Answer on Question #45669, Physics, Other

A galvanometer of resistance 120Ω a full scale deflection with a current of 0.0005A. How would you convert it to an ammeter that reads a maximum current of 5A?
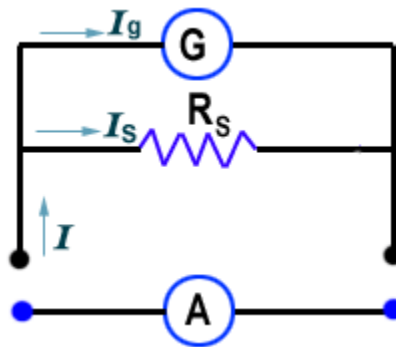
a. connect 2000Ω in parallel to it

b. connect 200.12Ω in series to it

c. connect 20.10Ω in series to it

d. connect 0.012Ω in parallel to it

Solution:

Let resistance of galvanometer R_g=120Ω and it gives full-scale deflection when current I_g=0.0005 A is passed through it. Then,

$$V_g = I_g R_g$$

Let a shunt of resistance (R_s) is connected in parallel to galvanometer. If total current through the circuit is I.

Then current through shunt:

$$I_s = (I - I_g)$$

potential difference across the shunt:

$$V_s = I_s R_s$$

or

$$V_s = (I - I_g)R_s$$

But

$$V_s = V_g$$

$$(I - I_g)R_s = I_g R_g$$

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

$$R_s = \frac{0.0005}{5 - 0.0005} \cdot 120 = 0.012 \ \Omega$$

Answer: d. connect 0.012Ω in parallel to it