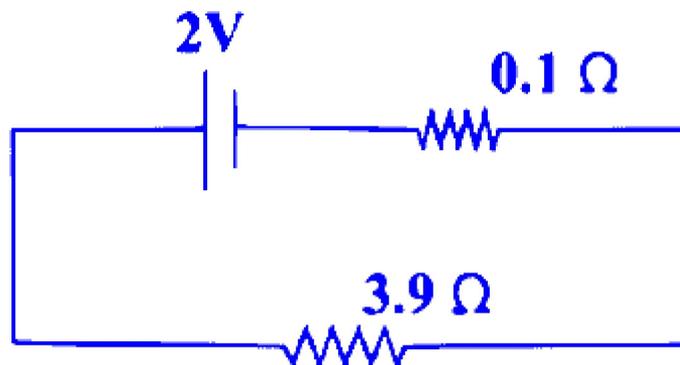## Question1

In the following circuit, the terminal voltage across the cell is

KCET 2025

Options:

A. 1.68 V

B. 1.95 V

C. 2.71 V

D. 0.52 V

Answer: B

Solution:

To determine the terminal voltage across the cell in the given circuit, we start by calculating the current (i) flowing through the circuit. The formula for the current is:

$$i = \frac{\text{Voltage}}{\text{Resistance}} = \frac{2}{4} = \frac{1}{2} \text{ A}$$

Next, we calculate the terminal voltage using the formula for terminal voltage, which accounts for the internal resistance of the cell:

Terminal voltage $= \text{emf} - i \times r$

where:

emf is the electromotive force of the cell (2 V in this case),

i is the current calculated above ($\frac{1}{2}$ A),

r is the internal resistance of the cell (0.1 Ω).

Substituting these values into the formula:

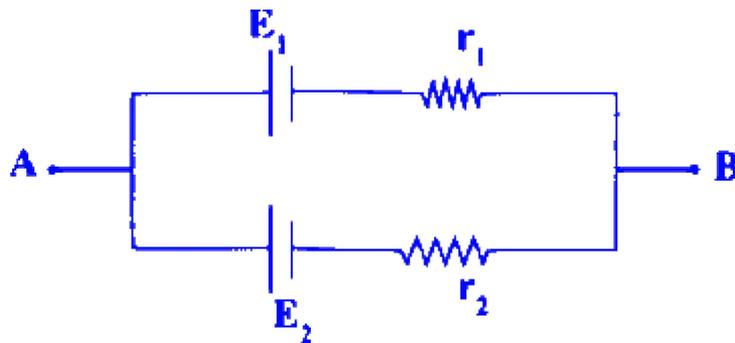Terminal voltage $= 2 - \left(\frac{1}{2} \times 0.1\right) = 2 - 0.05 = 1.95$ V

Therefore, the terminal voltage across the cell is 1.95 V.

Question2

Two cells of emfs E_1 and E_2 and internal resistances r_1 and r_2 ($E_2 > E_1$ and $r_2 > r_1$) respectively, are connected in parallel as shown in figure. The equivalent emf of the combination is $E_{eq.}$. Then

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Options:

A. $E_1 < E_{eq} < E_2$ and E_{eq} is nearer E_2

B. $E_{eq} > E_2$

C. $E_{eq} < E_1$

D. $E_1 < E_{eq} < E_2$ and E_{eq} is nearer E_1

Answer: D

Solution:

To find the equivalent electromotive force (emf) of the two cells connected in parallel, we use the formula for the equivalent emf, E_{eq} , which is given by:

$$E_{eq} = \frac{\frac{E_1}{r_1} + \frac{E_2}{r_2}}{\frac{1}{r_1} + \frac{1}{r_2}} = \frac{E_1 r_2 + E_2 r_1}{r_1 + r_2}$$

This result represents the combined effect of the two cells' emfs and their internal resistances. The equivalent emf E_{eq} will lie between E_1 and E_2. Given that $E_2 > E_1$ and $r_2 > r_1$, the equivalent emf E_{eq} will be closer to E_2 rather than E_1 because the cell with the larger emf and larger internal resistance will have a more significant influence on the total emf value. Therefore, it can be concluded that $E_1 < E_{eq} < E_2$, and E_{eq} is nearer to E_2.

Question3

The variations of resistivity ρ with absolute temperature T for three different materials X, Y and Z are shown in the graph below. Identify the materials X, Y and Z .
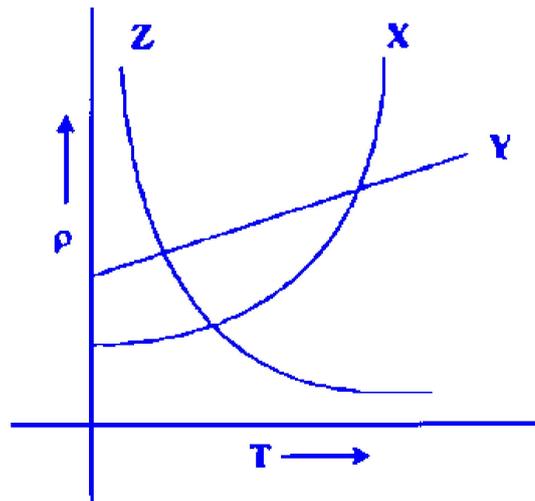
KCET 2025

Options:

A. X - copper, Y - semiconductor, Z - nichrome
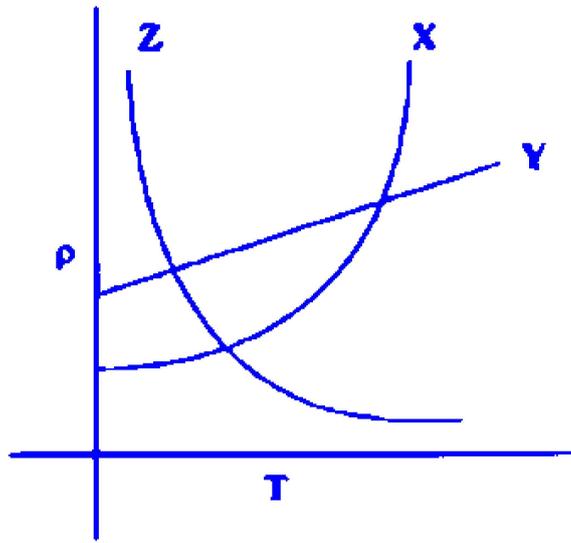
B. X - semiconductor, Y - nichrome, Z - copper

C. X - nichrome, Y - copper, Z - semiconductor

D. X - copper, Y - nichrome, Z - semiconductor

Answer: D

Solution:

X is copper, Y is nichrome, Z is semiconductor

Question4

Given, a current carrying wire of non-uniform cross-section, which of the following is constant throughout the length of wire?

KCET 2025

Options:

A. Drift speed

B. Current and drift sped

C. Current only

D. Current, electric field and drift speed

Solution:

In a steady-state circuit the charge per second crossing any section must be the same, so the current I is constant. However, for a non-uniform wire:

• Drift speed

$v_d = \frac{I}{nqA}$

depends on the local cross-sectional area A, so v_d varies.

• Electric field

$E = \rho J = \rho \frac{I}{A}$

also varies with A.

Therefore only the current remains the same throughout.

Answer: Option C (Current only).

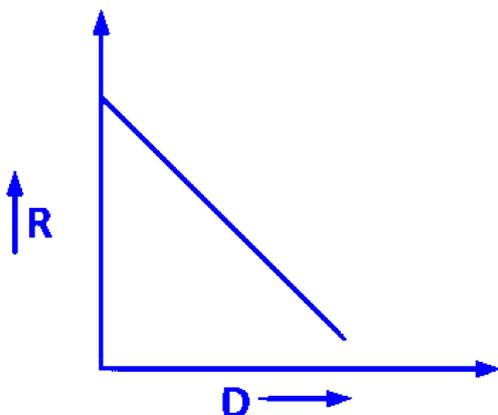# Question5

The graph between variation of resistance of a metal wire as a function of its diameter keeping other parameters like length and temperature constant is
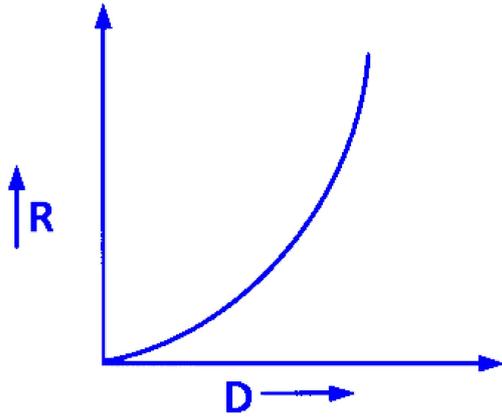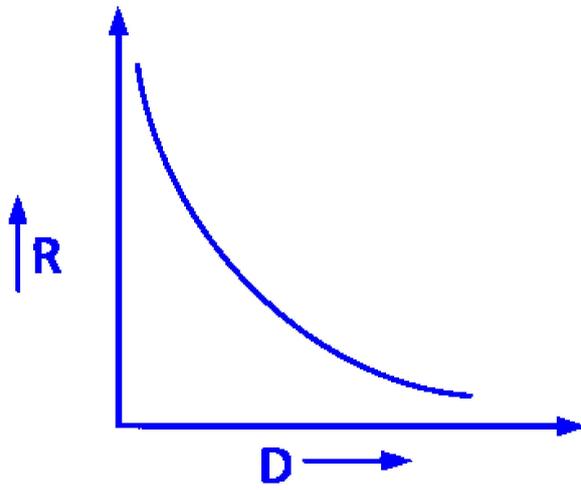
KCET 2025
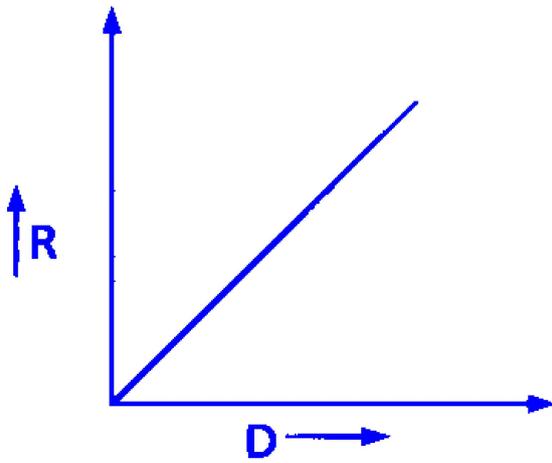
Options:

A.

B.

C.

D.

Answer: C

Solution:

To understand how the resistance of a metal wire varies with its diameter, while keeping other factors like length and temperature constant, we use the formula for resistance:

$R = \frac{\rho\ell}{A} = \frac{\rho\ell}{\pi r^2}$

Where:

R is the resistance.

ρ is the resistivity of the material.

ℓ is the length of the wire.

A is the cross-sectional area of the wire.

r is the radius of the wire.

Since $A = \pi r^2$, the resistance R is inversely proportional to the square of the radius:

$R \propto \frac{1}{r^2}$

When considering the diameter d of the wire, which is twice the radius ($d = 2r$), the relation can be rewritten in terms of the diameter:

$R \propto \frac{1}{(d/2)^2} = \frac{4}{d^2}$

This indicates that as the diameter of the wire increases, the resistance decreases quadratically. The relationship between resistance R and diameter d is a hyperbolic function, as resistance is inversely proportional to the square of the diameter.

Question6

Two similar galvanometers are covered into an ammeter and a milliammeter. The shunt resistance of ammeter as compared to the shunt resistance of milliammeter will be
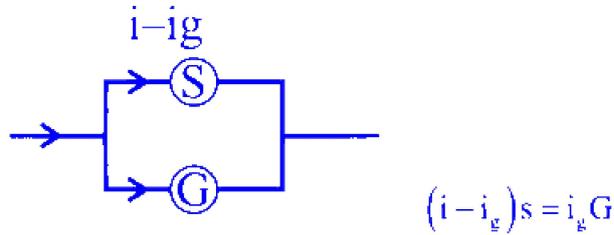
KCET 2025

Options:

A. Zero

B. More

C. Less

D. Equal

Solution:

$$is = ig(h + s)$$
$$i = ig\left(\frac{g}{s} + 1\right)$$

More 'S', less i

So milliammeter will have more shunt resistance.

