PHYSICS

BOOKS - DISHA PHYSICS (HINGLISH)

CURRENT ELECTRICITY

Physics

1. When 5 V potential difference is applied across a wire of length 0.1 m, the drift speed of electrons is $2.5 \times 10^{-4} ms^{-1}$. If the electron

density in the wire is $8 \times 10^{28} m^{-3}$, the resistivity of the material is close to :

A. $1.6 \times 10^{-6} \Omega m$

B. $1.6 \times 10^{-5} \Omega m$

C. $1.6 \times 10^{-8} \Omega m$

D. $1.6 \times 10^{-7} \Omega m$

Answer:

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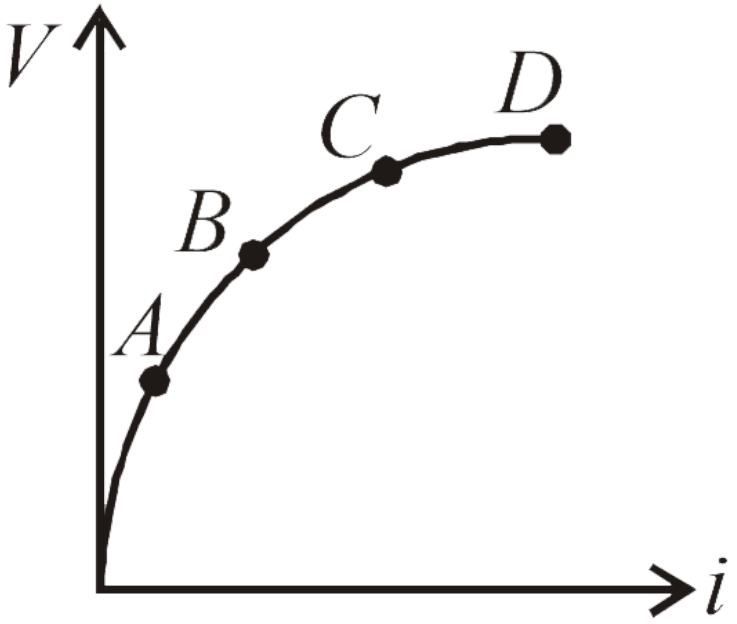
2. Variation of current passing through a conductor as the voltage applied across its ends is varied as shown in the adjoining diagram. If the resistance (R) is determined at the points A, B, C and D, we will find that



A. $R_C = R_D$

B. $R_B > R_A$

C. $R_C > R_B$

D. $R_A > R_B$

Answer:

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3. The length of a wire of a potentiometer is 100 cm, and the e.m.f. of its standard cell is E volt. It is employed to measure the e.m.f. of a

battery whose internal resistance is 0.5Ω. If the balance point is obtained at I = 30 cm from the positive end, the e.m.f. of the battery is . where i is the current in the potentiometer wire.

A. $\frac{30E}{100.5}$

B. $\frac{30E}{(100-0.5)}$

C. $\frac{30(E-0.5i)}{100}$

D. $\frac{30E}{100}$

Answer:

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4. 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. $125:15:1$

Answer:

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5. n equal resistors are first connected in series and then connected in parallel. What is the ratio of the maximum to the minimum resistance ?

A. n

B. $1/n^2$

C. n^2

D. $1/n$

Answer:

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6. A battery is charged at a potential of $15V$ for 8 hours when the current flowing is $10A$. The battery on discharge supplies a current of $5A$ for 15 hours. The terminal voltage during discharge is $14V$. The 'Watt-hour" efficiency of the battery is.

A. $80.5\ \%$

B. $82.5\ \%$

C. $80\ \%$

D. $90\ \%$

Answer:

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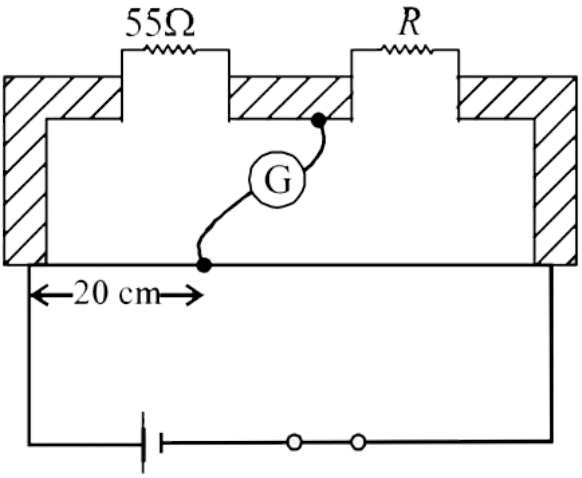
7. Shown in the figure below is a meter- bridge set up will null deflection in the galvanometer.



