Experiment No (3)

Name: Transformation of Galvanometer to Voltmeter

Apparatus:

1- Power Supply (D.C)　　2- Resistance box　　3-Rheostat
4- Galvanometer　　5-Voltmeter (3 V)　　6-Connection wire

Method

Voltmeter is a Galvanometer apparatus connect with it is coil high resistance as a series, and the current passed through it much small and can be neglected (according to the Ohms law), therefore the voltmeter can be connect parallel with the part which we wont to measure the potential difference across the on the each side of it , if we let (I) is the mainly current passed through the high resistance (R) and (R_G) is the resistance of the Galvanometer resistance which make a completely deflect on the Galvanometers signal. The (R) and (R_G) connect series with each other as shown figure (1).
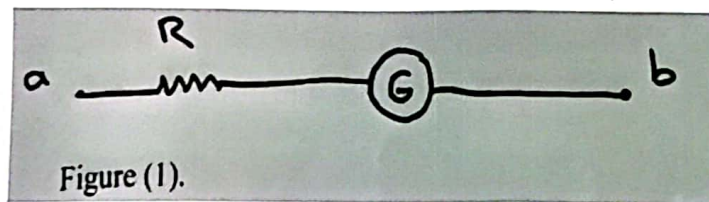

Figure (1).

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The potential difference across (AB) is equal to the

$$V_{AB} = IR + IR_G \qquad (1)$$

$$V_{AB} = I(R + R_G) \qquad (2)$$

$$R + R_G = \frac{1}{I}V_{AB} \qquad\qquad R = \frac{1}{I}V_{AB} - R_G$$

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Experimental Details:

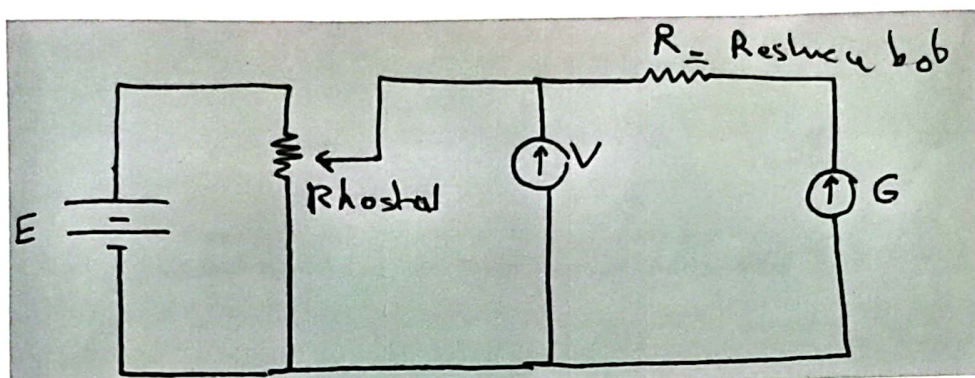1- **Connect the electrical circuit as shown in figure (2).**

Figure (2): Transformation of Galvanometer to Voltmeter.

2- **Change the value R and record the value of potential difference from the voltmeter when the Galvanometers signal deflect completely, (this can be controlled by using the rheostat).**

3- **Repeat the step two for difference value of each R and V_{AB} (when the Galvanometer signal deflect completely).**

4- **Record the measure value on the table as shown in this table**

$R(\Omega)$	$V_{AB}(V)$

5- **Draw a curve between R (on the Y axis) and V_{AB} (on the X axis(as shown in figure (3) and the slop of the line represents $\left(\frac{1}{I}\right)$ and the negative cut (OD) on the (Y axis) represents resistance of Galvanometer.**
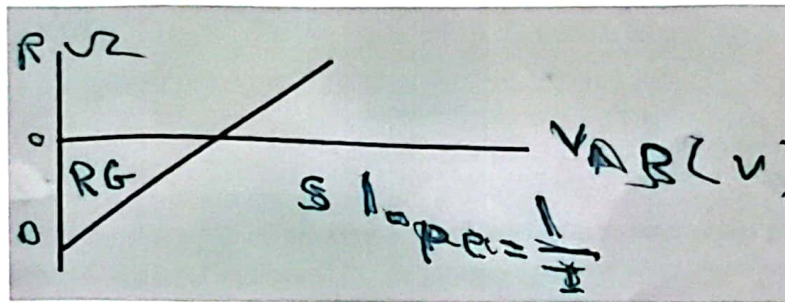
Figure(3): The resistance against of the voltage.

6- By using equation (2) one can calculate the high resistance value for Galvanometer,

7- For active value of (R) change the rheostat and then record the difference value from the voltmeter and the Galvanometer, and record then in this table

$V_{AB}(V)$ record by voltmeter	$V_G(V)$ record by Galvanometer

8- Plotted the curve between $V_{AB}(V)$ and $V_G(V)$ and the results line represent the calibration line as shown in figure (4).
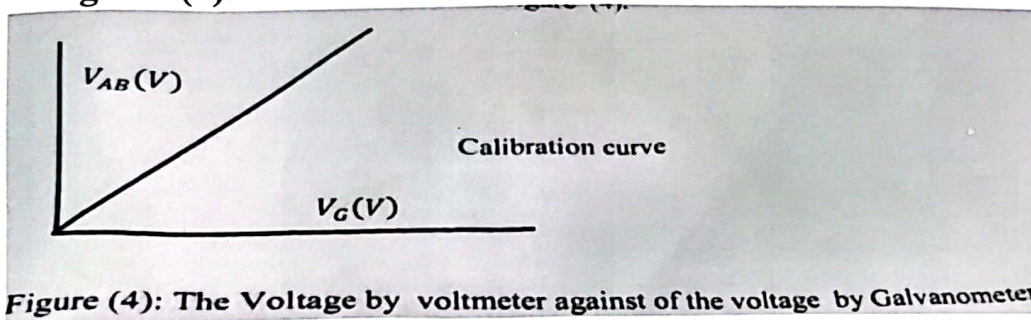

Figure (4): The Voltage by voltmeter against of the voltage by Galvanometer.