Expt. No. 1 Date

Page No. 1

Aim: To familarize with active and passive electronic components.

→ Apparatus required :-
Resistors (various values), Capacitors (ceramic, electrolytic), Inductors, Diode, LED, Transistors, Breadboard, Connecting wires, multimeter, power supply/Battery.

→ **Theory** :- Electronic components are classified into two types:

Passive Components: These components do not require power to operate and do not amplify signals.
Example:
Electronic components
Resistor → limits current flow.
Capacitor → Stores electrical energy.
Inductor → stores energy in a magnetic field.

Active Components :
These components require an external source of energy and can amplify signals.
Eg. Diode - Allows current to flow in one direction only.

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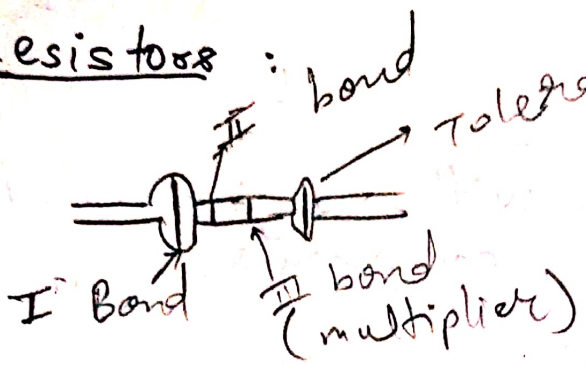
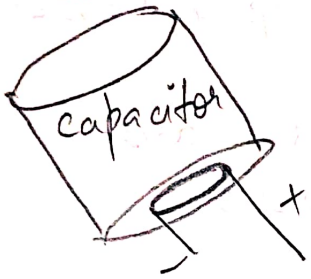
Resistors :



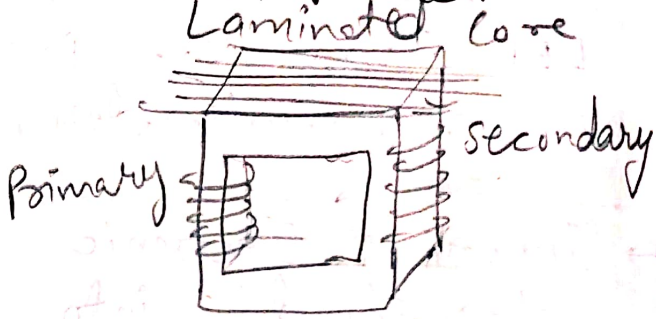
gold = ± 5 %

Silver = ± 10 %

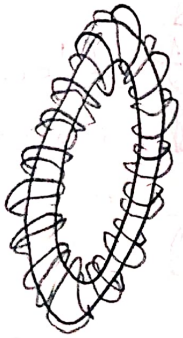
Capacitor :



Transformer :



Inductor :



(silicon transistors)

Silicon diodes

(zener diode)

- LED (light emitting Diode) - Emits light when forward biased.

- Transistor Acts as a switch or amplifier.

Procedure :-

1. Resistors :- Observe physical appearance Read colour codes to find resistance value. Verify value using a multimeter.

2. Capacitors :- Observe ceramic and electrolytic types. Note polarity in electrolytic capacitors. Measure capacit-ance (i.e LCR meter available)

3. Inductors :- Observe wire-wound structure Identify rating (if ~~possible~~ printed)

Diagram ?

4. Diodes :- identify cathode (marked with a silver band). test with multimeter in diode mode.

5. LEDS

Observe polarity : long leg is anode.

Connect in series with resistor and apply voltage to rest lighting.

Transistors :- Identify the pains (emitter, Base, Collector) using datasheet.
Test using multimeter in diode mode.

