PHYSICS

BOOKS - BITSAT GUIDE

CURRENT ELECTRICITY

Practice Exercise

1. Two uniform wires A and B of same metal and have equal masses, the radius of wire A is

twice that of wire B. The total resistance of A and B when connected in parallel is

A. 4Ω, when resistance of wire A is 4.25Ω

B. 5Ω, when the resistance of wire A is 4Ω

C. 4Ω, when the resistance of wire B is 4.25Ω

D. 5Ω, when the resistance of wire B is 4Ω

Answer: A

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2. A battery of e.m.f. $10V$ and internal resistance $0.5ohm$ is connected across a variable resistance R. The value of R for which the power delivered in it is maximum is given by

A. 2Ω

B. 0.25Ω

C. 1Ω

D. 0.5Ω

Answer: D

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3. If R_1 and R_2 are respectively the filament resistances of a 200 watt bulb and 100 watt bulb designed to operate on the same voltage, then

A. $R_1 = 2R_2$

B. $R_2 2R_1$

C. $R_2 = 4R_1$

D. $R_1 = 4R_2$

Answer: B

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4. Two electric bulbs rated P_1 and P_2 watt at V volt are connected in series across V volt mains then their total power consumption P is

A. $P_1 + P_2$

B. $\sqrt{P_1 P_2}$

C. $P_1 P_2 / (P_1 + P_2)$

D. $\frac{P_1 + P_2}{P_1 P_2}$

Answer: A

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5. In Bohr's model of H_2 atom, the electrons move around the nucleus in a circular orbit of radius 5×10^{-11} m. Its time period is 1.5×10^{-16} s, the current associated with electron motion is

A. zero

B. 1.6×10^{-19}A

C. 0.17 A

D. $1.07 \times 10^{-3} A$

Answer: D

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6. A $5^{\circ} C$ rise in the temperature is observed in a conductor by passing some current. When the current is doubled, then rise in temperature will be equal to

A. $20^\circ C$

B. 16^(@)C`

C. $12^\circ C$

D. $10^\circ C$

Answer: A

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7. A uniform wire when connected directly across a 220 V line produces heat H per second. If wire is divided into n parts and all

parts are connected in parallel across a 200 V line, then the heat produced per second will be

A. H_s

B. nH_s

C. $n^2 H_s$

D. H_s / n^2

Answer: C

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8. A wire of 50 cm long, $1mm^2$ in cross-section carries a current of 4 A, when connected to a 2 V battery, the resistivity of wire is

A. $2 \times 10^{-7}\Omega - m$

B. $5 \times 10^{-7}\Omega - m$

C. $4 \times 10^{-6}\Omega - m$

D. $1 \times 10^{-6}\Omega - m$

Answer: D

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9. Three equal resistors connected in series across a source of emf together dissipate 10W of power. What would be the power dissipated if te same resistors are connected in parallel across the same source of emf?

A. 10 W

B. 30 W

C. 90 W

D. $(10/3)W$

Answer: C

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10. Reciprocal of specific resistacne is

A. conductive resistance

B. specific conductance

C. conductive reactance

D. plate resistance

Answer: B

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11. A heating coil is labelled 100 W, 220 V, the coil is cut in half and two pieces are joined in parallel to the same source. t/he energy now liberated per second is

A. 200 J

B. 400 J

C. 25 J

D. 50 J

Answer: B

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12. Two resistors of 6Ω and 9Ω are connected in series to a 120 V source. The power consumed by the 6Ω resistor is

A. 384 W

B. 576 W

C. 1500 W

D. 1800 W

Answer: A

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13. A 100 W, 200 V bulb is connected to a 160 V supply. The power consumption would be

A. 64 W

B. 80 W

C. 100 W

D. 150 W

Answer: A

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14. The thermistors are usually made of

A. metals with low temperature coefficient of resistivity

B. metals with high temperature coefficient of resistivity

C. metal oxides with high temperature coefficient of resistivity

D. semiconducting materials having low temperature coefficient of resistivity

Answer: C

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15. Two wires of same material have lengths, L and 2L and cross-sectional area 4A and A, respectively. The ratio of their resistances would be

A. $1:1$

B. $1:8$

C. $8:1$

D. $1:2$

Answer: B

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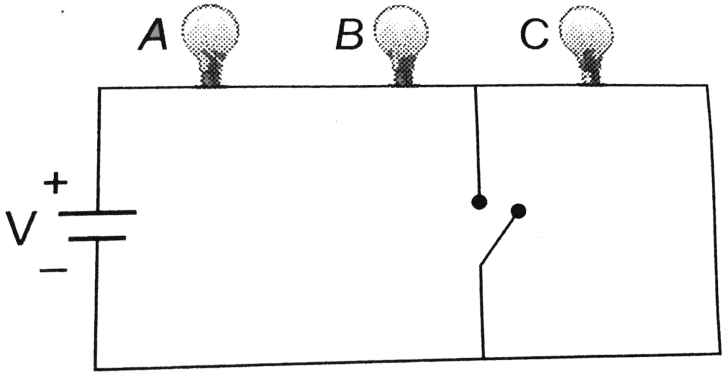
16. Assertion : If three identical bulbs are connected in series as shown in figure then on closing the switchs. Bulb C short circuited and

hence illumination of bulbs A and B decreases.

Reason : Voltage on A and B decreases



A. both A and B will glow more brightly

B. both A and B will glow less brightly than before

C. A will glow less brightly and B more brightly

D. None of the bulbs will glow

Answer: C

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17. Two wires of the same metal have the same length, but their cross-sections are in the ratio of $3:1$. They are joined in series. The

resistance of the thicker wire is 10Ω. The total resistance of the combinations will be

A. 40Ω

B. $40/3\Omega$

C. $5/2\Omega$

D. 100Ω

Answer: A

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18. Three copper wires of length and cross-sectional areas are (L,A) $\left(2L, \frac{A}{2}\right), (L/2, 2A)$, resistance is

A. minimum in wire of cross-sectional area $\frac{A}{2}$

B. minimum in wire of cross-sectional area A

C. minimum in wire of cross-sectional area 2A

D. same in all three cases

Answer: C

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19. Threre is a current of 1.344 a in a copper wire whose area of cross-sectional normal to the length of wire is $1mm^2$. If the number of free electrons per cm^2 is $8.4 \times 10^{28} m^3$, then the drift velocity would be

