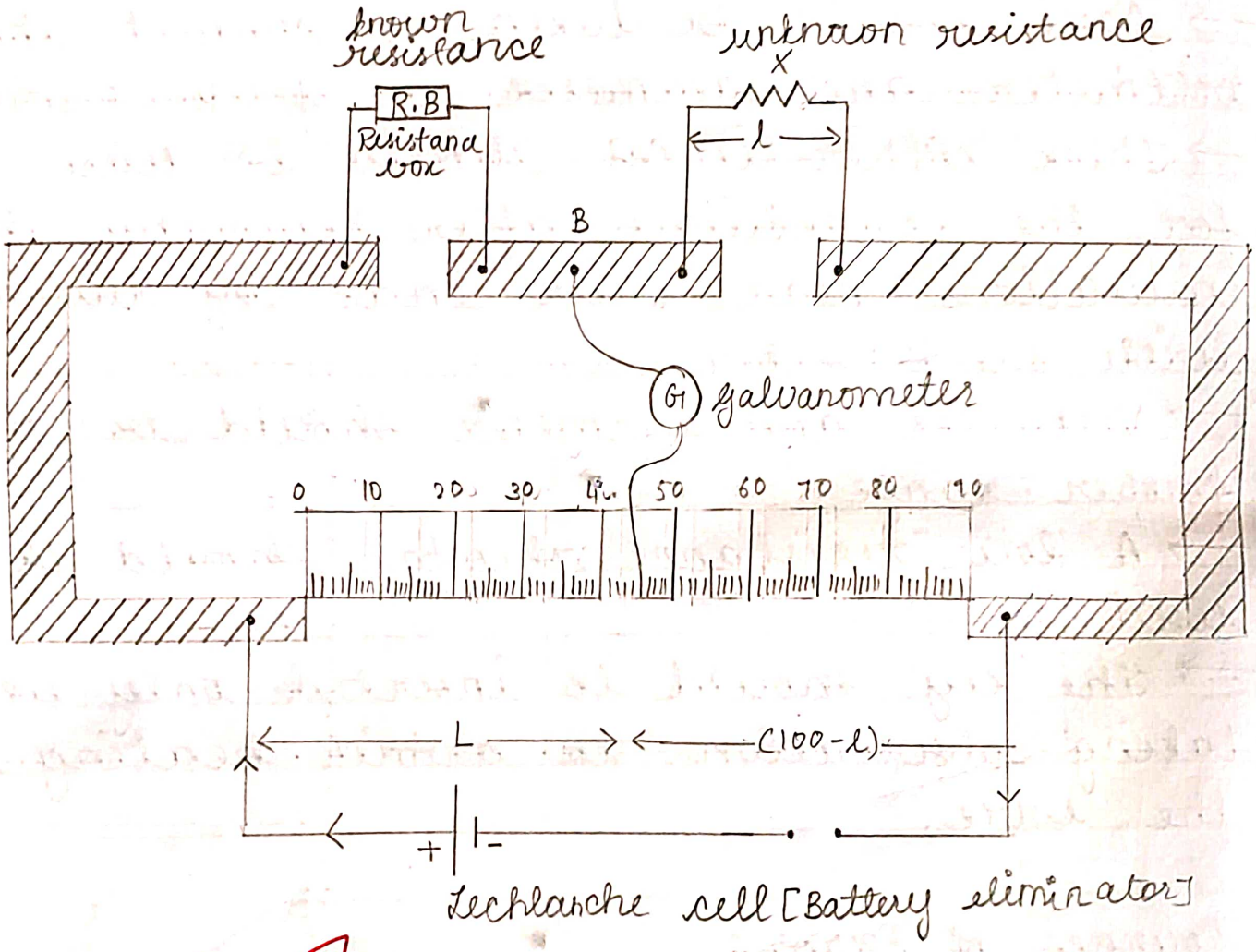
Circuit Diagram



Expt. No. : 2
Date. : 22/7/22

METRE BRIDGE - RESISTANCE OF THE WIRE

Aim :

To find resistance of the given wire using metre bridge

Materials Required :

Metre bridge, Battery eliminator, jockey, galvanometer, Resistance Box, One way key, Unknown resistance and connecting wire.

