PHYSICS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

CURRENT ELECTRICITY

Example

1. A current in a circuit is due to a potential difference of 30 V applied to a resistor of

resistance 300Ω. What resistance would permit the same current to flow, if the supply voltage was 300 V ?

A. $3k\Omega$

B. $6k\Omega$

C. $9k\Omega$

D. 300Ω

Answer: A

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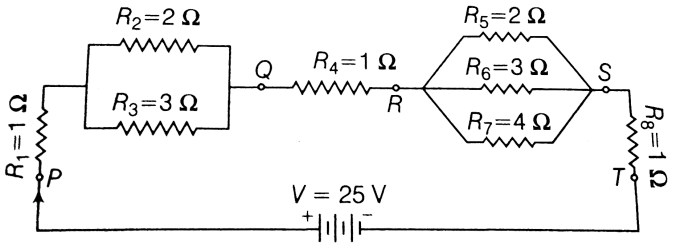
2. The value of equivalent resistance for the circuit shown below is,



A. 2.123Ω

B. 5.123Ω

C. 4.23Ω

D. 6.283Ω

Answer: B

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3. The resistance of eureka wire is 2.5Ω. What is the value of specific resistance of write of 14 m length and diameter of 0.14 cm ?

A. $27.5 \times 10^{-6}\Omega - cm$

B. $20.6 \times 10^{-6}\Omega - cm$

C. $25.3 \times 10^{-6}\Omega - cm$

D. None of the above

Answer: A

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4. A piece of copper wire has a resistance of 25Ω at $10^{\circ}C$. What is the maximum operating temperature, if the resistance of the wire is to be increased by 20 % ? (Assume α at $10^{\circ}C = 0.0041/.^{\circ}C^{-1}$).

A. $60.38^{\circ}C$

B. $58.78^{\circ}C$

C. $40.73^{\circ}C$

D. $20.23^{\circ}C$

Answer: B

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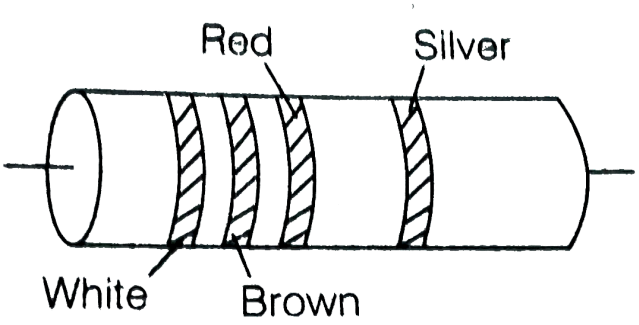
5. In the figure, a carbon resistor has band of different colours on its body. The resistanceof the following body is



A. $2.2k\Omega$

B. $3.3k\Omega$

C. $5.6k\Omega$

D. $9.1k\Omega$

Answer: D

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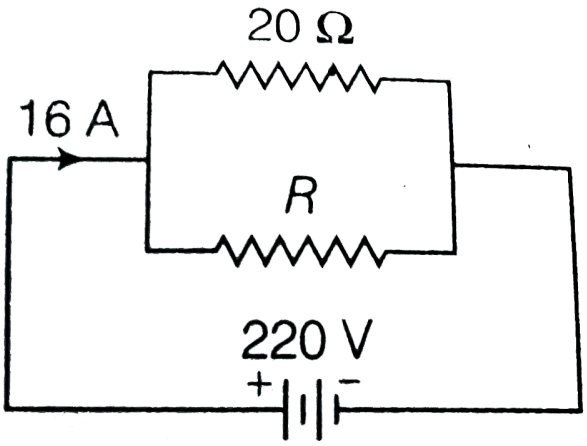
6. A current of 16 A is distributed in a circuit having two branches when connected on 220 V supply. If the resistance of one branch is $20Omeg$, then what is the resistance of other

branch and power taken by both the branches.



A. 44Ω and 3520 W

B. 50Ω and 3000 W

C. 20Ω and 2000 W

D. 26Ω and 2320 W

Answer: A

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7. What is the electrical energy of a circuit ? If the current flowing from the source is 5 A for duration of 2 s and the resistance of the circuit is 5Ω.

A. 125 J

B. 25 J

C. 300 J

D. 250 J

Answer: D

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8. A secondary cell have source emf of 3 V. When this cell is connected to a load of 0.25 then load emf calculated is 2.10 V. The internal resistance of cell and power consumed are

A. 0.107Ω and 7.56 W

B. 0.208Ω and 3.34 W

C. 1.234Ω and 6.28 W

D. None of the above

Answer: A

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9. If 8 cells having an emf of 1.5 V are connected in series across a load having resistance of 10Ω. What is the current drawn by the load ? Assume internal resistance of all be 0.5Ω.

A. 0.234 A

B. 0.632 A

C. 0.857 A

D. None of these

Answer: C

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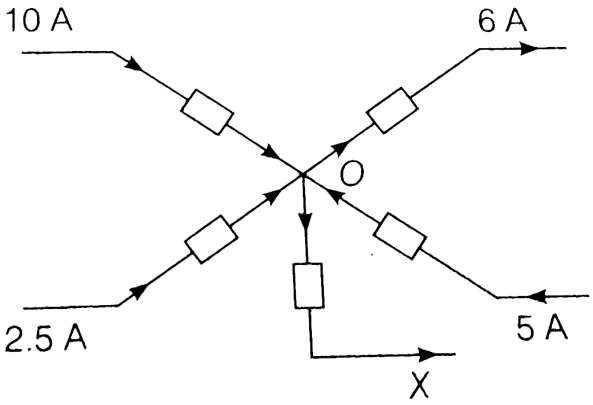
10. What is the magnitude of current branch OX of the circuit as shown in figure ?



A. 1.5 A

B. 6.5 A

C. 10.5 A

D. 11.5 A

Answer: D

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11. A battery 10 V and 0.5Ω internal resistance is connected to a battery of 12 V and 0.8Ω internal resistance and one terminal of battery is connected to a 20Ω resistance, then the current flow in 20Ω resistance is

A. 0.3023 A

B. 0.8034 A

C. 0.5303 A

D. 1.238 A

Answer: C

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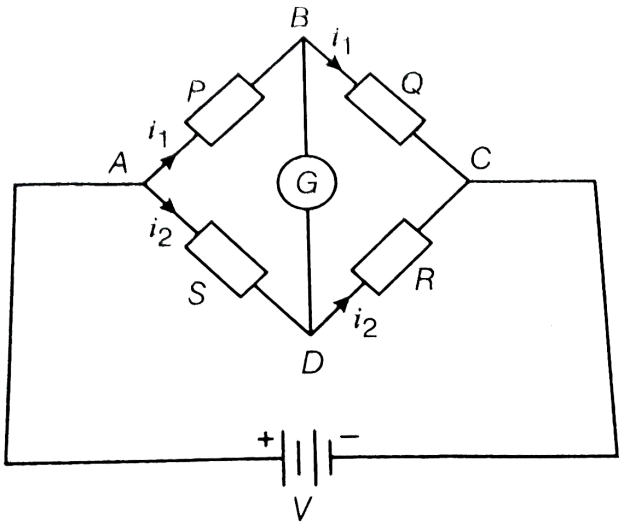
12. In the Wheatstone bridge network ABCD is balanced when $P = 500\Omega, Q = 250\Omega$ and $S = 12\Omega$, what is the value of R ?



A. 2Ω

B. 4Ω

C. 8Ω

D. 6Ω

Answer: D

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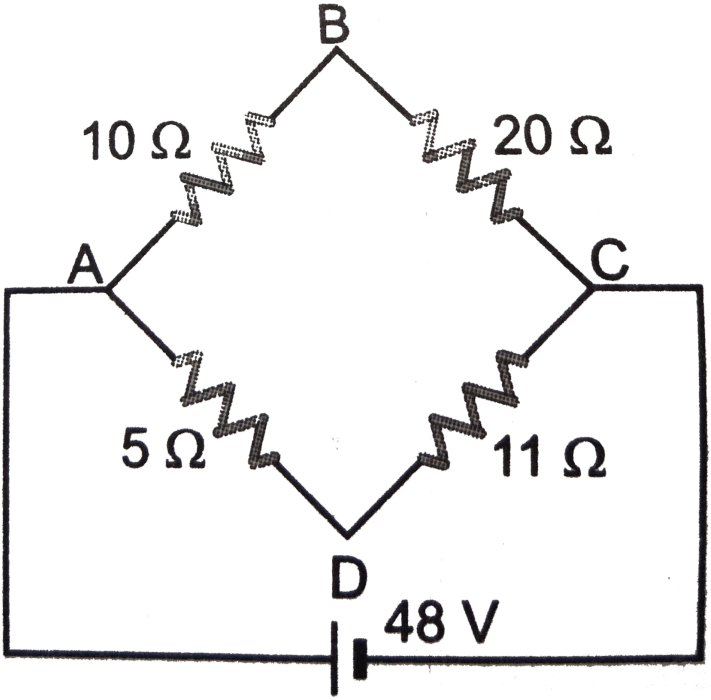
13. A Wheatstone bride is almost balanced with point C grounded. Calculate (a) the potential of point B (b) the potential of point

D (c) If a galvanometer is connected between B and D, what is the direction of current through it ? (d) For what value of the resistance BC would the bridge be in balanced state ?



A. 33V, 32V and 22Ω

B. 30V, 23V and 11Ω

C. 32V, 33V and 10Ω

D. 15V, 20 V and 20Ω

Answer: A

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14. A potentiometer wire of length 1 m has a resistance of 100Ω. It is connected to a 6V battery in series with a resistance of 5Ω.

Determine the emf of the primary cell which gives a balance point at 40cm.

A. 1.2 V

B. 1.8 V

C. 1.6 V

D. 1.9 V

Answer: C

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15. In a potentiometer arrangement, a cell of emf $2.25V$ gives a balance point at 30.0 cm length of the wire. If the cell is replaced by another cell and the balance point shifts to 60.0 cm, then what is the emf of the second cell?