A. $1mm/s$

B. $1mm/s$

C. $0.1mm/s$

D. $0.01mm/s$

Answer: C

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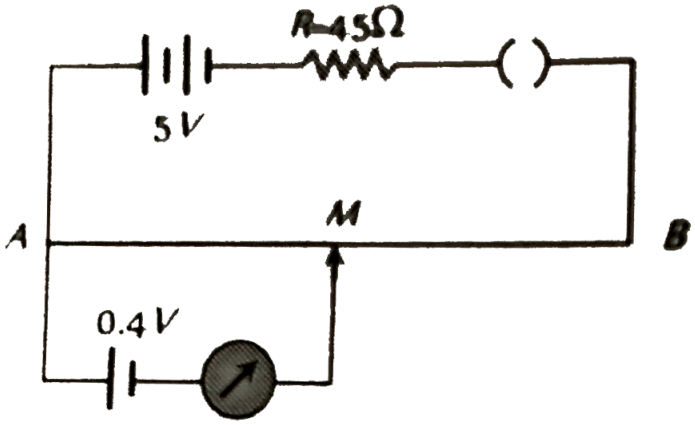
20. In given figure, the potentiometer wire AB has a resistance of 5Ω and length 10 m . The

balancing length AM for the emf of 0.4 V is



A. 8 m

B. 0.8 m

C. 4 m

D. 0.4 m

Answer: A

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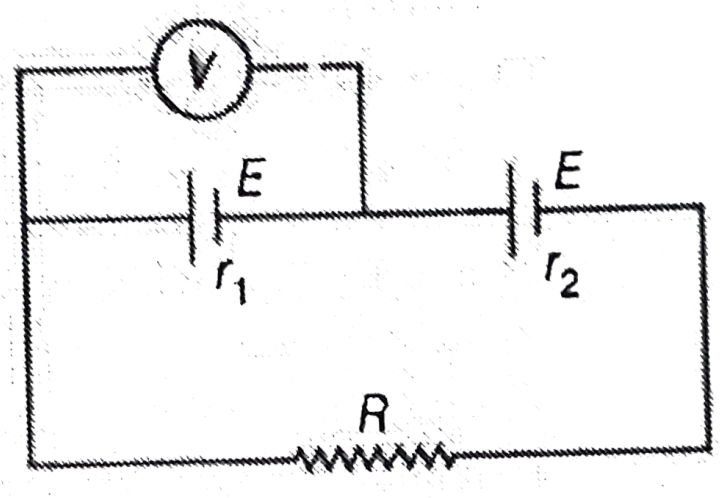
21. In the following figure, the reading of an ideal voltmeter V is zero. Then, the relation between R, r_1 and r_2 is



A. $R = r_2 - r_1$

B. $R = r_1 - r_2$

C. $R = r_1 + r_2$

D. $R = \frac{r_1 r_2}{r_1 + r_2}$

Answer: B

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22. Three equal resistors, each equals to r are connected as shown in figure. Then, the equivalent resistance between points A and B is

A. r

B. 3r

C. $\frac{r}{3}$

D. $\frac{2r}{3}$

Answer: C

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23. When a resistance of 2Ω is connected across the terminals of a cell, the current is 0.5

A. When resistance is increased to 5Ω, the current is 0.25 A. the emf of the cell is

A. 1V

B. 1.5 V

C. 2 V

D. 2.5 V

Answer: B

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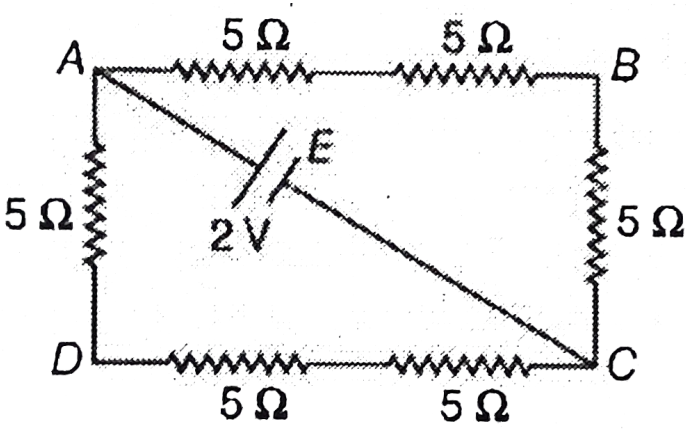
24. The potential difference between points A and B from the figure is



A. $2/3V$

B. $8/9V$

C. $4/3V$

D. 2 V

Answer: A

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25. The 80Ω galvanometer deflects full scale for a potential of 20 mV. A voltmeter deflecting full scale of 5 V is to made using this galvanometer. We must connect

A. a resistance of $19.92k\Omega$ parallel to the galvanometer

B. a resistance of $19.92k\Omega$ in series with the galvanometer

C. a resistance of $20k\Omega$ parallel to the galvanometer

D. a resistance of $20k\Omega$ in series with galvanometer

Answer: B

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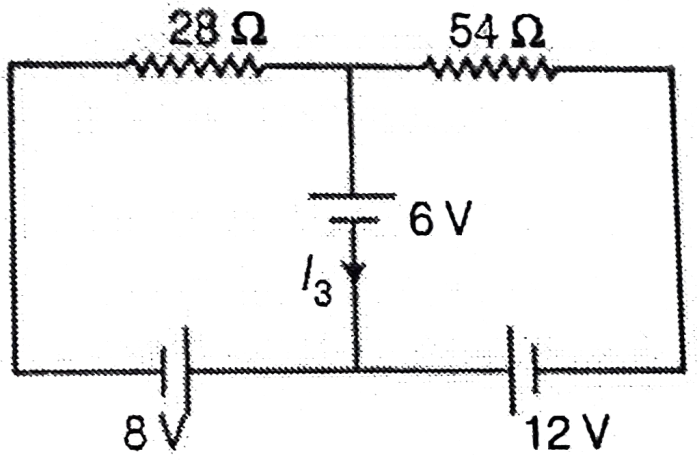
26. Consider the circuit shown in figure, the current l_3 is equal to



A. $5A$

B. $3A$

C. $-3A$

D. $-\frac{5}{6}A$

Answer: D

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27. Two cells having an internal resistance of 0.2Ω and 0.4Ω are connected in parallel, the voltage across the battery is 1.5 V. If the emf of one cell is 1.2 V, then the emf of second cell is

A. 2.1 V

B. 2.7 V

C. 3 V

D. 4.2 V

Answer: A

28. On a six fold increase in external resistance of a circuit the voltage across the terminals of the battery has increased from 5 V to 10 V. The emf of battery is

A. 15 V

B. 18 V

C. 12.5 V

D. 11 V

Answer: C

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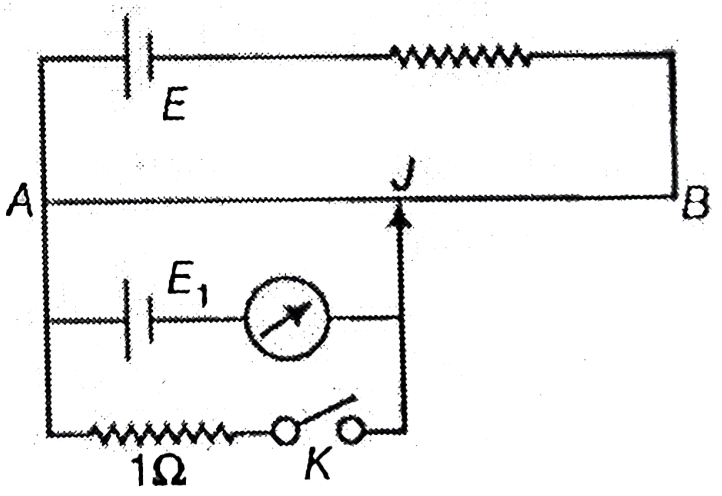
29. In figure, AB is a potentiometer wire, length 10 m and resistance 2Ω with open the balancing length is 5.5 m. However, on closing key K the balancing length reduces to 5 m. The

