# 4.HALF DEFLECTION- FIGURE OF MERIT

**AIM:**

To determine Resistance of a Galvanometer by Half-Deflection Method and To find Its Figure of Merit.

**APPARATUS:**

Battery, Galvanometer, High Resistance Box,Low Resistance Box, Connecting wires, Keys.

**THEORY:**

The resistance of the coil of a galvanometer is known as the resistance of the galvanometer. It is The represented by the letter G.The resistance of the galvanometer is given by,

$$G=\frac{RS}{R-S}$$ ...............................................(1)

Where,R is the resistance introduced by high resistance box to produce deflection $\theta$ .

S is the resistance introduced by high resistance box to produce deflection $\theta/2$ .

FIGURE OF MERIT OF A GALVANOMETER:

It is the current required to produce a deflection of one division of the galvanometer and is represented by k.

$$k=\frac{E}{(R+G)\theta}$$ ....................................................(2)

E is the emf of the cell.

θ deflection in the galvanometer

R is the resistance in circuit

G is the resistance of the galvanometer.

## PROCEDURE:

1. Make the connections as per the circuit diagram.
2. Open the key $K_2$
3. Introduce high resistance($3000\Omega$)from the resistance box R
4. Adjust the resistance from R till you get the full scale deflection in the galvanometer.
5. At this stage note the deflection angle θ and corresponding resistance R.
6. While keeping the R fixed, introduce a small resistance from the resistance box S.
7. Adjust the value of S till the deflection in the galvanometer is exactly half of what it was in the previous step.
8. Once you achieve half deflection, note down the value of Sand take out the plug from $K_2$
9. Calculate the value of G by equation (1)
10. Calculate k by equation (2)
11. Repeat the experiment for different values of deflection.
12. Find mean G and mean k

## RESULT:

1. Resistance of Galvanometer by Half deflection method,G=............Ω



2. Figure of merit of given galvanometer, k=.......................A/div

## PRECAUTION:

1. Connection should be neat and tight
2. The emf of the cell should be constant.
3. The value of R must be very large compared to the value of G
4. Before inserting the plug in key $K_2$, always introduce some resistance from the shunt resistance box to avoid short circuits of the cell.

## SOURCES OF ERROR:

1. Emf of battery may not be constant.
2. Unequal size of divisions in galvanometer.
3. Loose plugs in resistance box
4. Possible error in resistance of coil in resistance box.

CIRCUIT DIAGRAM:



Resistance of galvanometer.
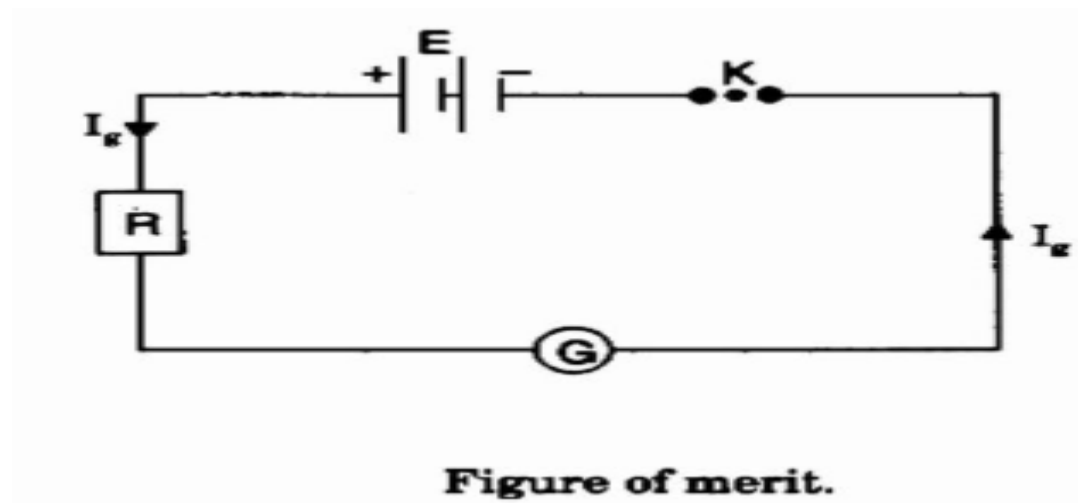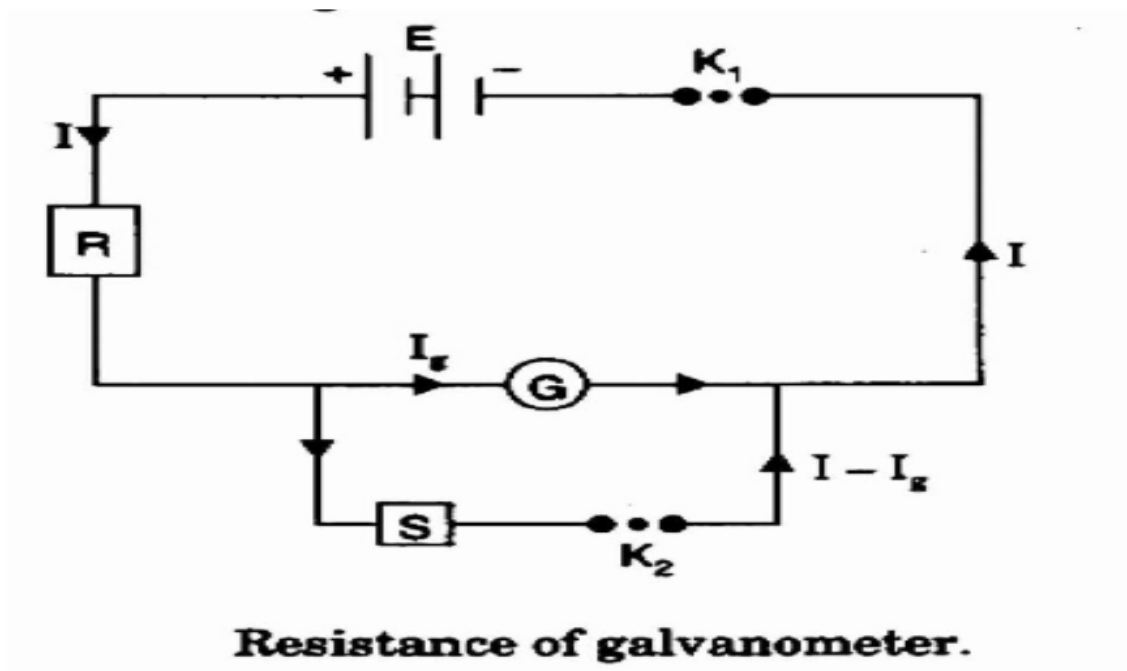


Figure of merit.

OBSERVATION:

Emf of the battery=................................V

| No | High Resistance,R (Ω) | Deflection (θ) | Shunt Resistance,S (Ω) | HAlf Deflection (θ/2) | Galvanometer resistance,G=$\frac{RS}{R-S}$ (Ω) | Figure of merit,k k=$\frac{E}{(R+G)\theta}$ (A/div) |
|---|---|---|---|---|---|---|
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |

Mean G=................................Ω

Mean k=..........................................A/div

$$G=\frac{RS}{R-S}=.................................$$     (showing calculation with values)

$$k=\frac{E}{(R+G)\theta}=................................$$