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ECE – A

Physics: Electromagnetic Theory, Quantum Mechanics, Waves and Optics- 18PYB101J

EXPERIMENT- II

28.04.2021

CALIBRATION OF AMMETER USING POTENTIOMETER

AIM

To Calibrate the given ammeter by potentiometer. (i.e To check the gradations of ammeter and to determine the corrections, if any).

APPARATUS REQUIRED:

Potentiometer, rheostat, batteries (2V and 6V) or accumulators, keys, Daniel cell, high resistance, sensitive table galvanometer, the given ammeter, a standard resistance (1 Ω) (or) a dial type resistance box (1-10 ohm), Connecting wires etc.

FORMULAE:

Calibrated current passing through Standard resistance,

$$i' = (1.08 \times l) / (R \times l_0) (A)$$

Where R = Standard Resistance (R = 1 Ω)

l = Balancing length for different ammeter reading (m)

l_0 = Balancing length corresponding to emf of Daniel cell (m).

OBSERVATIONS:

Balancing length l_0 = 5.554 m

(Length of the coil balancing the emf of the Daniel cell)

CALCULATIONS:

$i' = \frac{1.08}{l_0} \times l$; $i' - i$; $\frac{1.08}{5.554} = 0.1944$

1. $i' = \frac{1.08}{5.554} \times 0.380 = 0.0738$; $i' - i = 0.0738 - 0.1 = -0.0261$

2. $i' = 0.1944 \times 0.960 = 0.1866$; $i' - i = 0.1866 - 0.2 = -0.0133$

3. $i' = 0.1944 \times 1.5 = 0.2916$; $i' - i = 0.2916 - 0.3 = -0.0084$

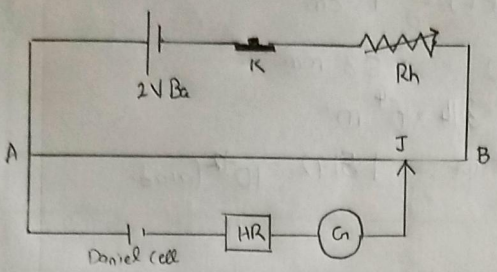
4. $i' = 0.1944 \times 2.040 = 0.3965$; $i' - i = 0.3965 - 0.4 = -0.0035$
5. $i' = 0.1944 \times 2.5 = 0.486$; $i' - i = 0.4860 - 0.5 = -0.014$
6. $i' = 0.1944 \times 3.04 = 0.5909$; $i' - i = 0.5909 - 0.6 = -0.0091$
7. $i' = 0.1944 \times 3.53 = 0.6862$; $i' - i = 0.6862 - 0.7 = -0.0138$
8. $i' = 0.1944 \times 4.13 = 0.8028$; $i' - i = 0.8028 - 0.8 = 0.0028$
9. $i' = 0.1944 \times 4.63 = 0.9000$; $i' - i = 0.9000 - 0.9 = 0$
10. $i' = 0.1944 \times 5.04 = 0.9797$; $i' - i = 0.9797 - 1.0 = -0.0203$

RESULT:

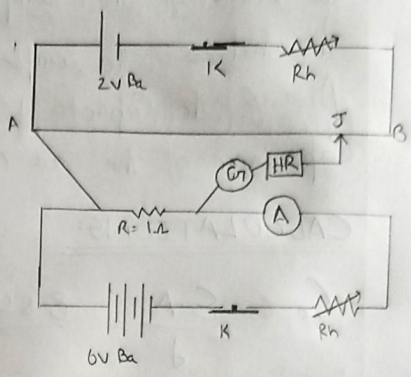
The given ammeter is Calibrated and Calibration graph is drawn.

CALIBRATION OF AMMETER USING POTENTIOMETER

Circuit Diagrams:

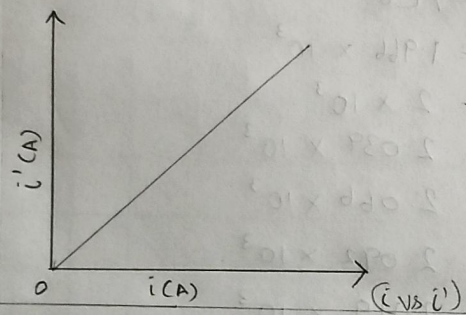


Standardization of Potentiometer

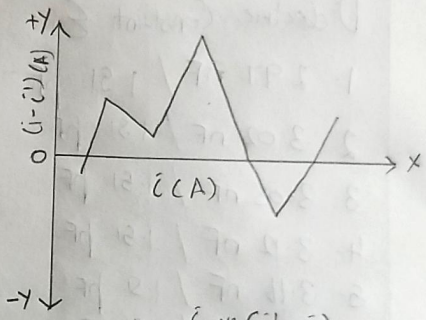


Calibration of Ammeter

Model Graphs



(i vs i')



i vs (i' - i)

Table To Calibrate the given Ammeter.

S No	Ammeter Reading i(A)	Length Balancing the P.D across 1 Ω coil ℓ (cm)	Calculated Ammeter Reading $i' = \frac{1.98}{\ell_0} \times \ell$ (A)	Correction (i'-i)(A)
1.	0.1	0.380	0.0738	-0.0261
2.	0.2	0.960	0.1866	-0.0133
3.	0.3	1.500	0.2916	-0.0084
4.	0.4	2.040	0.3965	-0.0035
5.	0.5	2.500	0.4860	-0.014
6.	0.6	3.040	0.5909	-0.0091
7.	0.7	3.530	0.6862	-0.0138
8.	0.8	4.130	0.8028	0.0028
9.	0.9	4.630	0.9000	0
10.	1.0	5.040	0.9797	-0.0203