initial resistance of the cell E_1 is



A. 0.01Ω

B. 0.1Ω

C. 0.2Ω

D. 1Ω

Answer: B

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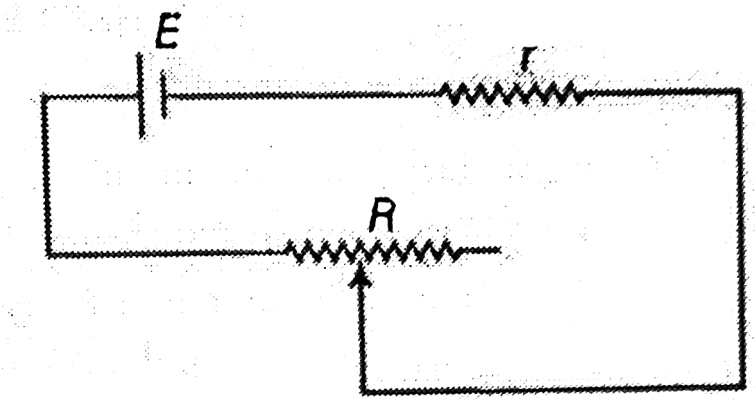
30. A battery of emf E and internal resistance r is connected to a variable resistor R as shown in figure. Which one of the following is true ?



A. Potenital difference across the terminals of the battery is maximum, when R=r

B. Power delivered to the resistor is maximum when R=r

C. Current in the circuit is maximum when R=r

D. Current in the circuit is maximum when $R > > r$

Answer: C

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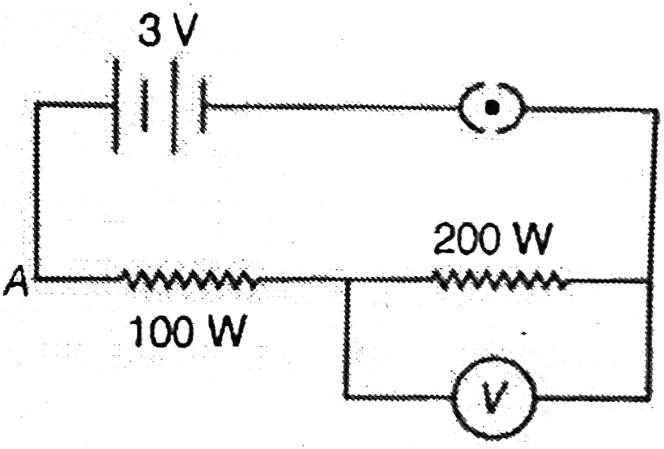
31. The voltmeter in figure has a resistance of 200Ω. The reading of voltmeter is



A. 2 V

B. 1 V

C. 1.5 V

D. 3 V

Answer: C

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32. For the circuit, the galvanometer G shows zero deflection. If the batteries A and B have negligible internal resistance, the value of the resistor R will be

A. 200Ω

B. 100Ω

C. 500Ω

D. 1000Ω

Answer: B

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33. For a potenitometer experiment, the emf of a battery in the primary circuit is 20 V and its internal resistance is 5Ω. There is a resistance box in series with the battery and the potentiometer wire, whose resistance can be varied from $120\Omega \text{ to } 170\Omega$. Resistance of

the potentiometer wire is 75Ω. The following potential differences can't be measured using this potentiometer

A. 5 V

B. 6 V

C. 7 V

D. 8 V

Answer: D

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34. A 6 V battery is connected to the terminals of a 3 m long wire of uniform thickness and resistance of 100Ω. The difference of potential between two points on the wire separated by a distance of 50 cm will be

A. 2 V

B. 3 V

C. 1 V

D. 15 V

Answer: C

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35. A cell has emf of 2.2 V, when connected to a resistance of 5Ω, the potential difference between the terminals of the cell becomes 2.1 V, the internal resistance for the cell is

A. 0.12Ω

B. 0.48Ω

C. 0.24Ω

D. 0.50Ω

Answer: C

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36. A uniform wire of 16Ω resistance is made into the form of a square. Two opposite corners of square are connected by a wire of resistance 16Ω. The effective resistance between the other two opposite corners is

A. 32Ω

B. 16Ω

C. 8Ω

D. 4Ω

Answer: D

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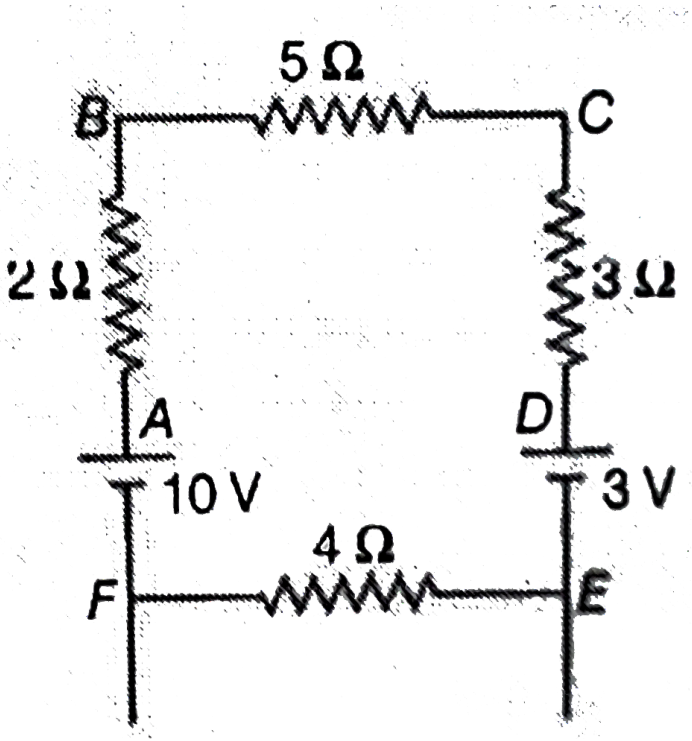
37. For the circuit shown in figure. The point F is grounded. Which of the following is wrong

statement ?



