doubtnut
India's Number 1 Education App

PHYSICS

BOOKS - DISHA PUBLICATION PHYSICS (HINGLISH)

CURRENT ELECTRICITY

Jee Main 5 Years At A Glance

1. A copper rod of cross sectional area A carries a uniform current I through it. At temperature T if

the volume charge density of the rod is ρ how long will the charges take to travel a distance d?

A. $\frac{2\rho dA}{IT}$

B. $\frac{2\rho dA}{I}$

C. $\frac{\rho dA}{I}$

D. $\frac{\rho dA}{IT}$

Answer: C

Watch Video Solution

2. A constant voltage is applied between two ends of a metallic wire. If the length is halved and the radius of the wire is doubled, the rate of heat developed in the wire will be:

A. Increased 8 times

B. Doubled

C. Halved

D. Unchanged

Answer: A

Watch Video Solution

3. On interchanging the resistances, the balance point of a meter bridge shifts to the left by 10 cm. The resistance of their series combination is $1k\Omega$. How much was the resistance on the left slot before interchanging the resistances ?

A. 990 Ω

B. 505Ω

C. 550Ω

D. 910Ω

Answer: C

Watch Video Solution

Watch Video Solution

4. Two batteries with emf 12 V and 13V are connected in parallel across a load resistor of 10Ω . The internal resistances of the two batteries are $1\Omega \text{ and } 2\Omega$ respectively . The voltage across the load lies between

A. 11. 6 V and 11.7 V

B. 11.5 V and 11.6 V

C. 11.4 V and 11.5 V

D. 11.7 V and 11.8 V

Answer: B

Watch Video Solution

5. A uniform wire of length / and radius r has a resistance of 100 Ω. It is recast into a wire of radius $\frac{r}{2}$. The resistance of new wire will be:

A. 1600Ω

B. 400Ω

C. 200Ω

D. 100Ω

Answer: A

Watch Video Solution

6. 

In the above circuit the current in each resistance is

A. 0.5A

B. $0A$

C. $1A$

D. $0.25A$

Answer: B

View Text Solution

7. Which of the following statements is false?

A. A rheostat can be used as a potential divider

B. Kirchhoff's second law represents energy conservation

C. Wheatstone bridge is the most sensitive when all the four resistances are of the same order of magnitude

D. In a balanced Wheatstone bridge if the cell and the galvanometer are exchanged, the null point is disturbed.

Answer: D

Watch Video Solution

8. 

In the circuit shown, the resistance r is a variable resistance. If for $r = fR$, the heat generation in r is maximum then the value of f is:

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

B. 1

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

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

Answer: C

View Text Solution

9. In the electric network shown, when no current flows through the 4Ω resistor in the arm EB, the potential difference between the points A and D

will be :

A. 6 V

B. 3 V

C. 5 V

D. 4 V

Answer: C

View Text Solution

10. In the circuit shown, the current in the 1Ω resistor is :

A. 0.13 A, from Q to P

B. 0.13 A, from P to Q

C. 1.3 A from P to Q

D. 0A

Answer: A

View Text Solution

11. A d.c. main supply of e.m.f. $220V$ is connected across a storage battery of e.m.f. 200 V through a resistance of 1Ω . The battery terminals are connected to an external resistance 'R'. The minimum value of 'R', so that a current passes through the battery to charge it is:

A. 7Ω

B. 9Ω

C. 11Ω

D. Zero

Answer: C

Watch Video Solution

12. In a large building, there are 15 bulbs of 40 W, 5 bulbs of 100 W, 5 fans of 80 W and 1 heater of 1 kW. The voltage of electric mains is 220 V. The minimum capacity fo the main fuse of the building will be :

A. $8A$

B. $10A$

C. $12A$

D. $14A$

Answer: C

Watch Video Solution

Exercise 1 Concept Builder Topicwise Topic 1 Electric Current Drift Of Electrons And Ohm S Low

1. 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. Is

B. $\sqrt{I/s}$

C. I/s

D. $(I/s)^2$

Answer: C

Watch Video Solution

2. A current passes through a resistor.Let K_1 and K_2 represent the average kinetic energy of the conduction electrons and the metal ions respectively.