The value of the unknown resistor R is

A. 13.75Ω

B. 220Ω

C. 110Ω

D. 55Ω

Answer:

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8. In the equation AB = C, A is the current density, C is the electric field, Then B is

A. resistivity

B. conductivity

C. potential difference

D. resistance

Answer:

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9. The Kirchhoff's first law $(\Sigma i = 0)$ and second law $(\Sigma iR = \Sigma E)$, where the symbols have their usual meanings, are respectively based on

A. conservation of charge, conservation of momentum

B. conservation of energy, conservation of charge

C. conservation of momentum, conservation of charge

D. conservation of charge, conservation of energy

Answer:

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10. You are given a resistance coil and a battery. In which of the following cases is largest amount of heat generated?

A. When the coil is connected to the battery directly

B. When the coil is divided into two equal parts and both the parts are connected to the battery in parallel

C. When the coil is divided into four equal parts and all the four parts are connected to the battery in parallel

D. When only half the coil is connected to the battery

Answer:

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11. The resistance of the coil of an ammeter is R. The shunt required to increase its range $n - fold$ should have a resistance.

A. $\frac{R}{n}$

B. $\frac{R}{n-1}$

C. $\frac{R}{n+1}$

D. nR

Answer:

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12. On increasing the temperature of a conductor, its resistance increases because

A. relaxation time increases

B. mass of electron increases

C. electron density decreases

D. relaxation time decreases

Answer:

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13. 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:

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

position of the null point from the same end, if one decides to balance a resistance of $4X$ against Y will be at.

A. 40 cm

B. 80cm

C. 50 cm

D. 70 cm

Answer:

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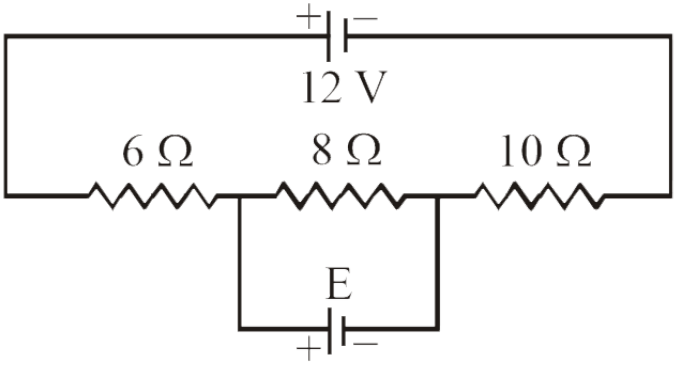
15. In the circuit shown, the current through 8 ohm is same before and after connecting E. The value of E is



A. 12V

B. 6V

C. 4V

D. 2V

Answer:

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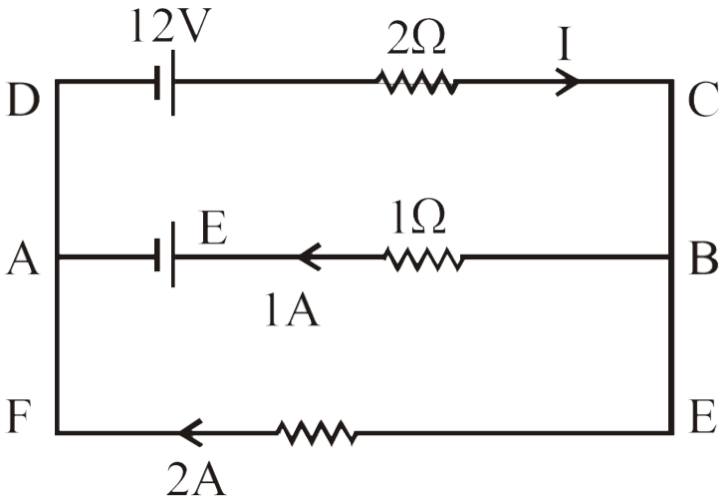
16. Find emf E of the cell as shown in figure.



