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India's Number 1 Education App

PHYSICS

FOR IIT JEE ASPIRANTS OF CLASS 12 FOR PHYSICS

CURRENT ELECTRICITY

Examples

1. In a hydrogen atom, electron moves in an orbit of radius $5 \times 10^{-11}m$ with a speed of $2.2 \times 10^6 \frac{m}{s}$. Calculate the equivalent current.

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2. The current through a wire depends on time as

$I = i_0 + \alpha t,$

where $i_0 = 10A$ and $\alpha = 4As^{-1}$.Find the charge crossed through a section of the wire in 10 second

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3. Consider a wire of length 4m and cross-sectional areal $1mm^2$ carrying of 2A. If each cubic metre of the material contains 10^{29}free electrons, find the average time taken by an electron to cross the length of the wire.

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4. A rectangular block has dimensions $5cm \times 5cm \times 10cm$. Calculate the resistance measured between (a) two square ends and (b) the opposite rectangular ends. Specific resistance of the material is $3.5 \times 10^{-5} \Omega m$.

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5. Temperature coefficient of resistance of platinum is $\alpha = 3.92 \times 10^{-3} K^{-1}$ at $0^{\circ} C$. Find the temperature at which the increase in the resistance of platinum wire is 10% of its value at $0^{\circ} C$

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6. The resistance of iron wire is 10Ω and $\alpha = 5 \times \frac{10^{-3}}{.^{\circ} C}$. If a current of 30A is flowing in it at $20^{\circ} C$ keeping the potential difference across its length constant, if the temperature is incresed to $120^{\circ} C$ what is the current flowing through that wire?

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7. Resistance of a resistor at temperature $t^{\circ} C$ is $R_t = R_0(1 + \alpha t + \beta t^2)$, where R_0 is the resistance at $0^{\circ} C$. The temperature coefficient of resistance at temperature $t^{\circ} C$ is

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8. A silver wire has a resistance of 2.1Ω at $27.5^{\circ}C \& 2.7\Omega$ at $100^{\circ}C$

Determine the temperature coefficient of resistivity of silver.

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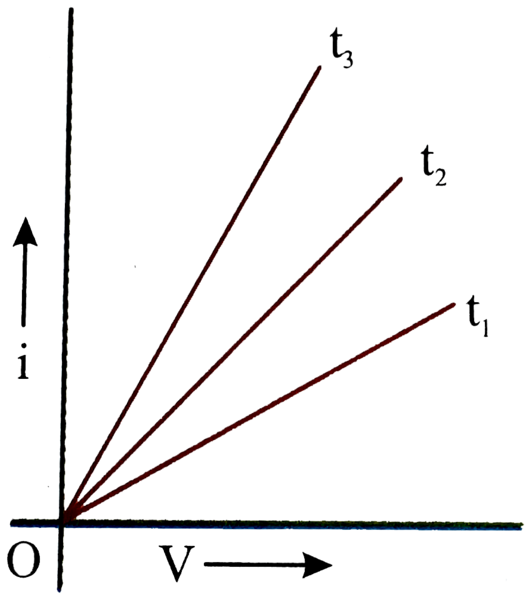
9. $V - i$ graphs of anichrome wire at three different temeperatures t_1, t_2 and t_3 are shown. From the graph.



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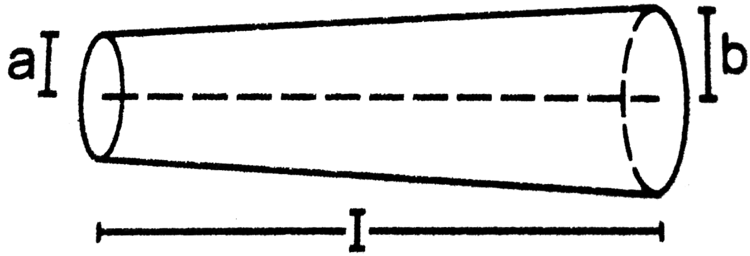
10. Shown a conductor of length l having a circular cross section. The radius of cross section varies linearly form $a \rightarrow b$. The resistivity of the material is(ρ).Assuming that $b - a < \; < l$,find the resistance of the conductor.



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11. A hollow cylinder of specific resistance ρ, inner radius R, outer radius $2R$ and length 1 is as shown in figure. What is the net resistance between the inner and outer surfaces?

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12. There are two concentric spheres of radius a and b respectively. If the space between them is filled with medium of resistivity ρ, then the resistance of the intergap between the two spheres will be (Assume $b > a$)

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13. A hollow copper cylinder is of inner radius 4 cm outer radius 5 cm. Now hollow portion is completely filled with suitable copper wires. Find percentage change in its electric resistance.

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14. Resistivity of the material of a conductor of uniform cross-section varies along its length as $\rho = \rho_0(1 + \alpha x)$. Find its resistance if its length is L and area of cross-section is A.

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15. How many number of turns of nichrome wire of specific resistance $10^{-6} \Omega m$ and diameter 2mm that should be wound on a cylinder of diameter 5 cm to obtain a resistance of 40Ω?

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

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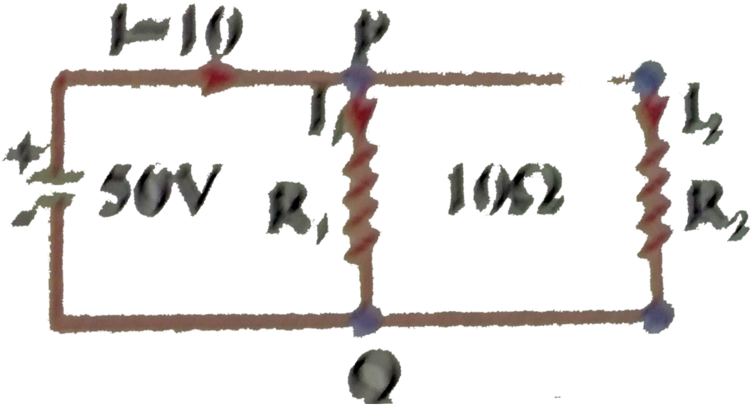
17. For a circuit shown in fig find the value of resistance R_2 and current I_2 flowing thorugh R_2



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18. Two wires of equal diameters of resistivities ρ_1 and ρ_2 and length x_1 and x_2 respectively are joined in series. Find the equivalent resistivity of the combination.

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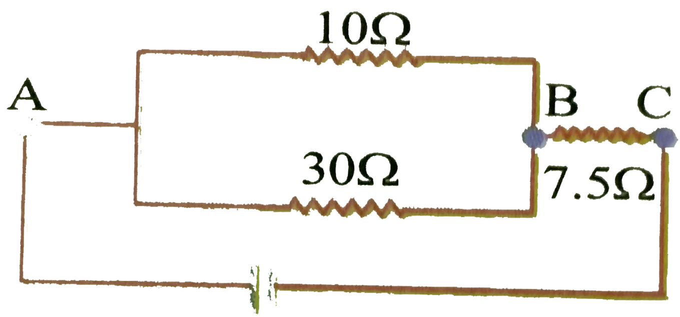
19.



Find equivalent resistance of the network in fig. Between points (i) A and B and (ii) A and C.

