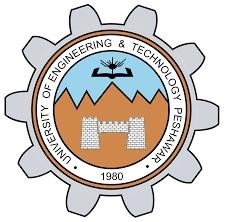
**Conversion of Galvanometer into Voltmeter**



**Submitted to**

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**Conversion into Voltmeter:**

**Principal:**

By connecting a high resistance of suitable value in series with a galvanometer, it is converted into voltmeter, voltmeter is always connected in parallel with the circuit.

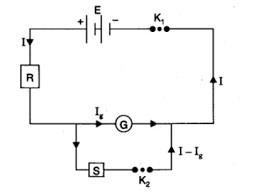
**Formula:**

V=Ig (R + Rg)

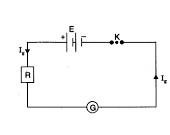
R=V/Ig- Rg

**Circuit Diagrams:**

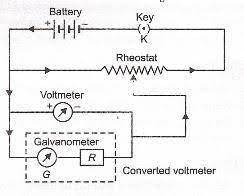
1. For measuring galvanometer’s resistance



1. **For full scale deflection:**



**3.Verification:**



**Apparatus:**

1. Galvanometer
2. DC E.M.F source
3. High resistance box
4. Low resistance box
5. Key switches
6. Rheostat
7. Connecting Wires
8. Voltmeter

**Procedure:**

1. Determination of the resistance of galvanometer by half scale deflection.
   1. Make the connections as shown in figure 1.
   2. Take out a high resistance plug from H.R.B and close key k1. Adjust the value of R to get a sufficiently large deflection, Φ in the pointer of Galvanometer.
   3. Then close key k2 and keep R fixed. Adjust the value from the other resistance box so that the deflection of the pointer becomes Φ/2.
   4. Repeat these steps for 5 times with different values of R.
2. Determination of current for full scale deflection.
   1. Make the connections as shown in figure 2.
   2. Adjust the current limit to maximum so that the pointer of galvanometer gets out of scale.
   3. Now take out a high resistance plug from H.R.B so that the pointer of galvanometer comes exactly on 30th position of the galvanometer.
   4. Note down the resistance for full scale deflection.

**v**. Note the e.m.f for the battery and calculate Ig by putting these values in the

respective formula.

1. Conversion of galvanometer into an voltmeter

To convert galvanometer into an voltmeter, connect R in series with the galvanometer as shown in fig 3 and take out calculated resistance from H.R.B.

**4) Verification.**

* + 1. Make the connections as shown in figure 3 by connecting a battery and key in series with the converted galvanometer and a voltmeter of nearly same range in series with H.R.B.
    2. Close the key K and adjust the current to get some deflection in the galvanometer.

Note the reading of galvanometer and voltmeter.

iv. convert the galvanometer deflection into volts and find the difference between the readings of the two instructions, which gives the error in converted galvanometer.

**CALCULATIONS:**

for determination galvanometer resistance Rg

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| S  NO | Resistance R  (Ω) | Deflection  Φ | Φ/2 | Rg (Ω) | Rg = Rs  (Ω) |
| 1. | 5000 | 25 | 12.5 | 120 | 120 |
| 2. | 5000 | 15 | 7.5 | 120 | 120 |
| 3. | 6000 | 25 | 12.5 | 120 | 120 |
| 4. | 8000 | 14 | 7 | 120 | 120 |
| 5. | 8000 | 15 | 7.5 | 120 | 120 |

* + - Mean value of the resistance of galvanometer, Rg=120Ω
    - E.m.f of the battery, E= 1.2V
    - Resistance from the full-scale deflection of galvanometer, R = 4000 Ω
    - Current in the galvanometer, Ig = E/R+Rg= 1.2/3500+120= 1.2/3610=0.00030 Amp

Now,

* + - Range of the voltmeter, V=3V

Required resistance, R=V/Ig-Rg =10000-120=9800Ω

**calibration of the converted galvanometer**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S  NO | Galvanometer reading In Φ | Galvanometer reading  In volts,  Vg=3/30×Φ | Voltmeter reading, V | Difference |
| 1. |  |  |  |  |
| 2. |  |  |  |  |