A. $K_1 < K_2$

B. $K_1 = K_2$

C. $K_1 > K_2$

D. any of these three may occur

Answer: C

Watch Video Solution

3. From the graph between current (I) and voltage (V) shown below, identify the portion corresponding to negative resistance.

A. AB

B. BC

C. CD

D. DE

Answer: C

View Text Solution

4. A current of 1 mA is flowing through a copper wire. How many electrons will pass a given point in one second $\left[e = 1.6 \times 10^{19}\text{Coulomb}\right]$

A. 6.25×10^8

B. 6.25×10^{31}

C. 6.25×10^{15}

D. 6.25×10^{19}

Answer: C

Watch Video Solution

5. A conducting wire of cross-sectional area $1cm^2$ has 3×10^{23} charge carriers per m3. If wire carries a current of $24mA$, then drift velocity of carriers is

A. 5×10^{-2} m/s

B. $0.5m/s$

C. $5 \times 10^{-3}m/s$

D. $5 \times 10^{-6}m/s$

Answer: C

Watch Video Solution

6. At room temperature copper has free electron density of $8.4 \times 10^{28} perm^3$. The copper conductor has a cross-section of $10^{-6}m^2$ and

carries a current of 5.4 A. What is the electron drift velocity in copper?

A. 400 m/s

B. 0.4 m/s

C. 0.4 mm/s

D. 72 m/s

Answer: C

7. The number of free electrons per 100 mm of ordinary copper wire is 2×10^{21}. The average drift speed of electorn is $0.25mm/s$. What is the current flowing?

A. $5A$

B. $80A$

C. $8A$

D. $0.8A$

Answer: D

Watch Video Solution

8. Two wires A an dB of the same material, having radii in the ratio I : 2 and carry currents in the ratio 4: I. The ratio of drift speed of electrons in A and Bis :

A. $16:1$

B. $1:16$

C. $1:4$

D. $4:1$

Answer: A

Watch Video Solution

9. An Aluminium (Al) rod. With area of cross-section $4 \times 10^{-6} m^2$ has a current of 5 ampere. Flowing through it. Find the drift velocity of electron in the rod. Density of $AI = 2.7 \times 10^3 kg/m^3$ and Atomic wt.= 27. Assume that each Al atom provides one electron.

A. $8.6 \times 10^{-4} m/s$

B. $1.29 \times 10^{-4} m/s$

C. $2.8 \times 10^{-2} m/s$

D. $3.8 \times 10^{-3} m/s$

Answer: B

Watch Video Solution

10. A charged belt 60 cm wide, travels at $20ms^{-1}$ between a source of charge and a sphere. The belt carries charges into the sphere at a rate corresponding to $120\mu A$. Calculate the surface charge density of the belt.

A. $6.7 \times 10^{-5}C \quad m^{-2}/s$

B. $6.7 \times 10^{-4}C \quad m^{-2}/s$

C. $6.7 \times 10^{-7}C \quad m^{-2}/s$

D. $6.7 \times 10^{-8}C \quad m^{-2}/s$

Answer: B

Watch Video Solution

11. 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 to the right

B. 0.66 A to the right

C. 0.66 A to the left

D. zero

Answer: B

12. A conductor-carries a current of $50\mu A$ If the area of cross-section of the conductor is $50mm^2$, then value of the current density in Amis

A. 0.5

B. 1

C. 10^{-3}

D. 10^{-6}

Answer: B

Watch Video Solution

13. When the current i is flowing through a conductor, the drift velocity is v . If 2i current is flowed through the same metal but having double the area of cross-section, then the drift velocity will be

A. $v4$

B. $v/2$

C. v

D. $4v$

Answer: C

Watch Video Solution

Exercise 1 Concept Builder Topicwise Topic 2 Resistance Conductance And Resistivity

1. Two resistors A and B have resistances R_A and $R_B$respectively with $R_A < (R_B$.the

resistivities of their materials are (ρ_A) and (ρ_B).