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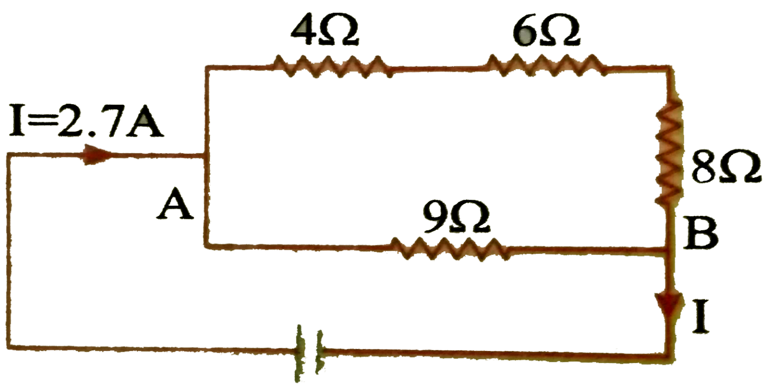
20.



Find potential difference between points A and B of the network shown in fig. and distribution of given main current through different resistors.

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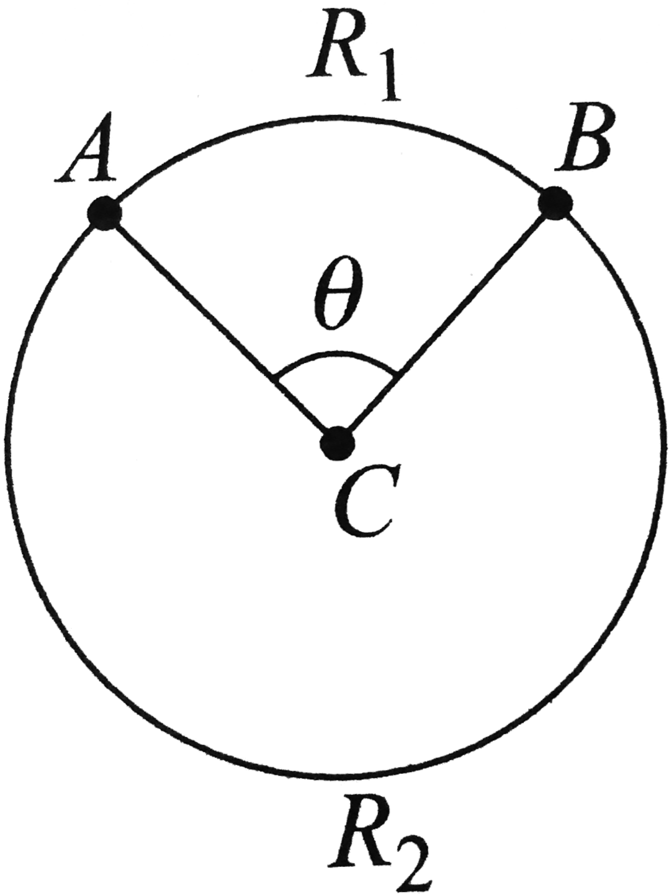
21. In a uniform ring of resistance R there are two points A and B such that $\angle ACB = \theta$, where C is the centre of the ring. The equivalent resistance between A and B is



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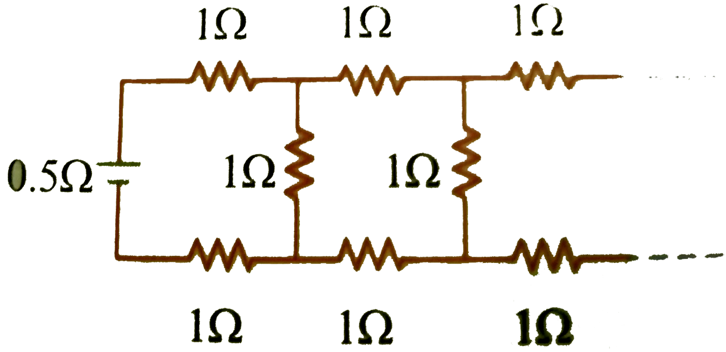

22. Determine the current drawn from a $12V$ supply with internal resistance 0.5Ω. By the infinite network shown in fig. Each resistor has 1Ω resistance.

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23. A fuse wire with radius of $0.2mm$ blows off with a current of 5 Amp. The fuse wire of same material,but of radius 0.3 mm will blow off with a current of

(1) $5 \times \frac{3}{2} Amp$

(2). $\frac{5\sqrt{3}}{2} Amp$

(3). $5\sqrt{\frac{27}{8}} Amp$

(4). $5 Amp$

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24. A 1 kQ heater is meant to operate at 200 V. (a) what is its resistance ? (b) How much power will it consume if the line voltage drops to 100 V? (c) how many units of electrical energy will it consume in a month (of 30 days) if it operates 10 hr daily at the specified voltage?

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25. A lamp of 100 W works at 220 volts What is its resistance and current capacity?

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26. A $100W - 220V$ bulb is connected to 110 V source. Calculate the power consumed by the bulb.

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27. A $100W$ and a $500W$ bulbs are joined in series and connected to the mains which bulb will glow brighter?

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28. A cell develops the same power across two resistances R_1 and R_2 separately. The internal resistance of the cell is

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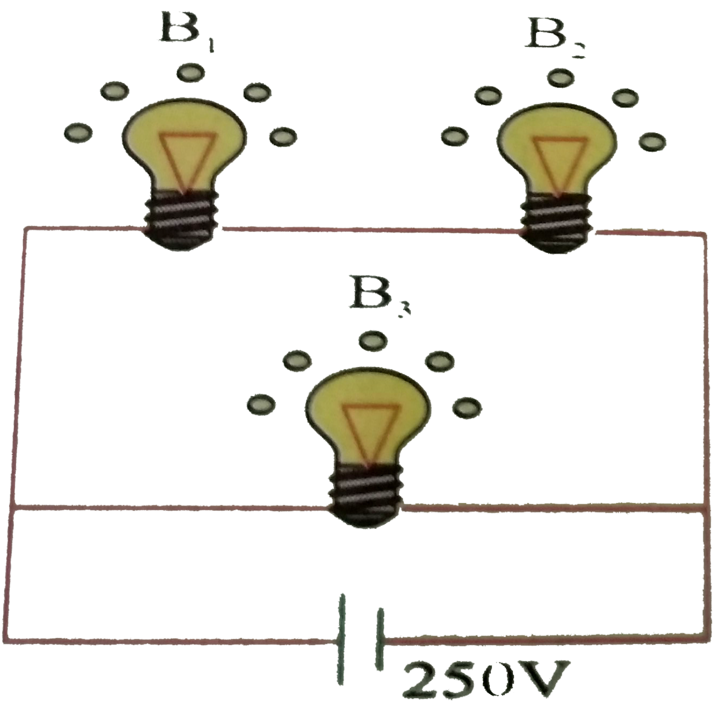

29.

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

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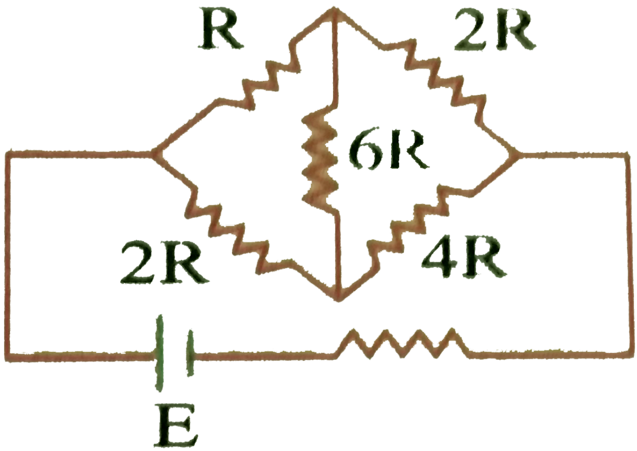
30. 