Formula :

The unknown resistance X is given by :

$$X = \frac{R(100 - l)}{l}$$

where R - Resistance in the resistance box in ohm

l - Balancing length in cm

Procedure :

→ Make the connections as shown in the circuit

Observation:

Least count of Metre Bridge Scale = 0.1 cm

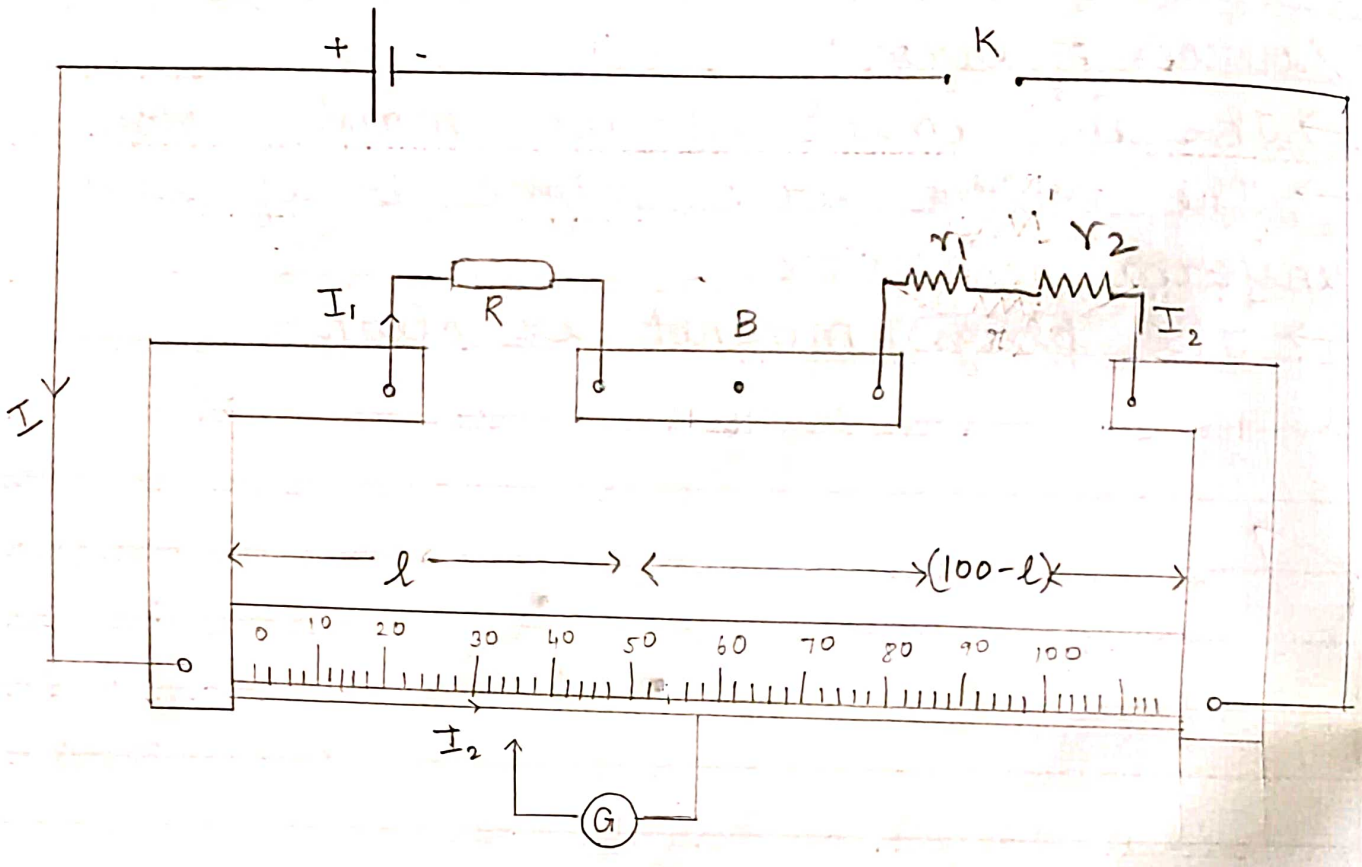
Tabulation:

S.No	Resistance from the Resistance Box 'R' ohm	Balancing length (from left) 'l' cm	Balancing length (100-l) cm	Unknown resistance $X = \frac{R(100-l)}{l}$ (Ω)
1	1	91.5	8.5	0.92
2	2	88	12	0.27
3	3	98	2	0.061
4	4	97	3	0.123
5	5	90.5	9.5	0.52
6	6	96	4	0.25

→ Include some known value of resistance in the left gap
→ Move the jockey from end A to B and observe the point of zero deflection in the galvanometer
→ Let the balancing length be 'l'. Repeat the experiment by including different values of resistances
→ Find the balancing length in each case. Tabulate the readings and calculate the resistance of the wire.

Result:
The value of unknown resistance X is 0.3573 Ω

Precautions:
→ The connections should be neat, clean and tight
→ Move the jockey gently over the bridge wire and donot rub it
→ Null point should be brought between 40 cm and 60 cm to avoid end resistances


+
-
K
r_1
r_2
I_1
R
B
I_2
I
l
(100-l)
0 10 20 30 40 50 60 70 80 90 100
I_2
G

Expt. No. : 3
Date. : 10/8/22

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METRE BRIDGE - RESISTORS IN PARALLEL.

Aim:

To verify the laws of combination (series) of resistances using a metre bridge.

Apparatus:

Metre bridge, Leclanche cell, galvanometer, Resistance box, jockey, key, unknown resistance and connecting wires.

Formula:

1) The unknown resistance X is given by:

$$X = \frac{lR}{100-l} \ (\Omega) \qquad X = \left(\frac{100-l}{l}\right) R$$

where,

R is known resistance in ohms

l is the balancing length in cm

2) Effective resistance of resistors in ~~parallel~~ series

$$R_p = \frac{R_1 R_2}{R_1 + R_2} \qquad R_s = R_1 + R_2$$

where,

Observation:

Least count of the metre bridge scale = 0.1 cm

Tabulation:

S.No	Resistance coil	Resistance from resistivity box (Ω)	Length AD = l	Length DL = (100 − l)	Mean resistance $R = \frac{(100-l)}{l} R$ (Ω)
1	r_1 only 2	2	68.4	31.6	0.92
2	5	5	71.3	28.7	2.01
3	r_2 only 2	2	78.3	21.7	0.55
4	5	5	8.2	18	1.097
	r_1 & r_2				
	2	2	86	14	0.325
	5	5	87.7	12.3	0.701

R_1 and R_2 are the resistance of the resistors in ~~parallel~~ series (in ohms)

Procedure :

→ Mark the two resistance coils as R_1 and R_2.

→ To find R_1 and R_2

(i) Make the connections as shown in the circuit

(ii) Include some known value of resistance

(iii) Move the jockey from end A to B and observe the point of zero deflection in the galvanometer

(iv) Let the balancing length be 'l'

(v) Repeat the experiment by including different values of resistance

(vi) Find the balancing length in each case

(vii) Tabulate the readings and calculate the resistance R_1

(viii) Repeat the same for R_2

→ Connect two coils R_1 and R_2 in ~~parallel~~ series as shown in circuit in the right gap of metre bridge and find the resistance of the combination

→ Record your observation

Result:
experimental value of $R_s = 0.513\Omega$
Calculated value of $R_s = 0.525\Omega$
Law of combination of resistances ~~parallel~~ series is verified

Precautions:
→ The connections should be neat, clean and tight
→ Move the jockey gently over the bridge wire and donot rub it.

Sources of error:
→ The instruments screws mayor loose
→ The plugs maynot be clean