Experiment No. …. Date: ……/……/……....

TO DETERMINE THE RESISTANCE OF THE GIVEN WIRE BY USING METER BRIDGE AND HENCE FIND ITS RESISTIVITY (SPECIFIC RESISTANCE)

APPARATUS REQUIRED:

1. Meter bridge
2. A wire (about 10 to 20 cm)
3. A Micro meter screw gauge
4. A resistance box
5. DC power source
6. Connecting wires
7. A galvanometer
8. A Jockey (slider)

THEORY:

A meter bridge also called a **slide wire bridge** is an instrument that works on the principle of a Wheatstone bridge. A meter bridge is used in finding the unknown resistance of a wire. It is also used to compare the resistance of two wires.

Construction of meter bridge

It consists of three copper ($R = 0$) strips: A, B and C fixed on a wooden board. A standard resistance wire is fixed between the gap A and C. the wire is 1m long and has uniform cross-sectional area. A meter scale is fixed parallel to the wire. An unknown resistance X is fixed connected between the gap A and B. And a resistance box is connected between the gap B and C.

One terminal of a galvanometer is connected to point B and another terminal of the galvanometer is connected to a jockey (slider). We slide the jockey over the standard resistance wire in order to obtain null deflection in the galvanometer.

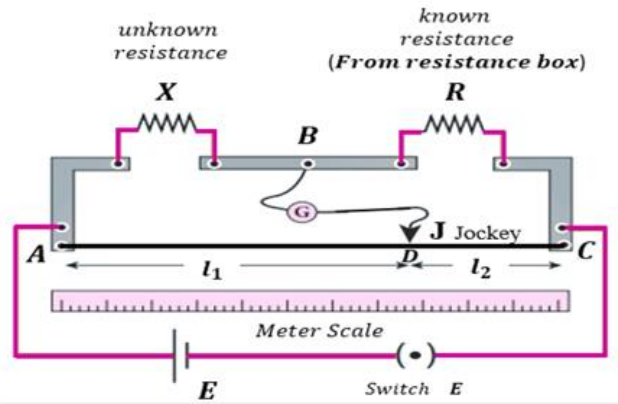

Figure (i): Circuit diagram to find unknown resistance using meter bridge

Working of meter bridge:

The meter bridge works on the principle of Wheatstone bridge.

At balanced condition (as in figure (ii);

$$X \times Q = P \times R$$

Or $$\boldsymbol{X = \frac{P}{Q} \times R} \dots\dots\dots \textbf{(1)}$$

For a wire of length *l* and cross-sectional area *A*, the resistance *R is:* $R = \rho \frac{l}{A}$

For a wire of uniform thickness, $\boldsymbol{R \propto l}$

Therefore, in the given meter bridge;

$$P \propto l_1$$

And, $$Q \propto l_2$$

$$\therefore \frac{P}{Q} = \frac{l_1}{l_2} \dots\dots\dots \textbf{(2)}$$

Using equation (2) in equation (1), we get

$$\boldsymbol{X = \frac{l_1}{l_2} \times R} \qquad [\text{ Here, } l_2 = 100 - l_1]$$

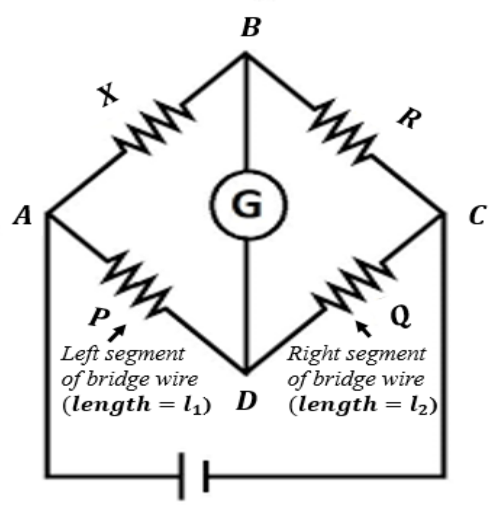

Figure (ii): Equivalent wheat stone bridge circuit

Note:
From above figures
At balanced condition,

$$\boldsymbol{X \times Q = R \times P}$$

OR

$$\boldsymbol{X \times l_2 = R \times l_1}$$