A battery if internal resistance 4Ω is conneted to the network of resistances as shown. What must be the value of R so that maximum power is delivered to the network Find the maximum power?

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31. When a current drawn from a battery is 0.5 A its terminal potential difference is 20 V. And when current drawn from it is 2.0 A, the terminal voltage reduces to 16 V. Find out. $e.m.f$ and internal resistance of the bettery.

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32. An ideal battery sends a current of 5A in a resistor.When another resistor of value $10\Omega$is connected in parallel ,the current through the battery is increased to 6A.Find the resistance of the first resistor.

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33. When a bettery is connected to the resistance of 10Ω the current in the circuit is 0.12 A the same battery gives $0.07A$ current with 20Ω calculate $e.m.f$ and internal resistance of the battery.

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34. Two cells A and B with same $e.m.f$ of 2 V each and with internal resistances $r_A = 3.5\Omega$ and $r_B = 0.5\Omega$ are connected in series with an external resistance $R = 3\Omega$ Find the terminal voltages across the two cells.

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35. Two cells A and B each of 2 V are connected in series to an external resistance $R = 1$ ohm.The internal resistance of A is $r_A = 1.9$ ohm and B is $r_B = 0.9$ ohm. Find the potential difference between the terminals of A.

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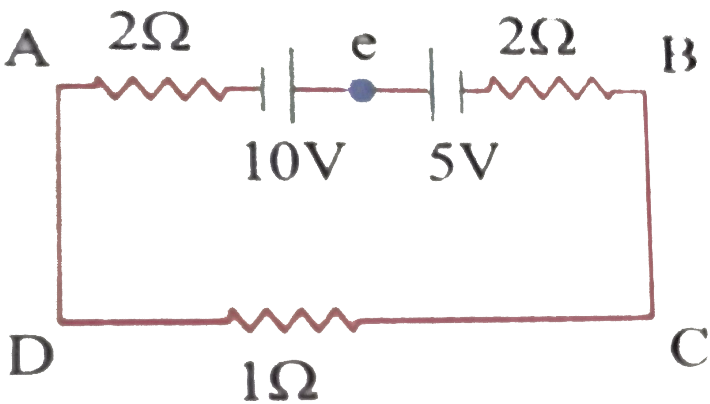
36. 

In the given circuit as shown below calculate the magnitude and direction of the current

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37. A voltmeter with resistance 500Ω is used to measure the emf of a cell of internal resistance 4Ω. The percentage error in the reading of the voltmeter will be

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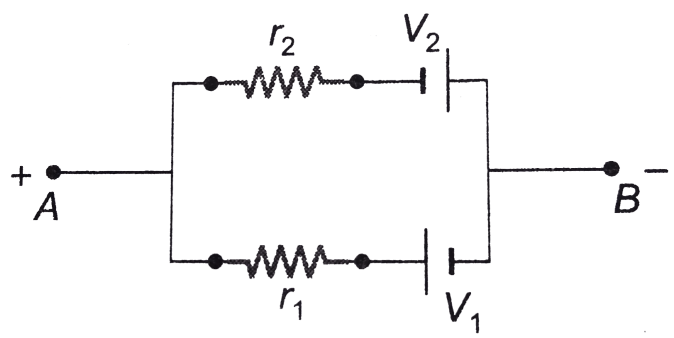
38. Find the emf (V) and internal resistance (R) of a single battery which is equivalent toa parallel combination of two batteries of emf V_1 and V_2 and internal resistances r_1 and r_2 respectively, with polrities as shown in figure



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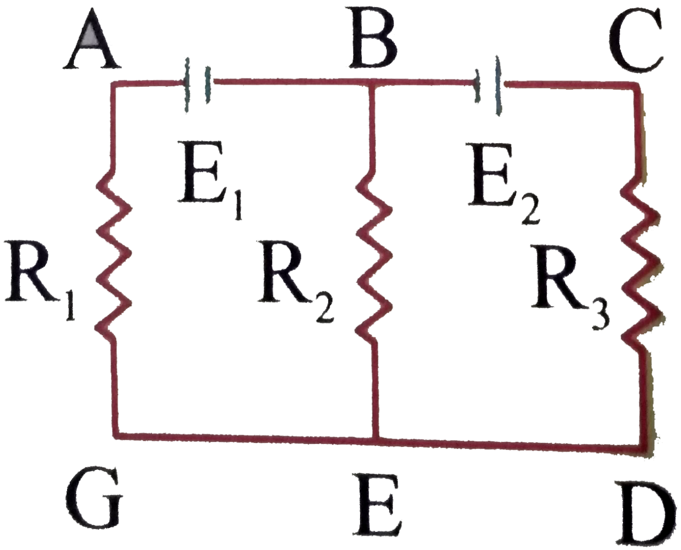
39. 

In the given circuit values are as follows

$\varepsilon = 2V$, $\varepsilon_2 = 4V$, $R_1 = 1\Omega$ and $R_2 = R_3 = 1\Omega$.

Calculate the current through R_1, R_2 and R_3

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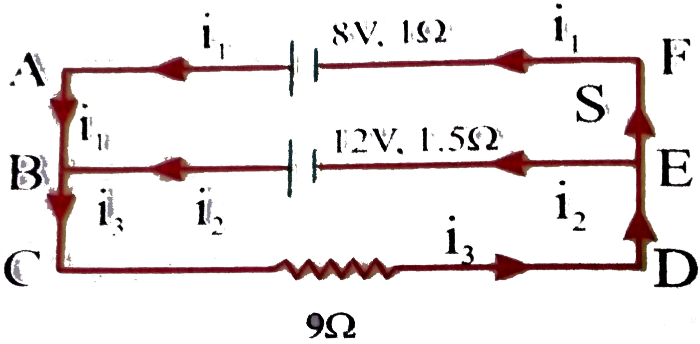

40.

Solve for current values in figure.

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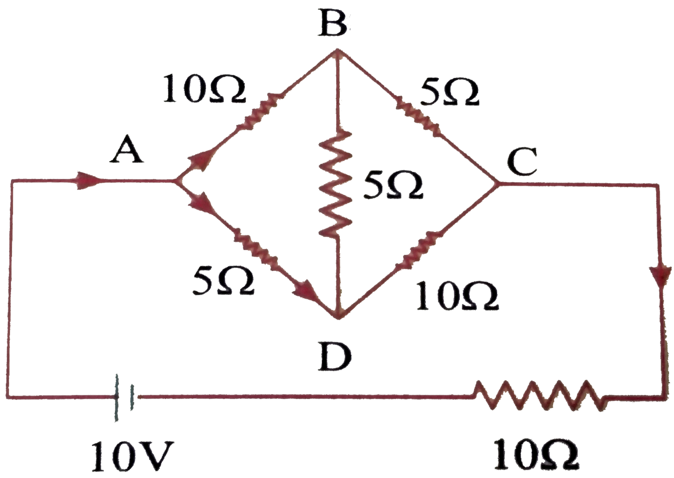
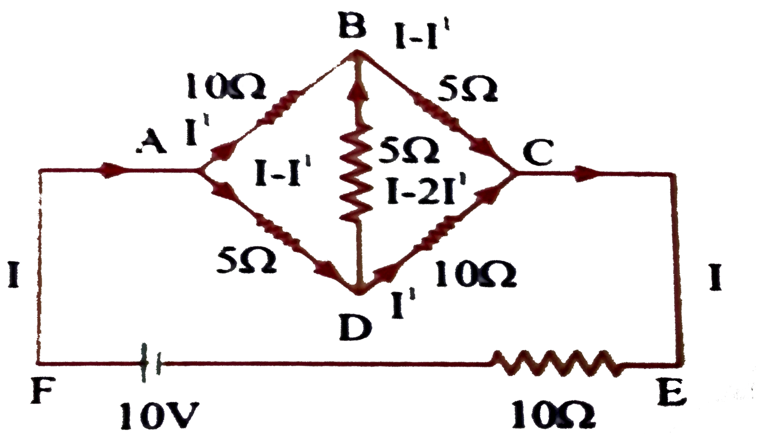
41.