A. $\rho_A > \rho_B$

B. $\rho_A = \rho_B$

C. $\rho_A < \rho_B$

D. The information is not sufficient to find the relation between ρ_A and ρ_B.

Answer: D

Watch Video Solution

2. If n, e, τ, m, are representing electron density charge, relaxation time and mass of an electron respectively then the resistance of wire of length 1 and cross sectional area A is given by

A. $\frac{ml}{Ne^2A^2\tau}$

B. $\frac{2m\tau A}{Ne^2l}$

C. $\frac{Ne^2\tau A}{2ml}$

D. $\frac{Ne^2A}{2m\tau l}$

Answer: A

Watch Video Solution

3. A piece of copper and another of germanium are cooled from room temperature to $80K$. The resistance of

A. each of them increases

B. each of them decreases

C. copper increases and germanium decreases

D. copper decreases and germanium increases

Answer: D

Watch Video Solution

4. A negligbly small current is passed through a wire of length 15 cm and uniform cross-section $6.0 \times 10^{-7} m^2$ and its resistance is measured to be 5.0Ω. What is the resistivity of the material at the temperature of the experiment ?

A. $1 \times 10^{-7}\Omega - m$

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

C. $3 \times 10^{-7}\Omega - m$

D. $4 \times 10^{-7}\Omega - m$

Answer: B

Watch Video Solution

5. Two copper wires have their masses in the ratio 2 : 3 and the lengths in the ratio 3 : 4. The ratio of the resistances is

A. $4:9$

B. $27:32$

C. $16:9$

D. $27:128$

Answer: B

Watch Video Solution

6. The massses of the three wires of copper are in the ratio 1 : 3 : 5. And their lengths are in th ratio 5 : 3 : 1. the ratio of their electrical resistance is

A. $1:3:5$

B. $5:3:1$

C. $1:25:125$

D. $125:45:3$

Answer: D

Watch Video Solution

7. As the temperature of a conductor increases,its resistivity and conductivity change.the ratio of resistivity to conductivity

A. increases

B. decreases

C. remains constant

D. may increase or decrease depending on the actual temperature.

Answer: C

Watch Video Solution

8. Two wires have lengths, diameters and specific resistances all in the ratio of $1:2$. The resistance of the first wire is 10 ohm. Resistance of the second wire in ohm will be

A. 5

B. 10

C. 20

D. infinite

Answer: B

Watch Video Solution

9. The length of a given cylindrical wire is increased by 100%. Due to the consequent decrease in diameter the change in the resistance of the wire will be

A. 200%

B. 1

C. 0.5

D. 3

Answer: D

Watch Video Solution

10. A wire has a resistance of 3.1Ω at $30^{\circ}C$ and a resistance 4.5Ω at 100°C. The temperature coefficient of resistance of the wire

A. $0.008^{\circ}C^{-1}$

B. $0.0034^{\circ}C^{-1}$

C. $0.0025^{\circ}C^{-1}$

D. $0.0012^{\circ}C^{-1}$

Answer: A

Watch Video Solution

11. The resistance of a wire at room temperature $30^{\circ} C$ is found to be 10Ω . Now to increase the resistance by 10% , the temperature of the wire must be [The temperature coefficient of resistance of the material of the wire is 0.002 per $.^{\circ} C$]

A. 36°C

B. 86°C

C. 63°C

D. 33°C

Answer: B

Watch Video Solution

12. The electric resistance of a certain wire of iron is R . If its length and radius are both doubled, then

A. the resistance and the specific resistance, will both remain unchanged

B. the resistance will be doubled and the specific resistance will be halved

C. the resistance will be halved and the specific resistance will remain unchanged

D. the resistance will be halved and the specific resistance will be doubled

Answer: C

 Watch Video Solution

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

A. 1.5 volt

B. 3 volt

C. 3 volt

D. 1 volt

Answer: D

Watch Video Solution

14. Two resistances R_1 and R_2 are made of different materials. The temperature coefficient of the material of R_1 is α and of the material of R_2 is $-\beta$. The resistance of the series combination of

R_1 and R_2 will not change with temperature, if R_1 / R_2 equals.