A. D is at 5 V

B. E is at zero potential

C. The current in the circuit will be 0.5 A

D. None of the above

Answer: A

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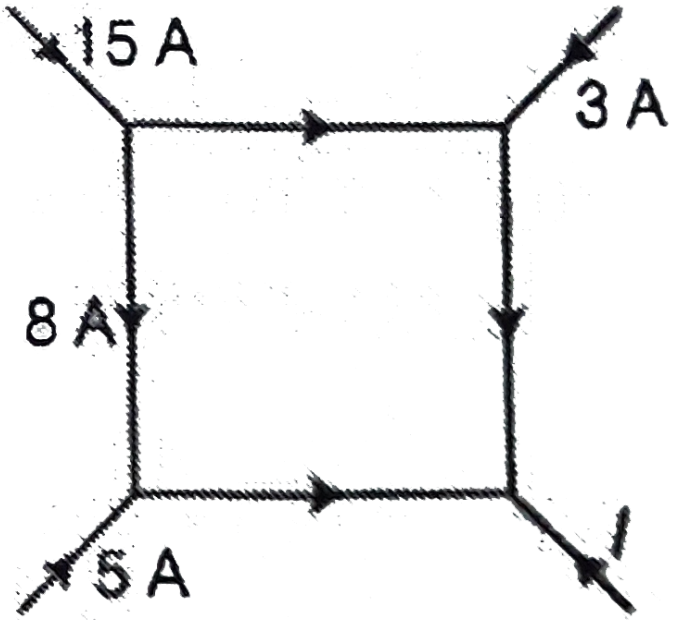
38. The figure shows a network of currents. The magnitude of currents is shwon here. The

magnitude of current I will be



A. $3A$

B. $13A$

C. $23A$

D. $-3A$

Answer: C

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39. Two wires having resistance R and 2 R are connected in parallel, the ratio of heat generated in 2 R and R is

A. $1:2$

B. $2:1$

C. $1:4$

D. $4:1$

Answer: B

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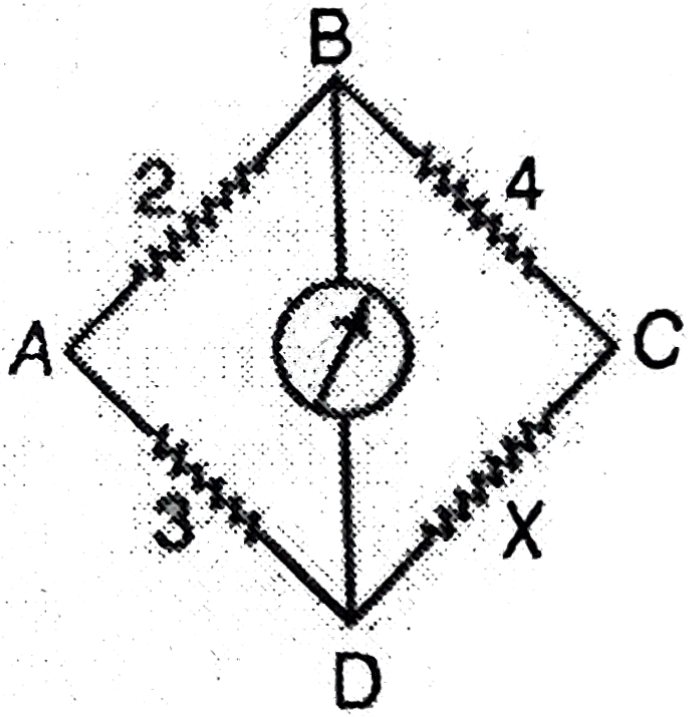
40. If the deflection of galvanometer in Wheatstone circuit is zero, the value of

resistance will be



A. 2Ω

B. 4Ω

C. 6Ω

D. 8Ω

Answer: C

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41. In which property of free electrons causes increase in the resistance of a conductor with rise in temperature ?

A. Number density

B. Relaxation time

C. Mass

D. None of these

Answer: B

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42. In an electroplating experiment, mg of silver is deposited when 4 A of current flows for 2 min. The amount of silver (in g) deposited by 6 A of current for 40 s will be

A. 4 m

B. $m/2$

C. $-m/4$

D. $2m$

Answer: B

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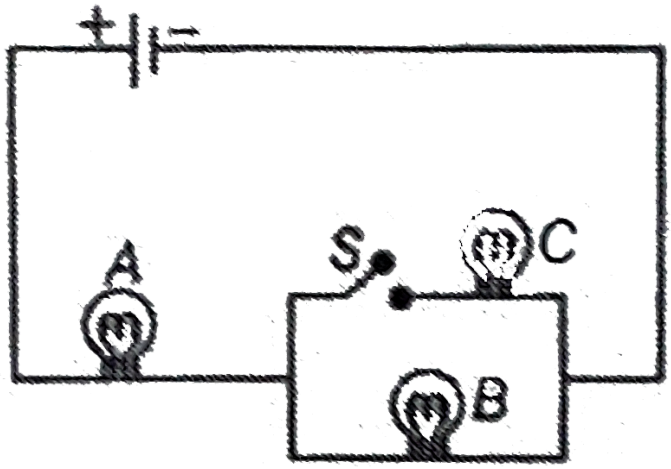
43. A, B, C are identical bulbs. How does the brightness of A and B change when the switch

S is closed ?



A. The brightness of A increases and that of B decreases

B. The brightness of A does not change and that of B decreases

C. The brightness of both A and B decreases

D. The brightness of A increases and that of B does not change

Answer: A

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44. For a thermocouple, T_c, T_n and T_i denote the temperatures of cold junction, the neutral temperature and the temperatures of

inversion respectively. Which one of the following relation is correct ?

A. $T_i = \frac{T_c + T_n}{2}$

B. $T_i 2T_n - T_c$

C. $T_i = \frac{T_n - T_c}{2}$

D. $T_i = T_n - T_c$

Answer: B

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45. If nearly 10^5 C liberate 1 g equivalent of aluminium, then the amount of aluminium (equivalent wt. 9) deposite through electrolysis is 20 min current of 50 A will A

A. 0.6 g

B. 10.8 g

C. 0.09 g

D. 5.4 g

Answer: D

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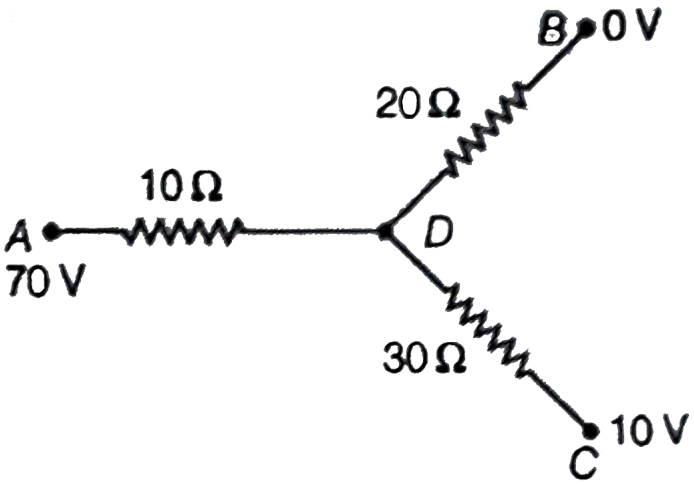
46. For the network shown in figure, points A, B and C are at potentials of 70 V, zero and 10 V respectively



A. point D is at a potential of 40 V

B. the currents in the sections AD, DB and DC are in the ratio $4:3:2$

C. the current in the sections AD, DB and DC are in the ratio $1:2:3$

D. the network draws a total power of 100 W

Answer: A

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47. When copper voltmeter is connected with a battery of emf 12 V, 2 g of copper is deposited in 30 min. If the same voltmeter is connected across a 6 V battery, then the mass of copper deposited in 45 min would be