A. 15 V

B. 10 V

C. 12 V

D. 5 V

Answer:

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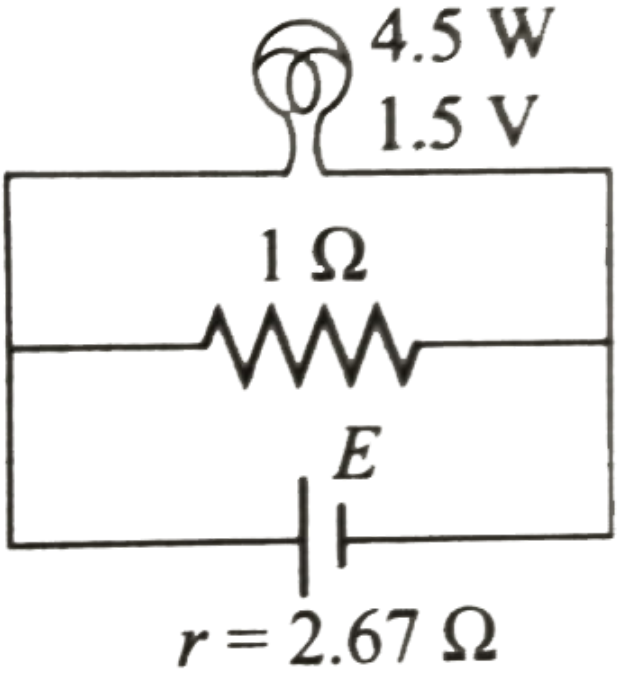
17. A torch bulb rated $4.5W, 1.5V$ is connected as shown in Fig. 7.35. The emf of the cell needed to make the bulb glow at full

intensity is



A. $4.5V$

B. $1.5V$

C. $2.67V$

D. $13.5V$

Answer:

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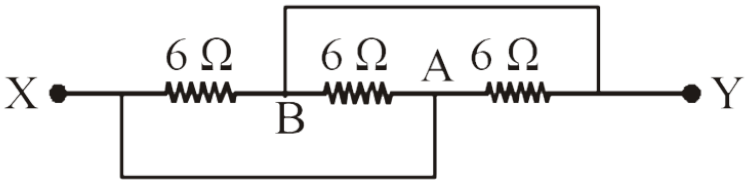
18. In a given network, each resistance has value of 6Ω . The point X is connected to point A by a copper wire of negligible resistance and point Y is connected to point B by the same wire. The effective resistance between X and Y will be



A. 18Ω

B. 6Ω

C. 3Ω

D. 2Ω

Answer:

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

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

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

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

Answer:

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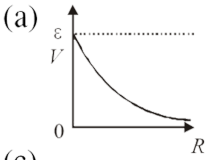
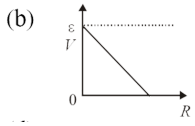
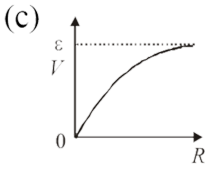
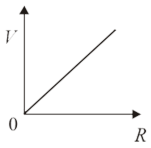
20. $2A$ cell having an emf ε and internal resistance r is connected across a variable external resistance R. As the resistance R is increased, the plot of potential difference V across R is given by

A. 

B. 

C. 

D. (d) 

Answer:

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21. If voltage across a bulb rated 220 volt-100 watt drops by 2.5% of its value, the percentage of the rated value by which the power would decrease is

A. 20%

B. 2.5%

C. 5%

D. 10%

Answer:

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22. If specific resistance of a potentiometer wire is $10^{-7}\Omega m$, the current flow through it is $0.1A$ and the cross-sectional area of wire is $10^{-6}m^2$ then potential gradient will be

A. $10^{-2}\text{volt}/m$

B. $10^{-4}\text{volt}/m$

C. $10^{-6}\text{volt}/m$

D. $10^{-8}\text{volt}/m$

Answer:

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23. Two resistance R_1 and R_2 are made of different material. The temperature coefficient of the material of R_1 is α and of the material

of R_2 is $-\beta$. Then resistance of the series combination of R_1 and R_2 will not change with temperature, if R_1/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:

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24. 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:

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25. 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. 100%

C. 50%

D. $300\ \%$

Answer:

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26. Potentiometer wire of length $1m$ is connected in series with 490Ω resistance and $2V$ battery. If $0.2m\frac{V}{c}m$ is the potential gradient, then resistance of the potentiameter wire is approximately

A. 4.9Ω

B. 7.9Ω

C. 5.9Ω

D. 6.9Ω

Answer:

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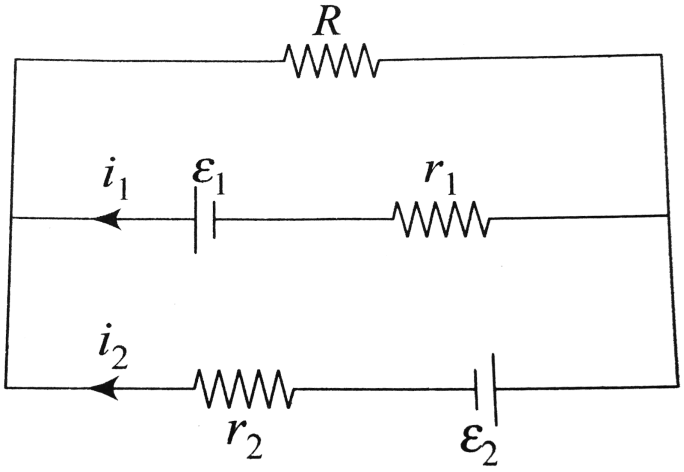
27. See the electrical circuit shown in this figure. Which of the following equations is the

correct equation for it ?



A. $\varepsilon_2 - i_2 r_2 - \varepsilon_1 - i_1 r_1 = 0$

B. $-\varepsilon_2 - (i_1 + i_2)R + i_2 r_2 = 0$

C. $\varepsilon_1 - (i_1 + i_2)R + i_i r_2 = 0$

D. $\varepsilon_1 - (i_1 + i_2)R - i_i r_2 = 0$

Answer:

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28. 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:

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29. 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:

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30. The resistance of the series combination of two resistances is S. When they are joined in

parallel the total resistance is P. If S= nP then the minimum possible value of n is

A. 2

B. 3

C. 4

D. 1

Answer:

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31. If an ammeter is to be used in place of a voltmeter, then we must connect with the ammeter a

A. low resistance in parallel

B. high resistance in parallel

C. high resistance in series

D. low resistance in series.

Answer:

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32. 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:

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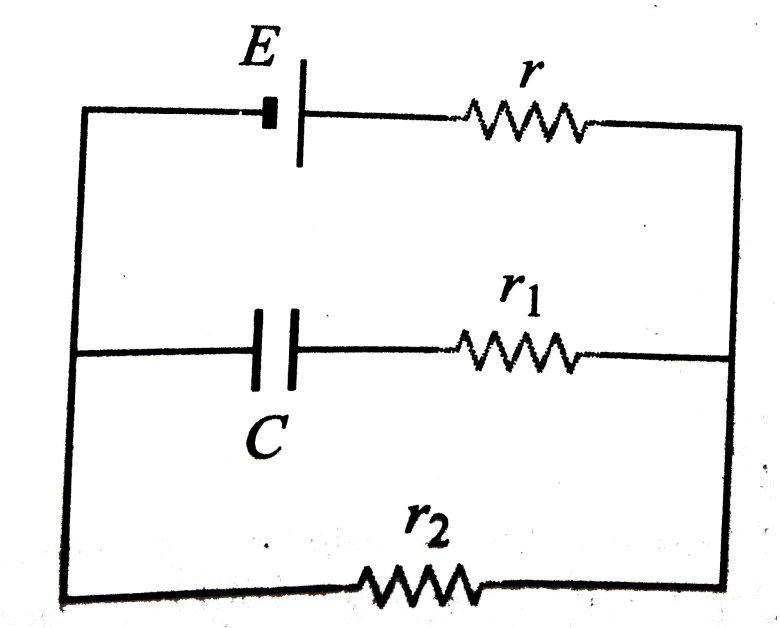
33. In the given circuit digram when the current reaclies steady state in the circuit , the charge an the capacity of capacitance C will

be



A. $CE\dfrac{r_2}{(r+r_2)}$

B. $CE\dfrac{r_1}{(r_1+r)}$

C. $CE\dfrac{r_2}{(r+r_1)}$

D. $CE\dfrac{r_1}{(r_2+r)}$

Answer:

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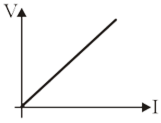
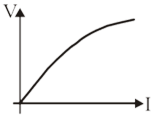
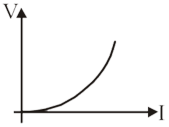
34. Suppose the drift velocity v_d in a material varied with the applied electric field E as $v_d \propto \sqrt{E}$. Then V – I graph for a wire made of such a material is best given by :