A. $\frac{\alpha}{\beta}$

B. $\frac{\alpha + \beta}{\alpha - \beta}$

C. $\frac{\alpha^2 + \beta^2}{2\alpha\beta}$

D. $\frac{\beta}{\alpha}$

Answer: D

Watch Video Solution

Exercise 1 Concept Builder Topicwise Topic 3 Combination Of Resistors

1. You have been provided with four 100 ohm resistors each with a tolerance of 2%. The number of ways in which these can be combined to have different equivalent resistance is

A. seven different combinations and seven different equivalents

B. eight different combinations and seven different equivalents resistances

C. nine different combinations and eight different resistances

D. ten different combinations and nine different resistances

Answer: D

View Text Solution

2. A 3 volt battery with negligible internal resistance is connected in a circuit as shown in the figure. The current I, in the circuit will be

A. $1A$

B. $1.5A$

C. $2A$

D. $1/3A$

Answer: B

View Text Solution

3. You are given two resistances R_1 and R_2. By using them in series and in parallel, you can obtain four resistances of 8Ω and 1.5Ω. The value of R_1 and R_2 are

A. $1\Omega, 7\Omega$

B. $1.5\Omega, 6.5\Omega$

C. $3\Omega, 5\Omega$

D. $2\Omega, 6\Omega$

Answer: D

Watch Video Solution

4. The total current supplied to the circuit by the battery is

A. $4A$

B. $2A$

C. $1A$

D. $6A$

Answer: A

View Text Solution

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

is 10Ω. The total resistance of the combination will be

A. 10Ω

B. 20Ω

C. 40Ω

D. 100Ω

Answer: C

Watch Video Solution

6. A, B and C are voltmeters of resistance R, 1.5 R and 3R respectively as shown in the figure. When some potential difference is applied between X and Y, the voltmeter readings are V_A, V_B and V_C respectively. Then

A. $V_A \neq V_B = V_C$

B. $V_A = V_B \neq V_C$

C. $V_A \neq V_B \neq V_C$

D. $V_A = V_B = V_C$

Answer: D

View Text Solution

7. Two metal wires of identical dimesnios are connected in series. If σ_1 and σ_2 are the conducties of the metal wires respectively, the effective conductivity of the combination is

A. $\frac{\sigma_1 + \sigma_2}{2\sigma_1\sigma_2}$

B. $\frac{\sigma_1 + \sigma_2}{\sigma_1\sigma_2}$

C. $\frac{\sigma_1\sigma_2}{\sigma_1 + \sigma_2}$

D. $\frac{2\sigma_1\sigma_2}{\sigma_1 + \sigma_2}$

Answer: D

Watch Video Solution

8. A wire of resistance 12 ohms per meter is bent to form a complete circle of radius 10 cm. The resistance between its two diametrically opposite points, A and B as shown in the figure, is

A. 3Ω

B. $6\pi\Omega$

C. 6Ω

D. $0.6\pi\Omega$

Answer: A

View Text Solution

9. Three resistance each of 4Ω are connected to form a triangle. The resistance between any two terminals is

A. 12Ω

B. 2Ω

C. 6Ω

D. $8/3\Omega$

Answer: D

Watch Video Solution

10. A letter A is constructed as a uniform wire of resistance 1 ohm/cm. The sides of the letter are 20 cm long and the cross piece in the middle is 10 cm long while the vertex angle is 60° the resistance of the letter between the two ends of the legs is

A. 50.0Ω

B. 10Ω

C. 36.7Ω

D. 26.7Ω

Answer: D

Watch Video Solution

Exercise 1 Concept Builder Topicwise Topic 4 Kirchhoff S Laws And Cells

1. The four wires from a larger circuit intersect at junction A as shown. What is the magnitude and direction of the current between points A and B ?

