Current Electricity

1. A current i is passing through a wire having two sections P and Q of uniform diameters d and $d/2$ respectively. If the mean drift velocity of electrons in sections P and Q is denoted by v_P and v_Q respectively, then

(a) $V_P - V_Q$ (b) $V_P = \frac{1}{2} V_Q$ (c) $V_P = \frac{1}{4} V_Q$ (d) $V_P = 2V_Q$

2. An ionization chamber with parallel conducting plates as anode and cathode has 5×10^7 electrons and the same number of singly-charged positive ions per cm^3. The electrons are moving at 0.4 *m/s*. The current density from anode to cathode is 4 $\mu A/m^2$. The velocity of positive ions moving towards cathode is

(a) 0.4 *m/s* (b) 1.6 *m/s* (c) Zero (d) 0.1 *m/s*

3. A rod of a certain metal is 1.0 *m* long and 0.6 *cm* in diameter. It's resistance is $3 \times 10^{-3}\ \Omega$. Another disc made of same metal is 2.0 *cm* in diameter and 1.00 *mm* in thick. What is the resistance between the round faces of the disc

(a) $1.35 \times 10^{-8}\ \Omega$ (b) $2.7 \times 10^{-7}\ \Omega$ (c) $4.05 \times 10^{-6}\ \Omega$ (d) $8.1 \times 10^{-5}\ \Omega$

4. Two wires of brass of diameter 1 *mm* and 2 *mm* have equal weight. Their electrical resistance will be in the ratio

(a) 16 : 1 (b) 1 : 16 (c) 1 4 (d) 4 : 1

5. The resistance of the series combination of two resistances is S. When they are joined in parallel the total resistance is P. *If* $S = n\ P$ then the Minimum possible value of n is

(a) 2 (b) 3 (c) 4 (d) 1

6. Two resistances R_1 and R_2 are made of different materials. The temperature coefficient of the material of R_1 is α and of the materials of R_2 is $-\beta$. The resistance of the series combination of R_1 and R_2 will not change with temperature, if R_1/R_2 equals

(a) $\frac{\alpha}{\beta}$ (b) $\frac{\alpha+\beta}{\alpha-\beta}$ (c) $\frac{\alpha^2+\beta^2}{\alpha\beta}$ (d) $\frac{\beta}{\alpha}$

7. When connected across the terminals of a cell, a voltmeter measures 5 V and a connected ammeter measures 10 A of current. A resistance of 2 *ohms* is connected across the terminals of the cell. The current flowing through this resistance will be

(a) 2.5 A (b) 2.0 A (c) 5.0 A (d) 7.5 A

8. A battery is first connected in parallel to resistor R_1 and then R_2. The value of R_0 of internal resistance of battery for which heat released in external circuit be same in both cases is

(a) $\frac{R_1 R_2}{R_1 + R_2}$ (b) $\sqrt{R_1 R_2}$ (c) $R_1 R_2$ (d) $\frac{R_1 R_2}{2}$

9. A galvanometer of resistance 20 Ω gives a full scale deflection when a current of 0.04 A is passed through it. It is desired to convert it into an ammeter reading 20 A in full scale. The only shunt available is 0.05 Ω resistance. The resistance that must be connected in series with the coil of the galvanometer is

(a) 4.95 Ω (b) 5.94 Ω (c) 9.45 Ω (d) 12.62 Ω

10. The length of a potentiometer wire is l. A cell of emf E is balanced at a length $\frac{l}{3}$ from the positive end of the wire. If the length of the wire is increased by $\frac{l}{2}$. At what distance will the same coil give a balance point

(a) $\frac{2l}{3}$ (b) $\frac{l}{2}$ (c) $\frac{l}{6}$ (d) $\frac{4l}{3}$

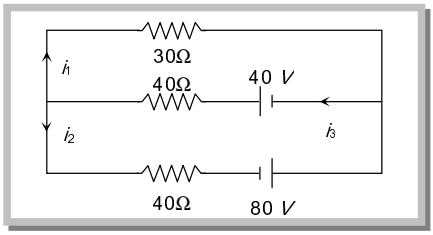
11. A galvanometer of resistance 36 Ω is changed into an ammeter by using a shunt of 4 Ω. The fraction i_0 of total current passing through the galvanometer is

(a) $\frac{1}{40}$ (b) $\frac{1}{4}$ (c) $\frac{1}{140}$ (d) $\frac{1}{10}$

12. Two resistances of 400 Ω and 800 Ω are connected in series with 6 *volt* battery of negligible internal resistance. A voltmeter of resistance 10,000 Ω is used to measure the potential difference across 400 Ω. The error in the measurement of potential difference in volts approximately is

(a) 0.01 (b) 0.02 (c) 0.03 (d) 0.05

13. In the following circuit current i_1 is



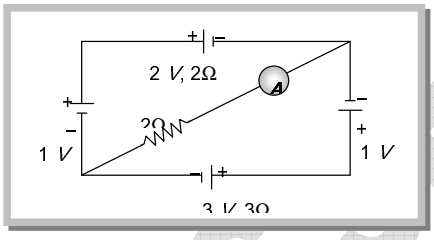
(a) 0.4 *A*

(b) – 0.4 *A*

(c) 0.8 *A*

(d) – 0.8 *A*

14. The reading of ammeter in the adjoining diagram will



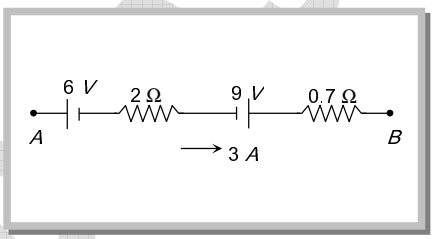
(a) $\frac{2}{17}A$

(b) $\frac{3}{11}A$

(c) $\frac{1}{13}A$

(d) $\frac{4}{15}A$

15. In the following part of a circuit, what will be the potential difference between *A* and *B i.e.* ($V_B - V_A$)



(a) 3 *V*

(b) 15 *V*

(c) – 5.1 *V*

(d) + 5.1 *V*