A. 4.5 V

B. 6.5 V

C. 5.6 V

D. 7.0 V

Answer: A

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16. A cell can be balanced against $110cm$ and $100cm$ of potentiometer wire, respectively with and without being short circuited through a resistance of 10Ω. Its internal resistance is

A. 1Ω

B. 2Ω

C. 3Ω

D. 4Ω

Answer: A

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Exercise 1

1. A wire of resistance 4Ω is stretched to twice its original length. The resistance of stretched wire would be

A. 2Ω

B. 4Ω

C. 8Ω

D. 16Ω

Answer: D

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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. $2 \times 10^{-8} ms^{-1}$

B. $0.5 \times 10^{-3} ms^{-1}$

C. $1.04 \times 10^{-4} ms^{-1}$

D. None of these

Answer: C

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3. With the rise of temperature the resistivity of a semiconductor

A. remains unchanged

B. increases

C. decreases

D. first increases and then decreases

Answer: C

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4. A carbon film resistor has colour green, black, violet and gold . The value of the resistor is

A. $50M\Omega$

B. $500M\Omega$

C. $(500 \pm 5\,\%\,)M\Omega$

D. $(500 \pm 10\,\%\,)M\Omega$

Answer: C

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5. Two wires of the same material but of different diameters carry the same current i. If the ratio of their diameters is $2:1$, then the corresponding ratio of their mean drift velocities will be

A. $4:1$

B. $1:1$

C. $1:2$

D. $1:4$

Answer: D

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6. For a metallic wire, the ratio $\frac{V}{i}$ ($V =$ applied potential difference and $i =$ current flowing) is

A. independent of temperature

B. increases as the temperature rises

C. decreases as the temperature rises

D. increases or decreases as temperature rises depending upon the metal

Answer: B

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7. Two conductors are made of the same material and have the same length. Conductor A is a solid wire of diameter $1mm$. Conductor B is a hollow tube of outer diameter $2mm$ and inner diameter $1mm$. Find the ratio of resistance R_A to R_B.

A. 3

B. 2

C. 1

D. 0.5

Answer: A

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8. Two wires of the same dimensions but resistivities ρ_1 and ρ_2 are connected in series. The equivalent resistivity of the combination is

A. $\frac{\rho_1 + \rho_2}{2}$

B. $\rho_1 + \rho_2$

C. $2(\rho_1 + \rho_2)$

D. $\sqrt{\rho_1 \rho_2}$

Answer: A

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9. A material 'B' has twice the specific resistance of 'A'. A circular wire made of 'B' has twice the diameter of a wire made of 'A'. Then

for the two wires to have the same resistance, the ratio l_B/l_A of their respective lengths must be

A. 2

B. 1

C. $\frac{1}{2}$

D. $\frac{1}{4}$

Answer: A

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10. The resistance of a 10 m long wire is 10 Ω. Its length is increased by 25% by stretching the wire uniformly . The resistance of wire will change to

A. 12.5Ω

B. 14.5Ω

C. 15.6Ω

D. 16.6Ω

Answer: C

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11. Calculate the average drift speed of conduction electrons in a copper wire of cross-sectional area $1.0 \times 10^{-7} m^2$, carrying a current of 1.5 A. Assume that each copper atom contributes roughly one conduction electron. The density of copper is $9.0 \times 10^3 kgm^{-3}$ and its atomic mass is 63.5. Take Avogadro's number $= 6.0 \times 10^{23}$.

A. $1.1 ms^{-1}$

B. $0.11 mms^{-1}$

C. $1.1mms^{-1}$

D. $11ms^{-1}$

Answer: C

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12. The resistance of a bulb filmanet is 100Ω at a temperature of $100^{\circ}C$. If its temperature coefficient of resistance be 0.005 per $.^{\circ}C$, its resistance will become 200Ω at a temperature of

A. $500^\circ C$

B. $300^\circ C$

C. $200^\circ C$

D. $400^\circ C$

Answer: B

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13. All the edges of a block with parallel faces are unequal. Its longest edge is twice its

shortest edge. The ratio of the maximum to minimum resistance between parallel faces is.

A. 8

B. 4

C. 2

D. None of these

Answer: B

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14. Two copper wire of length l and 2l have radii, r and 2r respectively. What si the ratio of their specific resistance.?

A. $1:2$

B. $2:1$

C. $1:1$

D. $1:3$

Answer: C

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15. Which of the following materials is the best conductor of electricity ?

A. Platinum

B. Gold

C. Silicon

D. copper

Answer: B

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16. Electric field (E) and current density (J) have relation

A. $J \propto E$

B. $E \propto J^2$

C. $E \propto \frac{1}{J^2}$

D. $E^2 \propto \frac{1}{J}$

Answer: A

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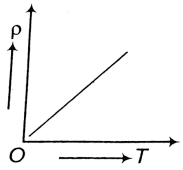
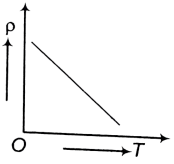
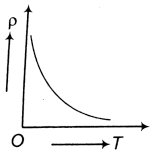
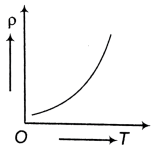
17. The temperature (T) dependence of resistivity (rho) of a semiconductor is represented by :

A. a. 

B. b. 

C. c. 

D. d. 

Answer: C

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18. 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. $6.0 \times 10^{28} m^{-3}$

B. $3.6 \times 10^{29} m^{-3}$

C. $7.0 \times 10^{30} m^{-3}$

D. $8.2 \times 10^{32} m^{-3}$

Answer: A

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19. A wire of resistance R is elongated $n - fold$ to make a new uniform wire. The resistance of new wire.

A. nR

B. $n^2 R$

C. $2nR$

D. $2n^2R$

Answer: B

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20. The four colours on a resistor are: brown, yellow, green and gold as read from left to right. What is resistance corresponding to these colours.

A. $(1.4 \pm 0.07) M\Omega$

B. $(2.4 \pm 0.05) M\Omega$

C. $(3.4 \pm 0.5) M\Omega$

D. $(1.4 \pm 0.05) M\Omega$

Answer: D

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21. The resistance will be least in a wire with length, cross-section area respectively,

A. L/2, 2A

B. 2L, A

C. L, A

D. L, 2A

Answer: A

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22. A wire has resistance of 10Ω. If it is stretched by 1/10th of its length, then its resistance is nearly

A. 9Ω

B. 10Ω

C. 11Ω

D. 12Ω

Answer: D

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23. If resistivity of copper conductor is $1.7 \times 10^{-8}\Omega - m$ and electric field is $100Vm^{-1}$, then current density will be

A. $6 \times 10^{9} Am^{-2}$

B. $1.7 \times 10^{-6} Am^{-2}$

C. $1.7 \times 10^{-10} Am^{-2}$

D. $6 \times 10^{7} Am^{-2}$

Answer: A

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24. A wire is stretched so 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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25. A potential difference of 100 V is applied to the ends of a copper wire one metre long . What is the average drift velocity of electrons

?

(Given, $\sigma = 5.81 \times 10^7 \Omega$ or $n_{Cu} = 8.5 \times 10^{28} m^{-3}$)

A. $0.43 ms^{-1}$

B. $0.83 ms^{-1}$

C. $0.52 ms^{-1}$

D. $0.95 ms^{-1}$

Answer: A

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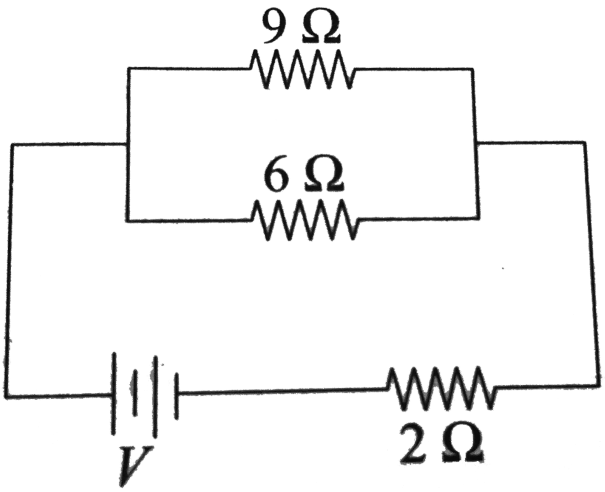
26. If power dissipated in the 9Ω resistor in the resistor shown is $36W$, the potential difference across the 2Ω resistor is



A. 8V

B. 10V

C. 2V

D. 4V

Answer: B

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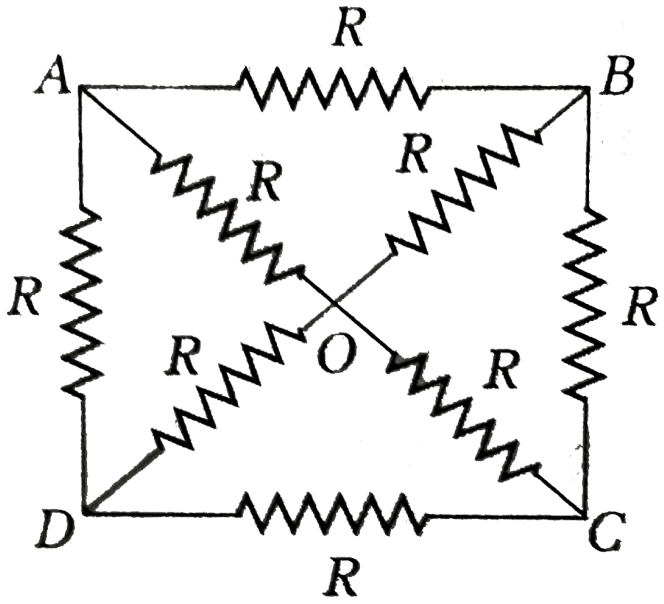
27. The effective resistance between points A and C for the network shown figure is



A. $\frac{2}{3}R$

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

C. 2R

D. $\frac{1}{2R}$

Answer: A

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28. A resistor of $6k\Omega$with tolerance 10% and another resistance of $4k\Omega$ with tolerance $10\,\%$ are connected in series. The tolerance of the combination is about