Determine the current in each branch of the network shown in fig.

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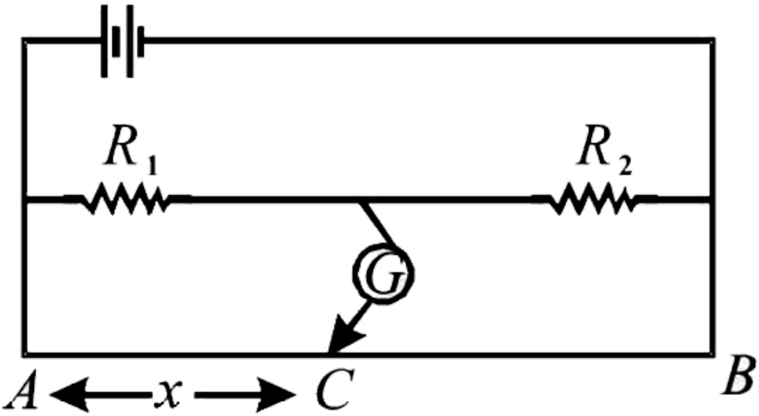
42. In the shown arrangement of the experiment of the meter bridge if AC corroesponding to null deflection of galvanometer is x, what would be its value if the radius of the wire AB is doubled?



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43. A resistance of 2Ω is connected across one gap of a meter bridge (the length of the wire is $100cm$) and an unknown resistance, greater than 2Ω is conneted across the other gap. When these resistances are interchanged, the balance point shifts by $20cm$. Neglecting any corrections,the unknown resistance is

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44. The length of a potentiometer wire is 1m and its resistance is 4Ω A current of 5 mA is flowing in it. An unknown source of emf is balanced on 40 cm length of this wire, then find the emf of the source.

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45. A cell of emf 2 volt and internal resistance 1.5Ω is connected to the ends of 1 long wire. The resistance of wire is (0.5Omega)/(m)`. Find the value of potential gradient on the wire.

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46. In a potentiometer experiment the balancing length with a cell is 560 cm. When an external resistance of 10Ω is connected in parallel to the cell, the balancing length changes by 60 cm. Find the internal resistance of the cell.

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47. In a potentiometer experiment when a battery of emf 2V is included in the secondary circuit the balance point is 500 cm. Find the balancing length of the same end when a cadimum cell of emf 1.018V is connected to the secondary circuit.

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C.U.Q

1. 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. $\dfrac{ml}{ne^2\tau A}$

B. $\dfrac{2mA}{ne^2\tau}$

C. $ne^2\tau A$

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

Answer: A

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2. Drift velocity v_d varies with the intensity of electric field as per their relation

A. $v_d \alpha E$

B. $v_d \alpha E^2$

C. $v_d \alpha \sqrt{E}$

D. $v_d =$ constant

Answer: A

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3. A current passes through a wire of nonuniform cross-section. Which of the following quantites are independent of the cross section?

A. independent of area of cross-section

B. directly proportional to the length of the conductor

C. directly proportional to the area of cross section.

D. inversely proportional to the area of the conductor.

Answer: A

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4. A Steady current flows in a metalic conductor of non uniform cross section. The quantity/quantities which remain constant along the length of the conductor is/are

A. current, electric field and drift speed

B. drift speed only

C. current and drift speed

D. current only

Answer: D

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5. When electric field $\left(\vec{E}\right)$ is applied on the ends of a conductor, the free electrons starts moving in direction

A. similar $\vec{E}$

B. Opposite $\vec{E}$

C. perpendicular to $\vec{E}$

D. cannot be predicted

Answer: B

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6. The drift velocity of electron in a metal conductor under effective of elecrtic field applied is

A. $10^{-13}\frac{m}{s}$

B. $10^{-3}\frac{mm}{s}$

C. $10^{-4}\frac{m}{s}$

D. $10^{-30}\frac{m}{s}$

Answer: C

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7. In metan and vacuume tubes charge carries are

A. electrons

B. protons

C. both

D. positrons

Answer: A

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8. The electric intesity E, current density j and conductivity σ are related as:

A. $j = \sigma E$

B. $j = \dfrac{E}{\sigma}$

C. $jE = \sigma$

D. $j = \sigma^2 E$

Answer: A

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

A. $E \propto J^{-1}$

B. $E \propto J$

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

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

Answer: B

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10. Assertion: A current flows in a conductor only when there is an electric field within the conductor:

Reason: The drift velocity of electron in presence of electric field decreases.

A. Both (A) and (R) are true and (R) is the correct explanantion of A.

B. Both (A) and (R) are true but (R) is not the correct explanation of A.

C. (A) is true but (R) is false

D. (A) is false but (R) is true.

Answer: C

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11. In an electric circuit containing a battery,the charge (assumed positive)inside the battery.

A. always goes form the positive terminal to the negative terminal

B. may move from the positive terminal to the negative terminal

C. always gows from the negative terminal to the positive terminal

D. does not move.

Answer: B

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12. Temperature is analogous to what in electricity?

A. potential

B. resistance

C. current

D. charge

Answer: A

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13. The flow of the electric current through a metallic conductor is

A. only due to electrons

B. only due to $+ve$ charges

C. due to both nuclei and electrons.

D. can not be presicted

Answer: A

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14. What are the materials generally used for making standard resistance? Give their compositions .

A. nichrome

B. copper

C. silver

D. maganin

Answer: D

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15. Why is nichrome used as a heating element ?

A. nichrome

B. copper

C. silver

D. maganin

Answer: A

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16. A piece of silver and another of silicon are heated from room temperature The resistance of

A. each of them increses

B. each of them decreases

C. silver increases and silicon decreases

D. silver decreases and silivon increases

Answer: C

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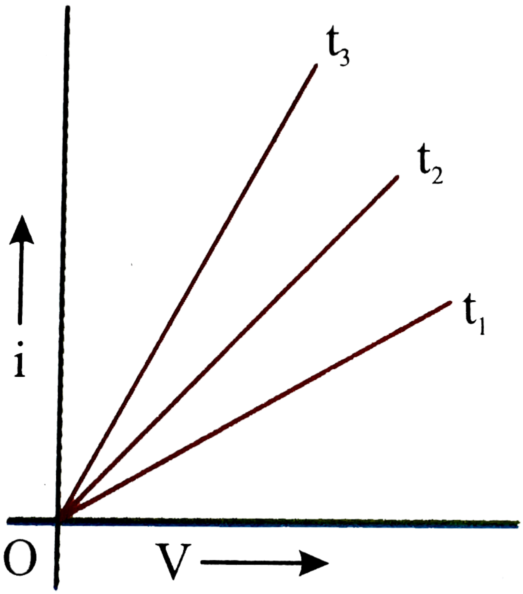
17. $V - i$ graphs of anichrome wire at three different temeperatures t_1, t_2 and t_3 are shown. From the graph.



