Ch—03 Current Electricity

Daily Practice Problem 09

Q1. What is the value of the shunt that passes 10% of the main current through a galvanometer of 99 Ω?

Q2. The deflection in a moving coil galvanometer falls from 50 divisions to 10 divisions when a shunt of 12 Ω is applied. What is the resistance of the galvanometer? Assume the main current to remain same.

Q3. The scale of a galvanometer is divided into 150 equal divisions. The galvanometer has a current sensitivity of 10 divisions per mA and a voltage sensitivity of 2 divisions per mV. How can the galvanometer be designed to read

(i) 6 A per division and

(ii) 1 V per division?

Q4. A galvanometer has a resistance of 50 Ω and its full-scale deflection current is 50 μA. What resistance should be added to it so that it can have a range of 0-5 V?

Q5. A voltmeter reads 5.0 V at full-scale deflection and is graded according to its resistance per volt at full-scale deflection as 5000 ΩV^{-1}. How will you convert it into a voltmeter that reads 20 V at full-scale deflection? Will it still be graded as 5000 ΩV^{-1}? Will you prefer this voltmeter to one that is graded 2000 ΩV^{-1}?

Q6. A moving coil galvanometer when shunted with a resistance of 5 Ω gives a full scale deflection for 250 mA and when a resistance of 1050 Ω is connected in series, it gives a full scale deflection for 25 volt. Find the resistance of the galvanometer

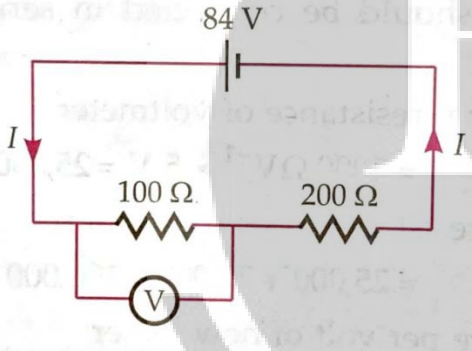
Q7. A galvanometer can be converted into a voltmeter of certain range by connecting a resistance of 980 Ω in series with it. When the resistance is 470 Ω connected in series, the range is halved. Find the resistance of the galvanometer.

Q8. The deflection produced in a galvanometer is reduced to 45 divisions from 55 when a shunt of 8 Ω is used. Calculate the resistance of the galvanometer.

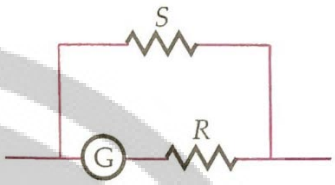
Q9. A voltmeter V of resistance 400 Ω is used to measure the potential difference across a 100 Ω resistor in the circuit shown in Fig.

(i) What will be the reading on the voltmeter?

(ii) Calculate the potential difference across 100 Ω resistor before the voltmeter is connected.



Q10. A galvanometer has a resistance of 8 Ω. It gives a full-scale deflection for a current of 10 mA. It is to be converted into an ammeter of range 5 A. The only shunt resistance available is of 0.02 Ω, which is not suitable for this conversion. Find the value of resistance R that must be connected in series with the galvanometer (Fig.) to get ammeter of desired range.



Q11. A galvanometer having a resistance of 20 Ω and 30 divisions on both sides has figure of merit 0.005 ampere/division. The resistance that should be connected in series such that it can be used as a voltmeter upto 15 volt is

(a) 100 Ω

(b) 125 Ω

(c) 120 Ω

(d) 80 Ω

ANSWERS

1. 11Ω

2. 48 Ω

3. (i) $8.3 \times 10^{-5}\Omega$ **(ii)** 9995 Ω

4. 100 kΩ

5. 75,000 Ω; YES; NO

6. 50 Ω

7. 40 Ω

8. 36 Ω

9. (i) 24V **(ii)** 28V

10. 1.98 Ω

11. d