Question7

The range of electrical conductivity (σ) and resistivity (ρ) for metals, among the following, is

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Options:

A. $\rho \to 10^{-5} - 10^{-6}\Omega \text{ m}$
   $\sigma \to 10^{5} - 10^{-6}\text{Sm}^{-1}$

B. $\rho \to 10^{11} - 10^{19}\Omega \text{ m}$
   $\sigma \to 10^{-11} - 10^{-19}\text{Sm}^{-1}$

C. $\rho \to 10^{2} - 10^{8}\Omega \text{ m}$
   $\sigma \to 10^{-2} - 10^{-8}\text{Sm}^{-1}$

D. $\rho \to 10^{-2} - 10^{-8}\Omega m$
   $\sigma \to 10^{2} - 10^{8}\text{Sm}^{-1}$

Answer: D

Solution:

Option D

Explanation:

• Metals have very low resistivity, on the order of

$\rho \approx 10^{-8}\text{–}10^{-6} \ \Omega \cdot m$

(for example, copper is about $1.7 \times 10^{-8} \ \Omega \cdot m$).

• Their conductivity is the reciprocal,

$\sigma = \frac{1}{\rho} \approx 10^6\text{–}10^8 \ S/m$.

Option D's intervals

$\rho : 10^{-2}\text{–}10^{-8} \ \Omega m, \quad \sigma : 10^2\text{–}10^8 \ S/m$

clearly include the true metallic range at the low-ρ/high-σ end.

Question8

In an experiment to determine the figure of merit of a galvanometer by half deflection method, a student constructed the following circuit.
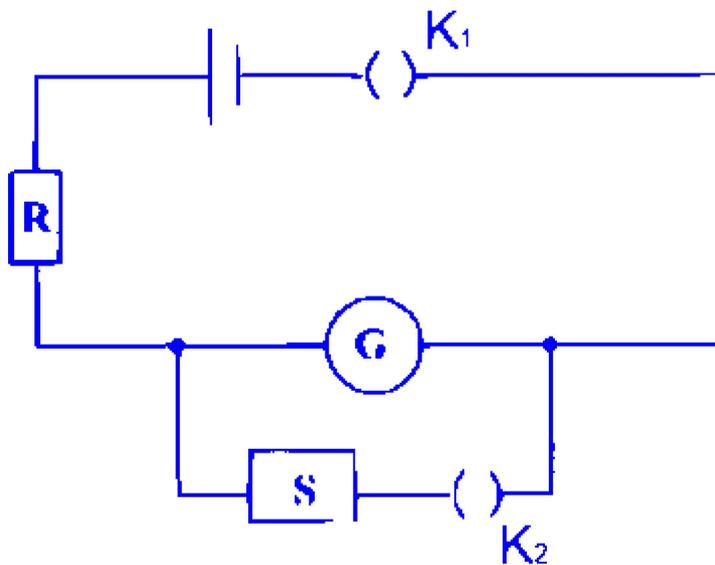
He unplugged a resistance of 5200Ω in R . When K_1 is closed and K_2 is open, the deflection observed in the galvanometer is 26 div. When K_2 is also closed and a resistance of 90Ω is removed in S , the deflection between 13 div. The resistance of galvanometer is nearly

KCET 2025

Options:

A. $45.0\,\Omega$

B. $103.0\,\Omega$
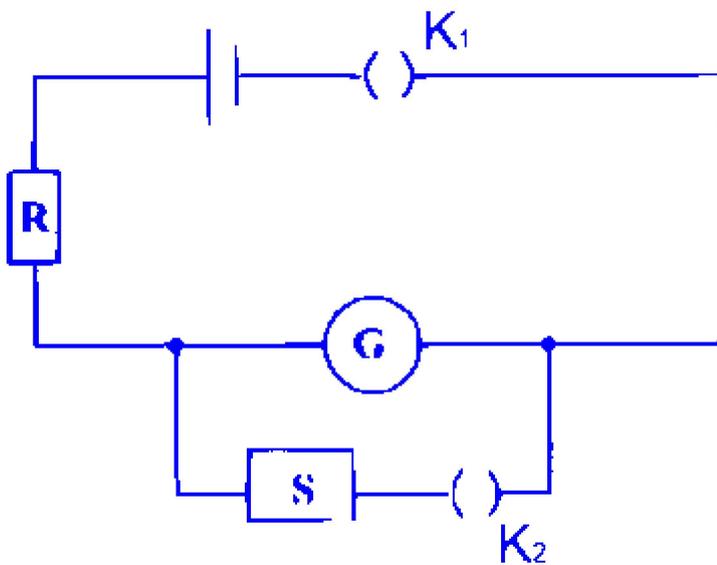
C. $91.6\,\Omega$

D. $116.0\,\Omega$

Answer: C

Solution:

In an experiment to determine the figure of merit of a galvanometer using the half deflection method, a student set up a specific circuit. Here's a representation of that setup:

During the experiment, the student initially removed a resistance of $5200\,\Omega$ at point R. When switch K_1 was closed and K_2 remained open, the galvanometer showed a deflection of 26 divisions. With both K_1 and K_2 closed and a resistance of $90\,\Omega$ removed at S, the galvanometer's deflection adjusted to 13 divisions.

To find the resistance of the galvanometer (G), we use the formula:

$$G = \frac{S'}{\frac{Q_1}{Q_2} - 1}$$

Substituting the values into the formula:

$$G = \frac{90}{\frac{26}{13} - 1}$$

This simplifies to:

$$G = 90\,\Omega \approx 91.6\,\Omega$$

Thus, the approximate resistance of the galvanometer is 91.6 Ω.

Question9

E is the electric field inside a conductor whose material has conductivity σ and resistivity ρ. The current density inside the conductor is J. The correct form of Ohm's law is

KCET 2024

Options:

A. $\mathbf{E} = \sigma\mathbf{J}$

B. $\mathbf{J} = \rho\mathbf{E}$

C. $\mathbf{E} = \rho\mathbf{J}$

D. $\mathbf{E} \cdot \mathbf{J} = \rho$

Answer: C

Solution:

We know that, $V = IR$ (Ohm's law)
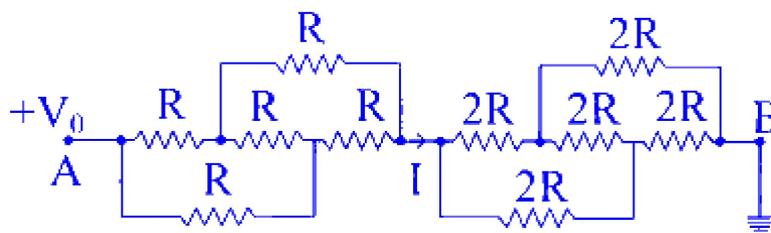
$$V = I \cdot \rho \cdot \frac{l}{A} \Rightarrow \frac{V}{l} = \frac{I}{A} \cdot \rho$$

$$\Rightarrow \quad E = J\rho \Rightarrow E = \rho J$$

Question10

In the circuit shown, the end A is at potential V_0 and end B is grounded. The electric current I indicated in the circuit is

KCET 2024

Options:

A. V_0/R

B. $2V_0/R$

C. $3V_0/R$

D. $V_0/3R$
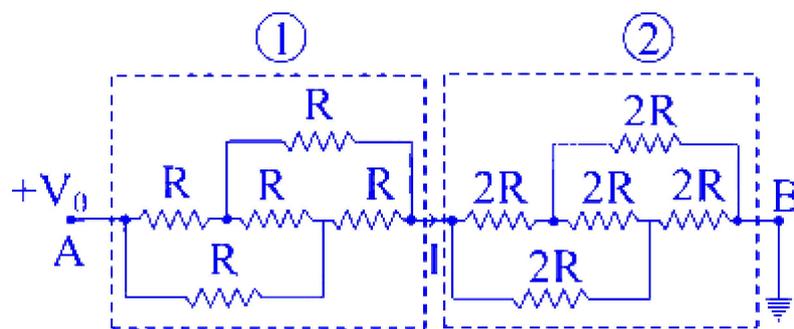
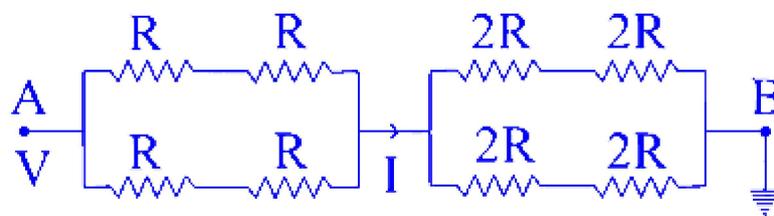**Answer: D**

Solution:

1st and 2nd networks form balanced Wheatstone bridge.

Hence, circuit diagram can be redrawn as

$$\therefore R_{AB} = 2R\|2R + 4R\|4R$$
$$= \frac{2R \times 2R}{2R + 2R} + \frac{4R \times 4R}{4R + 4R} = R + 2R = 3R$$
$$\therefore \quad I = \frac{V_0}{R_{AB}} = \frac{V_0}{3R}$$

Question11

The electric current flowing through a given conductor varies with time as shown in the graph below. The number of free electrons which flow through a given cross-section of the conductor in the time interval $0 \leq t \leq 20$ s is
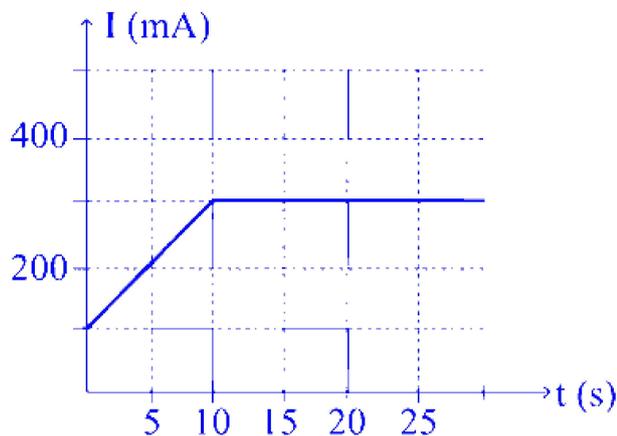
KCET 2024

Options:

A. 3.125×10^{19}

B. 1.6×10^{19}

C. 6.25×10^{18}

D. 1.625×10^{18}

Answer: A

Solution:

Total charge flowing the cross-section of the conductor is equal to area under $I - t$ graph.

$$\therefore Q = \frac{(100 + 300)}{2} 10 \times 10^{-3} + (20 - 10) \times 300 \times 10^{-3}$$
$$= 1 + 3 = 4 \text{C}$$

Since, $Q = ne$

$$\therefore \quad n = \frac{Q}{e} = \frac{4}{1.6 \times 10^{-19}} = 3.125 \times 10^{19}$$

Question12

The $I - V$ graph for a conductor at two different temperatures $100°C$ and $400°C$ is as shown in the figure. The temperature coefficient of resistance of the conductor is about (in per degree Celsius)
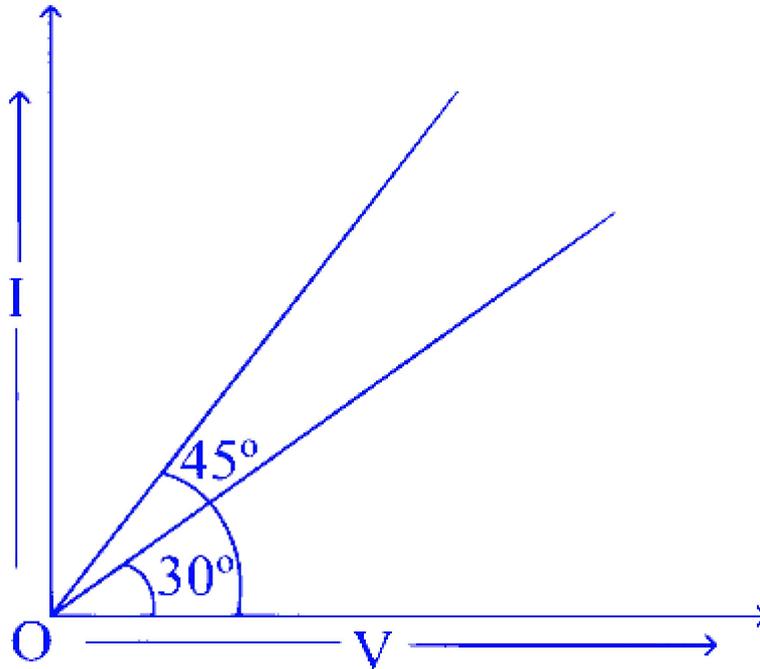
KCET 2024

Options:

A. 3×10^{-3}

B. 2×10^{-3}

C. 9×10^{-3}

D. 12×10^{-3}

Answer: A

Solution:

From the I-V graph,
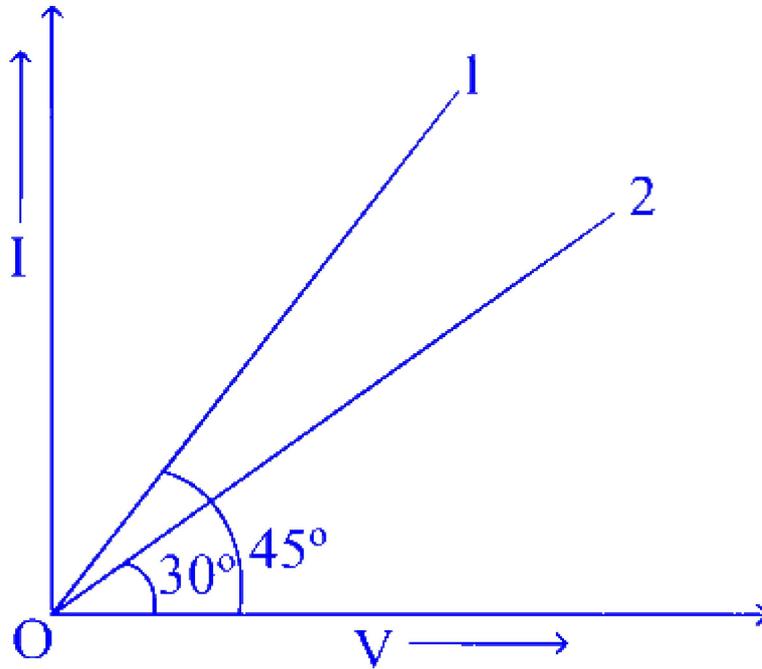
Resistance of first conductor,

$$R_1 = \frac{1}{\tan 45°} = 1\Omega$$

Resistance of second conductor,

$$R_2 = \frac{1}{\tan 30°} = \sqrt{3}\Omega$$

$\therefore$ Temperature coefficient of resistance of the conductor.

$$\alpha = \frac{R_2 - R_1}{R_1 t_2 - R_2 t_1} = \frac{\sqrt{3} - 1}{1 \times 400 - \sqrt{3} \times 100}$$
$$= 3.22 \times 10^{-3}/°C \simeq 3 \times 10^{-3}/°C$$

Question13

An electric blub of 60 W, 120 V is to be connected to 220 V source. What resistance should be connected in series with the bulb, so that the bulb glows properly?

KCET 2024

Options:

A. 50Ω

B. 100Ω

C. 200Ω

D. 288Ω

Answer: C

Solution:

Resistance of the bulb,

$$R = \frac{V^2}{P} = \frac{120 \times 120}{60} = 240\Omega$$

$$\therefore \qquad I = \frac{P}{V} = \frac{60}{120} = 0.5 \text{ A}$$

Since, bulb is connected with 220 V supply.

∴ Resistance required,

$$R' = \frac{V}{I} = \frac{220}{0.5} = 440\Omega$$

Thus, for the bulb to glow properly required resistance in series

$$= R' - R$$
$$= 440 - 240 = 200\Omega$$

Question14

In an experiment to determine the temperature coefficient of resistance of a conductor, a coil of wire X is immersed in a liquid. It is heated by an external agent. A meter bridge set up is used to determine resistance of the coil X at different temperatures. The balancing points measured at temperatures $t_1 = 0°\text{C}$ and $t_2 = 100°\text{C}$ are 50 cm and 60 cm respectively. If the standard resistance taken out is $S = 4\Omega$ in both trials, the temperature coefficient of the coil is
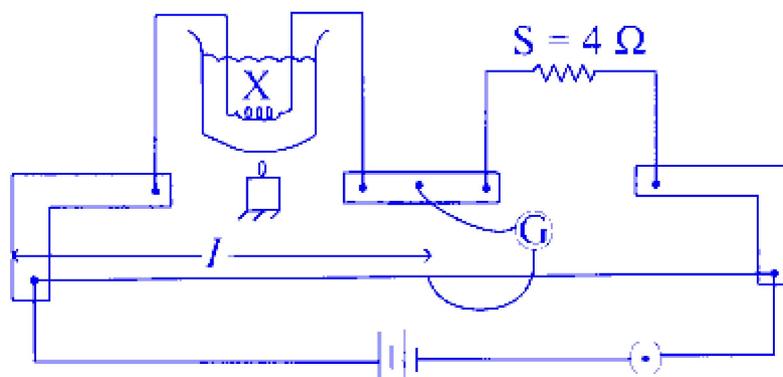
KCET 2024

Options:

A. $0.05°C^{-1}$

B. $0.02°C^{-1}$

C. $0.005°C^{-1}$

D. $2.0°C^{-1}$

Answer: C

Solution:

Standard resistance, $S = 4\Omega$

At $t_1 = 0°C, l_1 = 50$ cm

$\therefore R_1 = \dfrac{l_1}{100 - l} \times S = \dfrac{50}{100 - 50} \times 4 = 4\Omega$

At $t_2 = 100°, l_2 = 60$ cm

$\therefore R_2 = \dfrac{l_2}{100 - l_2} \times S = \dfrac{60}{100 - 60} \times 4 = 6\Omega$

$\therefore$ Temperature coefficient of the coil,

$\alpha = \dfrac{R_2 - R_1}{R_1 t_2 - R_2 t_1} = \dfrac{6 - 4}{4 \times 100 - 6 \times 0} = \dfrac{1}{200}$

$= 0.005°C^{-1}$

Question15

A wire of resistance R is connected across a cell of emf (ε) and internal resistance (r). The current through the circuit is I. In time t, the work done by the battery to establish the current I is

KCET 2023

Options:

A. εIt

B. $\frac{\varepsilon^2 t}{R}$

C. IRt

D. $I^2 Rt$

Answer: D

Solution:

The given situation is shown in the diagram.

In time t, work done by the battery to establish the current I is given as,
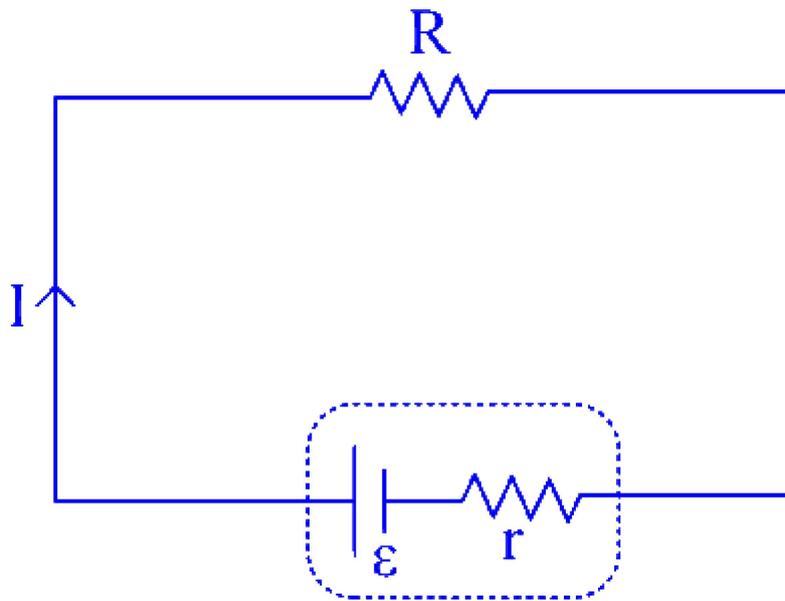
$$W = Vq = VIt \quad [\because q = It]$$
$$\quad = IR \cdot It \quad [\because V = IR]$$
$$\quad = I^2 Rt$$

Question16

For a given electric current the drift velocity of conduction electrons in a copper wire is v_d and their mobility is μ. When the current is increased at constant temperature

KCET 2023

Options:

A. v_d increases, μ remains the same

B. v_d remains the same, μ increases

C. v_d decreases, μ remains the same

D. v_d remains the same, μ decreases

Answer: A

Solution:

We know that, mobility of electron,

$$\mu = \frac{e\tau}{m}$$
$$\Rightarrow \quad \mu \propto \tau \quad [\tau \to \text{ relaxation time}]$$

Thus, for constant temperature, μ remains the same.

Since, $\quad I = neAv_d$

$$\Rightarrow \quad v_d \propto I$$

Hence, when current is increased, then drift velocity (v_d) also increases.

Question17

Ten identical cells each emf 2 V and internal resistance 1 Ω are connected in series with two cells wrongly connected. A resistor of 10 Ω is connected to the combination. What is the current through the resistor?

KCET 2023

Options:

A. 1.8 A

B. 2.4 A

C. 0.6 A

D. 1.2 A

Answer: C

Solution:

According to given situation,

Net emf of the combination,

$$E_{net} = 8 \times \text{ emf of one cell } - 2 \times \text{ emf of one cell}$$
$$= 8 \times 2 - 2 \times 2 = 12 \text{ V}$$

Equivalent resistance of the circuit

$$R' = 10r + R = 10 \times 1 + 10 = 20 \text{ V}$$

$\therefore$ Current through the resistor,

$$I = \frac{E_{net}}{R'} = \frac{12}{20} = 0.6 \text{ A}$$

Question18

The equivalent resistance between the points A and B in the following circuit is
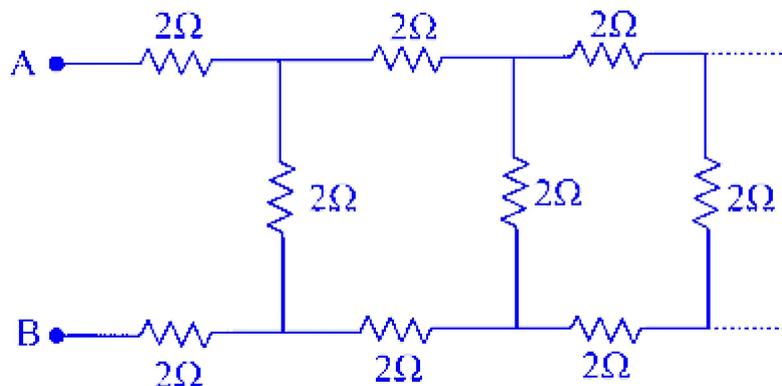
KCET 2023

Options:

A. 0.5 Ω

B. 5.5 Ω

C. 0.05 Ω

D. 5 Ω

Answer: B

Solution:

Let x be the equivalent resistance of the circuit, then
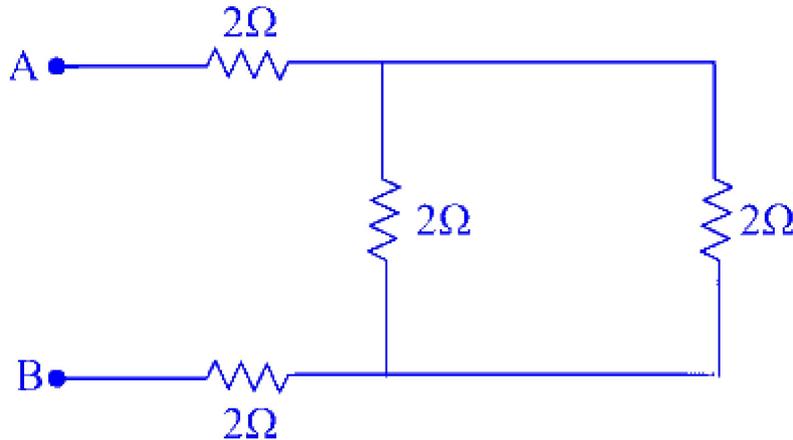
$$\therefore \quad R_{AB} = x$$
$$\Rightarrow \quad \frac{x \times 2}{2+x} + 2 + 2 = x$$
$$\Rightarrow \quad \frac{2x}{x+2} = x - 4$$
$$\Rightarrow \quad 2x = (x-4)(x+2)$$
$$\Rightarrow \quad 2x = x^2 + 2x - 4x - 8$$
$$\Rightarrow \quad x^2 - 4x - 8 = 0$$
$$\Rightarrow \quad x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4 \times 1 \times (-8)}}{2 \times 1}$$
$$= \frac{4 \pm \sqrt{48}}{2} = \frac{4 \pm 4\sqrt{3}}{2}$$
$$= 2 + 2\sqrt{3} = 5.46 \ \Omega \simeq 5.5 \ \Omega$$

Question19

The resistance of a carbon resistor is $4.7 \ k\Omega \pm 5\%$. The colour of the third band is

KCET 2023

Options:

A. gold

B. red

C. violet

D. orange

Answer: B

Solution:

Given, resistance of carbon resistor

$R = 4.7\ k\Omega \pm 5\% = 47 \times 10^2\ \Omega \pm 5\%$

The colour of four bands will be

$4 \rightarrow$ yellow

$7 \rightarrow$ Violet

$2 \rightarrow$ Red

$\pm 5 \rightarrow$ Gold

Thus, colour of third band is red.

