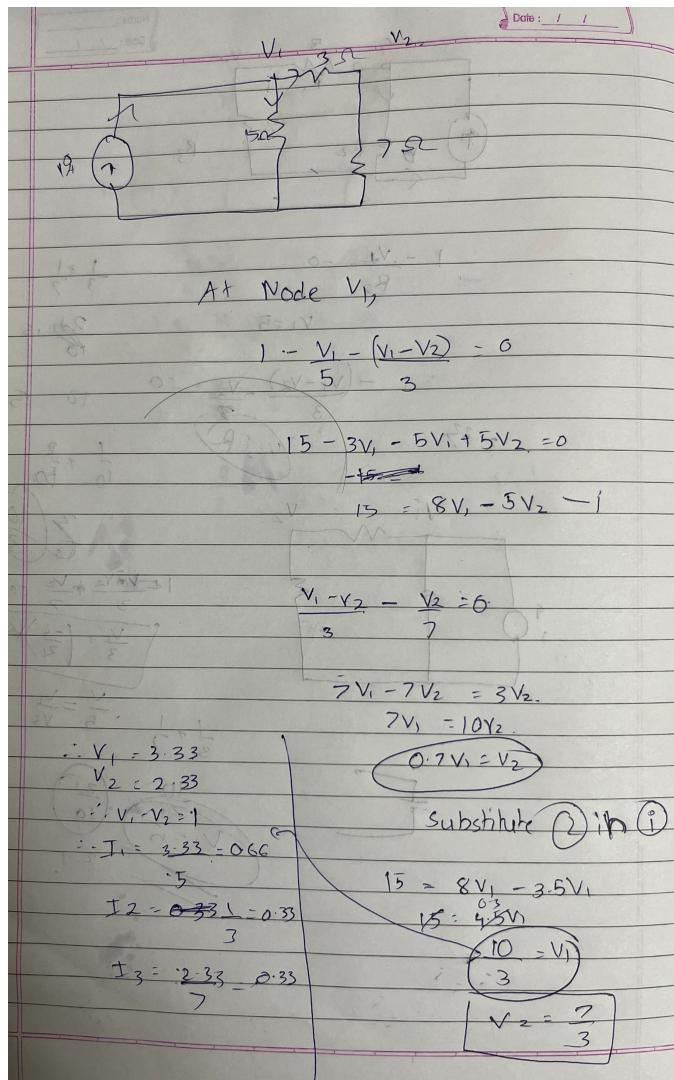
	Variable	Value
1	V1	1.000000e+000
2	I1	3.333333e-001
3	V2	3.333333e+000
4	I2	6.666667e-001
5	V3	2.333333e+000
6	I3	3.333333e-001

OK Cancel

**OBSERVATION TABLE:**

<b>V<sub>1</sub>(Volts)</b>	<b>V<sub>2</sub>(Volts)</b>	<b>V<sub>3</sub>(Volts)</b>
1V	3.33V	2

<b>I<sub>1</sub>(A)</b>	<b>I<sub>2</sub>(A)</b>	<b>I<sub>3</sub>(A)</b>
0.333	0.666	0.333

**CALCULATIONS:**

**RESULT:**

V <sub>1</sub> (Volts)		V <sub>2</sub> (Volts)		V <sub>3</sub> (Volts)	
Theoretical	By simulation	Theoretical	By simulation	Theoretical	By simulation
1	1	3.333	3.33	2.333	2.333

I <sub>1</sub> (mA)		I <sub>2</sub> (mA)		I <sub>3</sub> (mA)	
Theoretical	By simulation	Theoretical	By simulation	Theoretical	By simulation
0.333	0.333	0.666	0.666	0.333	0.333

**CONCLUSION:**

conclusion.

Therefore, by this experiment I verified the resistance, inductance, capacitance ~~at~~ and thereby learned how to use a multimeter. I also learned how to apply circuits in sequel and verified KCL and KVL using sequel software.