A. 2 A from A to B

B. 2A from B to A

C. 3A from A to B

D. 2A from B to A

Answer: C

View Text Solution

2. A battery of emf 10 V and internal resistance 3Ω 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. zero

C. 1.5 V

D. 8.5 V

Answer: D

Watch Video Solution

3. Five cells each of emf E and internal resistance r send the same amount of current through an external resistance R whether the cells are

connected in parallel or in series. Then the ratio $\left(\frac{R}{r}\right)$ is

A. 2

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

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

D. 1

Answer: D

Watch Video Solution

4. The figure below shows currents in a part of electric circuit. The current i is

A. 1.7 amp

B. 3.7 amp

C. 1.3 amp

D. 1 amp

Answer: A

View Text Solution

5. The potential difference betwee11 the terminals of a cell in an open circuit is 2.2 V. When a resistor of 5Ω is connected across the terminals of the cell, the potential difference between the terminals of the cell is found to be 1.8 V. The internal resistance of the cell is

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

B. $\frac{10}{9}\Omega$

C. $\frac{9}{10}\Omega$

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

Answer: B

Watch Video Solution

6. Two batteries, one of emf 18 volt and internal resistance 2Ω and the other of emf 12 volt and internal resistance 1Ω, are connected as shown. The voltmeter V will record a reading of

A. 30 volt

B. 18 volt

C. 15 volt

D. 14 volt

Answer: D

View Text Solution

7. A cell having an emf E and internal resistance r is connected across a variable external resistance R. As the resistance R is increased, the plot of potential difference V across R is given by

A. 

B. 

C. 

D. 

Answer: C

Watch Video Solution

Exercise 1 Concept Builder Topicwise Topic 5 Electrical Energy Power And Heating Effect Of Current

1. An electric heater operating at 220 volts boils 5 litre of water in 5 minutes. If it is used on 110 volts, it will boil the same amount of water in

A. 5

B. 20

C. 10

D. 2.5

Answer: B

Watch Video Solution

2. The thermo emf E of a thermocouple is found to vary wit temperature T of the junction (cold junction is $0^\circ C$) as

$$E = 40T - \frac{T^2}{20}$$

The temperature of inversion for the thermocouple is

A. $100^\circ C$

B. $200^\circ C$

C. 400°

D. $800^\circ C$

Answer: C

Watch Video Solution

3. A electric tea kettle has two heating coils. When first coil of resistance R_1 is switched on, the kettle begins to boil tea in 6 minutes. When second coil of resistance R_2 is switched on, the boiling begins in 8 minutes. The value of R_1 / R_2 is

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

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

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

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

Answer: C

Watch Video Solution

Watch Video Solution

4. The thermo emf of thermocouple varies with the temperature θ of the hot junction as $E = a\theta + b\theta^2$ in volts where the ratio a/b is $700^\circ C$. If the cold junction is kept at $0^\circ C$, then the neutral temperature is

A. $1400^\circ C$

B. $350^\circ C$

C. $700^\circ C$

D. No neutral temperature is possible for this termocouple.

Answer: D

Watch Video Solution

5. The resistance of hot tungsten filament is about 10 times the cold resistance. What will be the resistance of 100 W and 200 V lamp when not in use?

A. 20Ω

B. 40Ω

C. 200Ω

D. 400Ω

Answer: B

Watch Video Solution

6. Ten identical cells connected is series are needed to heated a wire of length one meter and radius 'r'by $10^{\circ}C$ in time t. How many cells will be required to heat the wire of length two meter of the same radius by the same temperature in time 't' ?

