Experiment No. …. Date: ……/……/……....

TO COMPARE THE RESISTANCE OF TWO GIVEN WIRES BY USING METER BRIDGE

APPARATUS REQUIRED:

1. Meter bridge
2. Two unknown resistance wires (about 10 - 20 cm)
3. DC power source
4. Connecting wires
5. A galvanometer
6. 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.***

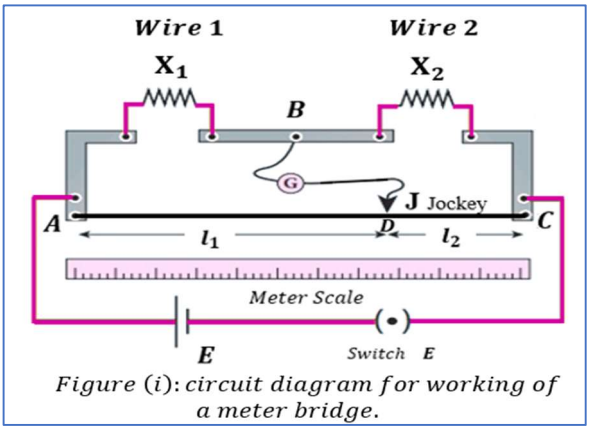

Figure (i): circuit diagram for working of a meter bridge.

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. One unknown resistance wire X_1 is connected between the gap A and B. And another unknown resistance wire X_2 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.

Working of meter bridge:

The meter bridge works on the principle of Wheatstone bridge.

At balanced condition (as in figure (ii));

$$X_1 \times Q = P \times X_2$$

Or $$\frac{\mathbf{X_1}}{\mathbf{X_2}} = \frac{\mathbf{P}}{\mathbf{Q}} \ldots\ldots\ldots \mathbf{(1)}$$

For a wire of length l and cross sectional area A,

the resistance R *is:* $R = \rho \frac{l}{A}$

For constant ρ and A , $\boldsymbol{R \propto l}$

Therefore, in the given meter bridge;

$$P \propto l_1$$

And, $$Q \propto l_2$$

$$\therefore \frac{P}{Q} = \frac{l_1}{l_2} \ldots\ldots\ldots \mathbf{(2)}$$

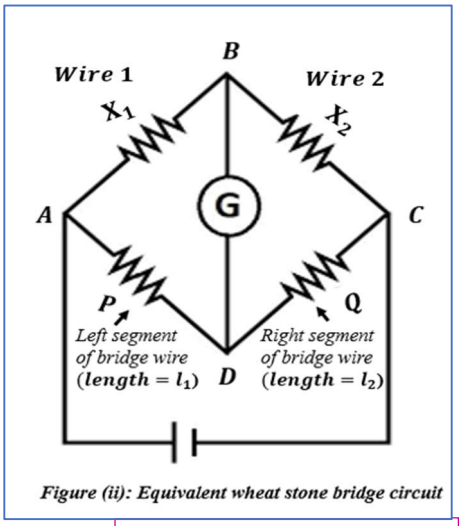

Figure (ii): Equivalent wheat stone bridge circuit

Note:
From above figures
At balanced condition,
$X_1 \times Q = P \times X_2$
OR
$\mathbf{X_1 \times l_2 = X_2 \times l_1}$

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

$$\frac{\boldsymbol{X_1}}{\boldsymbol{X_2}} = \frac{\boldsymbol{l_1}}{\boldsymbol{l_2}} \qquad \textbf{[Here, } \boldsymbol{l_2 = 100 - l_1}\textbf{]}$$