A. 1 g

B. 1.5 g

C. 2 g

D. 2.5 g

Answer: B

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48. The emf in a thermooelectric circuit with one junction at $0^\circ C$ and other at $t^\circ C$ is given by $E = At - Bt^2$, the neutral temperature is , then

A. A/B

B. $-A/2B$

C. $-B/2A$

D. $A/2B$

Answer: D

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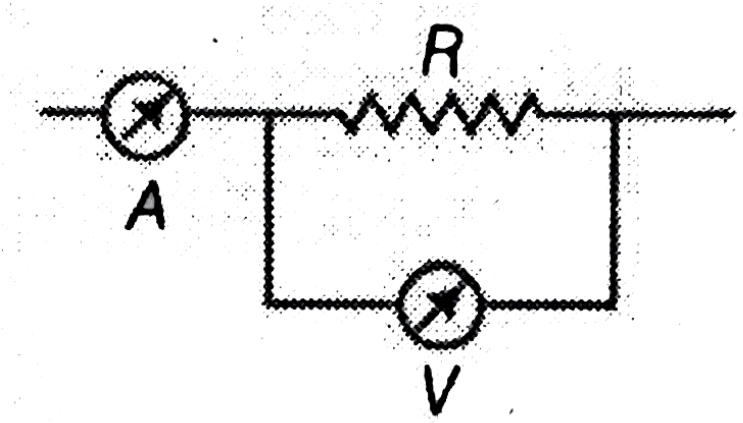
49. For the adjoining circuit diagram, the readings of ammeter and voltmeter are 2A and 120 V respectively. If the value of R is 75Ω, then the voltmeter resistance will be



A. 100Ω

B. 150Ω

C. 300Ω

D. 75Ω

Answer: C

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50. An electric heater rated as (500 W and 200 V) raises the temperature of 1 kg water from

$15^{\circ}C$ to its boiling point in 15 min. the heat effeciency of the heater is

A. 0.79

B. 0.97

C. 0.69

D. 0.96

Answer: A

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51. The same mass of copper is drawn into two wires 2 mm and 3mm thick. The two wires are connected in series and current is passed through them. The ratio of heat produced in the two wires is

A. $\frac{9}{4}$

B. $\frac{3}{2}$

C. $\frac{2}{3}$

D. $\frac{81}{16}$

Answer: D

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52. An electric bulb rated 500 W at 100 V is used in a circuit having a 200 V supply. What resistance R must be put in series with the bulbs so that the bulb delivers 500 W?

A. 20Ω

B. 40Ω

C. 10Ω

D. 5Ω

Answer: A

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53. Two heater coils made of the same material are connected in parallel across the mains : the length and the diameter of one coil is double that of the other . Which of them will produce more heat?

A. Thinner coil

B. Thicker coil

C. Both produce same heat.

D. None of these

Answer: B

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54. Cell of emf 1 V is connected across a potentiometer, balancing length is 600 cm. What will be the balancing length for 25 V?

A. 400 cm

B. 600 cm

C. 1500 cm

D. 1200 cm

Answer: C

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55. A moving coil galvanometer has a resistance of 9.8Ω and gives a full scale deflection when a current of 10 mA is passed through it. The value of the shunt required to

convert it into a milliameter to measure currents upto 500 mA is

A. 0.02Ω

B. 0.2Ω

C. 2Ω

D. 0.4Ω

Answer: B

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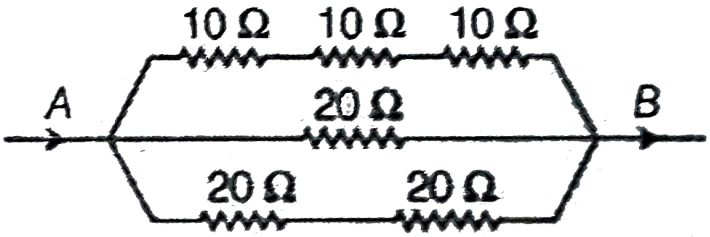
56. The total electrical resistance between the points A and B of the circuit shown, is



A. 9.23Ω

B. 15Ω

C. 30Ω

D. 100Ω

Answer: A

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57. A wire when connected to 220 V mains supply has power dissipation P_1. Now, the wire is cut into two equal pieces which are connected in parallel to same supply. Power dissipation in this case is P_2. Then, $P_1 : P_2$ is

A. 1

B. 2

C. 3

D. 4

Answer: D

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58. The resistance of a 50 cm long wire is 10Ω. The wire is stretched of uniform wire of length 100 cm. The resistance now will be

A. 15Ω

B. 30Ω

C. 20Ω

D. 40Ω

Answer: D

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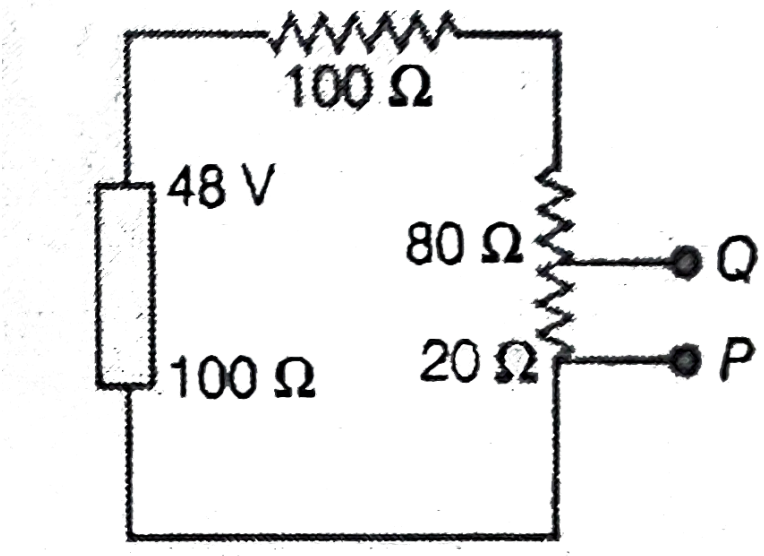
59. For the given circuit, the potenital difference across P and Q will be nearest to



A. 9.6 V

B. 6.6 V

C. 4 V

D. 3.2 V

Answer: D

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60. A voltmeter having resistance of 1800Ω is employed to measure the potential difference across 200Ω resistance which is connected to

DC power supply of 50 V and internal resistance 20Ω. What is the percentage change in potential difference across 200Ω resistance as a result of connecting voltmeter across it ?