Question20

The four bands of a colour coded resistor are of the colours grey, red, gold and gold. The value of the resistance of the resistor is

KCET 2023

Options:

A. $5.2\Omega \pm 5\%$

B. $82\Omega \pm 10\%$

C. $8.2\Omega \pm 5\%$

D. $82\Omega \pm 5\%$

Answer: C

Solution:

Colours in sequence,

Gray → 8   (1st digit)

Red → 2   (2nd digit)

Gold → 0.1   (Multiplier)

Gold → ±5%   (Tolerance)

⇒ $(82 \times 0.1) \pm 5\% \Rightarrow R = 8.2\Omega \pm 5\%$

Question21

A moving coil galvanometer is converted into an ammeter of range 0 to 5 mA. The galvanometer resistance is 90Ω and the shunt resistance has a value of 10Ω. If there are 50 divisions in the galvanometer-turned-ammeter on either sides of zero, its current sensitivity is

KCET 2023

Options:

A. $2 \times 10^4 \text{ div/A}$

B. $1 \times 10^5 \text{ A/div}$

C. $2 \times 10^4 \text{ A/div}$

D. $1 \times 10^5 \text{div/A}$

Answer: D

Solution:

Given,

$S = 10\Omega$
$G = 90\Omega$
$i = 5 \times 10^{-3} \text{ A}$

Number of divisions on one side of zero $= 50$

$i_g = \frac{S}{S+G} \times i = \left(\frac{10}{90+10}\right) \left(5 \times 10^{-3}\right) = 5 \times 10^{-4}$ A

Number of divisions per unit current

$= \frac{50}{5 \times 10^{-4}} = 1 \times 10^{-5} \text{div/A}$

Question22

A charged particle is moving in an electric field of $3 \times 10^{-10} \text{Vm}^{-1}$ with mobility $2.5 \times 10^6 \text{ m}^2/\text{V} - \text{s}$, its drift velocity is

KCET 2022

Options:

A. 8.33×10^{-4} m/s

B. 1.2×10^{-4} m/s

C. 25×10^4 m/s

D. 7.5×10^{-4} m/s

Answer: D

Solution:

The drift velocity (v_d) of a charged particle moving in an electric field can be calculated using the relation between drift velocity, electric field (E), and mobility (μ) of the charged particle, which is given by:

$v_d = \mu E$

Where:

- μ is the mobility of the charged particle, which is the velocity per unit electric field strength.
- E is the electric field strength.

Given:

- The mobility of the charged particle is $\mu = 2.5 \times 10^6 \text{ m}^2/\text{V} - \text{s}$.
- The electric field strength is $E = 3 \times 10^{-10} \text{Vm}^{-1}$.

Now let's calculate the drift velocity:

$$v_d = (\mu)(E)$$

$$v_d = (2.5 \times 10^6 \text{ m}^2/\text{V} - \text{s})(3 \times 10^{-10} \text{Vm}^{-1})$$

$$v_d = 7.5 \times 10^{-4} \text{ m/s}$$

Therefore, the drift velocity of the charged particle is 7.5×10^{-4} m/s, which corresponds to Option D.

Question23

Wire bound resistors are made by winding the wires of an alloy of

KCET 2022

Options:

A. Si, Tu, Fe

B. Ge, Au, Ga

C. Manganin, constantan, nichrome

D. Cu, Al, Ag

Answer: C

Solution:

Wire bound resistors are made by winding the wires of an alloy of manganin, constantan and nichrome. The choice of these materials is directed mostly by the fact that their resistivities are relatively intensive to temperature. These resistances are typically in range of a fraction of an ohm to a few hundred ohms.

Question24

10 identical cells each potential E and internal resistance r are connected in series to form a closed circuit.

Determine the potential difference across three cells using an ideal voltmeter.

Options:

A. 3E

B. 13E

C. 7E

D. 10E

Answer: A

Solution:

According to given situation, total voltage of 10 cells $= 10E$

Total resistance of 10 cells $= 10r$

$\therefore$ Current in the circuit, $I = \frac{10E}{10r} = \frac{E}{r}$

Potential difference across 3 cells,

$V = I \times (3r) = \frac{E}{r} \times 3r = 3E$

Hence, ideal voltmeter will read 3E.

Question25

In an atom electrons revolve around the nucleus along a path of radius $0.72\overset{o}{A}$ making 9.4×10^{18} revolutions per second. The equivalent currents is [given, $e = 1.6 \times 10^{-19}$C]

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Options:

A. 1.5 A

B. 1.4 A

C. 1.8 A

D. 1.2 A

Answer: A

Solution:

Given, radius of circular path,

$$r = 0.72 \overset{o}{A} = 0.72 \times 10^{-10} \text{ m} = 7.2 \times 10^{-11} \text{ m}$$
$$\left(\frac{n}{t}\right) = 9.4 \times 10^{18} \text{rev/s}$$
$$e = 1.6 \times 10^{-19} \text{C}$$

$\therefore$ Equivalent current,

$$I = \frac{ne}{t} = \left(\frac{n}{t}\right)e$$
$$= 9.4 \times 10^{18} \times 1.6 \times 10^{-19} = 1.504 \simeq 1.5 \text{ A}$$

Question26

When a metal conductor connected to left gap of a meter bridge is heated, the balancing point

KCET 2022

Options:

A. shifts towards left

B. remains unchanged

C. shifts to the centre

D. shifts towards right

Answer: D

Solution:

We know that, resistance of unknown wire can be determined by using meter bridge as

$$\frac{R}{S} = \frac{l}{100-l} \Rightarrow S = \frac{R(100-l)}{l} \text{ ..... (i)}$$

where R = known resistance, l = balancing length and S = unknown resistance.

When a metal conductor of resistance R connected to left gap is heated, then its resistance increases i.e. R increases. Hence, from Eq. (i), we see that when R will increase, then $(100-l)$ will decrease also, i.e l will increase. Therefore, balancing point will shift towards right.

Question27

A wire of a certain material is stretched slowly by 10%. Its new resistance and specific resistance becomes respectively

KCET 2022

Options:

A. 1.2 times, 1.1 times

B. 1.21 times, 1.21 times

C. both remains the same

D. 1.1 times, 1.1 times

Answer: A

Solution:

Let initial length of the wire be l. After stretching new length of the wire r' is given as

$$l' = l + 10\% \text{ of } l = l + \frac{10}{100}l = \frac{11l}{10} = 1.1l$$

i.e. length is increased by 1.1 times

$$\therefore \quad n = 1.1$$

We know that, when length of a wire is increased by n times, then its new resistance is increased by n^2 times i.e. $R' = n^2 R = (1.1)^2 R \quad [\because \text{Here, } n = 1.1]$

$$= 1.21 \text{R}$$

Specific resistance (resistivity) of a wire does not depends on its dimensions (length, width etc.) because it is a characteristic property of a material and depends only nature of material of wire. Hence, specific resistance remains same.

Question28

A galvanometer of resistance 50Ω is connected to a battery 3 V along with a resistance 2950Ω in series. A full scale deflection of 30 divisions is obtained in the galvanometer. In order to reduce this deflection to 20 divisions, the resistance in series should be

KCET 2022

Options:

A. 5550Ω

B. 5050Ω

C. 4450Ω

D. 6050Ω

Answer: C

Solution:

Resistance of galvanometer, $R_g = 50\Omega$

Emf of battery, $V = 3$ V

Resistance connected in series, $R_s = 2950\Omega$

Total resistance, $R' = R_g + R_s = 50 + 2950 = 3000\Omega$

$\therefore$ Current, $I = \frac{V}{R'} = \frac{3}{3000} = 10^{-3}$ A

If the deflection has to be reduced to 20 divisions, then current, $I' = \frac{I}{30} \times 20 = \frac{2}{3} \times 10^{-3}$ A

Let R_E be the effective resistance of the circuit, hence

$3 = R_E I'$

$\Rightarrow \quad R_E = \frac{3}{I'} = \frac{3}{\frac{2}{3} \times 10^{-3}} = 4.5 \times 10^3 = 4500\Omega$

$\therefore$ Resistance to be added $= R_E - R_g$
$= 4500 - 50 = 4450\Omega$

Question29

If voltage across a bulb rated 220 **V,** 100 **W drops by** 2.5% **of its rated value, then the percentage of the rated value by which the power would decrease is**

KCET 2022

Options:

A. 2.5%

B. 5%

C. 10%

D. 20%

Answer: B

Solution:

Given,

$P = 100$ W
$V = 220$ V

We know that, $P = \frac{V^2}{R}$

where, R is resistance of bulb.

$$\Rightarrow \quad R = \frac{V^2}{P} = \frac{220 \times 220}{100} = 484\Omega$$

Now, according to question, voltage drops by 2.5% of its rated value.

New voltage, $V' = 220 - 2.5\%$ of 220

$= 220 - \frac{2.5}{100} \times 220 = 214.5$ V

$\therefore$ New power, $P' = \frac{(V')^2}{R} = \frac{214.5 \times 214.5}{484} = 95.06$ W

$\%$ decrease in power $= \frac{P - P'}{P} \times 100$

$= \frac{100 - 95.06}{100} \times 100 \simeq 5\%$

Question30

A wire of resistance 3Ω is stretched to twice its original length. The resistance of the new wire will be

KCET 2021

Options:

A. 1.5Ω

B. 3Ω

C. 6Ω

D. 12Ω

Answer: D

Solution:

Given, resistance, $R_1 = 3\Omega$

If l is the original length of the wire, then after stretching the length of wire is

$l' = 2l$

From the relation, resistance of a wire,

$R = \rho \dfrac{l}{A}$

where, ρ is the resistivity and A is cross-sectional area.

$R \propto \dfrac{l}{A}$

$\Rightarrow \quad R \propto \dfrac{l^2}{V} \quad \left[\because A = \dfrac{\text{Volume}}{\text{Length}}\right]$

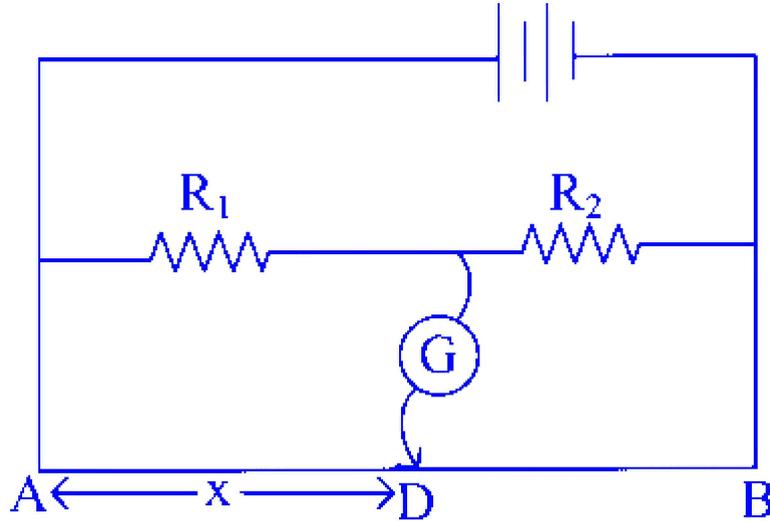$\Rightarrow \quad \dfrac{R_1}{R_2} = \dfrac{l_1^2}{V} \times \dfrac{V}{l_2^2}$

Here, $l_1 = l, l_2 = 2l$

$\Rightarrow \quad \dfrac{3}{R_2} = \dfrac{l^2}{4l^2}$

or $\quad R_2 = 3 \times 4 = 12\Omega$

Question31

In the given arrangement of experiment on meter bridge, if AD corresponding to null deflection of the galvanometer is X, what would be its value if the radius of the wire AB is doubled?

KCET 2021

Options:

A. X

B. $\frac{X}{4}$

C. $4X$

D. $2x$

Answer: A

Solution:

In a meter bridge, balancing length of the wire is independent of the area of cross-section of the wire.

So, if the radius of wire AB is doubled, the balancing length will still be X only.

