EXPERIMENT 2

Finding the resistance of a given wire using meter bridge and hence determine resistivity of its material:

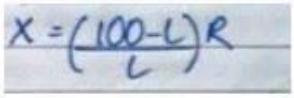
Aim: To find the resistance of a given wire using meter bridge and hence determine resistivity of its material.

Apparatus:

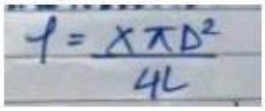
A meter bridge (slide wire bridge) , a lecranche cell, a galvanometer , a resistor , a jockey , a one way key , a resistance wire , a screw gauge , a meter scale , a set of square , connecting wire , a piece of sand paper.

Theory:

The unknown resistance 'X" is given by



1. Where 'R" is the known resistance placed in the left gap & unknown resistance 'X" is the right gap of Meter Bridge. 'L' is length of meter bridge wire from zero end up to balance.
2. Resistivity of the material of the given wire is given by



Where 'L' is the length & D is the diameter of the given wire.

Procedure:

1. Arrange the apparatus as shown in the arrangement diagram.
2. Connect the resistance wire whose resistance is to be determine in the right gap b/w C& B .Take care that no point /part of the wire forms a loop.
3. Connect resistance box of low range in the left gap b/w A & B.
4. Make all other connection as shown in the circuit diagram.
5. Take out some resistance from the resistance box , ping the key 'K'
6. Touch the jockey gently first at length end & then right end of the bridge wire.
7. Note the deflection in the galvanometer. If the galvanometer shows deflection in the galvanometer reading in opposite direction the correction are correct. If the deflection is on one side only then there is fault in the circuit. Check & rectify the fault.
8. Move the jockey gently along the wire from left to right till gives zero deflection. The point where the jockey is touching the wire is null point 'D'.
9. Choose an appropriate value of 'R' from the box such that there is no defection in the galvanometer when the jockey is nearly in the middle of the wire.
10. Note position of point 'D' to known the length AD=l
11. Take at least 4 sets of observation in the same way by changing the value of R in the steps.
12. Record your observation.
13. For specific resistance
    1. Cut the resistance wire at the point where it leaves the terminal, started it & find its length by using a meter scale.
    2. Measure the diameter of the wire at least at 4 places in two mutually perpendicular direction at each place with the of screw gauge.
    3. Record your observation as given in the table.

Observation:

1. Length of a given wire L = 66 cm =0.66 m
2. Table for unknown resistance (X)

Resistance from box, R (Ohm)	Length AB =l (cm)	Length BC = (100-l) (cm)	Unkown Resistance X = [R(100-l)]/L (ohm)
0.5	58.3	41.7	0.35
0.7	60.7	39.3	0.45
1	61.9	38.1	0.61
1.5	61.1	38.9	0.95
			Mean = 0.59

3. Least count of screw gauge

Pitch of screw gauge =0.01

Total no of division on the circular scale =

LC of screw gauge = Pitch /No of the circular scale

Zero error (e) = (0)

Zero connection = (e) =0

Radius of the resistance wire

Main Scale Reading (mm)	Circular Scale Reading	Total Reading (diameter) (mm)	Mean D (mm)	Mean radius (D/2) (mm)
0	43	0.43	0.42	0.21
0	41	0.41		

Result:

1. The value of the unknown resistance X =0.5 ohm
2. The specific resistance of material of wire = 0.104 $x10^{-3}$ ohm m
3. Percentage error

Precaution:

The connection should be neat, clean & tight.