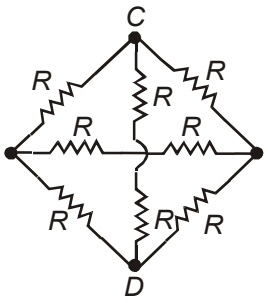
2. Current Electricity

CPP-2

Choose the correct answer :

1. The effective resistance between C & D in given circuit is



(1) R

(2) $3R$

(3) $\frac{2R}{3}$

(4) $\frac{R}{3}$

2. The resistance of a rectangular block of copper of dimensions 1 mm × 1 mm × 5 m between two square faces is 0.08 Ω. What is the resistivity of copper?

(1) 1.6×10^{-7} Ω-m (2) 1.6×10^{-6} Ω-m

(3) 1.6×10^{-8} Ω-m (4) Infinite

3. Choose the correct alternative

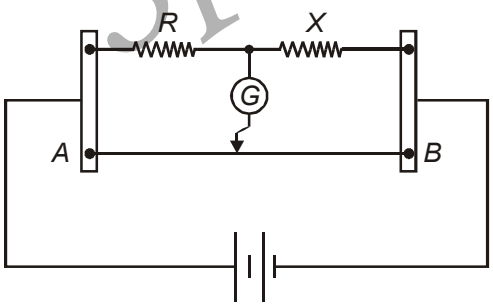
(1) Alloys of metal have lesser resistivity than that of constituent metals

(2) Resistivity of semiconductor increases rapidly with increasing temperature

(3) Alloys have lower temperature coefficients of resistance than pure metals

(4) The path of electrons in metals between successive collisions is straight line when current flows through them

4. In the meter bridge shown, the resistance R has a negative temperature coefficient of resistance. Neglecting the variation in other resistors, when current is passed for some time, in the circuit, balance point should shift towards



(1) A

(2) B

(3) First A then B

(4) It will remain at C

5. During charging of an ideal secondary cell, the potential difference across the cell is

(1) $V = E + Ir$ (2) $V = E - Ir$

(3) $V = E$ (4) Zero

6. Two identically shaped wires A and B are made of different substances having differing electron densities, with $n_A > n_B$. If both carry identical currents then the wire has larger drift speed for the electrons is

(1) A (2) B

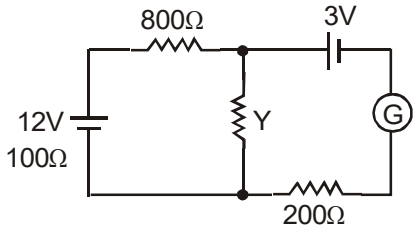
(3) Both (1) & (2) (4) None of these

7. A wire has resistance 16 Ω. It is bent in the form of an equilateral triangle. The effective resistance between the two points on any median of the triangle is

(1) 16 Ω (2) 8 Ω

(3) 4 Ω (4) 32 Ω

8. If galvanometer shows null deflection in the given figure then the value of Y is



(1) 100 Ω (2) 200 Ω

(3) 300 Ω (4) 400 Ω

9. Two cells $6V$, 1Ω and 4 volt, 2Ω are connected to form a closed loop. The current, which cannot flow through the loop is

(1) $\frac{10}{3}$ A (2) $\frac{2}{3}$ A

(3) $\frac{5}{3}$ A (4) All of these

10. The temperature co-efficient of resistance of a wire is $0.00125°C^{-1}$. At 300K its resistance is 2Ω. The resistance of the wire will be 2.5 Ω at temperature about

(1) 120°C (2) 234°C

(3) 310°C (4) 27°C

11. A wire is connected to a battery and drift velocity of electrons in the wire is v. Now, the wire is stretched to double its length and connected to same battery. The drift velocity of electrons in the new wire will become/remain