Question32

A copper wire of length 1 m and uniform cross-sectional area 5×10^{-7} m^2 carries a current of 1 A. Assuming that, there are 8×10^{28} free electrons per m^3 in copper, how long will an electron take to drift from one end of the wire to the other?

KCET 2021

Options:

A. 0.8×10^3 s

B. 1.6×10^3 s

C. 3.2×10^3 s

D. 6.4×10^3 s

Answer: D

Solution:

Given,

$l = 1$ m
$A = 5 \times 10^{-7}$ m^2
$I = 1$ A
$n = 8 \times 10^{28}$ electrons $/$m^3

Time taken by an electron to take the drift from one end to the other is given as

$T = \frac{l}{v_d}$ .... (i)

where, v_d is the drift velocity.

As, $v_d = \frac{I}{neA}$

$= \frac{1}{8 \times 10^{28} \times 1.6 \times 10^{-19} \times 5 \times 10^{-7}} = \frac{1}{6.4 \times 10^3}$

So, substituting the given values in Eq. (i), we get

$T = \frac{1}{\frac{1}{6.4 \times 10^3}} = 6.4 \times 10^3$ s

----

Question33

Consider an electrical conductor connected across a potential difference V. Let Δq be a small charge moving through it in time Δt. If I is the electric current through it,

I. the kinetic energy of the charge increases by $IV\Delta t$.

II. the electric potential energy of the charge decreases by $IV\Delta t$.

III. the thermal energy of the conductor increases by $IV\Delta t$.

Choose the correct option.

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Options:

A. Only I

B. I and II

C. I and III

D. II and III

Answer: D

Solution:

As the charges flow from higher potential to lower potential.

So, its potential energy decreases by $IV\Delta t$ but kinetic energy increase.

This increase in energy is transferred to conductor which increases the thermal energy by IV∆t.

So, statements (II) and (III) are correct.

Question34

A metal rod of length 10 cm and a rectangular cross-section of 1 cm $\times \frac{1}{2}$ cm is connected to a battery across opposite faces. The resistance will be

Options:

A. maximum when the battery is connected across $1 \text{ cm} \times \frac{1}{2}$ cm faces

B. maximum when the battery is connected across $10 \text{ cm} \times \frac{1}{2}$ cm faces

C. maximum when the battery is connected across $10 \text{ cm} \times 1$ cm faces

D. same irrespective of the three faces

Answer: A

Solution:

Given, length, $l = 10$ cm

Resistance of metal rod.

$R = \rho \cdot \frac{l}{A}$

i.e., $R \propto \frac{1}{A}$

Since, among given faces in the options, area is minimum corresponding to face $1 \text{ cm} \times \frac{1}{2}$ cm.

Hence, resistance will be maximum when the battery is connected across the face of dimension $1 \text{ cm} \times \frac{1}{2}$ cm

.

Question35

A car has a fresh storage battery of emf 12 V and internal resistance $2 \times 10^{-2}\Omega$. If the starter motor draws a current of 80 A. Then, the terminal voltage when the starter is On is

KCET 2020

Options:

A. 12 V

B. 8.5 V

C. 8.4 V

D. 9.3 V

Answer: A

Solution:

Given, emf of battery, $E = 12$ V

Internal resistance, $r = 2 \times 10^{-2} \Omega$

Current, $I = 80$ A

$\therefore$ Terminal voltage when starter is ON is given as

$$V = E - Ir$$
$$= 12 - 80 \times 2 \times 10^{-2}$$
$$= 12 - 1.6 = 10.4 \text{ V}$$

No given option is correct.

Question36

A potentiometer has a uniform wire of length 5 m. A battery of emf 10 V and negligible internal resistance is connected between its ends. A secondary cell connected to the circuit gives balancing length at 200 cm. The emf of the secondary cell is

KCET 2020

Options:

A. 4V

B. 6V

C. 2V

D. 8V

Answer: A

Solution:

Given, length of potentiometer wire

$l = 5$ m

emf of battery, $E = 10$ V

Potential gradient across the potentiometer wire,

$K = \frac{E}{l} = \frac{10}{5} = 2\mathrm{Vm}^{-1}$

When secondary cell is connected to the circuit of potentiometer, then balancing length,

$l_1 = 200$ cm $= 2$ m

$\therefore$ emf of the secondary cell, $E_s = Kl_1 = 2 \times 2 = 4$ V

Question37

The colour code for a carbon resistor of resistance $0.2\mathrm{k}\Omega \pm 10\%$ is

KCET 2020

Options:

A. red, grey, brown, silver

B. red, green, brown, silver

C. red, grey, silver, silver

D. red, green, silver

Answer: A

Solution:

Resistance of carbon resistor,

$R = 0.2\mathrm{k}\Omega \pm 10\%$
$\quad = 200\Omega \pm 10\%$
$\quad = 20 \times 10^1\Omega \pm 10\%$

According to the colour code for carbon resistor, the colour assigned to number 2, 0 and 1 are red, black and brown. For colour used for tolerance of 10% is silver.
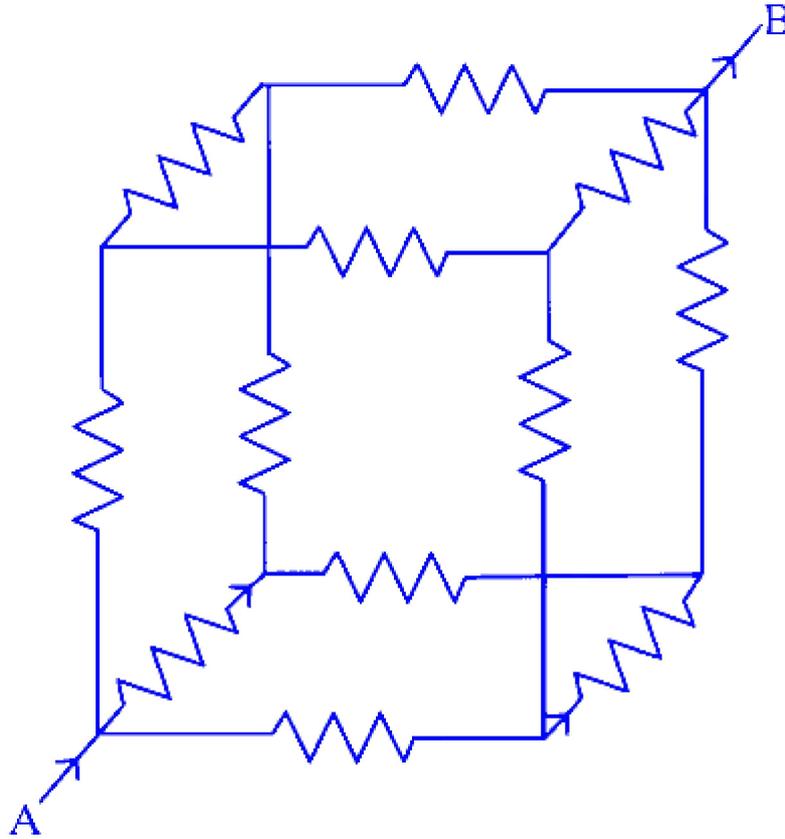
∴ colour code are red, black, brown and silver. No given option is correct.

Question38

Each resistance in the given cubical network has resistance of 1Ω and equivalent resistance between A and B is

KCET 2020

Options:

A. $\frac{5}{6}\Omega$

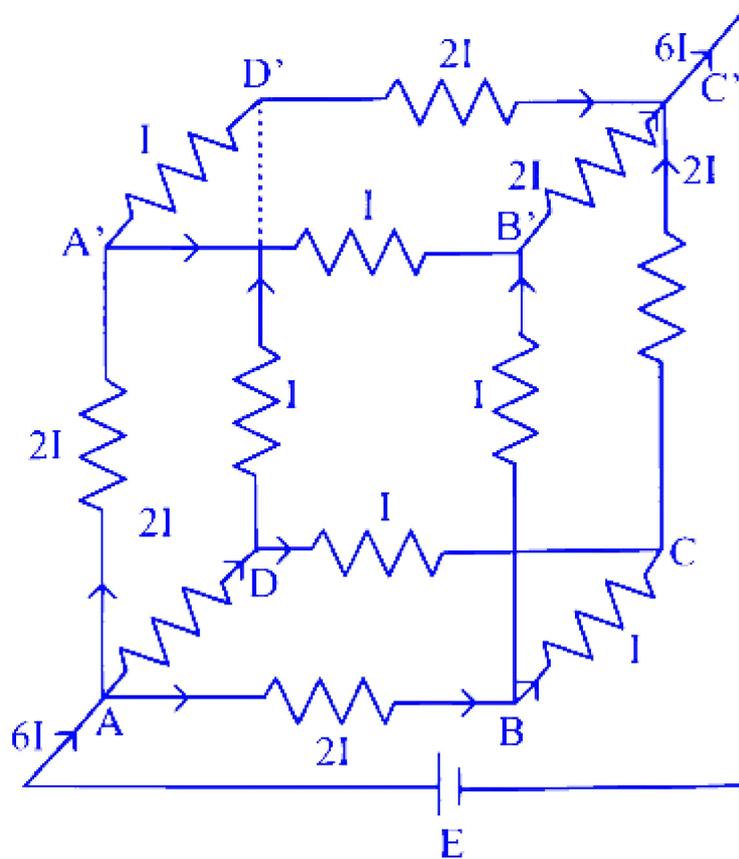B. $\frac{6}{5}\Omega$

C. $\frac{5}{12}\Omega$

D. $\frac{12}{5}\Omega$

Answer: A

Solution:

The given network of resistances can be shown as follows,

Let $6I$ be the current through the cell, which is distributed as shown in the figure.

Applying Kirchhoff's law to the loop $ABCC'EA$, we have

$$-2Ir - Ir - 2Ir + E = 0$$
$$\Rightarrow \quad E = 5Ir$$

but $r = 1\Omega$ given,

$$\therefore \quad E = 5I$$

If R' be the equivalent resistance of the network, then

$$R' = \frac{\text{total emf}}{\text{total current}} = \frac{5I}{6I} = \frac{5}{6}\Omega$$

Question39

$I - V$ characteristic of a copper wire of length L and area of cross-section A is shown in figure. The slope of the curve becomes
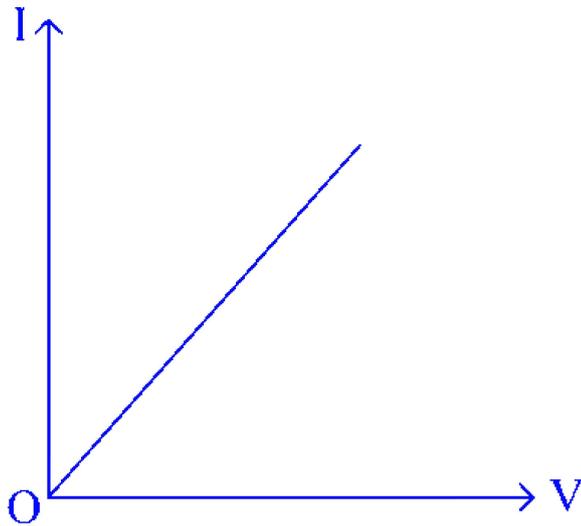
KCET 2020

Options:

A. More if experiment is performed at higher temperature

B. More if a wire of steel of same dimension is used

C. Less if the area of the wire is increased

D. Less if the length of the wire is increased

Answer: D

Solution:

$I - V$ characteristics of copper wire of length L and area of cross-section A is shown in the figure.
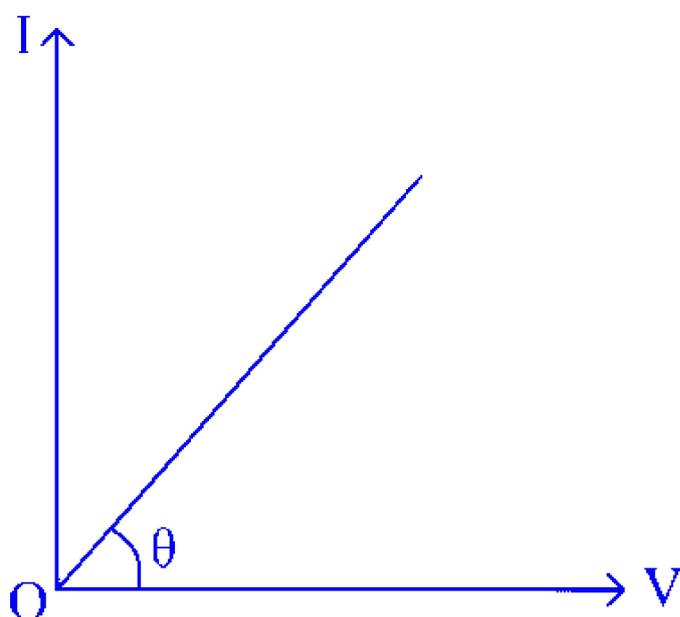
Since, $I - V$ characteristic is a straight line, hence it obeys Ohm's law. According to which resistance of copper wire,

$$R = \frac{V}{I} = \cot\theta$$

$$\Rightarrow \quad R = \cot\theta$$

$$\Rightarrow \quad \rho \cdot \frac{l}{A} = \cot\theta$$

or $\quad \tan\theta \propto \left(\frac{A}{\rho l}\right)$

Hence, slope $(\tan\theta)$ of the curve becomes

(i) less if the length of the wire is increased.