A. t_1

B. t_2

C. t_3

D. $t_1 = t_2 = t_3$

Answer: A

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18. A certain piece of copper is to be shaped into a conductor of minimum resistance, its length and cross sectional area should be

A. L and A

B. 2L and $\frac{A}{2}$

C. $\frac{L}{2}$ and 2A

D. 3L and $\frac{A}{3}$

Answer: C

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19. When light falls on semiconductors, their resistance

A. decreases

B. increases

C. does not change

D. can't be predicted

Answer: A

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

A. decreases

B. Remains same

C. Increases

D. May increases or decreases

Answer: A

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21. The conductivity of a super conductor is

A. zero

B. infinity

C. depends on temp

D. depends on free election

Answer: B

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22. When a piece of aliminium wire of finite length is drawn through a series of dies to reduce its diameter to half its original value, its resistance will become

A. two times

B. four times

C. eight times

D. sixteen times

Answer: D

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23. Metal have

A. Zero resistivity

B. High resistivity

C. Low resistivity

D. Infinite resistivity

Answer: A

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24. Consider a rectangular slab of length L, and area of cross-section A. A current I is passed through it if the length is doubled the potential drop across the end faces

A. Bacomes half of the initial value

B. Becomes one-fotrh of the initial value

C. Becomes double the initial value

D. remains same

Answer: C

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25. A metallic block has no potential difference applid across it, then the mean velocity of free electrons is $(T =$ absolute temperature of the block)

A. Propotional to T

B. Proportional to $\sqrt{T}$

C. zero

D. Finite but independent of temperature.

Answer: B

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

A. the collisions of the conducting electrons with the electrons increases

B. the collisions of the conducting electrons with the lattice consisting of the ions of the metal increases

C. the number of the conduction electrons decreases.

D. The number of conduction electrons increase.

Answer: B

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27. In the absence of applied potential, the electric current flowing through a metallic wire is zero because

A. The average velocity of electron is zero

B. The electrons are drifted in randon direction with a speed of the order of $10^{-2}\frac{cm}{s}$.

C. The electrons move in random direction with a speed of the order close to that of velocity of light.

D. Electrons and ions move in opposite direction.

Answer: A

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28. A long constan wire is connected across the terminals of an ideal battery. If the wire is cut in to two equal pieces and one of them is now connected to the same battery, what will be the mobility of free electrons not in the wire compared to that in the first case?

A. same as that of previous velue

B. double that of previous value

C. half that of previous value

D. four times that of previous value

Answer: A

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29. Ohm's law is not applicable for

A. insulators

B. semi conductors

C. vaccume tube all the above

D. all the above

Answer: D

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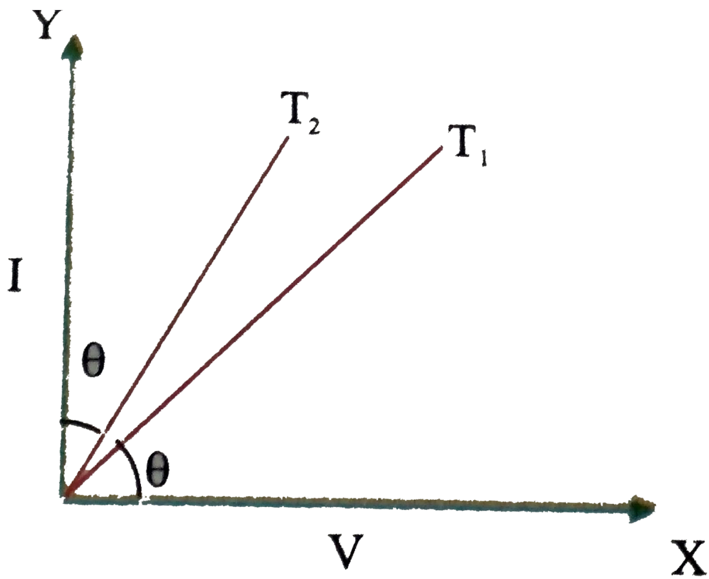

30.

$V - I$ graphs for a material is shown in the figure. The graphs are drawn at two different temperatures.

A. $T_1 - T_2 \propto \cot 2\theta$

B. $T_1 - T_2 \propto \sin 2\theta$

C. $T_1 - T_2 \propto \tan 2\theta$

D. $T_1 - T_2 \propto \cos 2\theta$

Answer: A

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31. Wires of nichrome and copper of equal dimensions are connected in series in electrical circuit. Then

A. More current will flow in copper wire

B. More current will flow in nichrome wire

C. copper wire will get heated more

D. Nichrome wire will get heated more

Answer: D

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32. At absolute zero silver wire behaves as

A. Super conductor

B. semi conductors

C. perfect insulator

D. semi insulator

Answer: A

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33. Fuse wire is a wire of :

A. low melting point and low value of α

B. high melting pointand high value of α

C. high melting point and low value of α

D. low melting point and high value of α

Answer: D

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34. Why are constantan and manganin used for making standard resistances ?

A. Both (A) and (R) are true and (R) is the correct explanantion of A.

B. Both (A) and (R) are true but (R) is not the correct explanation of A.

C. (A) is true but (R) is false

D. (A) is false but (R) is true.

Answer: A

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35. Assertion : Bending a wire does not effect electrical resistance.

Reason : The resistance of wire is proportional to the resistivity of material.

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36. Assertion: When the radius of a copper wire is doubled, its specific resistance gets increased.

Reason: Specific resistance is independent of cross-section of material used

A. Both (A) and (R) are true and (R) is the correct explanantion of A.

B. Both (A) and (R) are true but (R) is not the correct explanation of A.

C. (A) is true but (R) is false

D. (A) is false but (R) is true.

Answer: D

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37. The thermistors are usually made of

A. metals with low temperature coefficient of resistivity

B. metals with high temperature coefficient of resistivity.

C. metal oxides with high temperature coefficient of resistivity

D. semiconducting meterials having low temperature coefficient of resistivity.

Answer: C

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38. For a chosen non-zero value of voltage, there can be more than one value of current in

A. copper wire

B. thermistor

C. zener diode

D. maganin wire

Answer: B

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39. A heater coil is cut into two equal parts and only one part is now used in the heater. The heat generated will now be

A. becomes one fourth

B. halved

C. doubled

D. become four times

Answer: C

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40. Two lamps have resistance r and R, R being greater than r. If they are connected in paralled in an electric circuit, then

A. the lamp with resistance R will shine more brightly

B. the lamp with resistance r will shine more brightly

C. the two lamps will shine equal brightly

D. the lamp with resistance R will not shine at all

Answer: B

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41. Two bulbs are fitted in a room in the domestic electric installation. If one of them glows brighter than the other, then

A. the brighter bulb has smaler resistance

B. the brighter bulb has larger resistance

C. both the bulbs have the same resistance

D. nothing can be said about the resistance unless other factors are known

Answer: A

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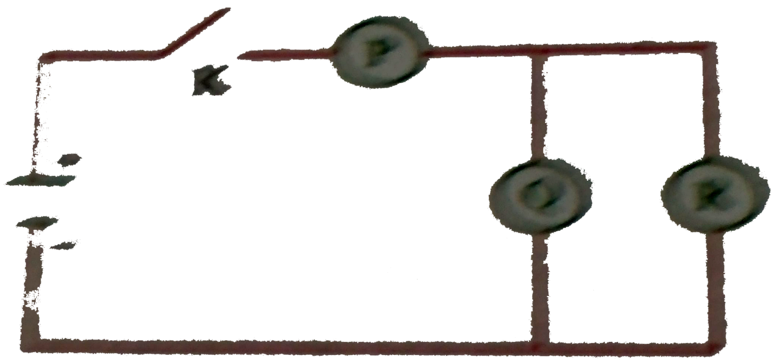
42. 

