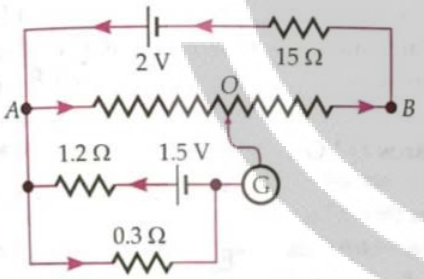
Ch—03 Current Electricity

Daily Practice Problem 10

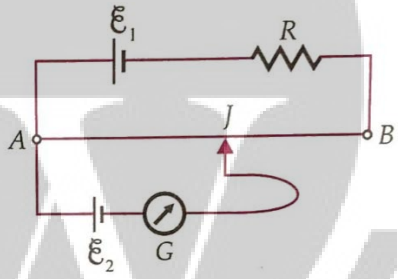
Q1. The length of a potentiometer wire is 5 m. It is connected to a battery of constant emf. For a given Leclanche cell, the position of zero galvanometer deflection is obtained at 100 cm If the length of the potentiometer wire be made 8 m instead of 5 m, calculate the length of wire for zero deflection in the galvanometer for the same cell.

Q2. AB is 1 metre long uniform wire of 10 Ω resistance. Other data are as shown in Fig. Calculate **(i)** potential-gradient along AB and **(ii)** length AO, when galvanometer shows no deflection.



Q3. When a resistor of 5 Ω is connected across cell, its terminal p.d. is balanced by 150 cm of potentiometer wire and when a resistor of 10 Ω resistance is connected across the cell, the terminal p.d. is balanced by 175 cm of the potentiometer wire. Find the internal resistance of the cell.

Q4. In the circuit diagram given below, AB is a uniform wire of resistance 15 ohm and length one metre. It is connected to a series arrangement of cell E_1 of emf 2.0 V and negligible internal resistance and a resistor R. Terminal A is also connected to an electrochemical cell E_2 of emf 75 mV and a galvanometer G. In this set-up, a balancing point is obtained at 30 cm mark from A. Calculate the A resistance of R. If E_2 were to have an emf of 300 mV, where will you expect the balancing point to be?



Q5. In a potentiometer, a standard cell of emf 5 V and of negligible resistance maintains a steady current through the potentiometer wire of length 5 m. Two primary cells of emfs E_1 and E_2 are joined in series with **(i)** same polarity, and **(ii)** opposite polarity. The combination is connected through a galvanometer and a jockey to the potentiometer. The balancing lengths in the two cases are found to be 350 cm and 50 cm respectively.

(i) Draw the necessary circuit diagram.

(ii) Find the value of the emfs of the two cells.

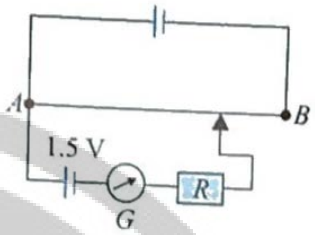
Q6. In a potentiometer experiment, it is found that no current passes through the galvanometer when the terminals of the cell are connected across 52 cm of the potentiometer wire. If the cell is shunted by a resistance of 5 Ω, a balance is found when the cell is connected across 40 cm of the wire. Find the internal resistance of the cell.

Q7. A potentiometer wire of length 1 m is connected to a driver cell of emf 3 V shown in figure. When a cell of 1.5 V emf is used in the secondary circuit, the balance point is found to be at 60 cm. On replacing this cell and using a cell of unknown emf, the balance point shifts to 80 cm.

(i) Calculate unknown emf of the cell.

(ii) Explain with reason, whether the circuit works, if the driver cell is replaced by a cell of emf 1 V.

(iii) Does the high resistance R, used in the secondary circuit affect the balance point? Justify your answer.



Q8. A potentiometer wire carries a steady current. The potential difference across 70 cm length of it balances the potential difference across a 2 Ω coil supplied by a cell of emf 2.0 V and an unknown internal resistance r. When a 1 Ω coil is placed in parallel with the 2 Ω coil, a length equal to 50 cm of the potentiometer wire is required to balance the potential difference across the parallel combination. Find the value of r.

ANSWERS

1. 1.6 m

2. (i) 0.008 V/cm **(ii)** 37.5 cm

3. 2Ω

4. R=105 Ω; Balance points cannot be obtained due to insufficient length of wire

5. E_1=2.0 V E_2=1.50 V

6. c

7.(i) 2.0 V **(ii)**the balance point of them cannot be obtained on AB and the circuit does not work **(iii)** No

8. 0.5 Ω