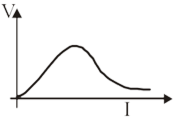
A. (a)



B. (b)



C. (c) 

D. (d) 

Answer:

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35. 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:

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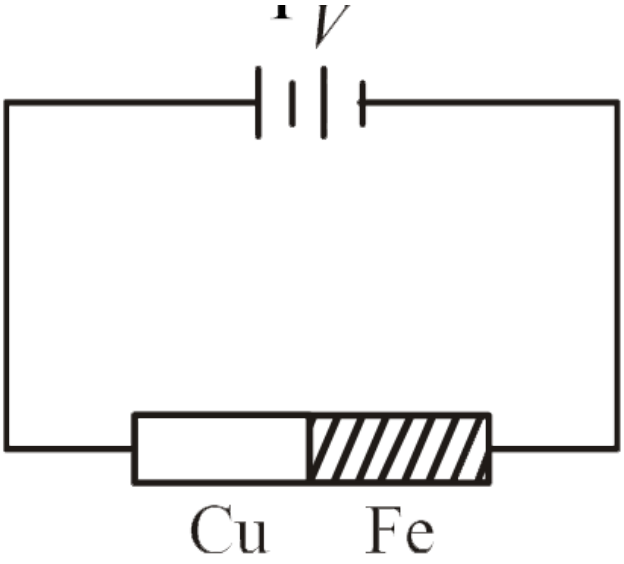
36. Two rods are joined end to end, as shown. Both have a cross-sectional area of $0.01cm^2$. Each is 1 meter long. One rod is of copper with a resistivity of 1.7×10^{-6} ohm-centimeter, the other is of iron with a resistivity of 10^{-5} ohm-centimeter. How much voltage is required to produce a current of 1 ampere in the rods?



A. $0.117V$

B. $0.00145V$

C. $0.0145V$

D. $1.7 \times 10^{-6}V$

Answer:

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37. An energy source will supply a constant current into the load if its internal resistance is

A. very large as compared to the load resistance

B. equal to the resistance of the load

C. non-zero but less than the resistance of the load

D. zero

Answer:

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38. 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. $36^{\circ} C$

B. $83^{\circ} C$

C. $63^{\circ} C$

D. $33^{\circ} C$

Answer:

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39. If the current in the electric bulb changes by 1%, then by what percentage will the power change?

A. $10\ \%$

B. $2\ \%$

C. $1\ \%$

D. $100\ \%$

Answer:

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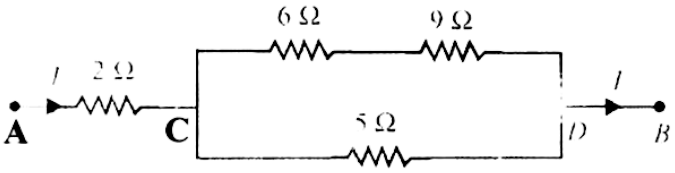
40. In the circuit shown in figure, the 5Ω resistance develops $20.00cal/s$ due to the current flowing through it. The heat developed in 2Ω resistance (in cal $/s$) is



A. 23.8

B. 14.2

C. 11.9

D. 7.1

Answer:

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41. 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. $\frac{P}{Q} = \frac{2R}{S_1 + S_2}$

B. $\frac{P}{Q} = \frac{R(S_1 + S_2)}{S_1 S_2}$

C. $\frac{P}{Q} = \frac{R(S_1 + S_2)}{2S_1 S_2}$

D. $\frac{P}{Q} = \frac{R}{S_1 + S_2}$

Answer:

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42. 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:

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43. A car has a fresh storage battery of emf 12 V and internal resistance $5.0 \times 10^{-2}\Omega$. If the starter motor draws a current of 90A, what is the terminal voltage of the battery when the starter is on?

A. 15 volt

B. 3 volt

C. 5 volt

D. 9 volt

Answer:

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44. 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. $5 \times 10^{-2} m/s$

B. $0.5m/s$

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

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

Answer:

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45. In the series combination of n cells each cell having emf ε and internal resistance r. If three cells are wrongly connected, then total emf and internal resistance of this combination will be

A. $n\varepsilon, (nr - 3r)$

B. $(n\varepsilon - 2\varepsilon)nr$

C. $(n\varepsilon - 4\varepsilon), nr$

D. $(n\varepsilon - 6\varepsilon), nr$

Answer:

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