(1) v (2) $4v$

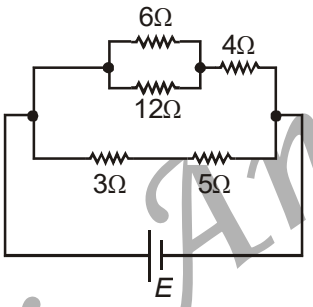
(3) $\frac{v}{2}$ (4) $2v$

12. Two cells of e.m.f. E_1 and E_2 are joined in series and the balancing length of the potentiometer wire is 875 cm. If the terminals of E_1 are reversed, the balancing length obtained is 175 cm. Given $E_2 > E_1$, the ratio $E_1 : E_2$ will be

(1) 2 : 3 (2) 5 : 1

(3) 3 : 2 (4) 1 : 5

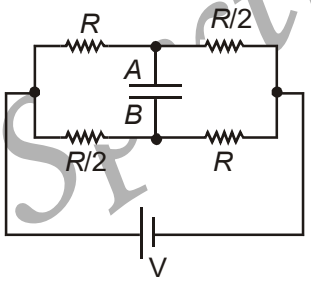
13. In the circuit shown, the potential drop across 6 Ω resistor is 12 V. The emf of the ideal battery is



(1) 8 V (2) 16 V

(3) 24 V (4) 32 V

14. In the circuit shown in the figure, the charge on the upper plate A is



(1) Positive (2) Negative

(3) Zero (4) Oscillating

15. The correct relation for the resistance R of an ohmic conductor and strength of applied electric field E on the above conductor is

(1) $R \propto E$

(2) ER = constant

(3) $E + R$ = a constant

(4) R does not depend on E

16. A plausible reason for the increase in resistivity of most of the conductors with temperature is

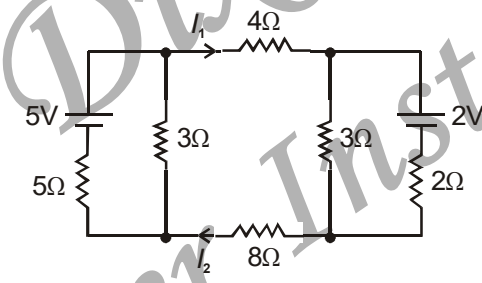
(1) The mass of the electron changes with temperature

(2) The charge on each electron changes with temperature

(3) The electron density changes with temperature

(4) The time between collisions changes with temperature

17. In the circuit shown, the ratio $\frac{I_1}{I_2}$ is equal to



(1) 4.0 (2) 3.0

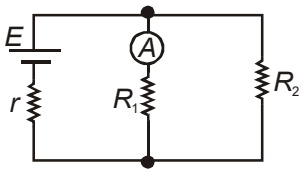
(3) 2.5 (4) 1.0

18. A resistance wire has a resistance R. Half of this wire is stretched to double its length and half is twisted to double its thickness, then its new resistance becomes

(1) $\frac{17R}{8}$ (2) $\frac{17R}{16}$

(3) $\frac{65R}{32}$ (4) $\frac{65R}{16}$

19. In the circuit shown, when R_2 is decreased, reading of ammeter will



(1) Increase

(2) Decrease

(3) Will not change

(4) Can not be calculated

20. Two batteries of different e.m.f.'s and internal resistance connected in series with each other and with an external load resistor. The current is 2.0 amp. When the polarity of one battery is reversed, the current becomes 1.0 amp. The ratio of the e.m.f.'s of the two batteries is

(1) 2.5 (2) 2.0

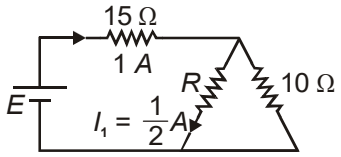
(3) 3.0 (4) 1.0

21. The emf of driver cell in a potentiometer circuit is 10 V. The length of potentiometer wire is 1 m and its resistance is 9 Ω. A cell of emf 5 V is balanced on $\frac{5}{9}$ m length of the wire. The internal resistance of the driver cell is