A. 0.05

B. 0.1

C. 0.12

D. 0.15

Answer: B

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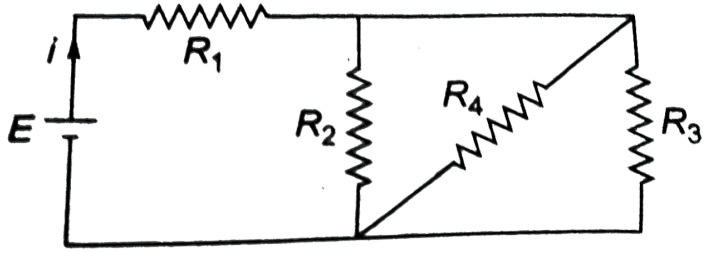
29. In the circuit given E = 6.0 volt, $R_1 = 100\Omega$, $R_2 = R_3 = 50\Omega$ and $R_4 = 75\Omega$. The equivalent resistance of the circuit, in ohms is



A. 11.875

B. 26.31

C. 118.75

D. None of these

Answer: C

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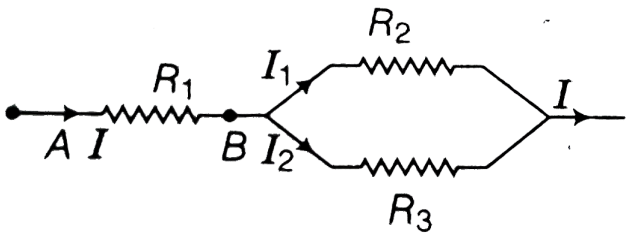
30. The circuit in figure, where there are three resistors R_1, R_2 and R_3 . If the voltage

between A and C is V, the current / is given by



A. $\frac{V(R_1+R_2)}{R_1R_2+R_1R_3+R_2R_3}$

B. $\frac{V(R_1+R_3)}{R_1R_2+R_1R_3+R_2R_3}$

C. $\frac{V(R_3\times R_2)}{R_1R_2+R_1R_3+R_2R_3}$

D. $\frac{V(R_2+R_3)}{R_1R_2+R_1R_3+R_2R_3}$

Answer: D

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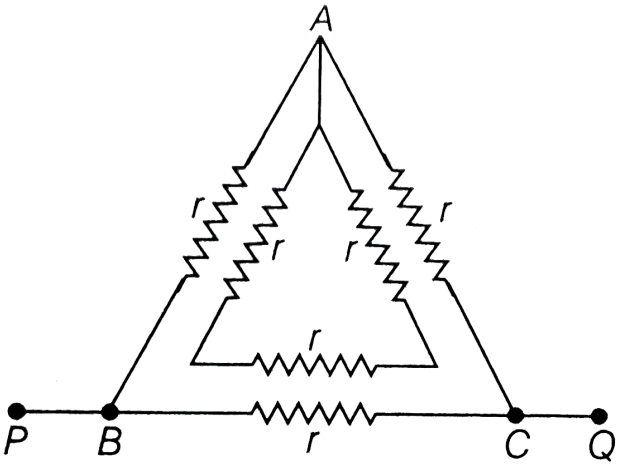
31. The resistance across R and Q in the figure is



A. r/3

B. r/2

C. 2r

D. 6r

Answer: A

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32. Two resistances are joined in parallel whose equivolent resistance is $\frac{3}{5}\Omega$. One of the resistance wire is broken and the effective resistance becomes 3Ω. The resistance (in ohms) of the wire that got broken was

A. $\frac{4}{3}$

B. 2

C. $\frac{6}{5}$

D. $\frac{3}{4}$

Answer: D

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33. The equivalent resistance of two resistors connected in series 6Ω and their parallel equivalent resistance is $\frac{4}{3}\Omega$. What are the value of resistance?

A. $4\Omega, 6\Omega$

B. $8\Omega, 1\Omega$

C. $4\Omega, 2\Omega$

D. $6\Omega, 2\Omega$

Answer: C

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34. Three resistances $2\Omega, 3\Omega$ and 4Ω are connected in parallel. The ratio of currents

passing through them when a potential difference is applied across its ends will be

A. $5:4:3$

B. $6:3:2$

C. $4:3:2$

D. $6:4:3$

Answer: D

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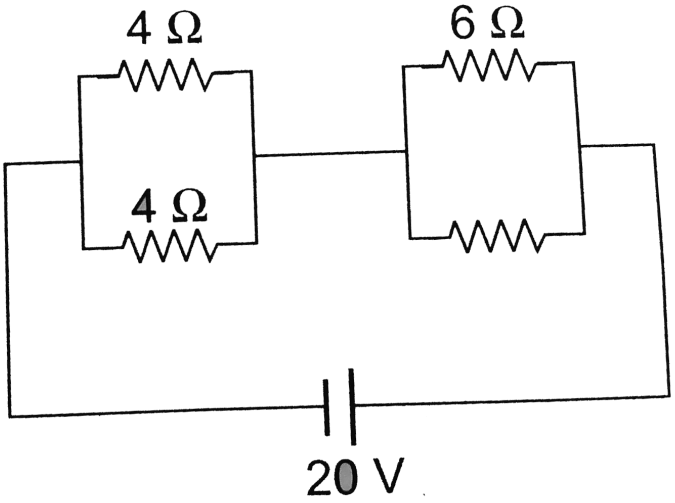
35. Four resistances are connected in a circuit in the given figure. The electric cirrent flowing through $4ohm$ and $6ohm$ resistance is respectively



A. 2A and 4A

B. 1A and 2A

C. 1A and 1A

D. 2A and 2A

Answer: D

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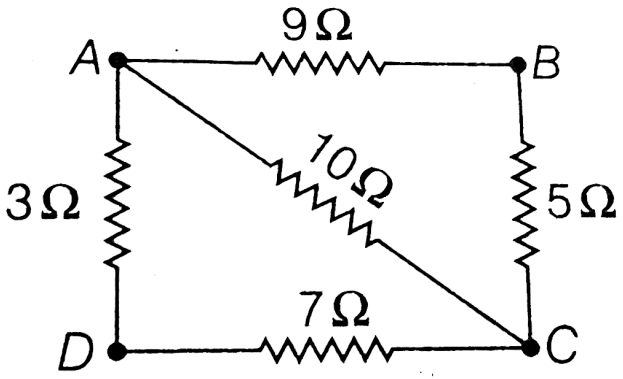
36. Five resistors are connected as shown in figure. Find the equivalent resistance between

the points B and C.



A. $\frac{70}{19}\Omega$

B. $\frac{19}{70}\Omega$

C. $\frac{16}{5}\Omega$

D. $\frac{15}{8}\Omega$

Answer: A

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37. If 400Ω of resistance is made by adding four 100Ω resistance of tolerance 5%, then the tolerance of the combinations

A. 0.2

B. 0.05

C. 0.1

D. 0.15

Answer: B

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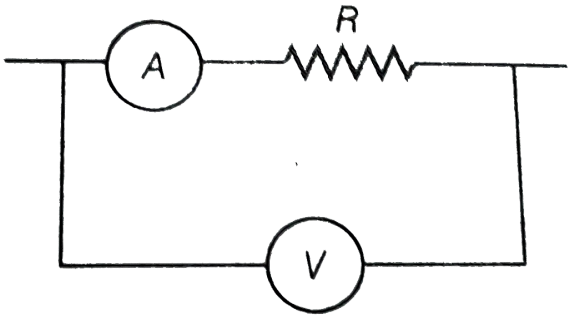
38. In the circuit shown below, the ammeter and the voltmeter readings are 3 A and 6 V respectively . Then, the value of the resistance R is



A. $< 2\Omega$

B. 2Ω

C. $\geq 2\Omega$

D. $> 2\Omega$

Answer: A

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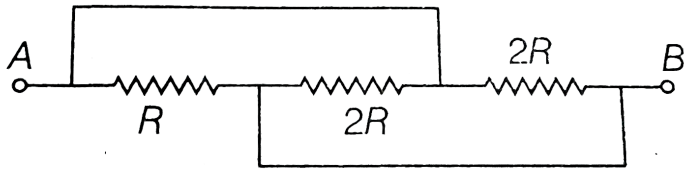
39. In the circuit show below total resistance between A and B is



A. 5R

B. 2R

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

D. $\frac{6R}{5}$

Answer: C

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40. How many minimum number of 2Ω resistance can be connected to have an effective resistance of 1.5Ω

A. 3

B. 2

C. 4

D. 6

Answer: C

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41. Two resistances R and 2R are connected in parallel in an electric circuit. The thermal energy developed in R and 2R are in the ratio

A. $1:2$

B. $1:4$

C. $4:1$

D. $2:1$

Answer: D

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42. A wire has a resistance of 6Ω. It is cut into two parts and both half values are connected in parallel. The new resistance is ....

A. 3Ω

B. 6Ω

C. 12Ω

D. 1.5Ω

Answer: D

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43. Four cells, each of emf E and internal resistance r, are connected in series across an

external resistance reverse. Then, the current in the external circuit is

A. $\frac{2E}{4r+R}$

B. $\frac{3E}{4r+R}$

C. $\frac{3E}{3r+R}$

D. $\frac{2E}{3r+R}$

Answer: A

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44. Two resistors of resistances 2Ω and 6Ω are connected in parallel. This combination is then connected to a battery of emf 2 V and internal resistance 0.5Ω. What is the current flowing through the battery ?

A. 4A

B. $\frac{4}{3}A$

C. $\frac{4}{17}A$

D. 1A

Answer: D

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45. Tow cells with the same emf E and different internal resistances r_1 and r_2 are connected in series to an external resistances R . The value of R so that the potential difference across the first cell be zero is

A. $\sqrt{r_1 r_2}$

B. $r_1 + r_2$

C. $r_1 - r_2$

D. $\frac{r_1 + r_2}{2}$

Answer: C

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46. Consider the following two statement.

`(A) Kirchhoff's junction law follows from the conservation of charge.

(B) Krichhoff's loop law follows from the conservation of energy.

Which of the following is correct ?