Observation:

Components	Symbol	function
◦ Resistor	R	limits current
◦ Capacitor	C	Stores electric charge.
◦ Inductor	L	Stores magnetic energy.
◦ Diode	D	Allows unidirection current
◦ LED	—	Emits light
◦ Transistor	Q	Acts as switch / amplifier

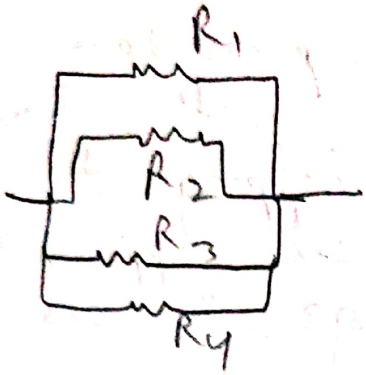
Result: The active and passive components were successfully identified and tested. their characteristics and functions

were understood.

Conclusion:- The practical provided hands-on experience with basic electronic components, helping to understand their physical appearance, identification, and usage in circuits.

17/2/25

---> Series Connection



--> Parallel Connection

	1, 2 Band	Multiply by :
Black	0	x 1
Brown	1	x 10
Red	2	x 100
Orange	3	x 1k
Yellow	4	x 10k
Green	5	x 100k
Blue	6	x 1M
Violet	7	x 10M
Grey	8	x 100M
White	9	x 1G

Date

Expt. No. 2

Page No. 5

Aim: To study and Understand the behavior of resistors, bulbs or other components when connected in series & parallel circuits.

→ **Apparatus required:**

- DC power supply / Battery (5V - 12V)
- Resistors, connecting wires, Breadboard.
- Multimeter, switch, Ammeter, Voltmeter.

→ **Theory:-**

(1) **Series connection:** Components are connected end-to-end forming a single path for current.
Current is same through all components.

- **Total resistance:**
  $R_{total} = R_1 + R_2 + R_3 + ---$
  voltage divides across each resistors based on resistance.

(2) **Parallel Connection:** Components are connected across the same two points, forming multiple paths for current.
Voltage is same across all components.

(1)

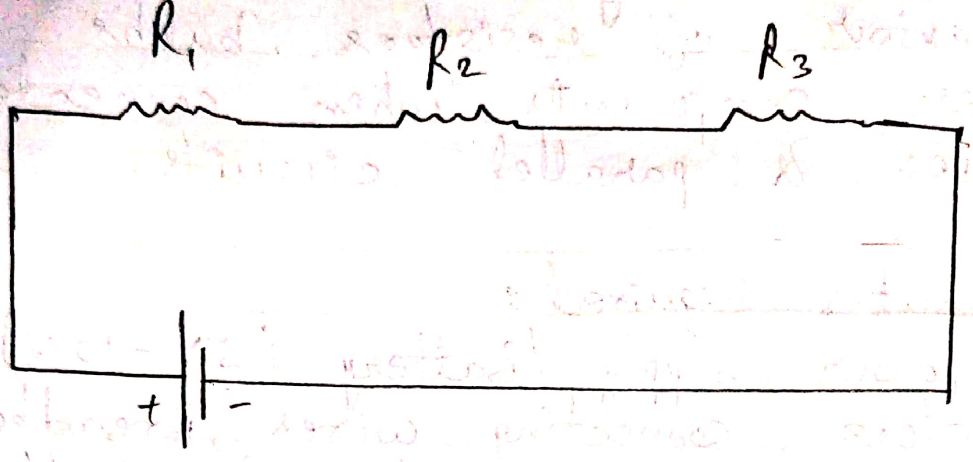


fig - Series Circuit

(2)

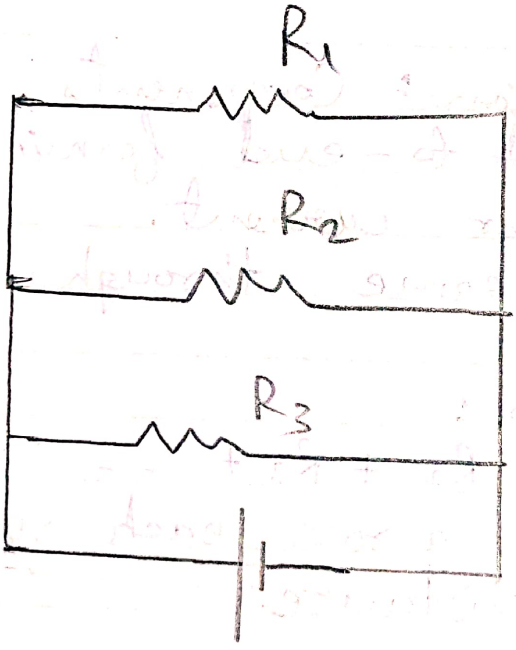


fig - parallel circuit

Total resistance :

$$\frac{1}{R_{total}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots$$

Current divides across each path.