A. 0.01

B. 0.05

C. 0.1

D. 0.2

Answer: A

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61. In an experiment to measure the internal resistance of a cell by a potentiometer, it is found that the balance point is at a length of $2m$ when the cell is shunted by a 5Ω resistance and is at a length of $3m$ when the cell is shunted by a 10Ω resistance, the internal resistance of the cell is then

A. 12Ω

B. 8Ω

C. 16Ω

D. 1Ω

Answer: B

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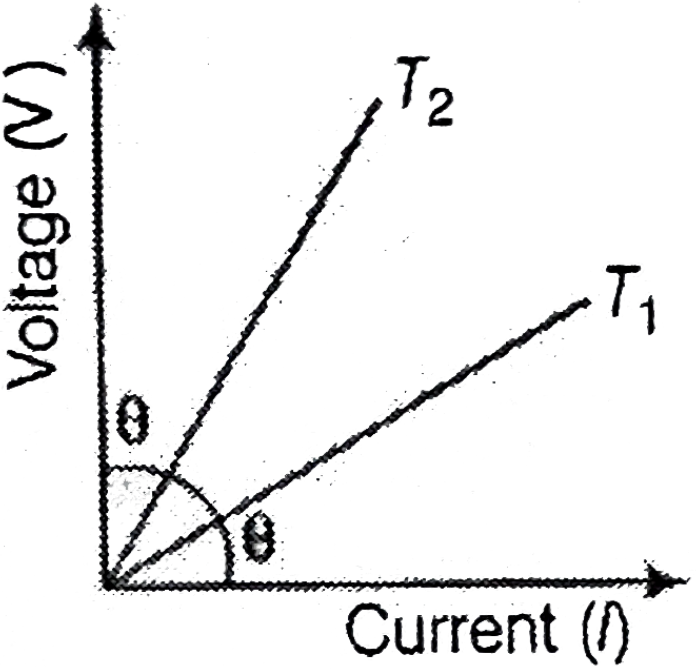
62. The V-I graph for a conductor at temperatures T_1 and T_2 are as shown in the

figure. The term $T_2 - T_1$ is proportional to



A. $\cos 2\theta$

B. $\sin 2\theta$

C. $\cot 2\theta$

D. $\tan 2\theta$

Answer: C

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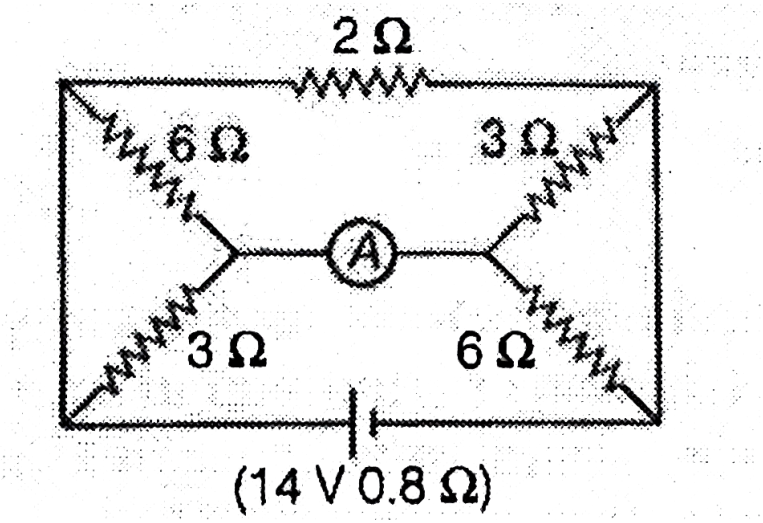
63. The reading of ammeter shown in figure is



A. 6.56 A

B. 3.28 A

C. 2.18 A

D. 1.09 A

Answer: C

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Bitsat Archives

1. Ohms law says

A. V= I R

B. V/l= constant

C. Both a and b are correct

D. Both a and b are incorrect

Answer: C

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2. A current 4.0 A exist in a wire of cross-sectional area $2.0mm^2$. If each cubic metre of

the wire contains 12.0×10^{28} free electrons, then the drift spped is

A. $2 \times 10^{-8} m / s$

B. $0.5 \times 10^{-3} m / s$

C. $1.04 \times 10^{-4} m / s$

D. None of these

Answer: C

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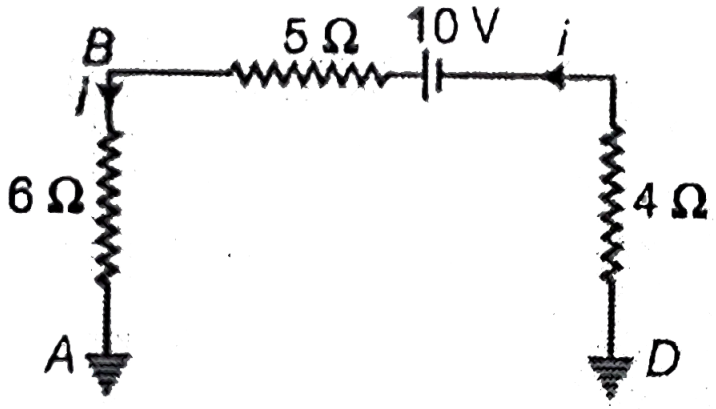
3. What will be the value of current I in the circuit shown ?



A. 0.67 A

B. $1A$

C. 0.32 A

D. None of these

Answer: A

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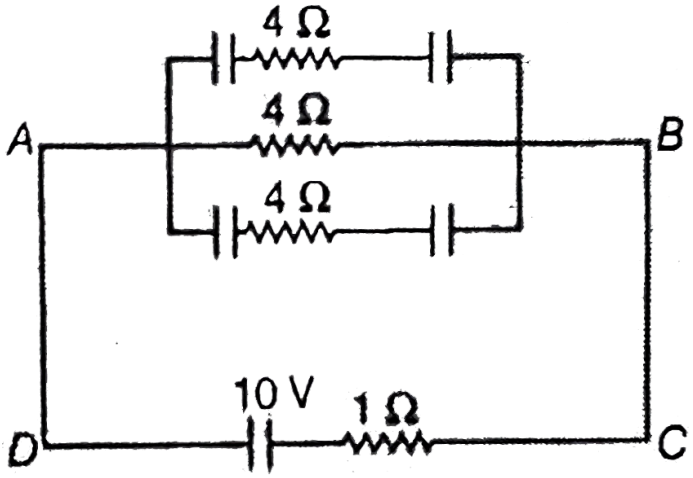
4. In the given circuit (as shown in figure), each capacitor has a capacity of $3\mu F$. What will be the net charge on each capacitor ?