A. Both (A) and (B) are wrong

B. (A) is correct and (B) is wrong

C. (A) is wrong and (B) is correct

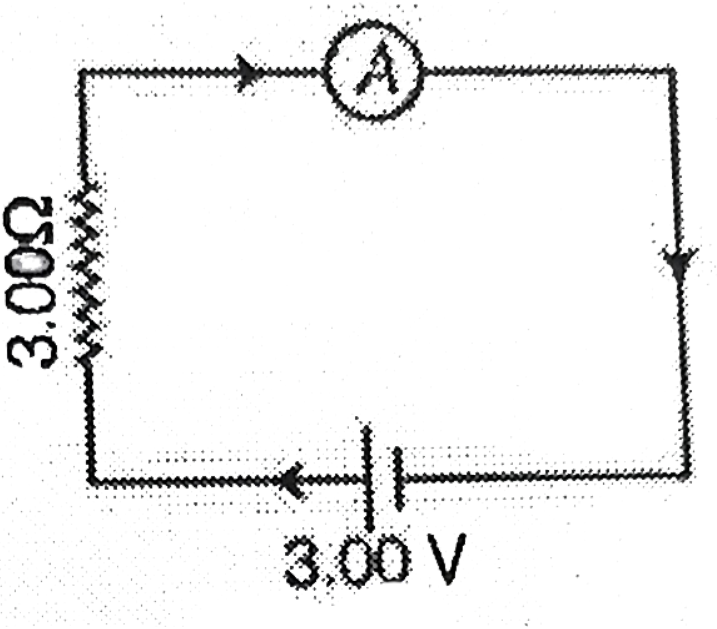
D. Both (A) and (B) are correct

Answer: D

Watch Video Solution

47. For the circuit (figure) the currents is to be measured. The ammeter shown is a galvanometer with a resistance $R_G = 60.00\Omega$

converted to an ammeter by a shunt resistance $r_S = 0.02\Omega$. The value of the current is



A. 0.79 A

B. 0.29 A

C. 0.99 A

D. 0.8 A

Answer: C

 Watch Video Solution

48. For driving a current of 2 A for 6 minutes in a circuit, 1000 J of work is to be done. The e.m.f. of the source in the circuit is

A. 1.38 V

B. 1.68 V

C. 2.03 V

D. 3.10 V

Answer: A

Watch Video Solution

49. A 10 m long wire ofresistance 20Ω is connected in series with battery of EMF $3V$ and negligible internal resistance and a resistance of 10Ω. The potential gradient along the wire is :

A. 0.02

B. 0.1

C. 0.2

D. 1.2

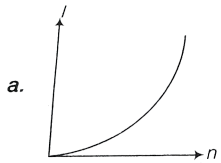
Answer: C

 Watch Video Solution

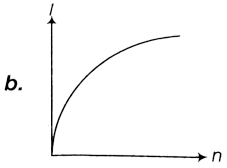
50. A battery consists of a variable number n of identical cells having internal resistance connected in series. The terminals of the

battery are short circuited and the current I measured. Which one of the graph below shows the correct relationship between I and n?

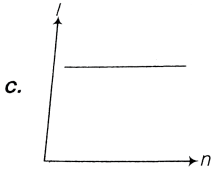
A.



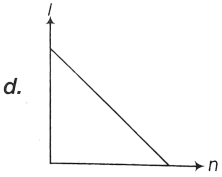
B.



C.



D.



Answer: C

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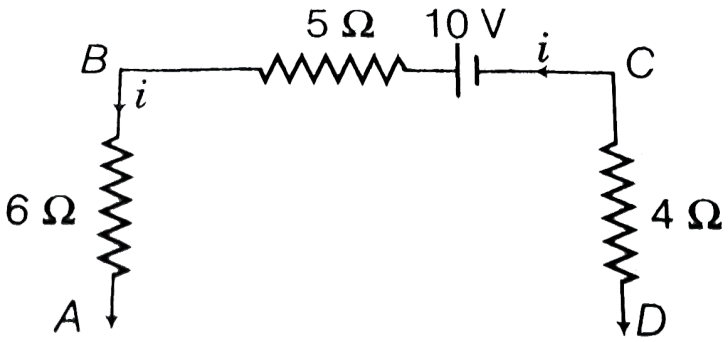
51. What will be the value of current I in the circuit shown ?



A. 0.67 A

B. 1A

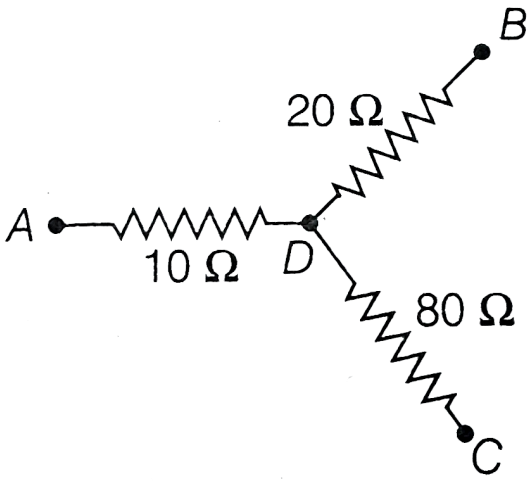
C. 0.32 A

D. None of these

Answer: A

Watch Video Solution

52. In the circuit given here, the points A,B and C are 70 V, zero, 10 V respectively . Then,



A. the point d will be at a potential of 60 V

B. the point D will be at a potential of 20 V

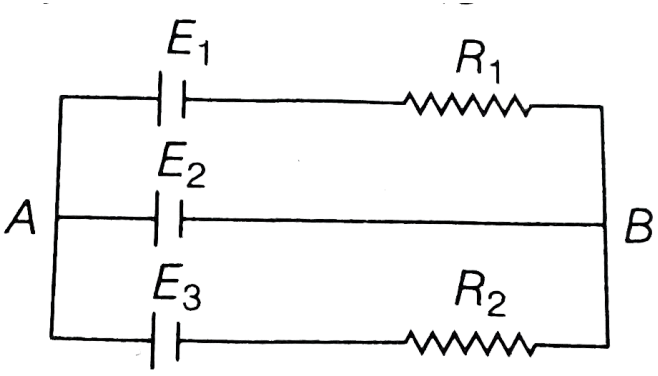
C. currents in the paths AD, DB and DC are in the ratio of $1:2:3$

D. currents in the paths AD, DB and DC are in the ratio of $3:2:1$

Answer: D

Watch Video Solution

53. In the following circuit $E_1 = E_2 = E_3 2V$ and $R_1 = R_2 = A\Omega$. The current passing through battery E_2 between points A and B is



A. Zero

B. 2A, B and A

C. 2A, A and B

D. None of these

Answer: C

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54. Four resistence of $10\Omega, 60\Omega, 100\Omega$and 200Ω, respectively taken in order are used to form a Wheatstone's bridge . A 15 V battery is

connected to the ends of a 200Ωresistance, the current through it will be

A. $7.5 \times 10^{-5} A$

B. $7.5 \times 10^{-4} A$

C. $7.5 \times 10^{-3} A$

D. $7.5 \times 10^{-2} A$

Answer: D

Watch Video Solution

55. To get a maximum current through a resistance of 2.5Ω one can use m rows of cells each row having n cells . The internal resistance of each cell is 0.5Ω. What are the values of m and n, if the total number of cells are 20?

A. $m = 2, n = 10$

B. m=4, n=5

C. m=5, n=4

D. n=2, m=10

Answer: A

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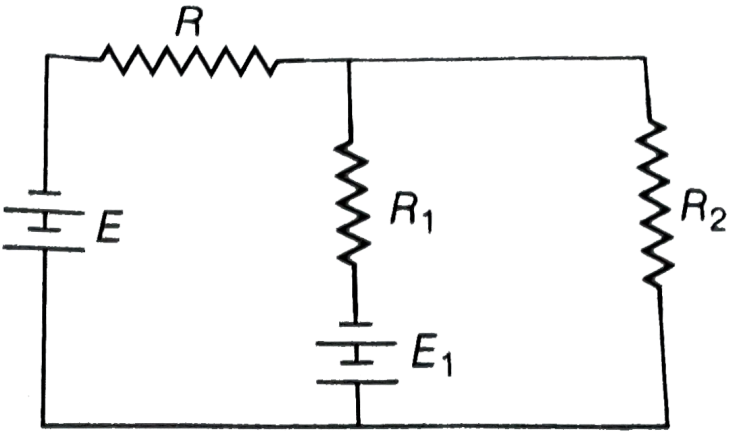
56. Figure shows a circuit with known resistances R_1 and R_2 . Neglect the internal resistance of the sources of current and resistance of the connecting wire . The magnitude of electromotive force E, such that the current through the resistance R is zero

will be



A. $E\frac{R_1}{R_2}$

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

C. $E(R_1 + R_2)R_2$

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

Answer: C

View Text Solution

57. The potential difference across the terminals of a battery is 50 V when 11 A current is drawn and 60 V, when 1A current is drawn . The emf the battery is