A. 10

B. 20

C. 30

D. 40

Answer: B

Watch Video Solution

7. Two 220 V,100 W bulbs are connected first in series and then in parallel. Each time the combination is connected to a 220 V AC supply line. The power drawn by the combination in each case respectively will be :

A. 50 watt, 200 watt

B. 50 watt, 100 wat

C. 100 watt, 50 watt

D. 200 watt, 150 watt

Answer: A

Watch Video Solution

8. A $100W$ bulb and a 25W bulb are desigened for the same voltage. They have filaments of the same length and material. The ratio of the diameter of $100W$ bulb to that of the $25W$ bulb is

A. $4:1$

B. $2:1$

C. $\sqrt{2}:1$

D. $1:2$

Answer: B

Watch Video Solution

9. Water boils in an electric kettle in 15 minutes after switching on. If the length of the heating wire is decreased to $2/3$ of its initial value, then

the same amount of water will with the supply voltage in

A. 8 minutes

B. 10 minutes

C. 12 minutes

D. 15 minutes

Answer: B

Watch Video Solution

10. 125 cm of potentiometer wire balances the emf. of a cell and 100 cm of the wire is required for balance, if the poles of the cell are joined by a 2Ω resistor. Then the internal resistance of the cell is

A. 0.25Ω

B. 0.5Ω

C. 0.75Ω

D. 1.25Ω

Answer: B

Watch Video Solution

11. The current in the primary circuit of a potentiometer is $0.2A$. The specific resistance and cross-section of the potentiometer wire are 4×10^{-7} ohm meter and $8 \times 10^{-7} m^2$ respectively. The potential gradient will be equal to -

A. $1V/m$

B. $0.5V/m$

C. $0.1V/m$

D. $0.2V/m$

Answer: C

Watch Video Solution

12. 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. 2Ω

B. 0.2Ω

C. $2k\Omega$

D. 20Ω

Answer: A

Watch Video Solution

13. The resistances in the two arms of the meter bridge are 5Ω and $R\Omega$, respectively. When the resistance R is shunted with an equal resistance, the new balance point is at $1.6l_1$. The resistance 'R' is:

A. 10Ω

B. 15Ω

C. 20Ω

D. 25Ω

Answer: B

View Text Solution

14. Five resistances have been connected as shown in the figure. The effective resistance between A and B is

A. $\frac{14}{3}\Omega$

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

C. 14Ω

D. 21Ω

Answer: A

View Text Solution

15. In a meter bridge experiment null point is obtained at 20 cm. from one end of the wire when resistance X is balanced against another resistance Y. If X $<$ Y, then where will be the new

position of the null point from the same end, if one deicdes to balance a resistance of 4 X against Y

A. 40 cm

B. 80 cm

C. 50 cm

D. 70 cm

Answer: C

Watch Video Solution

16. A potentiometer is connected across A and B and a balance is obtained at 64.0 cm. When the potentiometer lead at B is moved to C, a balance is found at 8.0 cm. If the potentiometer is now connected across Band C, a balance will be found at

A. $8.0cm$

B. $56.0cm$

C. $64.0cm$

D. $72.0cm$

Answer: B

View Text Solution

17. In a Wheatstone's brigde all the four arms have equal resistance R. If the resistance of the galvanometer arm is also R, the equivalent resistance of the combination as seen b the battery is

A. $2R$

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

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

D. R

Answer: D

Watch Video Solution

Exercise 2 Concept Applicator

1. An electric current is passed through a circuit containing two wires of the same material, connected in parallel. If the lengths and radii are in the ratio of 4/3 and 2/3, then the ratio of the current passing through the wires will be

A. $8/9$

B. $1/3$

C. 3

D. 2

Answer: B

 Watch Video Solution

2. The supply voltage to room is 120 V. The resistance of the lead wires is 6Ω. A 60 W bulb is already switched on. What is the decrease of

voltage across the bulb, when a 240 W heater is switched on in parallel to the bulb?

