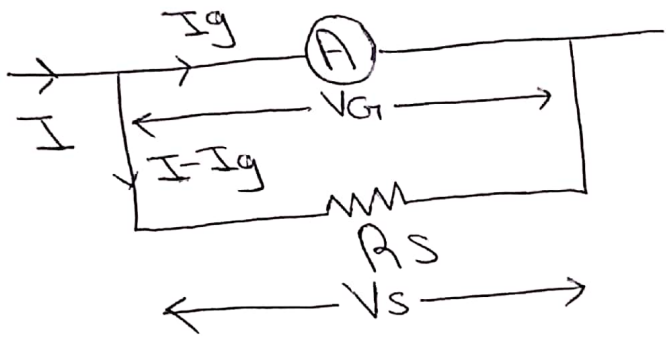
Problem 1 :-

A galvanometer gives a F.S.D when the current is 40mA and its resistance is 25Ω. Calculate the value of Shunt to be connected in parallel with the meter to enable it to be used as an ammeter for measuring currents upto 50A.



Given Data:-

$R_G = 25\Omega$, $I = 50A$

$I_g = 40mA$

Required :-

$R_S = ?$

Solution :-

As $V_G = V_S$

$I_g R_g = (I - I_g) R_S$

$$R_S = \frac{I_g R_g}{I - I_g}$$

$$R_S = \frac{(0.04)(25)}{50 - 0.04}$$

$$\boxed{R_S = 0.02\Omega}$$ Ans:-

Problem 2:-

A galvanometer gives FSD for a current of 10mA. Neglecting the resistance of the instrument, calculate the appropriate value of series resistance needed to enable the instrument to enable the instrument to measure up to:-

(a):- 20V

b):- 100V.

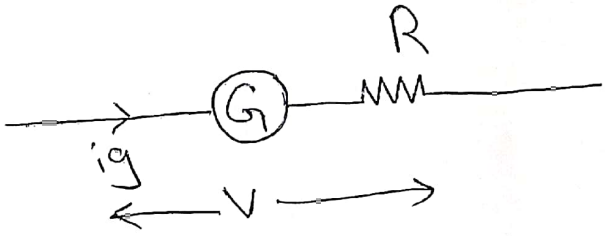
- Given Data:-

$I_g = 10mA$

$V = 20v$

neglect (G_1)

$\Rightarrow G_1 = 0\Omega$



Required:-

$R = ?$

- Solution:-

$$V = i_g(G_1 + R)$$

$$\frac{V}{i_g} = G_1 + R$$

$$R = \frac{V}{i_g} - G_1$$

(a):- $R = \frac{20}{0.01} - 0$

$R = 2k\Omega$ Ans:-

b):- $R = \frac{100}{10 \times 10^{-3}} - 0$

$R = 10k\Omega$ Ans:-

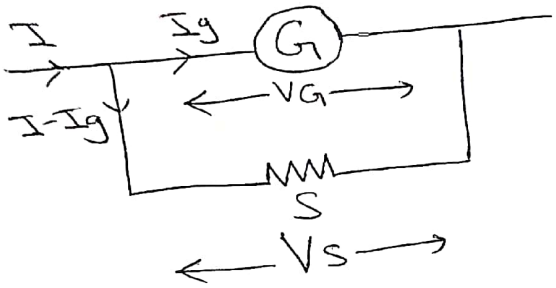
Problem 3:-

A meter of resistance 50Ω has a fsd of 4mA. Determine the value of Shunt resistance required in order that fsd should be:-

a):- 15mA

b):- 20A

Given Data:-



$G = 50\Omega$

$I_g = 4mA$

Required:-

$S = ?$

Solution:-

$$S = \frac{I_g G}{I - I_g}$$

a):- $I = 15mA$

$$S = \frac{(0.004)(50)}{(0.015)-(0.004)}$$

$$S = \frac{0.2}{0.011} \Rightarrow \boxed{S = 18.18\Omega}$$ Ans:-

b):- $I = 20A$

$$S = \frac{(0.2)}{20-0.004}$$

$$S = \frac{0.2}{19.996}$$

$$\boxed{S = 0.010\Omega}$$ Ans:-

Problem 4:-

A moving coil instrument having a resistance of 20Ω gives a fsd when the current is 5mA. Calculate the value of resistance to be connected in series with the instrument so that it can be used as a voltmeter for measuring p.d upto 200V.

Given Data:-

$G_1 = 50\Omega$

$I_g = 5mA$

$V = 200V$

Required:-

$R = ?$

Solution:-

In order to convert it into voltmeter, we will use:-

$$V = I_g(G_1 + R)$$

$$\frac{V}{i_g} = G_1 + R$$

$$R = \frac{200}{5 \times 10^{-3}} - 50$$

$$R = 40,000 - 50$$

$$R = 39.95k\Omega \quad \text{Ans:-}$$

Problem 5:-

A meter has a resistance of 40Ω and registers a maximum deflection when a current of 15mA flows. Calculate the value of resistance that converts the meter into:-

a):- An ammeter with a maximum deflection of 50A

b):- A voltmeter with a range of 0-250V.

Given data:-

$G = 40\,\Omega$

$I_g = 15\,mA$

a):- $I = 50\,A$

b):- $V = 250\,V$

Required:-

a):- $S = ?$

b):- $R = ?$

Solution:-

a) As $R_S = \frac{I_g R_g}{I - I_g}$

$= \frac{(15\times10^{-3})(40)}{(50 - 15\times10^{-3})} = \frac{0.6}{49.98} =$ **0.012 in parallel** Ans:-

b):- $V = I_g(G + R)$

$R = \frac{V}{I_g} - G = \frac{250}{0.015} - 40 =$ **16.62KΩ in series** Ans:-