EXPERIMENT NO: 7

Aim : To verify the law of combination (parallel) of resistors using a metre bridge.

Apparatus : A metre bridge, battery or a battery eliminator, galvanometer, low resistance box, high resistance box, jockey, key, two known resistance coils and connecting wires.

Theory : If two resistors R_1 and R_2 are connected in parallel, then the effective resistance of the combination R_p is given by the relation, $\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$

The known resistance (say R_1)is connected across the right gap of the meter bridge. When the bridge is balanced,

$R_1 = \frac{100-l}{l} R$; where R is the resistance across the left gap (resistance box) and l is the balancing length measured from the end A)

Procedure :

1. Arrange the apparatus accordingly, with reference with the circuit diagram.
2. Connect the known resistance (R_1) in the right gap of the meter bridge.
3. Connect the low resistance box in the left gap of the metre bridge.
4. Make all other connections as shown in the circuit diagram.
5. Take out a small resistance (say 5 Ω) from the low resistance box and a high resistance (say 2000 Ω) from the high resistance box.
6. Touch the jockey on both ends of the metre bridge wire (A and C). If the galvanometer shows opposite deflections, the connections are correct.
7. Move the jockey along the metre bridge wire from the left to the right, till the galvanometer shows zero or null deflection. This point is called the null point.
8. Adjust the value from the low resistance box (R), such that the null point is between 40cm and 60 cm of the metre bridge wire. Measure the length AD=l.
9. Repeat the same for different values of R and take three sets of observation.
10. Remove R_1 and connect R_2 across the right gap and take three sets of observations.
11. Connect R_1 and R_2 in parallel and connect the combination across the right gap. Take three sets of observations.

Result :

Experimental value of R_p = _____ Ω
Theoretical value of R_p = _____ Ω
Difference = _____ Ω

Within the limits of experimental error, the theoretical and experimental values of R_s are same. Hence, law of resistors in parallel is verified.

Precautions :

1. The connections should be clean and tight.
2. All the plugs in the resistance box should be tight.
3. Null points should be brought between 40 cm and 60 cm.

Sources of error :

1. The instrument screws may be loose.
2. The known resistances may have a different value.
3. The resistance box plugs may not be clean.

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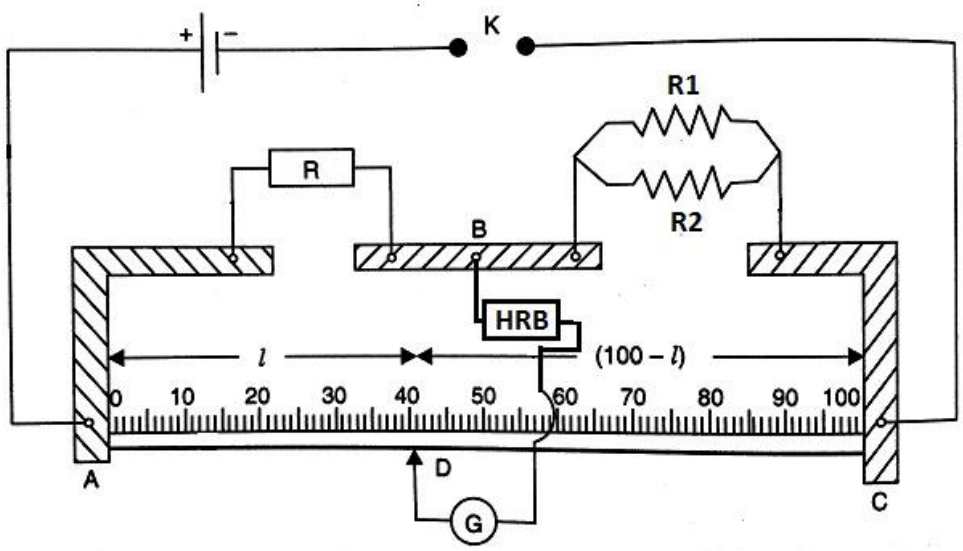
Circuit Diagram :



Observations:

R_1 = _____ Ω
R_2 = _____ Ω

$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$ = _____ Ω (Theoretical value)

Observation Table :

Resistance Coil	Sr. No.	Resistance taken from Resistance Box, R (Ω)	l (cm)	100 – l (cm)	Measured Resistance (Ω)	Mean Resistance (Ω)
R_1	1 2 3					
R_2	1 2 3					
R_p	1 2 3					

Calculation:

$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$

R_p = _____ Ω (Experimental value)

Difference = _____ Ω

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