A. zero

B. 2.9 Volt

C. 13.3 Volt

D. 10.04 Volt

Answer: D

3. A current of $2A$ flows through a 2Ω resistor when connected across a battery. The same battery supplies a current of $0.5A$ when connected across a 9Ω resistor. The internal resistance of the battery is

A. 0.5Ω

B. $1/3\Omega$

C. $\frac{1}{4}\Omega$

D. 1Ω

Answer: B

Watch Video Solution

Watch Video Solution

4. In a potentionmeter experiment, when three cells A, B and C are connected in series, the balancing length is found to be 740 cm. If A and B are connected in series, balancing length is 440 cm and for B and C connected in series, it is 540 cm. The emf of E_A, E_B and E_C are respectively (in volts)

A. $1, 1.2 \text{ and } 1.5$

B. $1, 2 \text{ and } 3$

C. $1.5, 2 \text{ and } 3$

D. $1.5, 2.5$ and 3.5

Answer: A

 Watch Video Solution

5. Two identical cells connected in series send 1.0A current through a 5Ω resistor. When they are connected in parallel, they send 0.8 A current through the same resistor. What is the internal resistance of the cell?

A. 0.5Ω

B. 1.0Ω

C. 1.5Ω

D. 2.5Ω

Answer: D

Watch Video Solution

6. Resistors of 1, 2, 3 ohm are connected in the form of a triangle. If a 1.5 volt cell of negligible internal resistance is connected across 3 ohm resistor, the current flowing through this resistance will be

A. $0.25A$

B. $0.5A$

C. $1.0A$

D. $1.5A$

Answer: B

Watch Video Solution

7. A heater is operated with a power of 1000 W in a 100 V line. It is connected in combination with a resistance of 10Ω and a resistance R to a 100 V line as shown in figure. What should be the value

of R so that the heater operates with a power of 62.5 W?

A. 10Ω

B. 62.5Ω

C. $\frac{1}{5}\Omega$

D. 5Ω

Answer: D

View Text Solution

8. A cell sends a current through a resistance R_1 for time t, next the same cell sends current through another resistance R_2 for the time t If the same amount of heat is developed in both the resistance then find the internal resistance of the cell

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

B. $R_1 + R_2$

C. zero

D. $\sqrt{R_1 R_2}$

Answer: D

Watch Video Solution

9. In a metre bridge experiment, resistances are connected as shown in figure. The balancing length 1_1 is 55 cm. Now an unknown resistance x is connected in series with P and the new balancing length is found to be 75 cm. The value of x is

A. $\frac{54}{13}\Omega$

B. $\frac{20}{11}\Omega$

C. $\frac{48}{11}\Omega$

D. $\frac{11}{48}\Omega$

Answer: C

View Text Solution

10. Two wires of same metal have the same length but their cross- sections are in the ratio 3 :1 . They are joined in series. The resistance of the thicker wire is 10Ω . The total resistance of the combination will be

A. $5/2\Omega$

B. $40/3\Omega$

C. 40Ω

D. 100Ω

Answer: C

Watch Video Solution

11. A cylindrical solid of length L and radius a is having varying resistivity given by $\rho = \rho_0 x$, where ρ_0 is a positive constant and x is measured from left end of solid. The cell shown in the figure is having emf V and negligible internal resistance.

The electric field as a function of x is best described by

A. $\frac{2V}{L^2}x$

B. $\frac{2V}{\rho_0 L^2}x$

C. $\frac{V}{L^2}x$

D. None of these

Answer: A

View Text Solution

12. Two sources of equal emf are connected to an external resistance R. The internal resistance of the two sources are R_1 and $R_2(R_1 > R_1)$. if the potential difference across the source having internal resistance R_2 is zero, then

A. $R = R_2 - R_1$

B. $R = R_2 \times (R_1 + R_2)/(R_2 - R_1)$

C. $R = R_1 R_2/(R_2 - R_1)$

D. $R = R_1 R_2/(R_1 - R_2)$

Answer: A

Watch Video Solution

Watch Video Solution

13. The figure shows three circuits I, II and III which are connected to a 3V battery. If the powers dissipated by the configurations I, II and III are P_1, P_2 and P_3 respectively, then:

A. $P_1 > P_2 > P_3$

B. $P_1 > P_3 > P_2$

C. $P_2 > P_1 > P_3$

D. $P_3 > P_2 > P_1$

Answer: C

View Text Solution

14. It takes 12 minutes to boil 1 litre of water in an electric kettle. Due to some defect it becomes necessary to remove 20% turns of heating coil of the kettle. After repair, how much time will it take to boil 1 litre of water?