(ii) more if the area of the wire is increased.

(iii) less if a wire of steel of same dimensions is used as $\rho_{\text{steel}} > \rho_{\text{copper}}$.

(iv) less if experiment is performed at higher temperature.

Question40

The readings of ammeter and voltmeter in the following circuit are respectively
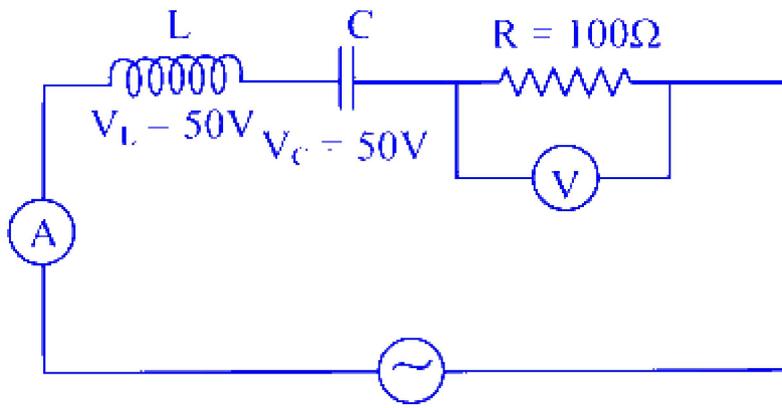
KCET 2019

Options:

A. 1.2 A, 120 V

B. 1.5 A, 100 V

C. 2.7 A, 220 V

D. 2.2 A, 220 V

Answer: D

Solution:

From circuit diagram, $V_L = V_C = 50$ V

Hence, given circuit is a L-C-R series resonance circuit.

$\therefore$ Impedance of circuit, $Z = R = 100\Omega$

In series L-C-R resonance circuit, voltage across resistor $R =$ Applied voltage $= 220$ V

$\therefore$ Reading of voltmeter $V = 220$ V

$\therefore$ Reading of ammeter $I = \frac{V}{Z} = \frac{V}{R} = \frac{220}{100} = 2.2$ A

Question41

Though the electron drift velocity is small and electron charge is very small, a conductor can carry an appreciably large current because

Options:

A. electron number density is very large

B. drift velocity of electron is very large

C. electron number density depends on temperature

D. relaxation time is small

Answer: A

Solution:

Electric current flowing through a conductor is given by $I = neAv_d$ .... (i)

where, n = number of electrons per unit volume (electron number density)

e = charge on a electron

A = area of cross-section of conductor

v_d = drift velocity

From Eq (i), when e and v_d is small and A is constant for given conductor, then for large current I, n (electron number density) should be very large.

Question42

Masses of three wires of copper are in the ratio $1 : 3 : 5$ and their lengths are in the ratio $5 : 3 : 1$. The ratio of their electrical resistance are

KCET 2019

Options:

A. $1 : 3 : 5$

B. $5 : 3 : 1$

C. $1 : 15 : 125$

D. $125 : 15 : 1$

Answer: D

Solution:

Given, ratio of masses of three copper wires $m_1 : m_2 : m_3 = 1 : 3 : 5$

ratio of lengths, $l_1 : l_2 : l_3 = 5 : 3 : 1$

Resistance of a wire is given by

$$R = \rho \cdot \frac{l}{A} = \rho \cdot \frac{l^2}{Al} = \rho \cdot \frac{l^2}{V} \qquad [\text{Volume, } V = Al]$$

$$= \rho \frac{l^2}{\frac{m}{d}} \qquad [\text{Volume, } V = \frac{m}{d}]$$
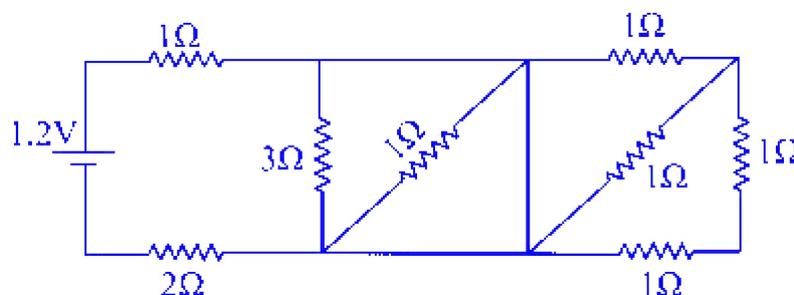
$$R = \rho d \cdot \frac{l^2}{m}$$

$$\therefore \quad R \frac{l^2}{m}$$

$$\therefore \quad R_1 : R_2 : R_3 = \frac{l_1^2}{m_1} : \frac{l_2^2}{m_2} : \frac{l_3^2}{m_3}$$

$$= \frac{5^2}{1} : \frac{3^2}{3} : \frac{1^2}{5}$$

$$= 25 : 3 : \frac{1}{5} = 125 : 15 : 1$$

Question43

In the given circuit, the current through 2Ω resistor is

KCET 2019
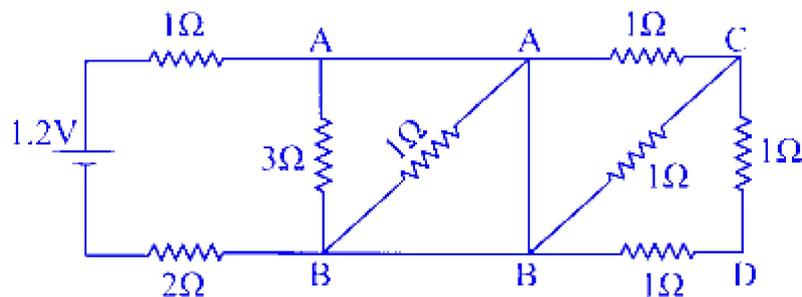
Options:

A. 0.2 A
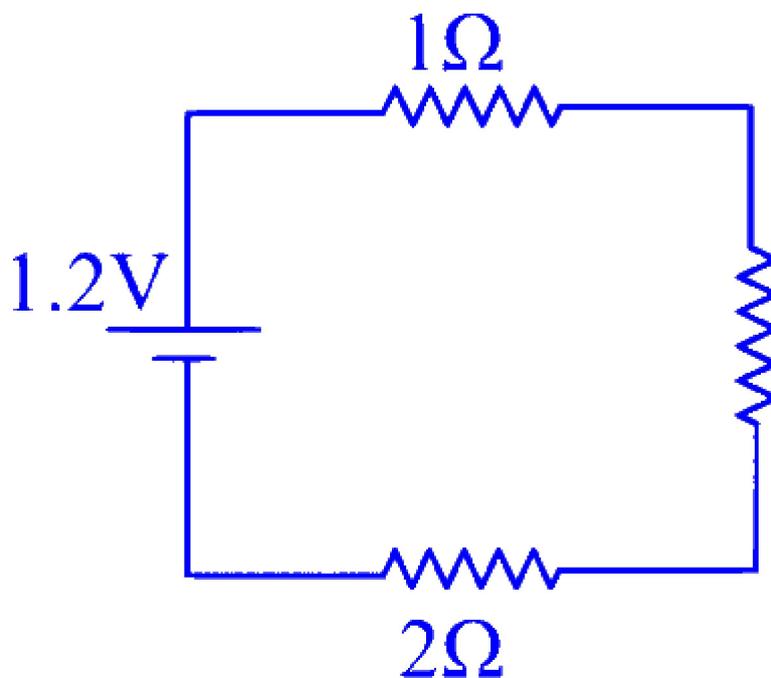
B. 0.3 A

C. 0.4 A

D. 0.1 A

Answer: C

Solution:

The given circuit diagram is shown as

Since, $V_A = V_B$

So, network of resistance becomes short, so effective circuit becomes as shown below

Current in 2Ω resistor, $I = \frac{1.2}{1+2} = \frac{1.2}{3} = 0.4$ A

Question44

Kirchhoff 's junction rule is a reflection of

Options:

A. conservation of current density vector

B. conservation of energy

C. conservation of momentum

D. conservation of charges

Answer: D

Solution:

According to Kirchhoff's junction rules, the current entering a junction = current leaving a junction

$\Rightarrow$ Charge entering = charge leaving

(as there is no accumulation of charges when steady current flows)

So Kirchhoff's junction rule is in accordance with conservation of charges.

Question45

The variation of terminal potential difference V with current flowing through a cell is as shown. The emf and internal resistance of the cell are
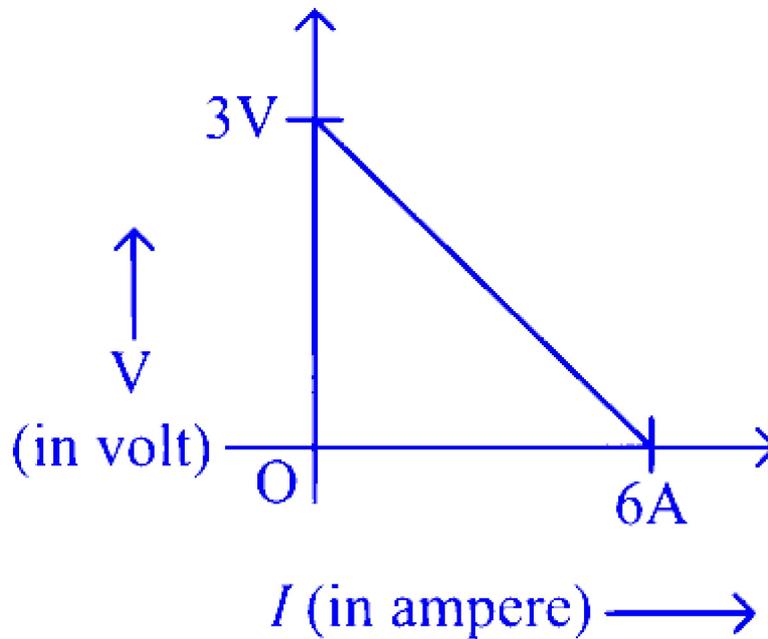
KCET 2019

Options:

A. $3\text{ V}, 3\Omega$

B. $3\text{ V}, 0.5\Omega$

C. $6\text{ V}, 2\Omega$

D. $6\text{ V}, 0.5\Omega$

Answer: B

Solution:

We know, terminal voltage emf an internal resistance of a cell are related as $V = r - Ir$ (where, $I =$ current drawn)

From graph, $y = mx + c = c + mx$

$\Rightarrow$ Intercept on y-axis, $c = E = 3\text{ V}$

and slope, $m = r = \frac{dy}{dx} = \frac{3}{6} = 0.5\Omega$

Question46

In a potentiometer experiment, the balancing point with a cell is at a 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**

Options:

A. 4Ω

B. 2Ω

C. 1Ω

D. 0.5Ω

Answer: B

Solution:

We know, $r = R\left(1 - \frac{l_1}{l_2}\right)$

where, $r = $ internal resistance

$R = $ external resistance

l_1 and $l_2 = $ 1st and 2nd balancing lengths

$\Rightarrow \quad r = \frac{2(240-120)}{120} = 2\Omega$

Question47

The resistance $R = \frac{V}{I}$**, where** $V = (100 \pm 5)$V **and** $I = (10 \pm 0.2)$A**. The percentage error in** R **is**

Options:

A. 5.2%

B. 4.8%

C. 7%

D. 3%

Answer: C

Solution:

To determine the percentage error in resistance R, given by the formula $R = \frac{V}{I}$, where $V = (100 \pm 5)$ V and $I = (10 \pm 0.2)$ A, we follow these steps:

Identify the Errors:

Voltage: $\Delta V = 5$ V

Current: $\Delta I = 0.2$ A

Calculate Relative Errors:

$\frac{\Delta V}{V} = \frac{5}{100} = 0.05$

$\frac{\Delta I}{I} = \frac{0.2}{10} = 0.02$

Find the Total Relative Error in R:

The formula for the relative error in division is:

$\frac{\Delta R}{R} = \frac{\Delta V}{V} + \frac{\Delta I}{I}$

Substituting the values, we get:

$\frac{\Delta R}{R} = 0.05 + 0.02 = 0.07$

Convert to Percentage Error:

$\frac{\Delta R}{R} \times 100 = 7\%$

Thus, the percentage error in R is 7%.

