

Conversion of galvanometer into voltmeter

Aim : - To convert galvanometer into voltmeters of different ranges which can be used to measure the potential differences in electrical circuits.

Apparatus : - Galvanometer, voltmeter, variable resistor, variable power supply and connecting terminals.

Description : - A galvanometer can be converted into a voltmeter by connecting a high resistance (R) in series with the galvanometer as shown in the figure. The value of resistance (R) connected in series decides the range of the voltmeter. The scale is calibrated in volts, so as to read the potential difference directly. To measure the potential difference between two points, the voltmeter must be connected in parallel across those two points in the circuit. When a high value of resistance is connected in series to the galvanometer, only a small fraction of the total current will flow through the galvanometer. So, this does not cause any damage to the galvanometer. Moreover, as the current flow in the galvanometer, which is connected in parallel in the circuit, is very small, it causes no effect in the current of the main circuit.

Procedure : - Connect the circuit as shown in the figure. The variable power supply connected gives the required potential difference to the circuit. Also select and connect the required resistance (R) in series with the galvanometer, to convert the galvanometer into voltmeter of required range. The selection of the resistance that should be connected in series to the galvanometer is in such a way that the galvanometer shows full deflection for the required range. By increasing the supply voltage, the galvanometer reading is increased in steps of 5 divisions, starting from zero, the corresponding voltmeter readings are noted, in the table.

Graph : - A graph is drawn, by taking galvanometer reading on X- axis and the corresponding voltmeter reading on Y-axis. It gives a straight line passing through the origin. The graph is useful to know the potential difference across any two points in the circuit if the galvanometer reading is known.

The experiment is repeated by connecting another resistance (R) in series with the galvanometer to get a voltmeter of a different range. So the same galvanometer can be used to get voltmeters of different ranges, just by changing the series resistance (R).

Precautions : - 1) The series resistance should be so selected such that for the required range of voltmeter, the galvanometer shows full the deflection within the scale.
2) The continuity of connecting terminals should be checked before going to the experiment.

Results : -

Table

Voltmeter range = V

Value of resistance connected in series to galvanometer = Ω

S.No.	Galvanometer reading (n divisions)	Voltmeter reading (V)
1.		
2.		
3.		
4.		
5.		