Three identical bulbs P, Q and R are connected to a battery as shown in the figure. When the circuit is closed.

A. Q and R will be brighter than P

B. Q and R will be dimmer than P

C. all the bulbs will be equally bright

D. Q and R will not shine at all

Answer: B

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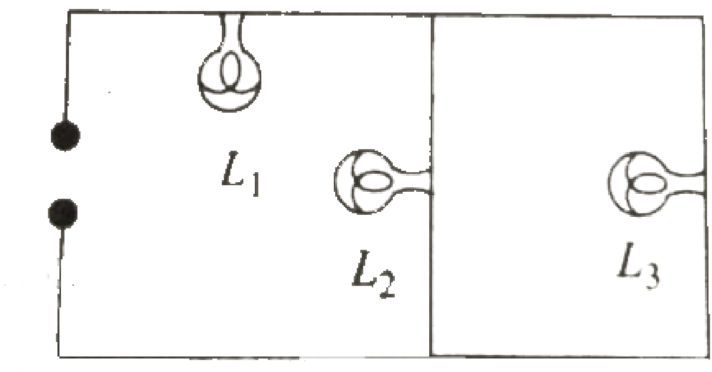
43. Figure 7.44 shows three similar lamps $L_1, L_2,$ and L_3 connectged across a power supply. If the lamp L_3 fuses, how will the light emitted by L_1 and L_2 change?



A. no change

B. brilliance of L_1 decreases and that of L_2 increases

C. brilliance of both L_1 and L_2 increases

D. brilliance of both L_1 and L_2 decreases

Answer: B

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44. The potential difference across a conductor is doubled, the rate of generation of heat will

A. become one fourth

B. be halved

C. be doubledtimes

D. become four times

Answer: D

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45. Two metallic wires of same material and same length have different diameters. When the wires are connected in parallel across an ideal battery the rate of heat produced in thinner wire is Q_1 and that in thicker wire is Q_2. The correct statement is

A. $Q_1 = Q_2$

B. $Q_1 < Q_2$

C. $Q_1 > Q_2$

D. it will depend on the emf of the battery

Answer: B

Watch Video Solution

46. There are two metallic wires of same material, same length but of different radii. When these are connected to an ideal bettery in series, heat produced is H_1 but when connected in parallel, geat produced is H_2 for the wsame time.Then the correct statement is

A. $H_1 = H_2$

B. $H_1 < H_2$

C. $H_1 > H_2$

D. No relation

Answer: B

Watch Video Solution

47. Two electric bulbs rated P_1 watt and V volt, are connected in series, across V-volt supply. The total power consumed is

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

B. $\sqrt{P_1 . P_2}$

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

D. $(P_1 + P_2)$

Answer: C

Watch Video Solution

48. In above question, if the bulbs are connected in parallel, total power consumed is

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

B. $\sqrt{P_1 . P_2}$

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

D. $(P_1 + P_2)$

Answer: D

Watch Video Solution

49. Which of the following causes production of heat, when current is set up in a wire

A. fall of electron from higher orbits to lower orbits

B. inter atomic collisions

C. inter electron collisions

D. collisions of conductions electrons with atoms

Answer: D

Watch Video Solution

50. A constant voltage is applied between the two ends of a metallic wire . If both the length and the radius of the wire are doubled , the rate of heat developed in the wire will

A. will be doubled

B. will be halved

C. will remain the same

D. will be quadrupled

Answer: A

Watch Video Solution

51. A resistor R_1 dissipates the power P when connected to a certain generator. If the resistor R_2 is put in series with R_1, the power dissipated by R_1

A. decreases

B. increases

C. Remains the same

D. Any of the above depending upon the relative value of R_1 and R_2

Answer: A

Watch Video Solution

52. Back emf of a cell is due to

A. Electrolytic polarization

B. Peltier effect

C. Magnetic effect of current

D. Internal resistance

Answer: A

Watch Video Solution

53. The direction of current in a cell is

A. $(-)$ ve pole to $(+)$ ve pole during descharging

B. $(+)$ ve pole to $(-)$ ve pole during discharging

C. Always $(-)$ ve pole to $(+)$ ve pole

D. always flows $(+)$ ve pole to $(-)$ ve pole

Answer: A

Watch Video Solution

54. When an electric cell drives current through load resistance, its back emf,

A. Supports the original emf

B. Opposes the original emf

C. Supports if internal resistance is low

D. Opposes if load resistance is large

Answer: B

Watch Video Solution

55. The terminal voltage of a cell is greater tha its emf. When it is

A. being charged

B. an open circuit

C. being discharged

D. it never happens

Answer: A

Watch Video Solution

56. What is constant in a battery (also called a source of emf)?

A. current supplied by it

B. terminal potential difference

C. internal resistance

D. emf

Answer: D

Watch Video Solution

57. From the following the standard cell is

A. Daniel cell

B. Cadmium cell

C. Leclanche cell

D. Lead accumulator

Answer: B

Watch Video Solution

58. A cell is to convert

A. Chemical energ into electrical energy

B. electrical energy into chemical energy

C. heat energy into potential energy

D. potential energy into heat energy

Answer: A

Watch Video Solution

59. n identical calls, each of internal resistance (r) are first connected in parallel and then connected in series across a resistance (R). If the current through R is the same in both cases, then

A. $R = \frac{r}{2}$

B. $r = \frac{R}{2}$

C. $R = r$

D. $r = 0$

Answer: C

Watch Video Solution

60. The value of internal resistance of ideal cell is

A. zero

B. infinity

C. 1Ω

D. 2Ω

Answer: A

Watch Video Solution

61. In a circuit two or more cells of the same emf are connected in parallel in order

A. increases the pd across resistance in the circuit

B. decreases pd across a resistance in the circuit

C. facilitate drawing more current from the battery system

D. Change the emf across the system of batteries

Answer: C

Watch Video Solution

62. The resistance of an open circuit is

A. infinity

B. zero

C. negative

D. can't be predicted

Answer: A

Watch Video Solution

63. According to Joule's law, if the potential difference across a conductor having a material of specific resistance remains constant, then the heat produced in the conductor is directly proportional to

A. ρ

B. ρ^2

C. $\frac{1}{\sqrt{\rho}}$

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

Answer: D

Watch Video Solution

64. Internal resistance of a cell depends on

A. concentration of electrolyte

B. distance between the electrodes

C. area of electrode

D. all the above

Answer: D

Watch Video Solution

65. When cells are arranged in series

A. the current capacity decreases

B. the current capacity increases

C. the emf increases

D. the emf decreases

Answer: C

Watch Video Solution

66. To supply maximum current cells should be arrange in

A. series

B. parallel

C. mixed grouping

D. depends on the internal and external resistance

Answer: D

Watch Video Solution

67. The terminal Pd of a cell is equal to its emf if

A. external resistance is infinity

B. internal resistance is zero

C. both 1 and 2

D. internal resistance is 5Ω

Answer: C

Watch Video Solution

68. The electric power transferred by a cell to an external resistance is maximum when the external resistance is equal to (r internal resistance)

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

B. $2r$

C. r

D. r^2

Answer: C

Watch Video Solution

69. Which depolarizers are used to neutralizes hydrogen layer in cells

A. Potassium dichromite

B. Manganese dioxide

C. 1 or 2

D. hydrogen peroxide

Answer: C

Watch Video Solution

70. Assertion: Series combination of cells is used when their internal resistance is much smaller than the external resistance.

