Ministry of Higher Education and Scientific Research

Al-Mustaqbal University College

Department of Technical Computer Engineering

instrument and measurement

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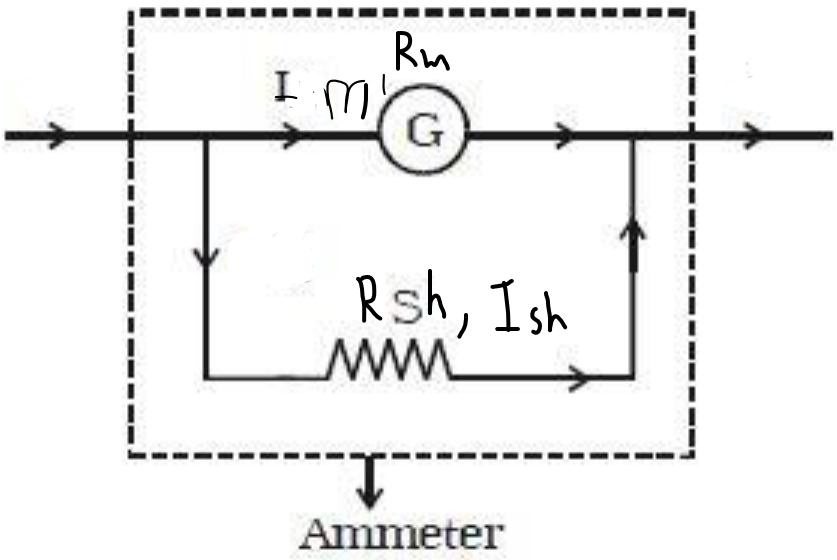
Galvanometer

1-Convert the galvanometer to ammeter

Conversion of Galvanometer into an Ammeter: A galvanometer is a device used to detect the flow of current in an electrical circuit. Even though the deflection is directly proportional to the current, the galvanometer scale is not marked in ampere. Being a very sensitive instrument, a large current cannot be passed through the galvanometer, as it may damage the coil. However, a galvanometer is converted into an ammeter by connecting a low resistance in parallel with it. As a result, when large current flows in a circuit, only a small fraction of the current passes through the galvanometer and the remaining larger portion of the current passes through the low resistance. The low resistance connected in parallel with the galvanometer is called shunt resistance. The scale is marked in ampere.



$V=IR$

$V_m=I_m*R_m$

$V_m=V_{sh}=V$

$I-I_m=I_{sh}$

$I_m+I_{sh=}I$

$R_{sh}=\frac{Vsh}{Ish}$

$$R_{sh}=\frac{ImRM}{I-Im}$$

EX/Convert the galvanometer to ammeter if the internal resistance is 850Ω and the galvanometer current 100μA find the resistance that calculate100mA

Solution

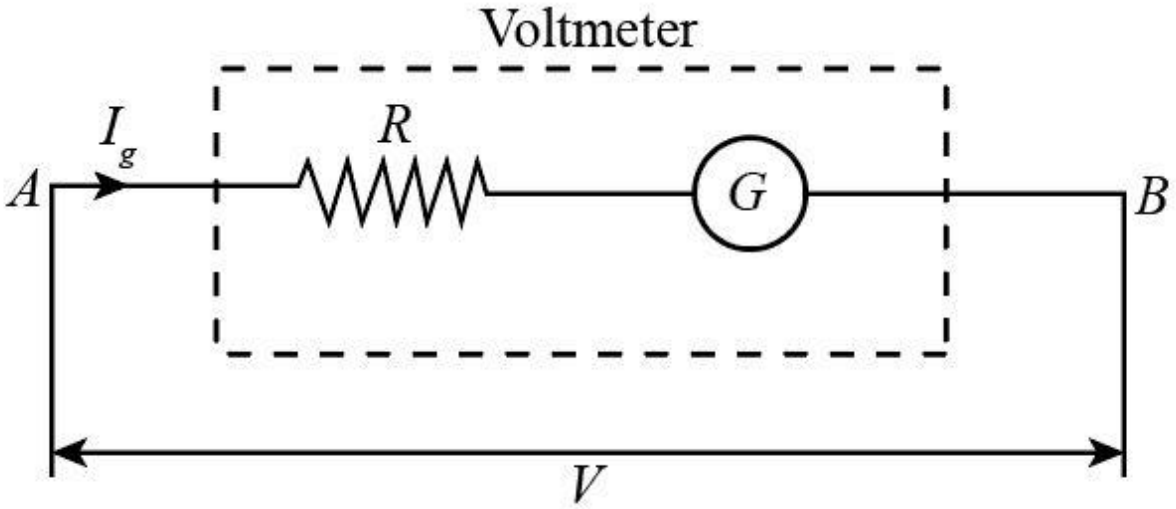
$$R_{sh} = \frac{Im\ RM}{I - Im}$$

$$= \frac{0.0001 * 850}{0.1 - 0.0001} = \frac{0.085}{0.0999}$$

$$Rsh = 0.850\Omega$$

2-Convert the galvanometer to voltmeter

A galvanometer can be converted in to a voltmeter by connecting a high resistance in series connection within it. The scale is calibrated in volt. The value of the resistance connected in series decides the range of the voltmeter. The resistance is calculated by this equation which is connected in series



$V=V_s+V_m$

$I_{fs} = I_m = I_s$

$S=\frac{1}{Ifs}$

$R_s=\frac{V}{Ifs} - Rm$

$R_s = V_s - R_m$

EX/ Convert the galvanometer to voltmeter if the I_{fs} 100μA and the internal resistance is 1KΩ find the multiplier resistance to find 50V

$R_s= \frac{V}{Ifs} - Rm$

$R_s= \frac{50}{100*10} - 1 * 10$

$R_s = \frac{50}{0.0001} - 1000$

R_s = 50.000 – 1000 = 499000Ω

R_s = 499 KΩ

Rs >> Rm