A. 62 V

B. 63 V

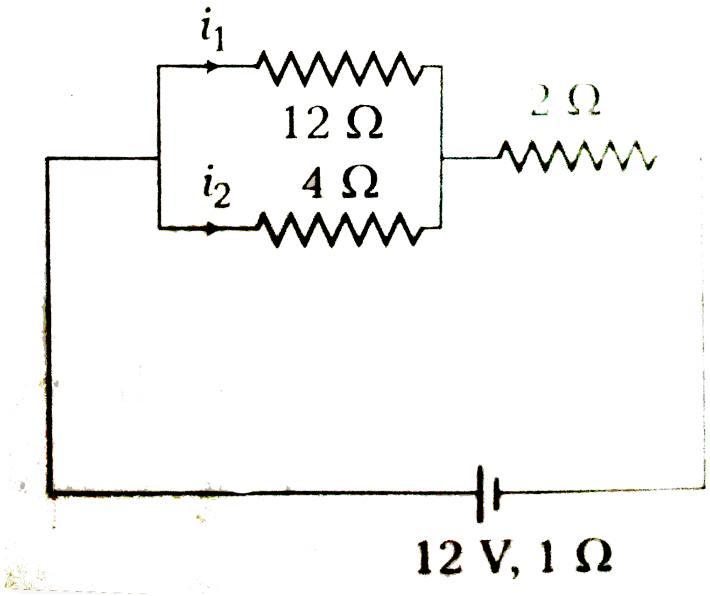
C. 61 V

D. 64 V

Answer: C

Watch Video Solution

58. In the circuit shown, the currents i_1 and i_2 are



A. $i_1 = 1.5A, i_2 = 0.5A$

B. $i_1 = 0.5A, i_2 = 1.5A$

C. $i_1 = 1A, i_2 = 3A$

D. $i_1 3A, i_2 = 1A$

Answer: B

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59. A battery of emf 10 V and internal resistance $3\Omega$is connected to a resistor. The current in the circuit is 0.5 A . The terminal

voltage of the battery when the circuit is closed is

A. 10 V

B. 0V

C. 1.5 V

D. 8.5 V

Answer: D

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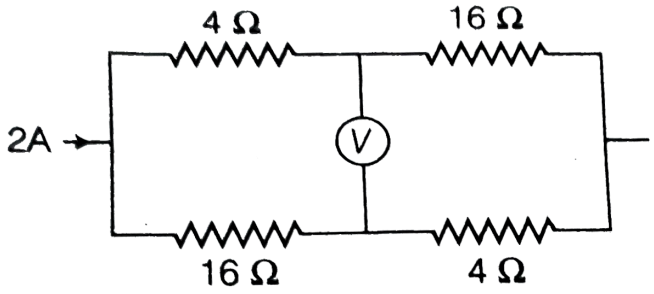
60. In the following circuit reading of voltmeter V is



A. 12 V

B. 8 V

C. 20 V

D. 16 V

Answer: A

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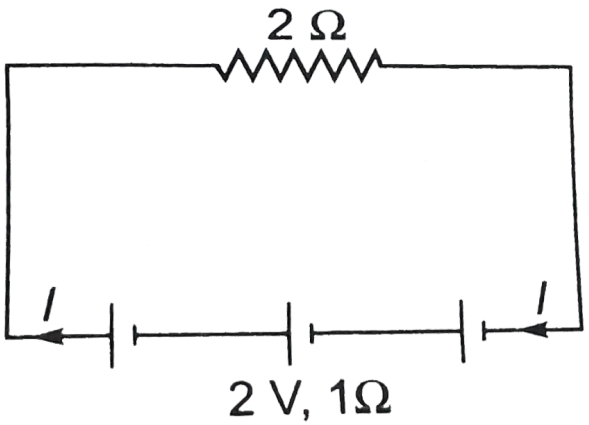
61. In the electric circuit shown each cell has an emf of 2 V and internal resistance of 1Ω. The external resistance is 2Ω . The value of the current is (in A)



A. 2

B. 1.25

C. 0.4

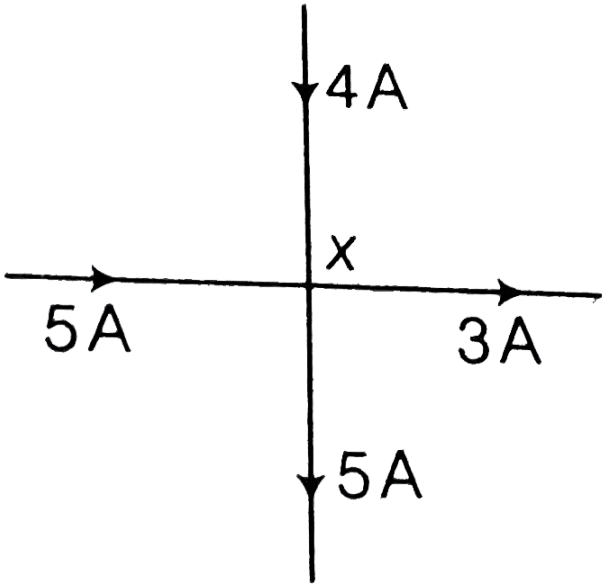
D. 1.2

Answer: D

Watch Video Solution

62. Five conductors are meeting a point x as shown in the figures . What is the value of

current in fifth conductor ?



A. 3 A away from x

B. 1 A away from x

C. 4 A away from x

D. 1 A towards x

Answer: B

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63. Two resistors of resistances 2Ω and 6Ω are connected in parallel. This combination is then connected to a battery of emf 2 V and internal resistance 0.5Ω. What is the current flowing through the battery ?

A. 4A

B. $\frac{4}{3}A$

C. $\frac{4}{17}A$

D. 1A

Answer: D

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64. Four identical cells of emf ε and internal resistance r are to be connected in series. Suppose, if one of the cell is connected wrongly, then the equivalent emf and effective internal resistance of the combination is

A. 2E and 4r

B. 4E and 4r

C. 2E and 2r

D. 4E and 2r

Answer: A

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65. 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. 2.7 V

B. 2.1 V

C. 3V

D. 4.2 V

Answer: A

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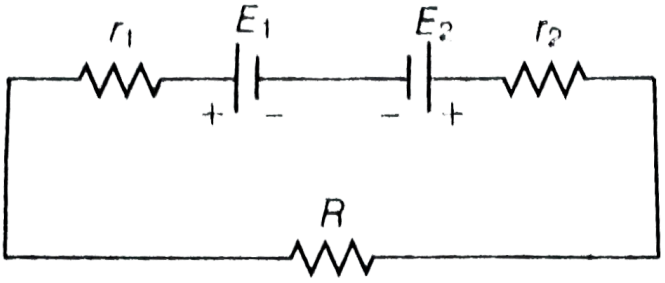
66. Two cells of emf E_1 and E_2 are joined in opposition (such that $E_1 > E_2$) . If r_1 be the internal resistances and R be the external resistance, then the terminal potential difference is



A. $\frac{E_1 - E_2}{r_1 + r_2} \times R$

B. $\frac{E_1 + E_2}{r_1 + r_2} \times R$

C. $\frac{E_1 - E_2}{r_1 + r_2 + R} \times R$

D. $\frac{E_1 + E_2}{r_1 + r_2 + R} \times R$

Answer: C

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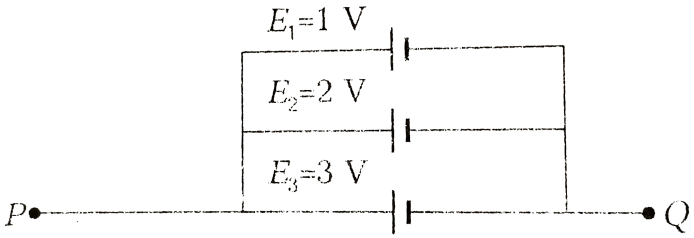
67. A circuit consists of three bateries of emf $E_1 = 1V, E_2 = 2V$ and $E_3 = 3V$ and internal resistance 1Ω, 2Ω and 1Ω respectively which are connected in parallel as shown in figure. The potential difference between

points P and Q is



A. 1.0 V

B. 2.0 V

C. 2.2 V

D. 3.0 V

Answer: B

Watch Video Solution

68. Two identical cells whether connected in parallel or in series gives the same current, when connected to an external resistance 1.5Ω. Find the value of internal resistance of each cell.

A. 1Ω

B. 0.5Ω

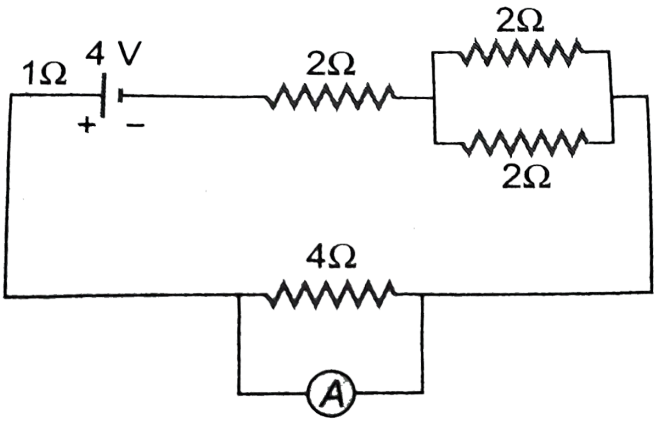
C. Zero

D. 1.5Ω

Answer: D

Watch Video Solution

69. The current pasing through the ideal ammeter in the circuit given below is



A. 1.25 A

B. $1A$

C. 0.75 A

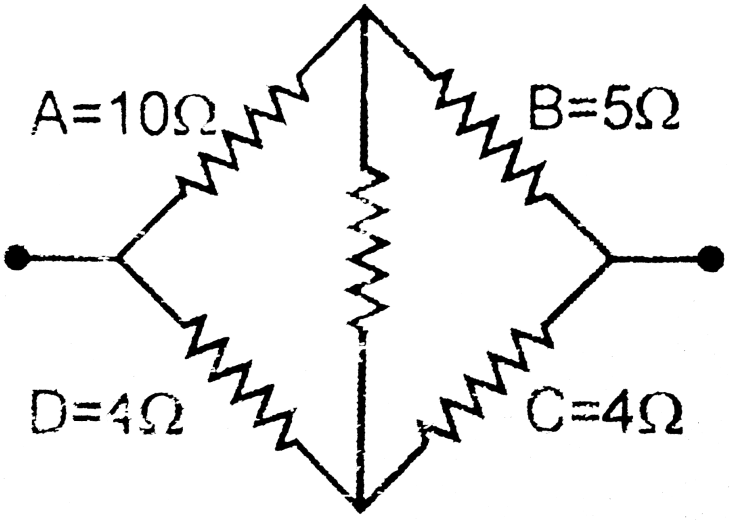
D. 0.5 A

Answer: D

Watch Video Solution

70. In a typical wheatstone network the resistance in cyclic order are A= 10Ω, $B = 5O$, ega, $C = 4\Omega$ and $D = 4\Omega$ for

the bridge to be balanced.



