National Institute of Technology Silchar

Department of Physics

Physics laboratory, BTech 1st and 2nd Semester.

EXPERIMENT NO. **6**

1.1 AIM

Calibration of a given ammeter by using a potentiometer.

1.2 APPARATUS REQUIRED

Potentiometer, Milliammeters, Rheostats, Keys, Galvanometer, Resistance Boxes, Shunt resistance, Battery, Leclanche cell.

1.3 THEORY:

Calibration of an instruments means standardization of the instrument with reference to another standered similar instruments or some calculated theoretical values.

Let i be the current flowing through the low resistance r the potential difference at the end of the resistance r is = i.r

This potential difference is balanced by the length L of the potentiometer wire, then

$$i.r = L.e \qquad (i)$$

Where e= potential difference per cm of the potentiometer wire.

I = current in the potentiometer circuit

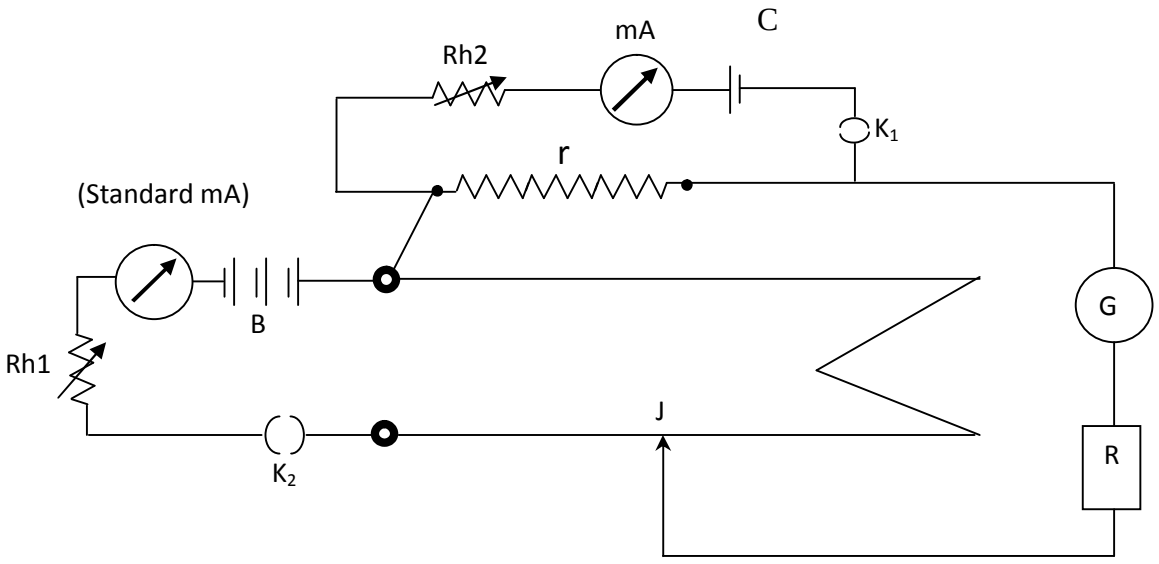
R= total resistance of the potentiometer wire.

Again, e= I.R/1000 (Total length of the potentiometer wire = 1000 cm)

Substituting the value of e in equation (i)

i.r = LRI/1000

i=LRI/1000 r mA



Circuit Diagram

1.4 PROCEDURE:

1. By adjusting rheostats in the potentiometer and resistance circuit and putting a suitable resistance in r, opposite deflections are obtained in first and last wire.
2. Current in the potentiometer is kept fixed and by adjusting R_{h2} and resistance r a current ói ô is allowed to flow in the resistance circuit. The corresponding null point is noted.
3. This current is found up by calculation (say i) . This I is actually the calculated value of ói/ô
4. The process is repeated by varying the current in the resistance circuit

5. For calibration of given ammeter the observations for I should be taken corresponding to the whole range of the current in the milliammeter. A graph ói-i/ô&ói -i-i/' is plotted, calibration can be made after analysis of the graph.

1.5 OBSERVATIONS:

TABLE-1

Resistance of the potentiometer wire (R) = é é é .Ý

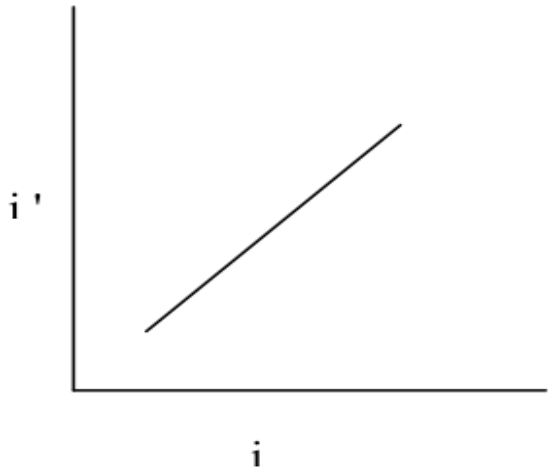
No. of obs.	Reading of the milliammeter to be calibrated i (mA)	Resistance r (box) Ω	Current in the standard milliammeter I (mA)	Balancing length (Lcm)			Calculated Current Reading $i^{/}$ = IRL/1000r (mA)	Corrected $i-i^{/}$ (mA)
				On wire no.	Scale reading	Total(Lcm)		

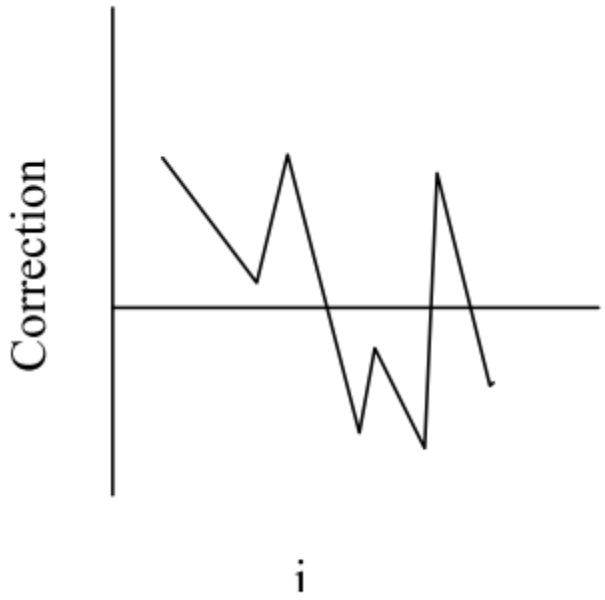
The current ($i^{/}$) is calculated using the formula given. Also the correction($i-i^{/}$) (ammeter reading - calculated current) is also found. If the calculated value is less than the ammeter reading, the correction is positive; if greater than the ammeter reading, the correction is negative.

A graph is drawn between ammeter reading (i) and calculated reading .(iõ).

1.6 RESULT:

The given ammeter is calibrated. The graphs were drawn for i vs i and i vs (i-i). The graph is drawn between ammeter reading (i) and correction (i-i).





1.7 PRECAUTIONS:

1. All connections must be checked and should be tight during experiment.
2. EMF of ôBô must be greater than EMF of ôCô.
3. The $^{+}$ Ve of potentiometer battery ôBô and that of EMF ôCô must be joined to the same end of the potentiometer.
4. The potentiometer circuit should be kept closed only for the time which is necessary to find the null point otherwise null point will shift due to heating of the potentiometer wire.

1.8 DISCUSSIONS :