Question48

Ohm's law is applicable to

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Options:

A. diode

B. transistor

C. electrolyte

D. conductor

Answer: D

Solution:

Ohm's law states that the voltage across a conductor is directly proportional to the current flowing through it, expressed as

$V = IR,$

where:

• V is the voltage,

• I is the current, and

• R is the resistance.

For a device to obey Ohm's law, its resistance must remain constant regardless of the applied voltage (i.e., it must have a linear current–voltage relationship).

Let's look at the options:

Diode – Diodes are non-ohmic devices because their current–voltage relationship is exponential, not linear.

Transistor – Transistors are semiconductor devices with nonlinear behavior and do not obey Ohm's law.

Electrolyte – Although some electrolytes can sometimes show ohmic behavior under specific conditions, they generally do not demonstrate the simple linear behavior required by Ohm's law in typical electronic circuits.

Conductor – Metal conductors (or ohmic conductors) generally exhibit a linear relationship between voltage and current, making them ideal examples of materials that obey Ohm's law.

Thus, the correct answer is:

Option D: Conductor

Question49

If the last band on the carbon resistor is absent, then the tolerance is

KCET 2018

Options:

A. 5%

B. 20%

C. 10%

D. 15%

Answer: B

Solution:

When dealing with resistor color codes, the extra (fourth) band typically indicates the tolerance of the resistor. If this band is absent, it is generally understood that the resistor has the standard tolerance value for carbon resistors, which is:

20%

To break it down:

Most resistors have four bands:

The first two bands represent the significant digits.

The third band is the multiplier.

The fourth band (if present) indicates the tolerance.

If the tolerance band is missing, the default tolerance for many carbon resistors is assumed to be 20%.

Thus, the correct answer is:

Option B: 20%.

Question50

The effective resistance between P and Q for the following network is

Options:

A. $\frac{1}{12}\Omega$

B. 21Ω

C. 12Ω
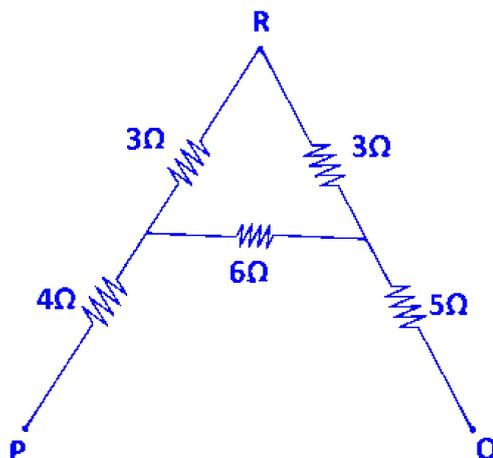
D. $\frac{1}{21}\Omega$

Answer: C

Solution:

In the given circuit diagram, 3Ω and 3Ω are in series.

$3 + 3 = 6\Omega$

6Ω and 6Ω are in parallel

$\frac{6 \times 6}{6 + 6} = 3\Omega$

This 3Ω is in series with 4Ω and 5Ω

$4 + 3 + 5 = 12\Omega$

Question51

Five identical resistors each of resistance $R = 1500\Omega$ are connected to a 300 V battery as shown in the circuit. The reading of the ideal ammeter A is
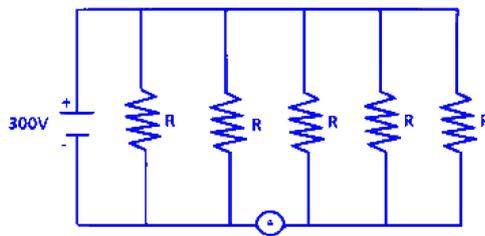
KCET 2018

Options:

A. $\frac{1}{5}$ A

B. $\frac{3}{5}$ A

C. $\frac{2}{5}A$

D. $\frac{4}{5}A$

Solution:

The circuit can be simplified in the following manner:
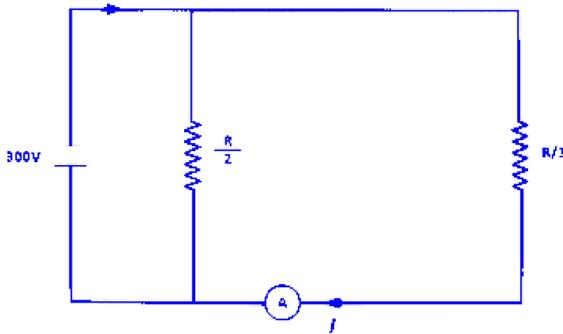
The reading on the ammeter, denoted as I, can be calculated using the formula:

$$I = \frac{300}{R/3} = \frac{900}{R}$$

Given that $R = 1500\,\Omega$, the current I is:

$$I = \frac{3}{5}\,A$$

Question52

Two cells of internal resistances r_1 and r_2 and of same emf are connected in series, across a resistor of resistance R. If the terminal potential difference across the cells of internal resistance r_1 is zero, then the value of R is

KCET 2018

Options:

A. $R = 2\left(r_1 + r_2\right)$

B. $R = r_2 - r_1$

C. $R = r_1 - r_2$

D. $R = 2\left(r_1 - r_2\right)$

Answer: C

Solution:

Given, $V_1 = 0$
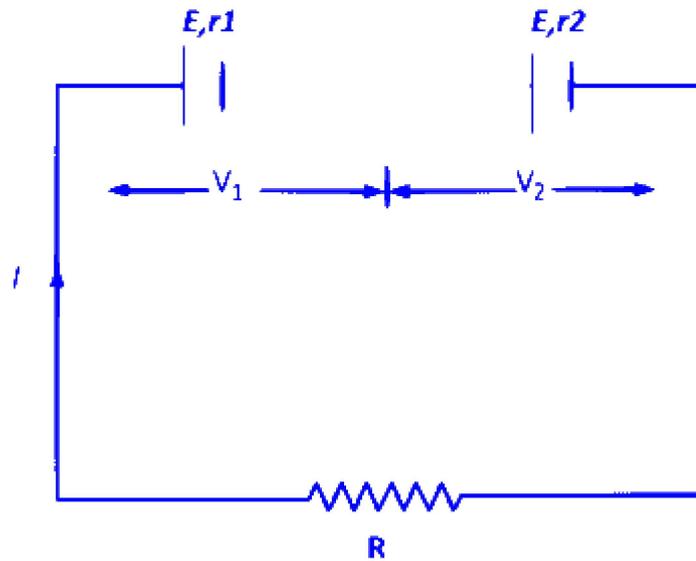
$V_1 + V_2 = IR \quad \Rightarrow \quad V_2 = IR$

$E - Ir_2 = IR$

But $V_1 = E - Ir_1$

i.e. , $E = Ir_1 \quad$ (as $V_1 = 0$)

$Ir_1 = Ir_2 = IR$

or $R = r_1 - r_2$

Question53

The $I - V$ graphs for two different electrical appliances P and Q are shown in the diagram: If R_P and R_Q be the resistances of the devices, then
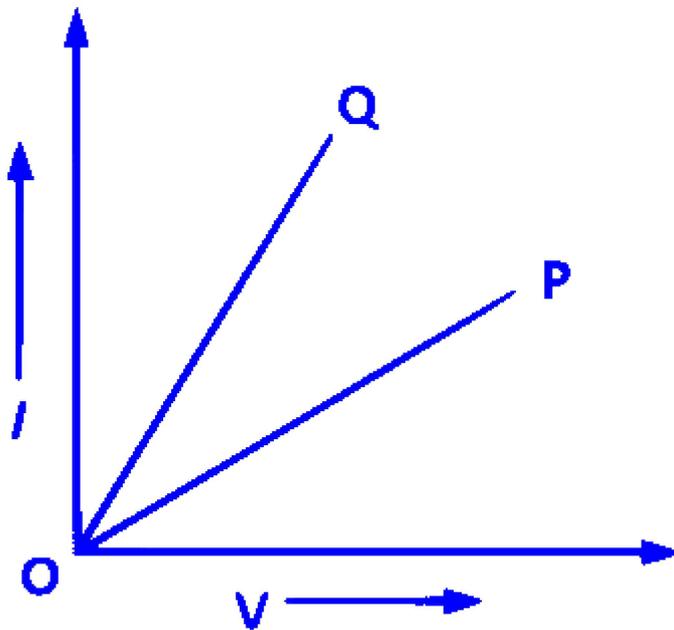
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Options:

A. $R_P = R_Q$

B. $R_P > R_Q$

C. R_P

D. $R_P = \frac{R_Q}{2}$

Answer: B

Solution:

The slope of $V - I$ graph = resistance.

The graph is plotted with I on Y-axis and V on . X-axis, hence the slope $= \frac{1}{R}$

Question54

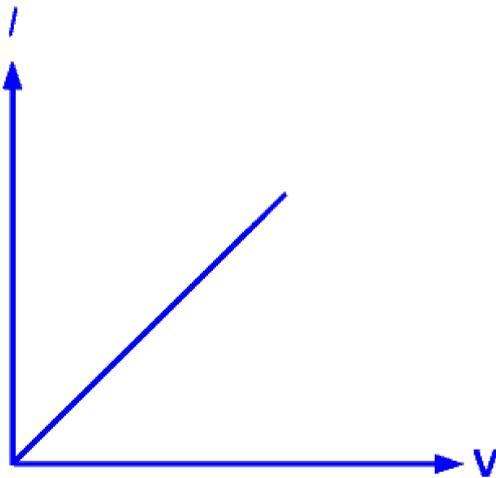**Of the following graphs, the one that correctly represents the $I - V$ characteristics of a 'Ohmic device' is**
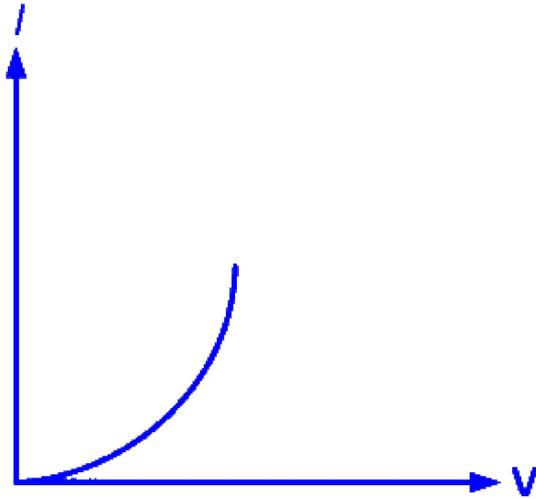
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Options:

A.
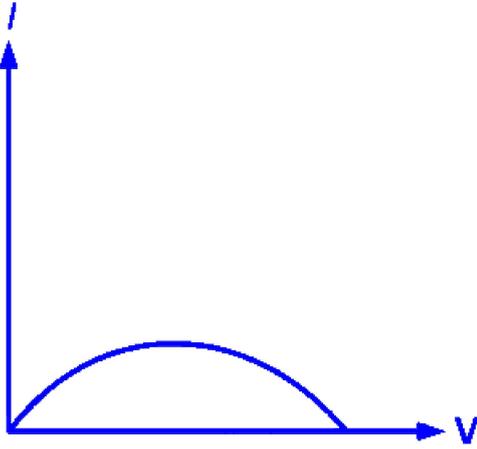
B.

C.