A. 10Ω should be connected in parallel with

A

B. 10Ωshould be connected in series with A

C. 5Ω should be connected in series with B

D. 5Ω should be connected in parallel with

B

Answer: A

Watch Video Solution

71. In a potentiometer experiment for measuring the emf of cell, the null point is at 480 cm when we have a 400Ω resistor in series with the cell and galvanometer . If the series

resistances is reduced to half, the null point will be at

A. 120 cm

B. 240 cm

C. 480 cm

D. 600 cm

Answer: C

Watch Video Solution

72. In a Wheatstone's network, $P = 2\Omega, Q = 2\Omega, R = 2\Omega$ and $S = 3\Omega$. The resistance with which S is to be shunted in order that the bridge may be balanced is 

A. 4Ω

B. 1Ω

C. 6Ω

D. 2Ω

Answer: C

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73. In a potentiometer experiment the balancing with a cell is at length 240 cm. On shunting the cell with a resistance of 2Ω, the balancing length becomes 120 cm.The internal resistance of the cell is

A. 4Ω

B. 2Ω

C. 1Ω

D. 0.5Ω

Answer: B

 Watch Video Solution

74. For measurement of potential difference, potentiometer is perferred in comparison to voltmeter because

A. potentiometer is more sensitive than voltmeter

B. the resistance of potentiometer is less than voltmeter

C. potentiometer is cheaper than voltmeter

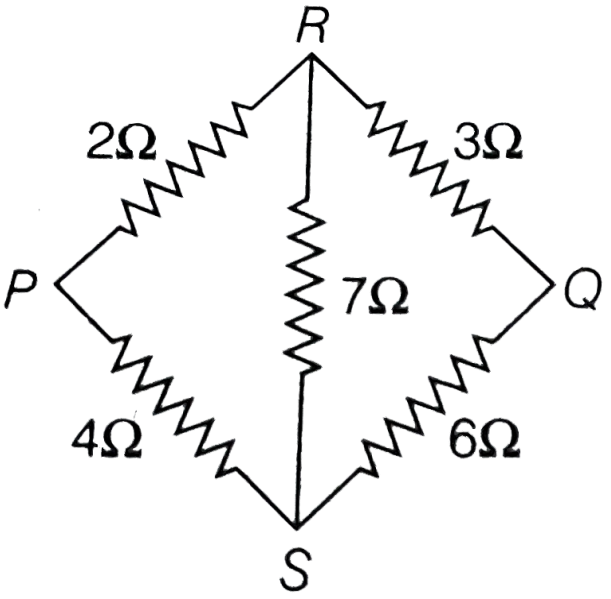
D. potentiometer does not take current from the circuit

Answer: D

Watch Video Solution

75. Five resistance are connected as shown in the figure . The equivalent resistance between

P and Q will be



A. $\frac{10}{3}\Omega$

B. $\frac{20}{3}\Omega$

C. $\frac{16}{2}\Omega$

D. None of these

Answer: A

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Exercise 2

1. Find the true statement.

A. Ohm's law is applicable to all conductors of electricity

B. In an electrolyte solution, the electric current is mainly due to the movement of electrons

C. The resistance of an incandescent lamp is lasser when the lamp is switched on

D. The resistance of carbon decreases with the increase of temperature

Answer: D

 Watch Video Solution

2. The amount of charge Q passed in time t through a cross-section of a wire is $Q = 5t^2 + 3t + 1$. The value of current at time t=5 s is

A. 9A

B. 49A

C. 53A

D. None of these

Answer: C

Watch Video Solution

3. If the free electron density be n and relaxation time be τ, the electrical conductivity of a conductor may be expressed as

A. $\frac{\mathrm{ne}\ \ \tau}{m_e}$

B. $\frac{\mathrm{ne}^2\tau}{m^e}$

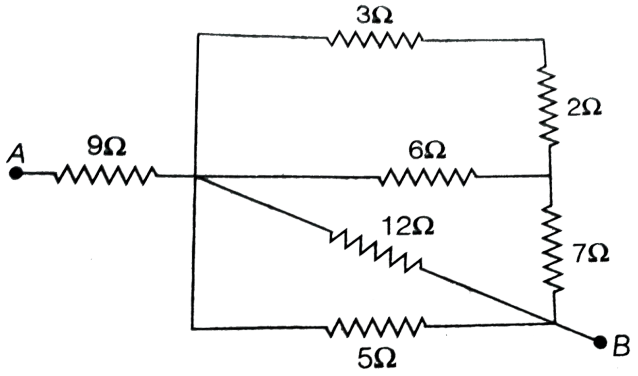
C. $\frac{\mathrm{ne}^2}{\tau m_e}$

D. $\frac{m_e e^2 \tau}{n}$

Answer: B

Watch Video Solution

4. In the given circuit the equivalent resistance between the points A and B in ohm is



A. 9

B. 11.6

C. 14.5

D. 21.2

Answer: B

Watch Video Solution

5. A 10 m long wire ofresistance 20Ω is connected in series with battery of EMF $3V$ and negligible internal resistance and a resistance of 10Ω. The potential gradient along the wire is :

A. 3 V/m

B. 0.2 V/m

C. 0.1 V/m

D. 0.3 V/m

Answer: C

Watch Video Solution

6. A straight conductor of uniform cross-section carries a current I. Let $s =$ specific charge of an electron. The momentum of all

the free electrons per unit length of the conductor, due to their drift velocity only, is

A. i.s

B. $\sqrt{i}/(s)$

C. i/s

D. $\left(\frac{i}{s}\right)^2$

Answer: C

Watch Video Solution

7. The resistance of a wire R Ω . The wire is stretched to double its length keeping volume constant. Now, the resistance of the wire will become

A. $4R\Omega$

B. $2R\Omega$

C. $\frac{R}{2}\Omega$

D. $\frac{R}{4}\Omega$

Answer: A

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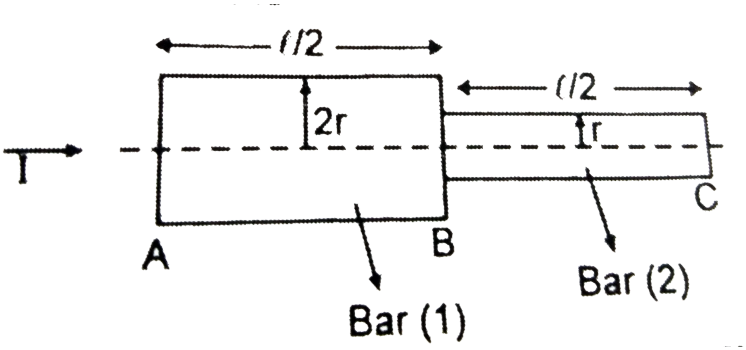
8. Two bars of equal resistivity ρ and radius 'r' and '2r' are kept in contact as show. An electric current is passed through the bars. Which one of the following is correct ?



A. Heat produced in bar BC is 4 time the heat produced in bar AB

B. Electric field in both halves is equal

C. Current densit across AB is double that of across BA

D. Potential difference across AB is 4 time that of across BC

Answer: A

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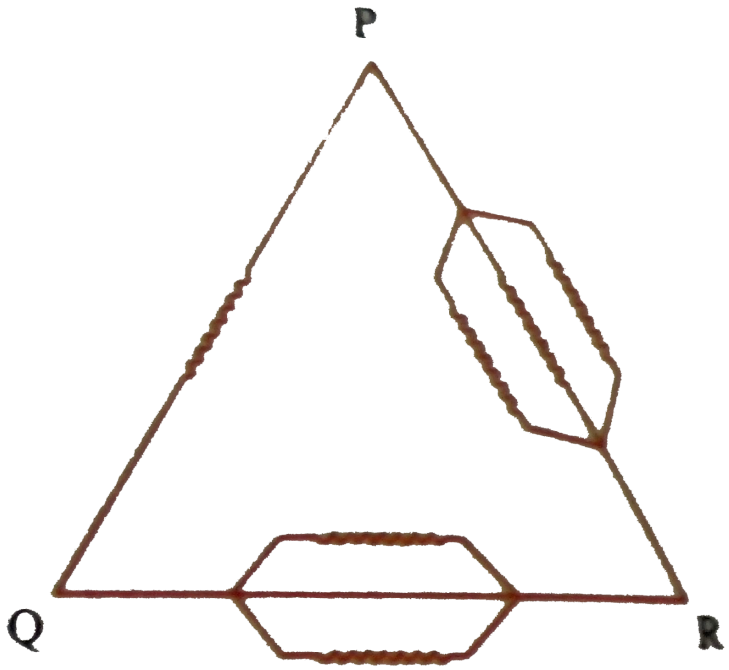

9.

Six equal resistances are connected between points P, Q and R as shown in the figure. Then the net resistance will be maximum between

A. P and Q

B. Q and R

C. P and R

D. any two points

Answer: A

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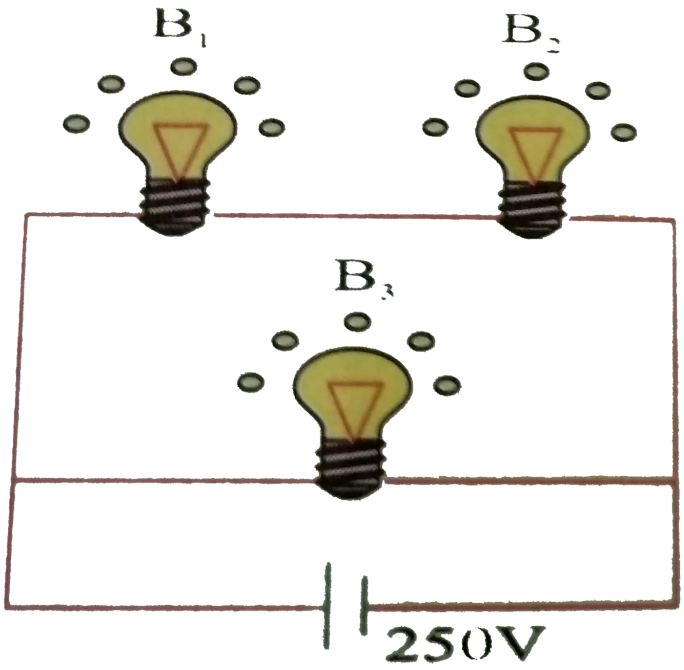


10.