Reason: $I = \frac{n\varepsilon}{R + nr}$ where is symbols have their standard meaning in series connection

A. Both (A) and (R) are true and (R) is the correct explanantion of A.

B. Both (A) and (R) are true but (R) is not the correct explanation of A.

C. (A) is true but (R) is false

D. (A) is false but (R) is true.

Answer: A

Watch Video Solution

71. Assertion: To draw more current at low P.d, parallel connection of cells is preferred.

Reason: In parallel connection, current

$i = \frac{nE}{r}$ if $r > \; > R$

A. Both (A) and (R) are true and (R) is the correct explanantion of A.

B. Both (A) and (R) are true but (R) is not the correct explanation of A.

C. (A) is true but (R) is false

D. (A) is false but (R) is true.

Answer: A

Watch Video Solution

72. Kirchoff's second law is based on the law of conservation of

A. charge

B. current

C. energy

D. angular momentum

Answer: C

Watch Video Solution

73. Kirchoff's second law is based on the law of conservation of

A. energy

B. charge

C. momentum

D. angular momentum

Answer: B

Watch Video Solution

74. Why is the meter bridge method considered unsuitable for the measurement of very low resistances ?

A. high

B. low

C. low or high

D. zero

Answer: B

Watch Video Solution

75. In a balanced wheatstone's network, the resistances in the arms Q and S are interchanged. As result of this:

A. galvanometer and the cell must be interchanged to balance

B. galvoanometer shows zero deflection

C. network is not balanced

D. network is still balanced

Answer: C

Watch Video Solution

76. If in the experiment of Wheatstone's bridge, the positions of cells and galvanometer are interchanged, then balance point will

A. the battery discharges

B. the bridge still balances

C. the balance point is changed

D. the galvanometer is damaged due to flow of high current.

Answer: B

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77. Wheatstone bridge can be used

A. to compare two unknown resistances.

B. to measure small strains produced in hardmetal

C. as the working principle of meterbridge

D. all the above

Answer: D

Watch Video Solution

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

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

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

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

Answer: C

Watch Video Solution

79. Assertion: At any junction of a network algebraic sum of various currents is zero

Reason: At steady state there is no accumulation of charge at the junction.

A. Both (A) and (R) are true and (R) is the correct explanantion of A.

B. Both (A) and (R) are true but (R) is not the correct explanation of A.

C. (A) is true but (R) is false

D. (A) is false but (R) is true.

Answer: A

Watch Video Solution

80. Metal wire is connected in the left gap, semi conductor is connected in the right gap of meter bridge and balancing point is found. Both are heated so that change of resistances in them are same. Then the balancing point

A. will not shift

B. shifts towards left

C. shifts towards right

D. depends on rise of temperature

Answer: C

Watch Video Solution

81. A metre bridge is balanced with known resistance in the right gap and a metal wire in the left gap. If the metal wire is heated the balance point.

A. shifts towards left

B. shifts towards right

C. does not change

D. may shift towards left or right depending on the nature of the metal.

Answer: B

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82. In meter brigde of Wheatstone bridge for measurment of resistance, the known and the unknown resistance are interchanged. The error so removed is

A. end correction

B. index error

C. due to temperature effect

D. randon error

Answer: A

Watch Video Solution

83. In a metre-bridge experiment, when the resistances in the gaps in the gaps are interchanged, the balance-point did not shift at all. The ratio of resistances must be

A. very large

B. very small

C. equal to unity

D. zero

Answer: C

Watch Video Solution

84. Assertion: meterbridge wire is made up of manganin

Reason: The temperature coefficient of resistance is very small for manganin

A. Both (A) and (R) are true and (R) is the correct explanantion of A.

B. Both (A) and (R) are true but (R) is not the correct explanation of A.

C. (A) is true but (R) is false

D. (A) is false but (R) is true.

Answer: A

Watch Video Solution

85. Potentiometer is superior to voltmeter because

A. voltmeter has high resistance

B. resistance of potentiometer wire is quite low

C. potentiometer does not draw any current from the unknown source of emf. To be measured.

D. sensititvity of potentiometer is higher than that of a voltmeter.

Answer: C

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86. In comparing emf's of 2 cells with the helf of potentiometer, at the balance point, the current flowing through the wire is taken from

A. any one of these cells.

B. both of these cells

C. bettery in the primary circuit

D. from an unknown source

Answer: C

Watch Video Solution

87. A potentiometer wire is connectd across the ideal battery now, the radius of potentiometer wire is doubled without changing its length. The values of potential gradient

A. increases 4 times

B. increases two times

C. does not change

D. becomes half

Answer: C

Watch Video Solution

88. In a potentiometer of ten wires each of $1m$, the balance point is obtained on the sixth wire. To shift the balance point to eighth wire, we should

A. increase resistance in the primary circuit

B. decrease resistance in the primary circuit

C. decrease resistance in series with the cell whose emf.has to be measured.

D. increase resistance in series with the cell whose emf. Has to be measured.

Answer: A

Watch Video Solution

89. If the emf of the cell in the primary circuit is doubled, with out changing the cell in the secondary circuit, the balancing length is

A. doubled

B. halved

C. uncharged

D. zero

Answer: B

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90. The potential gradients on the potentiometer wire are V_1 and V_2 with an ideal cell and a real cell of same emf in the primary circuit, then

A. $V_1 = V_2$

B. $V_1 > V_2$

C. $V_1 < V_2$

D. $V_1 < V_2$

Answer: B

Watch Video Solution

91. If the current in the primary circuit is decreased, then balancing length is obtained at

A. lower length

B. higher length

C. same length

D. 1/3rd length

Answer: B

Watch Video Solution

92. Temperature coefficient of resistance α and resistivity ρ of a potentiometer wire must be

A. high and low

B. low and high

C. low and low

D. high and high

Answer: B

Watch Video Solution

93. A series high resistance is preferable than shunt resistance in the galvanometer circuit of potentiometer. Because

A. shunt resistance are costly

B. shunt resistance reduces the current through galvanometer in an unbalanced circuit

C. high resistances are easily available

D.