A. $48\mu C$

B. $24\mu C$

C. $12\mu C$

D. None of these

Answer: C

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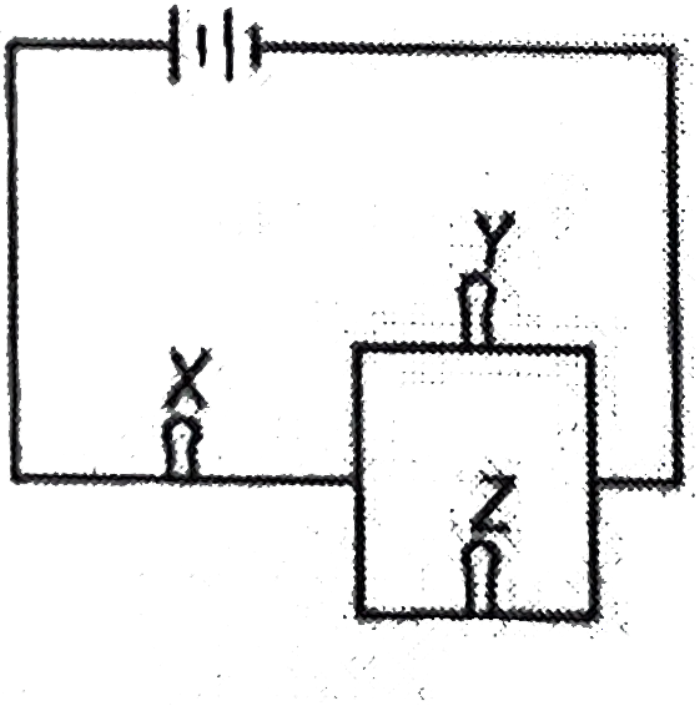
5. Three bulbs X, Y and Z are connected as shown in figure. The bulbs Y and Z are

identical. If bulb Z gets fused, then



A. Both X and Y will glow more brightly

B. Both X and Y will glow less brightly

C. X will glow less brightly and Y will glow more brightly

D. X will glow more brightly and Y will glow less brightyly

Answer: C

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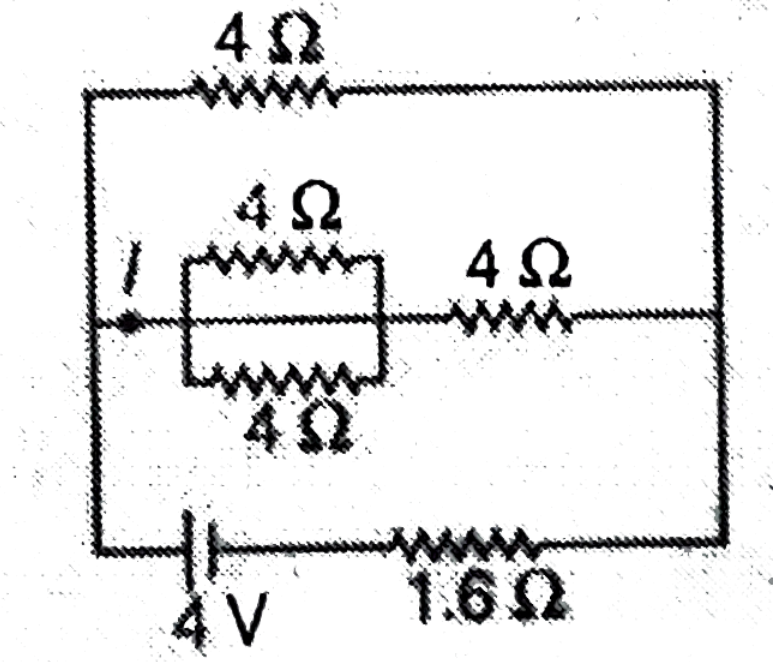
6. In the circuit shown, the value of I in ampere is



A. 1

B. 0.60

C. 0.4

D. 1.5

Answer: C

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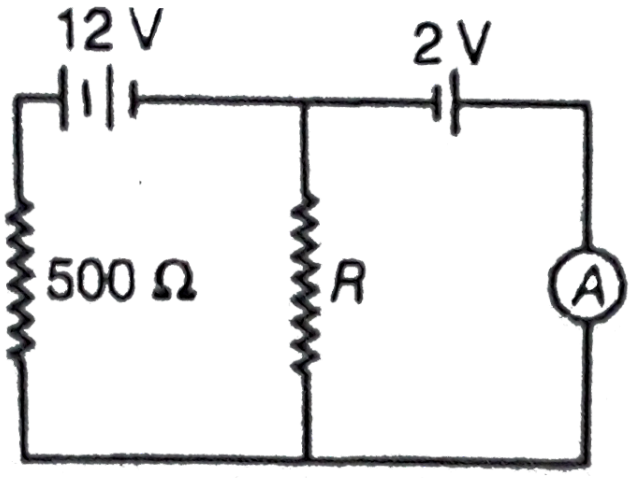
7. In the circuit shown below, the ammeter reading is zero. Then, the value of the resistance R is



A. 50Ω

B. 100Ω

C. 200Ω

D. 400Ω

Answer: B

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8. A steady current flow in a metallic conductor of non-uniform cross-section. The quantity/quantities remaining constant along the whole length of the conductor is /are.

A. current, electric field and drift speed

B. drift speed only

C. current and drift speed

D. current only

Answer: D

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9. Two bulbs which consume powers P_1 and P_2 are connected in series. The power consumed by the combination is

A. $P_1 + P_2$

B. $\sqrt{P_1 P_2}$

C. $\frac{P_1 P_2}{P_1 + P_2}$

D. $\frac{2P_1 P_2}{P_1 + P_2}$

Answer: A

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10. Three conductors draw respectively currents of 1 A, 2 A and 4 A when connected in turn across a battery. If they are connected in

series across the same battery, the current drawn will be

A. $\frac{2}{7}A$

B. $\frac{3}{7}A$

C. $\frac{4}{7}A$

D. $\frac{5}{7}A$

Answer: C

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11. 24 identical cells, each of internal resistance 0.5Ω, are arranged in a parallel combination of n rows, each row containing m cells in series. The combination is connected across a resistor of 3Ω. In order to send maximum current through the resistor, we should have

A. m=12, n=2

B. m=8, n=3

C. m=2, n=2

D. m=3, n=8

Answer: A

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12. A wire is stretched as to change its diameter by 0.25%. The percentage change in resistance is

A. 4.0%

B. 2.0%

C. 1.0%

D. 0.5%

Answer: C

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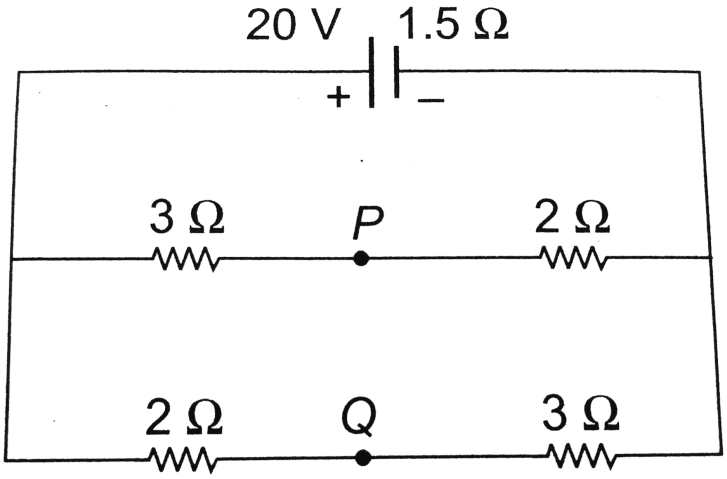
13. If in the circuit shown below, the internal resistance of the battery is 1.5Ω and V_P and V_Q are the potential at P and Q respectively, what is the potential difference between the

point P and Q?