A 100 W bulb B_1 and two 60 W bulbs B_2 and B_3, are connected to a 250V source, as shown in the figure now W_1, W_2 and W_3 are the output powers of the bulbs B_1, B_2 and B_3 respectively then

A. $W_1 > W_2 = W_3$

B. $W_1 > W_2 > W_3$

C. $W_1 < W_2 = W_3$

D. $W_1 < W_2 < W_3$

Answer: D

Watch Video Solution

11. In a region 10^{19} $\propto$ -particles and 10^{19} protons move to the left, while 10^{19} electrons moves to the right per second. The current is

A. 3.2 A towards left

B. 3.2 A towards right

C. 6.4 A towards left

D. 6.4 A towards right

Answer: C

Watch Video Solution

12. The V-I graph for a good conductor makes angle 40° with V-axis. Here, V denotes voltage

and I denotes current. The resistance of the conductor will be

A. $\sin 40^\circ$

B. $\cos 40^\circ$

C. $\tan 40^\circ$

D. $\cot 40^\circ$

Answer: D

 Watch Video Solution

13. If an increase in length of copper wire is 0.5% due to stretching, the percentage increase in its resistance will be

A. 0.001

B. 0.002

C. 0.01

D. 0.02

Answer: D

View Text Solution

14. In a neon discharge tube $2.9 \times 10^{18} Ne^{+}$ ions move to the right each second while 1.2×10^{18} eletrons move to the left per second. Electron charge is $1.6 \times 10^{-9} C$. The current in the discharge tube

A. 0.27 A towards right

B. 0.66 A towards right

C. 0.66 A towards left

D. zero

Answer: B

Watch Video Solution

15. `If the resistivity of an alloy is ____ and that of constituent metal is p, then

A. $\rho' > \rho$

B. $\rho' < \rho$

C. $\rho' = \rho$

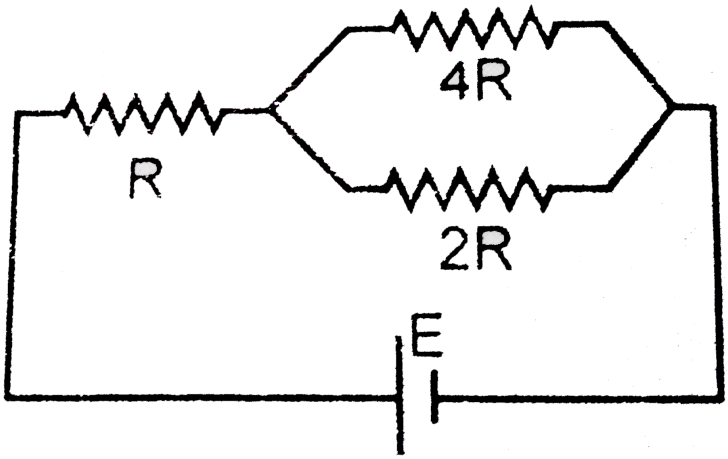
D. there is no simple relation between ρ and ρ'

Answer: A

Watch Video Solution

16. In a network as shown in the figure the potential difference across the resistance 2R is (the cell has an emf of E and has no internal

resistance):



A. 2E

B. $\frac{2E}{7}$

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

D. E

Answer: B

Watch Video Solution

17. A wire of lenth L is drawn such that its diameter is reduced to half of its original diamter. If the initial resistance of the wire were 10Ω, its new resistance would be

A. 160Ω

B. 120Ω

C. 140Ω

D. 100Ω

Answer: A

Watch Video Solution

18. In a potentiometer, the null point is received at 7th wire. If now we have to change the null point at 9th wire, what should we do?

A. Attach resistance in series with battery

B. Increase resistance in main circuit

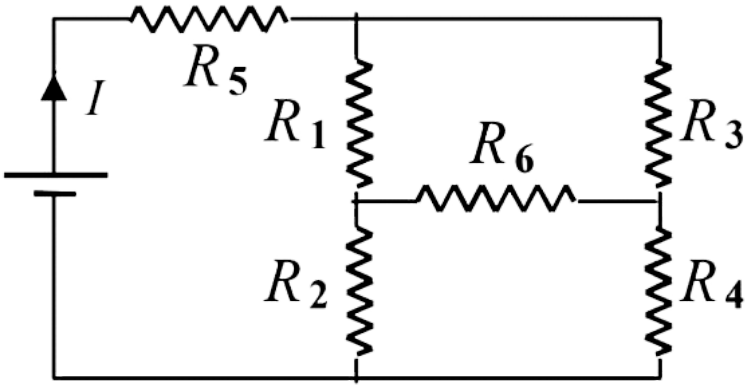
C. Decrease resistance in main circuit

D. Decrease applied emf

Answer: B

Watch Video Solution

19. In the given circuit, it is observed that the current I is independent of the value of the resistance R_6. Then the resistance values must satisfy



A. $R_1R_2R_5 = R_3R_4R_6$

B. $\frac{1}{R_5} + \frac{1}{R_6} = \frac{1}{R_1 + R_2} + \frac{1}{R_3 + R_4}$

C. $R_1R_4 = R_2R_3$

D. $R_1R_3 = R_2R_4 = R_5R_6$

Answer: C

Watch Video Solution

20. The size of a carbon block, having specific resistance. $3.5 \times 10^{-3}\Omega - cm$ is $2cm \times 2cm \times 2cm$. The resistance of the

block between two square end faces and two opposite rectangular faces are respectively

A. 17.5×10^{-4} and $1.75 \times 10^{-4}\Omega$

B. 1.75×10^{-4} and $175 \times 10^{-4}\Omega$

C. 175×10^{-4} and $1.75 \times 10^{-4}\Omega$

D. 1.75×10^{-4} and $17.5 \times 10^{-4}\Omega$

Answer: C

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21. Calculate the average drift speed of conduction electrons in a copper wire of cross-sectional area $1.0 \times 10^{-7} m^2$, carrying a current of 1.5 A. Assume that each copper atom contributes roughly one conduction electron. The density of copper is $9.0 \times 10^3 kgm^{-3}$ and its atomic mass is 63.5. Take Avogadro's number $= 6.0 \times 10^{23}$.

A. $1.1 \times 10^{-2} ms^{-1}$

B. $1.1 \times 10^{-3} ms^{-1}$

C. $2.2 \times 10^{-2} ms^{-1}$

D. $2.2 \times 10^{-3} ms^{-1}$

Answer: B

Watch Video Solution

22. The current through a wire depends on time as, $i = (10 + 4t)$ Here , i is ampere and t in seconds. Find the charge crossed through section in time interval between $t = 0$ to $t = 10s$.

A. 50 C

B. 300C

C. 400C

D. 4C

Answer: B

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23. In cosmic rays 0.15 protons $cm^{-2}s^{-1}$ are entering the Earth's atmosphere . If the radius of the Earth is 6400 km, the current received

by the Earth in the form of cosmic rays is nearly.

A. 0.12 A

B. 1.2 A

C. $12A$

D. $120A$

Answer: A

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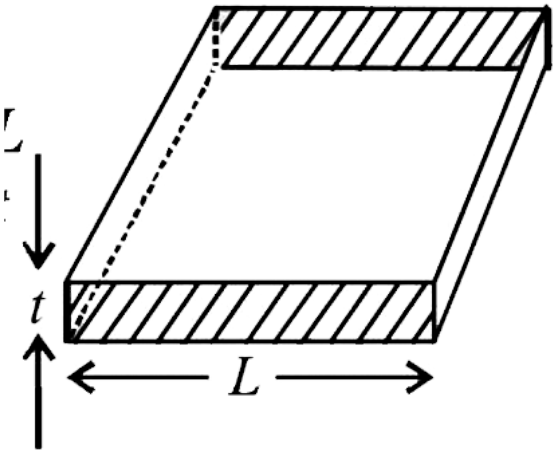
24. Consider a thin square sheet of side L and thickness t, made of a material of resistivity ρ. The resistance between two opposite faces, shown by the shaded areas in the figure is



A. directly proportional to L

B. directly proportional to t

C. independent of L

D. independent of t

Answer: C

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25. 160W-60V lamp is connected at 60 V DC supply. The number of electrons passing through the lamp in 1 min is

(The charge of electron, $e = 1.6 \times 10^{-19} C$)

A. 10^{19}

B. 10^{21}

C. 1.6×10^{19}

D. 1.4×10^{20}

Answer: B

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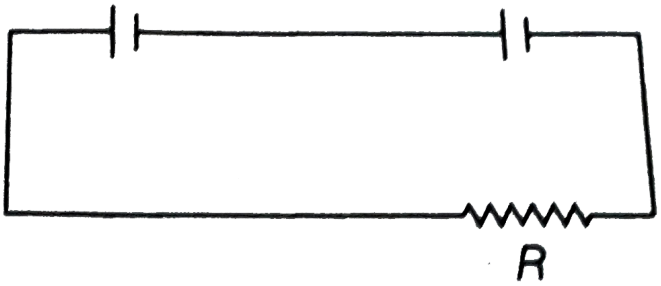
26. Two batteries A and B whose emf is 2V are connected in series with external resistance $R = 1\Omega$. Internal resistance of battery A is

1.9Ω and that of B is 0.9Ω.



A. 2V

B. 3.8V

C. zero

D. None of these

Answer: C

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Mht Cet Corner

1. In potentiometer experiment, null point isobtained at a particular point for a cell on potentiometer wire x cm long. If the lengthof the potentiometer wire is increasedwithout changing the cell, the balancing length will (Driving source is not changed)

A. increase

B. decrease

C. not change

D. become zero

Answer: A

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2. In balanced meter bridge, the resistance of bridge wire is $0.1\Omega cm$. Unknown resistance X is connected in left gap and 6Ω in right gap, null point divides the wire in the ratio 2:3 .