(1) 1 Ω (2) 0.1 Ω

(3) 2 Ω (4) 0.5 Ω

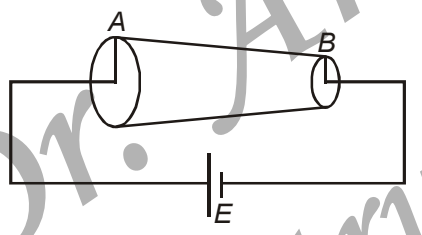
22. In the circuit shown in the figure, the value of *E* is equal to



(1) 20 V (2) 10 V

(3) 5 V (4) 30 V

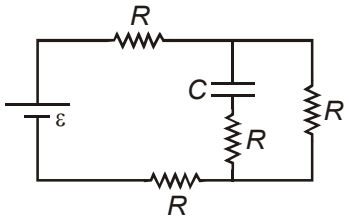
23. Consider the figure, cross-sectional area of conductor at *A* and *B* is 2*a* and *a* respectively. Current density at *A* and *B* are given by J_A and J_B then J_A / J_B is



(1) $\frac{1}{2}$ (2) 2

(3) 1 (4) 4

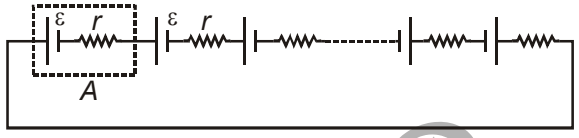
24. The time constant of the circuit shown in the figure is



(1) $\frac{3RC}{2}$ (2) *RC*

(3) $\frac{5RC}{3}$ (4) $\frac{2RC}{3}$

25. In a arrangement, 3*n* cells of emf ε and internal resistance *r* are connected in series. Out of 3*n* cells, polarity of *n* cells is reversed.

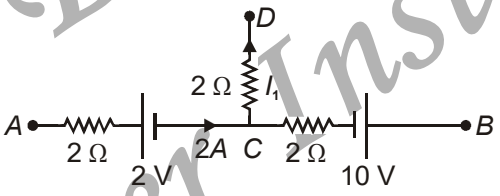


Current in the circuit is

(1) $\frac{2\varepsilon}{r}$ (2) $\frac{2\varepsilon}{3r}$

(3) $\frac{\varepsilon}{3r}$ (4) $\frac{\varepsilon}{r}$

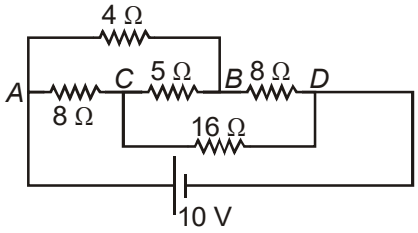
26. A part of a circuit is shown in figure. $V_B - V_C$ is equal to 12 V. I_1 is equal to



(1) 1 A (2) 2 A

(3) 3 A (4) 4 A

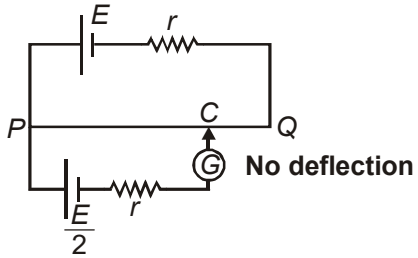
27. In the circuit shown in the figure, current through 5 Ω is



(1) 1 A (2) 2 A

(3) Zero (4) 0.5 A

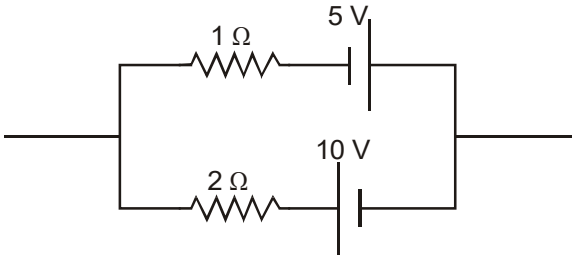
28. The potentiometer wire *PQ* is 100 cm long and its resistance is 2*r*. Where *r* is internal resistance of the battery. *PC* is equal to