A. 9.6 minute

B. 14.4 minute

C. 16.8 minute

D. 16.8 minute

Answer: A

Watch Video Solution

15. Resistance of 12Ω and $X\Omega$ are connected in parallel in the left gap and resistances of 9Ω and 7Ω are connected in series in the right gap of the meter bridge. If the balancing length is 36 cm, then the value of resistance X is

A. 72Ω

B. 54Ω

C. 36Ω

D. 64Ω

Answer: C

Watch Video Solution

16. A battery is charged at a potential fo 15 V for 8 h when the current folwing is 10A. The battery on discharge supplies a current of 5A fo 15h . The mean terminal voltage during discharge is 14V. The watt-hour efficiency of the battery is

A. 87.5%

B. 82.5%

C. 80%

D. 90%

Answer: A

Watch Video Solution

17. The thermo e.m.f E in volts of a certain thermocouple is found to very with temperature difference θ in $^{\circ}C$ between the two junctions

according to the relation $E = 30\theta - \frac{\theta^2}{15}$. The neutral temperatur e for the thermo - couple will be .

A. $30^\circ C$

B. $450^\circ C$

C. $400^\circ C$

D. $225^\circ C$

Answer: D

Watch Video Solution

18. In the circuit shown below, all the three voltmeters are identical and have very high resistance (but not ∞). Each resistor has the same resistance. The voltage of the ideal battery shown is 9V. Find the reading of voltmeter V_3 (in volts).

A. 3

B. 6

C. 2

D. 9

Answer: C

View Text Solution

19. A cell when balanced with potentiometer gave a balance length of50 cm. 4.5Ω external resistance is introduced in the circuit, now it is balanced on 45 cm. The internal resistance of cell is

A. 0.25Ω

B. 0.5Ω

C. 1.0Ω

D. 1.5Ω

Answer: A

Watch Video Solution

20. v34_stem

A. $m = 12, n = 2$

B. $m = 8, n = 3$

C. $m = 2, n = 12$

D. $m = 6, n = 4$

Answer: A

Watch Video Solution

21. Two bulbs of 500 watt and 200 watt are manufactured to operate on 220 volt line. The ratio of heat produced in $500W$ and $200W$, in two cases, when firstly they are joined in parallel and secondly in series, will be

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

B. $\frac{5}{2}:\frac{5}{2}$

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

D. $\frac{2}{5}:\frac{2}{5}$

Answer: A

Watch Video Solution

22. In the circuit shown, current (in A) through 50 V and 30 V batteries are, respectively.

A. $2.5 \text{ and } 3$

B. $3.5 \text{ and } 2$

C. $4.5 \text{ and } 1$

D. $3 \text{ and } 2.5$

Answer: A

View Text Solution

23. The resistance of an electrical toasterf has a temeprature dependence given by $R(T) = R_0[(T - T_0)]$ in its range of operation. At $T_0 = 300K, R = 100\Omega$ and $atT = 500K, R = 120\Omega$. The toasterf is connected to a voltage source at 200 V and its temperature is raised at a con- stant rate from 300 to 500 K in 30 s. The total work done in raising the temperature is :

A. $400\frac{\ln(5)}{6}kJ$

B. $200\frac{\ln(2)}{3}kJ$

C. $60\ln\left(\frac{6}{5}\right)kJ$

D. $400\frac{\ln(1.5)}{1.3}kJ$

Answer: C

Watch Video Solution