Find the current drawn the battery of 5V having negligible resistance

A. 1A

B. 1.5A

C. 2A

D. 5A

Answer: A

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3. The resistances in left and right gap of a meter brigdge are 20 ω and 30 ω respecitively when the resistance in the left gap is reduced to half its value then balance point shifts by

A. 15 cm to right

B. 15 cm to the left

C. 20 cm to the right

D. 20 cm to the left

Answer: B

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4. A potentiometer wire of length 10 m is connected in series with a battery the emf of a cell balances against 250 cm length of wire if length of potentiometer wire is increased by 1 m then new balancing length of wire will be

A. 2.00m

B. 2.25 m

C. 2.50 m

D. 2.75 m

Answer: D

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5. A range of galvanometer is V, when 50Ω resistance is connected in series. Its range gets doubled when 500Ω resistance is connected in series. Galvanometer resistance is

A. 100Ω

B. 200Ω

C. 300Ω

D. 400Ω

Answer: D

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6. In a Wheatstone's bridge, three resistances P,Q and R connected in the three arms and the fourth arm is formed by two resistances S_1 and S_2 connected in parallel. The condition for the bridge to be balanced will be

A. $\frac{R(s_1 + s_2)}{s_1 s_2}$

B. $\frac{s_1 s_2}{R(s_1 + s_2)}$

C. $\frac{Rs_1 s_2}{(s_1 + s_2)}$

D. $\frac{(s_1 + s_2)}{Rs_1 s_2}$

Answer: A

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7. A wire of resistance 4Ω is stretched to twice its original length. The resistance of stretched wire would be

A. 2Ω

B. 4Ω

C. 8Ω

D. 16Ω

Answer: D

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8. The internal resistance of a $2.1V$ cell which gives a current $0.2A$ through a resistance of 10Ω

A. 0.2Ω

B. 0.5Ω

C. 0.8Ω

D. 1.0Ω

Answer: B

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9. The resistances of the four arms P, Q, R and S in a Wheatstone's bridge are 10Ω, 30Ω, 30Ω and 90Ω, respectively. The emfs and internal

resistances of the cell are 7V and 5Ω respectively. If the galvanometer resistance is 50Ω, the current drawn from the cell will be

A. $1.0A$

B. 0.2 A

C. 0.1A

D. 2.0A

Answer: B

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10. What is the maximum power output than can be obtained from a cell of emf E and internal resistance r?

A. $2\frac{E^2}{r}$

B. $\frac{E^2}{2}r$

C. $\frac{E^2}{4}r$

D. None of these

Answer: C

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11. A voltmeter of range 3V and resistance 200Ω cannot be converted to an ammeter of range

A. 10mA

B. 100 mA

C. 1A

D. 10A

Answer: A

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12. For measurement of potential difference, potentiometer is perferred in comparison to voltmeter because

A. potentiometer is more sensitive than voltmeter

B. the resistance of potentiometer is less than voltmeter

C. potentiometer is cheaper than voltmeter

D. potentiometer does not take current from the circuit

Answer: D

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13. When a resistance of 100Ω is connected in series with a galvanometeer of resistance R, its range is V. To double its range, a resistance of 1000Ω is connected in series. Find R.

A. 700Ω

B. 800Ω

C. 900Ω

D. 100Ω

Answer: C

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14. A 2 V battery, a 990Ω resistor and a potentiometer of 2 m length, all are connected in series of the resistance of potentiometer wire is 10Ω, then the potential gradient of the potentiometer wire is

A. $0.05Vm^{-1}$

B. $0.5Vm^{-1}$

C. $0.01Vm^{-1}$

D. $0.1Vm^{-1}$

Answer: C

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15. The resistance of an ammeter is 13Ω and its scale is graduated for a current upto $100A$. After an additional shunt has been connected to this ammeter it becomes possible to

measure currents upto $750A$ by this meter. The value of shunt resistance is

A. 20Ω

B. 2Ω

C. 0.2Ω

D. $2k\Omega$

Answer: B

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16. A galvanometer of resistance 50Ω is connected to a b attery of 3V alongwith a resistance of 2950Ω in series. A full scale deflection of 30 division is obtained in the galvanometer in order to reduce this deflection to 20 division. The resistance in sereis. should be:-

A. 5050Ω

B. 550Ω

C. 6050Ω

D. 4450Ω

Answer: D

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17. Potentiometer measures the potential difference more accurately than a voltmeter, because

A. it has a wire resistance

B. it has a wire of low resistance

C. it does not draw current from external circuit

D. it draws a heavy current from external circuit

Answer: A

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18. The cell has an emf of 2 V and the internal resistance of this cell is 0.1Ω, it is connected to

resistance of 3.9Ω, the voltage across the cell will be

A. 1.95V

B. 1.5V

C. 2V

D. 1.8V

Answer: A

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19. Is it possible that any battery has some constant valur of emf, but the potential difference between the plates is zero?

A. Not possible

B. Yes, if another identical is joined in series

C. Yes, if another identical battery is joined in opposition

D. Yes, possible, if another similar battery is joined in parallel

Answer: C

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20. To get maximum current through a resistance of 2.5Ω, one can use m rows of cells, each row having n cells. The internal resistance of each cell is 0.5Ω what are the values of n and m, if the total number of cells is 45.

A. m=3, n=15

B. m=5,n=9

C. m=9, n=5

D. m=15, n=3

Answer: A

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21. A potential difference is applied across the ends of a metallic wire. If the potential difference is doubled, the drift velocity will

A. be doubled

B. be halved

C. be quadrupled

D. remain unchanged

Answer: A

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22. A current of 0.01 mA passes through the potentiometer wire of a resistivity of $10^9\Omega$ cm

and area of cross-section $10^{-1}cm^{-2}$. The potential gradient is

A. $10^9 \frac{V}{m}$

B. $10^{11} \frac{V}{m}$

C. $10^{10} \frac{V}{m}$

D. $10^8 \frac{V}{m}$

Answer: D

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23. A thick wire is stretched so that its length become two times. Assuming that there is no change in its density, then what is the ratio of change in resistance of wire to in initial resistance of wire

A. $2:1$

B. $4:1$

C. $3:1$

D. $1:4$

Answer: C

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24. The length of the resistance wire is increased by 10%. What is the corresponding change in the resistance of wire?

A. 0.1

B. 0.25

C. 0.21

D. 0.09

Answer: C

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25. If three resistors of resistance 2Ω, 4Ω and 5Ω are connected in parallel then the total resistance of the combination will be

A. $\frac{20}{19}\Omega$

B. $\frac{19}{20}\Omega$

C. $\frac{10}{20}\Omega$

D. $\frac{29}{10}\Omega$

Answer: A

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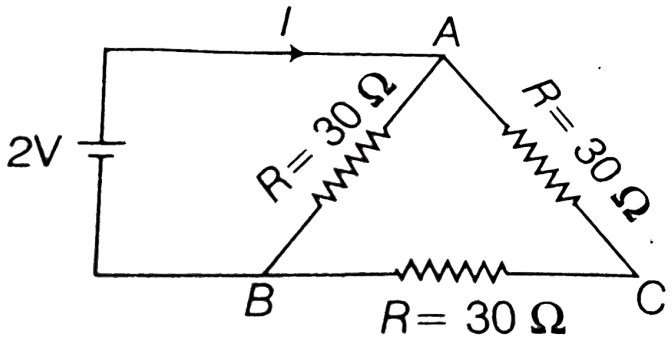
26. What is the magnitude of the current I in the circuit given?

(in the circuit, each side of triangle ABC has resistance equal to 30Ω)



A. $\frac{1}{2}A$

B. $\frac{1}{20}A$

C. $\frac{1}{25}A$

D. $\frac{1}{10}A$

Answer: D

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27. Two wires of same material have length L and 2 L and cross– sectional areas 4 A and A respectively. The ratio of their specific resistance would be

A. $1:2$

B. $8:1$

C. $1:8$

D. $1:1$

Answer: D

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28. The resistance of a 5 cm long wire is 10Ω . It is uniformly stretched so that its length becomes 20 cm . The resistance of the wire is

A. 160Ω

B. 80Ω

C. 40Ω

D. 20Ω

Answer: A

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29. The effective resistance of two resistors in parallel is $\frac{12}{7}\Omega$. If one of the resistors is

disconnected the resistance becomes 4Ω. The resistance of the other resistor is

A. 4Ω

B. 3Ω

C. $\frac{12}{7}\Omega$

D. $\frac{7}{12}\Omega$

Answer: B

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30. A series combination of two resistors 1Ω each is connected to a 12 V battery of internal resistance 0.4Ω. The current flowing through it will be

A. 3.5A

B. 5A

C. 6A

D. 10A

Answer: B

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31. Electromotive force is the force, which is able to maintain a constant

A. potentential difference

B. power

C. resistance

D. current

Answer: A

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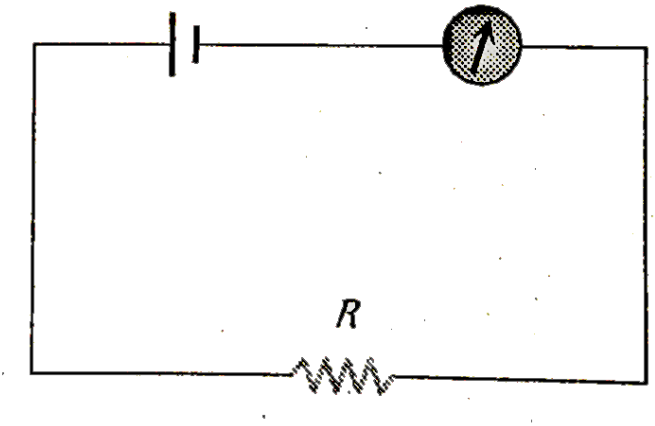
32. A battery of e mf 10 V and internal resistance 3Ω is connected to a resistor as shown in the figure. If the current in the circuit is 0.5 A . then the resistance of the resistor will be



A. 19Ω

B. 17Ω

C. 10Ω

D. 12Ω

Answer: B

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