A. Zero

B. $4V\left(V_P > V_Q\right)$

C. $4V\left(V_Q > V_P\right)$

D. $2.5VV\left(V_Q > V_P\right)$

Answer: D

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14. When the potential difference applied across a solid conductor is increased, the rate of flow of electrons

A. remains same

B. decreases

C. increase

D. decreases sharply

Answer: C

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15. A box with two terminals is connected in series with a 2 V battery, an ammeter and a switch. When the switch is closed the needle of the ammeter moves quickly across the scale and drops back to zero. The box contains

A. 20Ω resistor

B. a strip of copper

C. a diode

D. a short length of fuse wire

Answer: D

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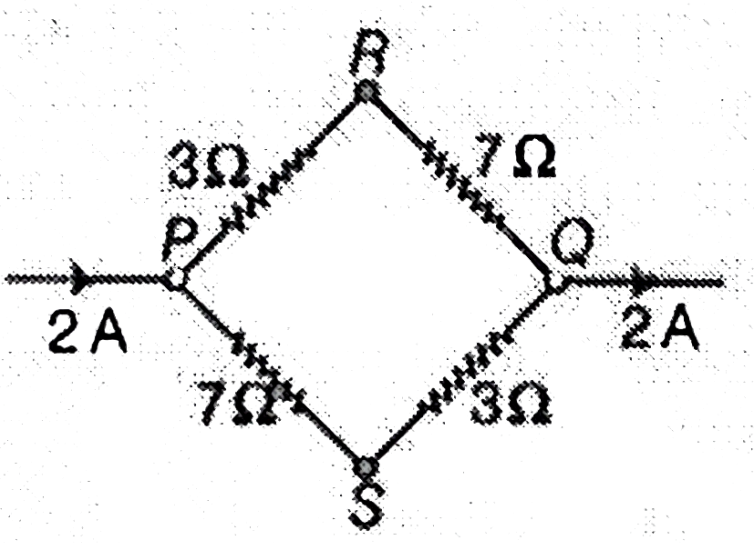
16. A current of 2 A flows in an electric circuit as shown in figure. The potential difference $(V_R - V_S)$, in volts $(V_E \text{ and } V_S$ are

potenitals at R and S respectively) is



A. -4

B. $+2$

C. $+4$

D. -2

Answer: C

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17. When a battery connected across a resistor of 16Ω, the voltage across the resistor is 12 V. When the same battery is connected across a resistor of 10Ω, voltage across it is 11 V. The internal resistance of the battery (in ohm) is

A. $\frac{10}{7}$

B. $\frac{20}{7}$

C. $\frac{25}{7}$

D. $\frac{30}{7}$

Answer: B

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18. If a rod has resistance 4Ω and if rod is turned as half circle, then the resistance along diameter is

A. 1.56Ω

B. 2.44Ω

C. 4Ω

D. 2Ω

Answer: C

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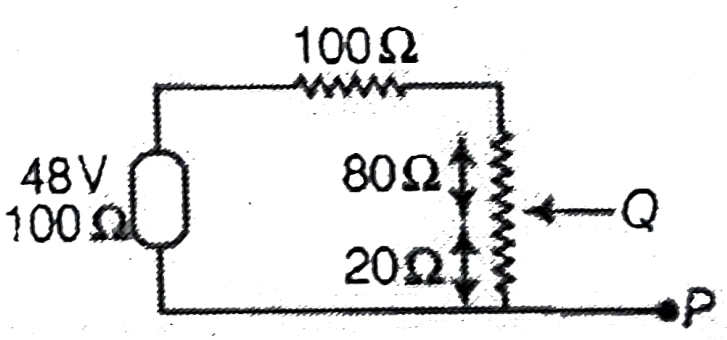
19. In the circuit, the potential difference across PQ will be nearest to



A. 9.6 V

B. 6.6 V

C. 4.8 V

D. 3.2 V

Answer: D

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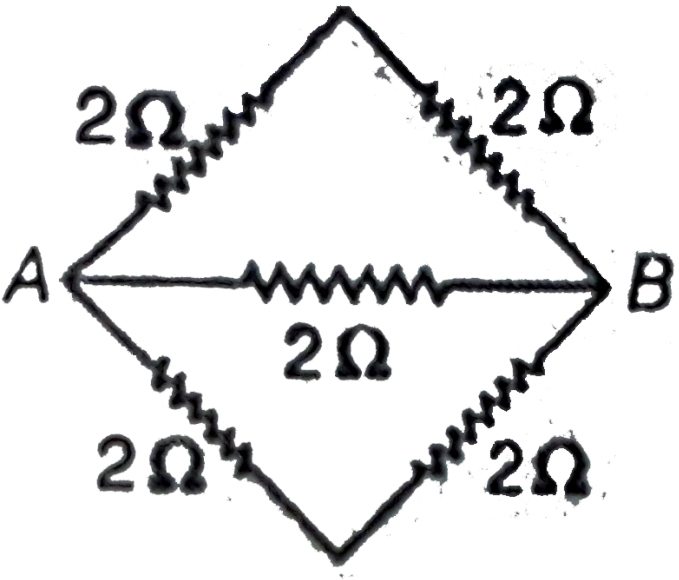
20. Each resistance shown in figure is 2Ω. The equivalent resistance between A and B is



A. 2Ω

B. 4Ω

C. 8Ω

D. 1Ω

Answer: A

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21. A cell of constant emf first connected to a resistance R_1 and then connected to resistance R_2. If power deliverd in both cases is same, then the internal resistance of the cell is

A. $\sqrt{R_1 R_2}$

B. $\sqrt{\frac{R_1}{R_2}}$

C. $\frac{R_1 - R_2}{2}$

D. $\frac{R_1 + R_2}{2}$

Answer: A

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22. Ampere- hour is the unit of

A. quantity of charge

B. potential

C. energy current

D.

Answer: A

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23. A 5.0 amp current is setup in an external circuit by a 6.0 volt storage battery for 6.0 minutes. The chemical energy of the battery is reduced by

A. $1.08 \times 10^4 J$

B. $1.08 \times 10^{-4} J$

C. $1.8 \times 10^4 J$

D. $1.8 \times 10^{-4} J$

Answer: A

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24. The current in a simple series circuit is 5.0 A. When an additional resistance of 2.0Ω is inserted, the current drops to 4.0 A. The original resistance of the circuit in ohms was

A. 1.25

B. 8

C. 10

D. 20

Answer: B

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25. Two resistances are connected in tow gaps of a Meter bridge. The balance point is 20 cm from the zero end. A resistance of 15Ω is connected in series with the smaller of the

two. The null point shifts to 40 cm. The value of the smaller resistance in ohms is

A. 3

B. 6

C. 9

D. 12

Answer: C

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26. By using only two resistance coils-singly, in series, or in parallel one should be able to obtain resistances of 3, 4, 12 and 16 ohms . The separate resistances of the coil are

A. 3 and 4

B. 4 and 12

C. 12 and 16

D. 16 and 3

Answer: B

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