→ **Procedure :-**

A Series Connection :

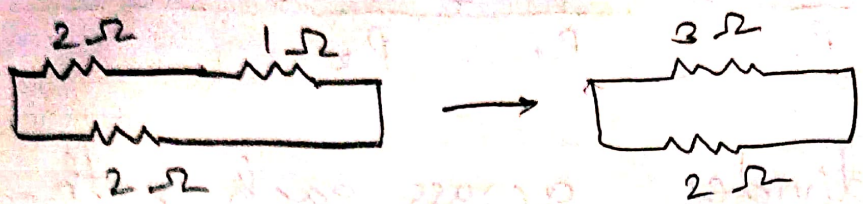
1. Connect three resistors in series on the breadboard.
2. Connect power supply and ammeter in series with the circuit.
3. Measure the ~~total~~ current using the ammeter.
4. measure the voltage across each resistor using a voltmeter.
5. Note down the values.

B Parallel Connection :

1. Connect the same 3 resistors in parallel on the Breadboard.

Calculation :

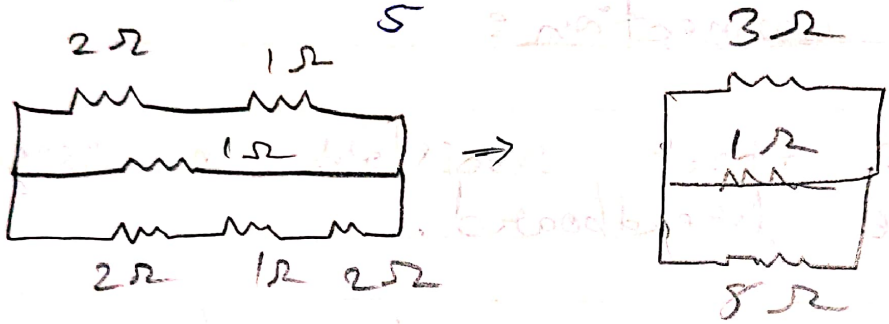
(1)



$$\frac{1}{Req} = \frac{1}{3} + \frac{1}{2} \Rightarrow \frac{2+3}{6} = \frac{5}{6}$$

$$Req = \frac{6}{5}\ \Omega$$

(2)



$$\frac{1}{Req} = \frac{1}{3} + \frac{1}{1} + \frac{1}{5} = \frac{5+15+3}{15}$$

$$\frac{1}{Req} = \frac{23}{15}$$

$$Req = \frac{15}{23}$$

(2) Connect the power supply and ammeter in series before the junction.

(3) Measure the total current and individual branch currents.

(4) Measure the voltage across each resistor.

(5) Note down the values.

Observations :-

Connection type	Resistor values
Series	R_1, R_2, R_3
Parallel	R_1, R_2, R_3

Connection type	Total Resistance
Series	$R_{total} = R_1 + R_2 + R_3$
Parallel	$1/R_t = 1/R_1 + 1/R_2 + 1/R_3$

Calculations :
Calculate theoritical values of total resistance for both cases.

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→ verify ohm's law : $V = IR$.

• **Result** → In a series circuit, current remains constant while voltage divides across resistors.

→ In a parallel circuit, voltage remains constant while current divides across branches.
practical values matched closely with theoritical calculations.

Precautions :

(1) Check all connections properly before switching on the power.

(2) Use resistors of suitable rating to prevent overheating.

(3) Ensure correct polarity of meters and power supply.

(4) Do not touch open wires while the circuit is powered.

→ **Conclusion**: The experiment helped us to clearly understand the difference b/w series & parallel circuits. It also validated ohm's law and taught how to calculate total resistance in different connections.

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Rewd 21/8/25