(1) 25 cm (2) 75 cm

(3) 50 cm (4) 40 cm

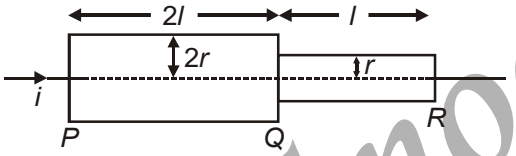
29. The emf of a single battery which is equivalent to a parallel combination of two batteries of emfs 5 V and 10 V and internal resistances 1 Ω and 2 Ω respectively connected as shown in figure is



(1) 5 V (2) 10 V

(3) Zero (4) 15 V

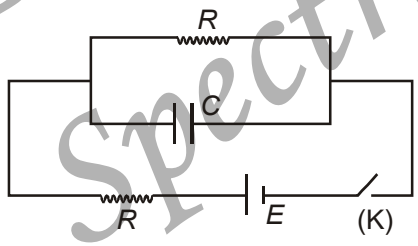
30. Two bars made of same material are connected as shown in the figure. An electric current is passed through the bars. Resistance of bar PQ is R_1 while resistance of QR is R_2, then



(1) $2R_1 = R_2$ (2) $2R_2 = R_1$

(3) $4R_2 = R_1$ (4) $R_2 = 4R_1$

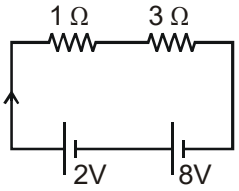
31. Consider the circuit. Key k is closed at $t = 0$. At this instant current flowing through circuit is I_0 and after very long time current in circuit is I_∞. Then $\frac{I_0}{I_\infty}$ is equal to



(1) 2 (2) $\frac{1}{2}$

(3) 1 (4) 0

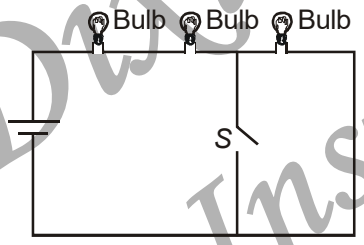
32. In the circuit shown, the power consumed by 2V battery is



(1) 5 W (2) 6 W

(3) 7 W (4) 8 W

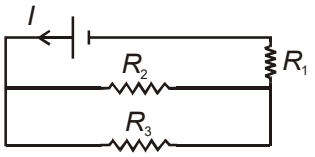
33. In the circuit shown, the total power output is P when S is closed. As the switch S is opened, the power output becomes (all bulbs are identical)



(1) $\frac{2}{3}$P (2) $\frac{3}{2}$P

(3) $\frac{4}{9}$P (4) $\frac{9}{4}$P

34. Refer to the circuit shown. What will be the total power dissipation in the circuit if P is the power dissipated in R_1? It is given that $R_2 = 4\ R_1$ and $R_3 = 12\ R_1$



(1) 4 P (2) 7 P

(3) 13 P (4) 17 P

35. Four equal resistances dissipate 80W of power together when connected in parallel to a battery of negligible internal resistance. The total power dissipated in these resistances when connected in series across the same battery would be

(1) 5 W (2) 80 W

(3) 20 W (4) 2.5 W

Answer Keys Current Electricity

1.	(3)	2.	(3)	3.	(3)	4.	(1)	5.	(1)	6.	(2)	7.	(3)
8.	(3)	9.	(3)	10.	(2)	11.	(3)	12.	(1)	13.	(3)	14.	(2)
15.	(4)	16.	(4)	17.	(4)	18.	(3)	19.	(2)	20.	(3)	21.	(1)
22.	(1)	23.	(1)	24.	(3)	25.	(3)	26.	(3)	27.	(3)	28.	(2)
29.	(3)	30.	(1)	31.	(1)	32.	(1)	33.	(1)	34.	(1)	35.	(1)