D.
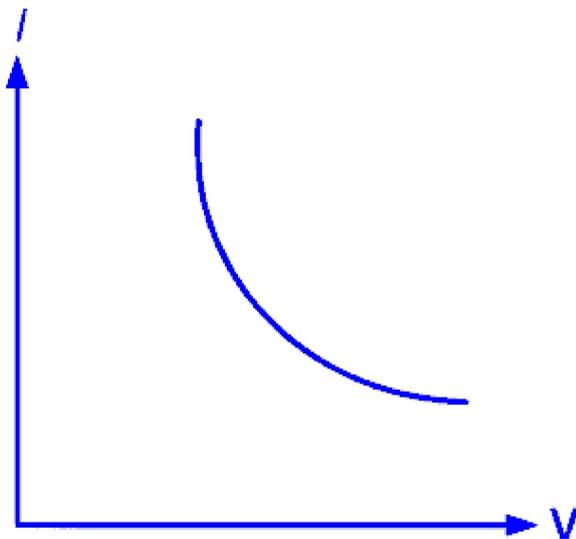
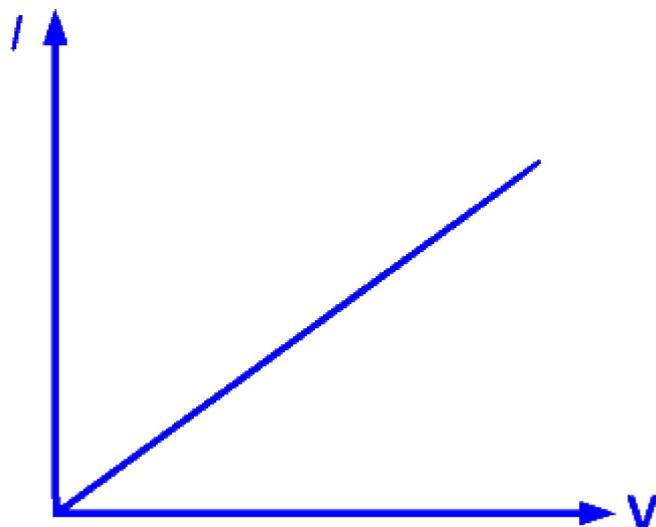**Answer: B**

Solution:

According to Ohm's Law, the current flowing through a conductor is directly proportional to the potential difference (V) across the ends of the conductor, provided physical conduction of the conductor such as temperature, mechanical strain etc, are kept constant.

ie. $\quad V \propto I$

$\quad\quad V = IR$

$\quad\quad \dfrac{V}{I} = R \text{ (constant)}$

Question55

A galvanometer of resistance 50Ω is connected to a battery of $3 \cdot$ V along with a resistance of 2950Ω in series shows full-scale deflection of 30 divisions. The additional series resistance required to reduce the deflection to 20 divisions is

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Options:

A. 2950Ω

B. 1500Ω
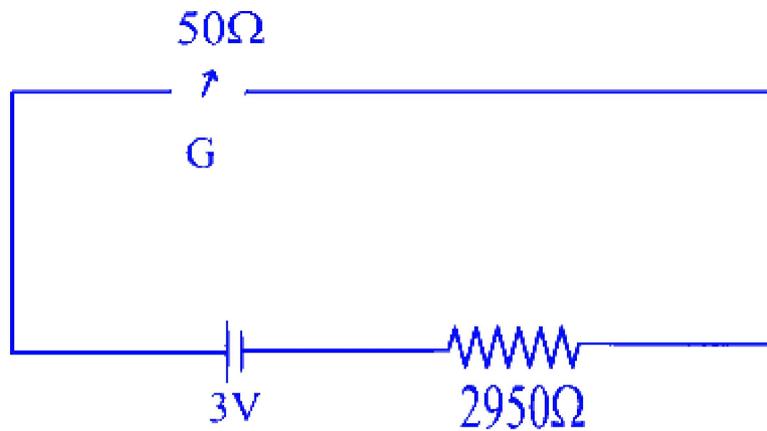
C. 4440Ω

D. 7400Ω

Answer: C

Solution:

Current flowing in galvanometer,
$$I = \frac{3}{(50 + 2950)}$$
$$I = 10^{-3} \text{ A}$$

Current for 30 division $= 10^{-3}$ A

Current for 20 division $= \frac{10^{-3}}{30} \times 20 = \frac{2}{3} \times 10^{-3}$ A

Let the series resistance $= R$

$\therefore \quad \frac{2}{3} \times 10^{-3} = \frac{3}{(50 + R)}$

$R = 4450\Omega$

Option (c) is nearest option in the given options.

Question56

A cylindrical conductor of diameter 0.1 mm carries a current of 90 mA . The current density (in $\mathrm{Am^{-2}}$) is ($\pi \approx 3$)

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Options:

A. 1.2×10^7

B. 3×10^6

C. 6×10^6

D. 2.4×10^7

Answer: A

Solution:

Given:

Diameter of the cylindrical conductor (D) = 0.1 mm

Radius (r) = $\frac{D}{2} = \frac{0.1}{2}$ mm

Current (I) = 90 mA = 90×10^{-3} A

To find the current density (J), we use the formula:

Current density (J) = $\frac{I}{A} = \frac{I}{\pi r^2}$

Substituting the known values:

$J = \dfrac{90 \times 10^{-3}}{\frac{22}{7} \times \left(\frac{0.1 \times 10^{-3}}{2}\right)^2}$

Approximating $\pi \approx 3.14$:

$J = \dfrac{90 \times 10^{-3}}{3.14 \times \left(\frac{0.1 \times 10^{-3}}{2}\right)^2}$

$J = 12000 \times 10^3$

Thus, the current density:

$J = 12 \times 10^7 \, \text{A/m}^2$

Question57

A piece of copper is to be shaped into a conducting wire of maximum resistance. The suitable length and diameter are ....and...............................respectively.

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Options:

A. $2L$ and $d/2$

B. $L/2$ and $2d$

C. Landd

D. $2L$ and d

Answer: A

Solution:

To determine the configuration of a copper wire that results in maximum resistance, we use the formula for resistance, R:

$$R = \frac{\rho l}{A} = \frac{\rho l}{\pi r^2}$$

Where:

R is the resistance,

ρ is the resistivity of the material,

l is the length of the wire,

A is the cross-sectional area of the wire,

r is the radius of the wire.

For maximum resistance, we need to increase the length l of the wire, which inversely reduces the radius r for a given volume of copper.

To achieve the maximum resistance, the wire should have a length $2L$ and a diameter $\frac{d}{2}$.

Question58

In meter bridge experiment, with a standard resistance in the right gap and a resistance coil dipped in water (in a beaker) in the left gap, the balancing length obtained is ' l '. If the temperature of water is increased, the new balancing

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Options:

A. < 1

B. > 1

C. $= 0$

D. $= 1$

Answer: B

Solution:

In a meter bridge experiment, the original setup involves placing a standard resistance in one gap and an unknown resistance coil, which is immersed in water, in the other gap. The balancing length obtained is denoted by 'l'. The relationship between the resistances and the balancing length is given by:

$$\frac{R_{\text{unknown}}}{R_{\text{standard}}} = \frac{l}{1-l}$$

When the temperature of the water is increased, the resistance of the coil in the water also increases. This change in resistance affects the balancing condition, resulting in a new balancing length that is greater than the original value. Therefore, as temperature increases, the new balancing length becomes greater, indicating that the balancing point shifts to a position representing a higher resistance ratio.

Question59

The power dissipated in 3Ω resistance in the following circuit is
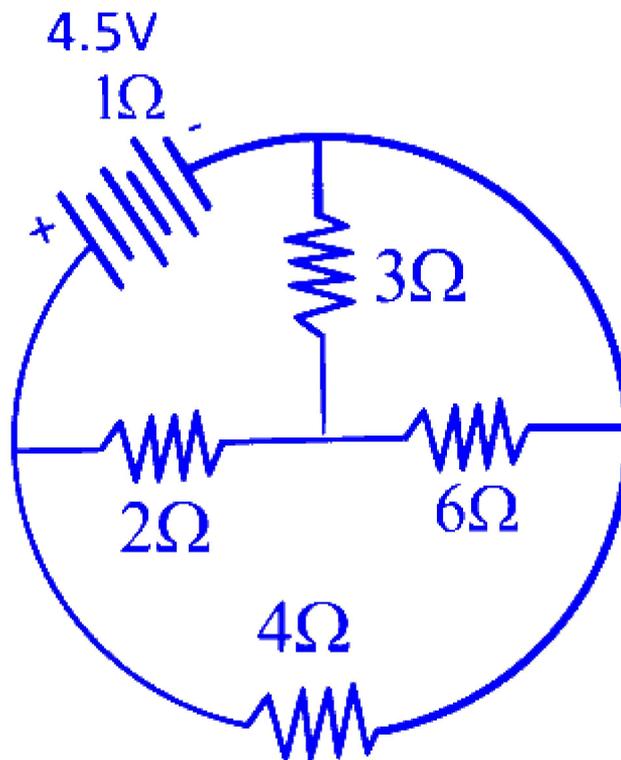
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Options:

A. 0.25 W

B. 0.75 W

C. 1 W

D. 0.5 W

Solution:

The equivalent circuit of the given circuit will be
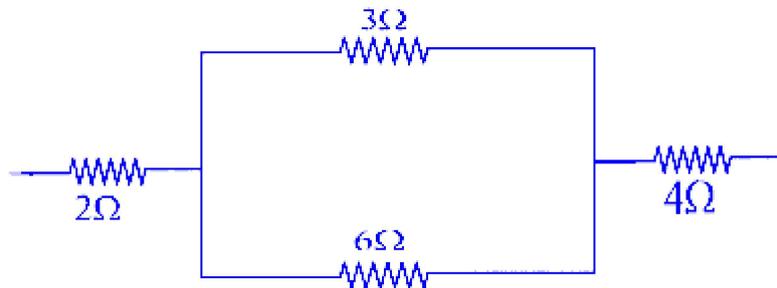
From circuit, $\quad \dfrac{1}{R} = \dfrac{1}{3} + \dfrac{1}{6}$

$$= \dfrac{2+1}{6} = \dfrac{3}{6}\Omega$$

$$R_1 = 2\Omega$$

$R_2 = R_2 + R_2 + R_4$
$\quad = 2 + 2 + 4 = 8\Omega$

The internal resistance of battery $= 1\Omega$

So, the equivalent resistance of circuit

$= 8\Omega + 1\Omega$
$= 9\Omega$

'The current in the circuit

$I = \dfrac{V}{R} = \dfrac{4.5}{9}$
$\quad = \dfrac{1}{2}$ A.

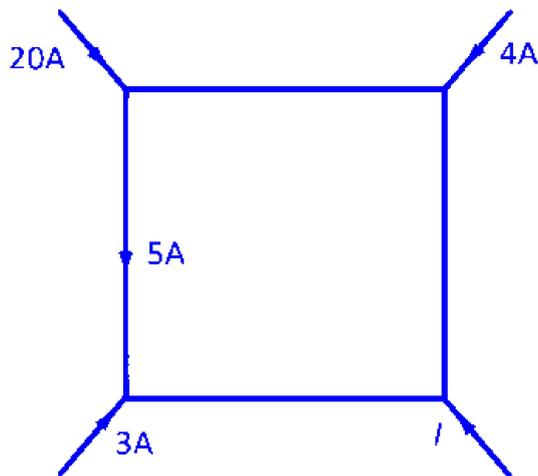The power dissipated in 3Ω resistance

$P = I^2 \times R$
$\quad = \left(\dfrac{1}{2}\right)^2 \times 3$
$\quad = \dfrac{1}{4} \times 3$
$\quad = 0.75$ W

Question60

The value of I in the figure shown below is

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Options:

A. 21 A
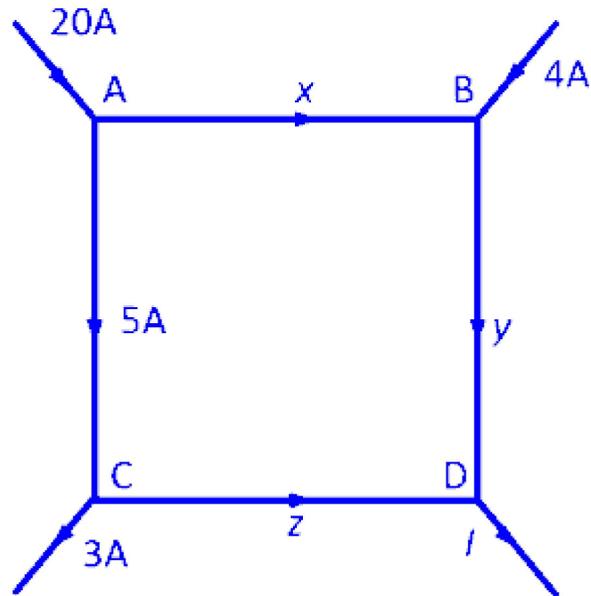
B. 4 A

C. 8 A

D. 19 A

Answer: A

Solution:

At junction A,

$20 = 5 + x$
$x = 20 - 5 = 15$ A

At junction B,

$4 + x = y$
$4 + 15 = y$
$y = 19$ A

At junction C,

$= 5 = 3 + z$
$z = 5 - 3 = 2A$

Now, network is shown by following diagram