Answer: C

Watch Video Solution

94. Sensitivity of potentiometer can be increased by

A. decreasing the length of potentiometer wire

B. increasing potential gradient on its wire

C. increasing emf of battery in the primary circuit

D. decreasing the potential gradient on its wire

Answer: D

Watch Video Solution

95. A cell of emf E and internal resistance r connected in the secondary gets balanced against length l of potentiometer wire. If a resistance R is connected in parallel with the cell, then the new balancing length for the cell will be

A. $\left(\frac{R}{R-r}\right)$

B. $\left(\frac{R-r}{R}\right)$

C. $\left(\frac{R}{r}\right)$

D. $\left(\frac{R}{R+r}\right)l$

Answer: D

Watch Video Solution

96. Potentiometer is an ideal instrument because

A. no current is drawn from the source of unknown emf

B. current is drawn from the source of unknown emf

C. it gives deflection even at null point

D. it has variable potential gradient

Answer: A

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97. On increasing the resistance of the primary circuit of potentiometer, its potential gradient will

A. become more

B. become less

C. not change

D. become infinite

Answer: B

Watch Video Solution

98. If the value of potential gradient on potentiometer wire is decreased, then the new null point will be obtained at

A. lower length

B. higher length

C. same length

D. nothing can be said

Answer: B

Watch Video Solution

99. A cell of negligible internal resistance is connected to a potentiometer wire and potential gradient is found. Keeping the length as constant, if the radius of potentiometer wire is increased four times, the potential gradient will become (no series resistance in primary)

A. 4 times

B. 2 times

C. half

D. constant

Answer: D

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100. For a potentiometer to function, the emf of the cell (E) in the primary circuit compared to the emf of the cell (E^1) in the secondary circuit should have a realtion

A. $E > E'$

B. $E < E^1$

C. both the above

D. $E = E^1$

Answer: A

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101. The balancing lengths of potentiometer wire are l_1 and l_2 when two cells of emf E_1 and E_2 are connected in the secondary circuit in series first to help eachg other and next to oppose each other $\frac{E_1}{E_2}$ is equal to $(E_1 > E_2)$

A. $\frac{l_1}{l_2}$

B. $\frac{l_1 - l_2}{l_1 + l_2}$

C. $\frac{l_1 + l_2}{l_1 - l_2}$

D. $\frac{l_2}{l_1}$

Answer: C

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102. At the moment when the potentiometer is balanced,

A. current flows only in the primary circuit

B. current flows only in the secondary circuit

C. current flows both in primary and secondary circuits

D. current does not flow in any circuit

Answer: A

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103. The quantity that cannot be measured by a potentiometer is....

A. Resistance

B. emf

C. current in the wire

D. inductance

Answer: D

Watch Video Solution

104. Assertion A potentiometer is preferred over that of a voltmeter for measurement of emf of a cell

Reason potentiometer does not draw any current from the cell.

A. Both (A) and (R) are true and (R) is the correct explanantion of A.

B. Both (A) and (R) are true but (R) is not the correct explanation of A.

C. (A) is true but (R) is false

D. (A) is false but (R) is true.

Answer: A

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105. Assertion: The emf of the cell in secondary circuit must be less than emf of cell in primary circuit in potentiometer.

Reason: Balancing length cannot be more than length of potentiometer wire.

A. Both (A) and (R) are true and (R) is the correct explanantion of A.

B. Both (A) and (R) are true but (R) is not the correct explanation of A.

C. (A) is true but (R) is false

D. (A) is false but (R) is true.

Answer: A

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Level 1 C.W

1. If the electron in a Hydrogen atom makes 6.25×10^{15} revolutions in one second, the current is

A. $1.12mA$

B. $1mA$

C. $1.25mA$

D. $1.5mA$

Answer: B

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2. The current through a wire connected to a condenser varies with time as $i = (2t + 1)A$ the charge transport to the condenser from $t = 0$ to $t = 5s$ is

A. 5C

B. 55C

C. 30C

D. 60C

Answer: C

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3. A copper wire of cross sectional area 2.0 mm^2, resistivity $= 1.7 \times 10^{-8} \Omega m$, carries a current of 1 A. The electric field in the copper wire is

A. $8.5 \times 10^{-5} \frac{V}{m}$

B. $8.5 \times 10^{-4} \frac{V}{m}$

C. $8.5 \times 10^{-3} \frac{V}{m}$

D. $8.5 \times 10^{-2} \frac{V}{m}$

Answer: C

Watch Video Solution

4. Using three wires of resistances 1 ohm, 2ohm and 3 ohm then no. of different values of resistances that possible are

A. 6

B. 4

C. 10

D. 8

Answer: D

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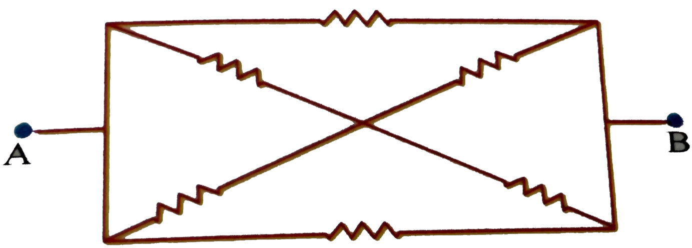
5. 

Six resistances of each 12 ohm are connected as shown in the fig. The effective resistance between the terminals A and B is

A. 8Ω

B. 6Ω

C. 4Ω

D. 12Ω

Answer: C

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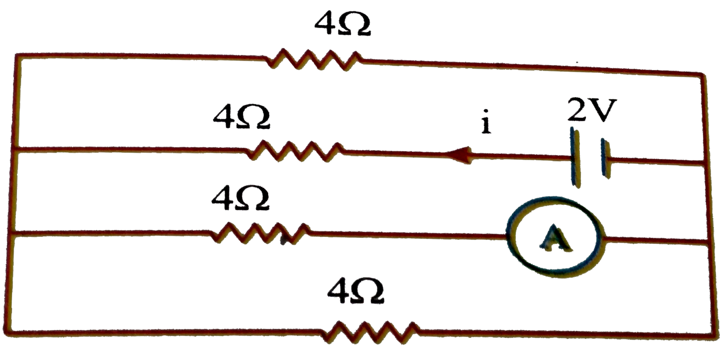
6. 

Current i coming from the battery and ammeter reading are

A. $\frac{3}{8}A, \frac{1}{8}A$

B. $\frac{1}{8}A, \frac{1}{8}A$

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

D. $2A, \frac{1}{8}A$

Answer: A

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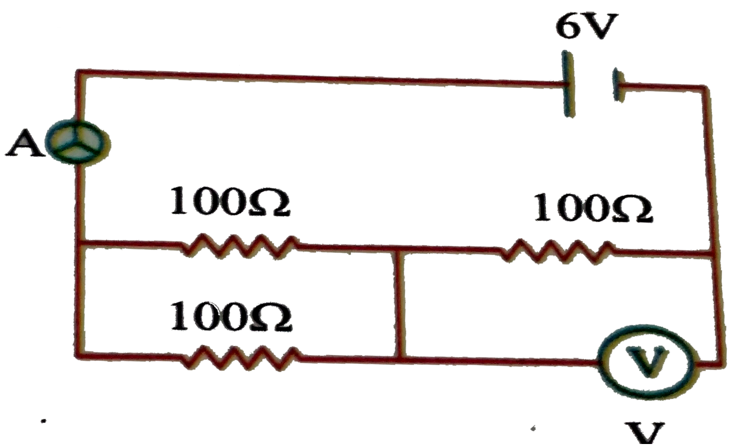
7. 

In the circuit shown, the reading of the voltmeter and the ammeter are

A. $4V.0.2A$

B. $2V, 0.4A$

C. $3V, 0.6A$

D. $4V$, $0.04A$

Answer: D

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8. The resistance of a wire of 100 cmlength is 10Ω. Now, it is cut into 10 equal parts and all of them are twisted to form a single bundle. Its resistances is

A. 1Ω

B. 0.5Ω

C. 5Ω

D. 0.1Ω

Answer: D

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9. A metallic wire of resistance 20 ohm stretched until its length is doubled. Its resistances is

A. 20Ω

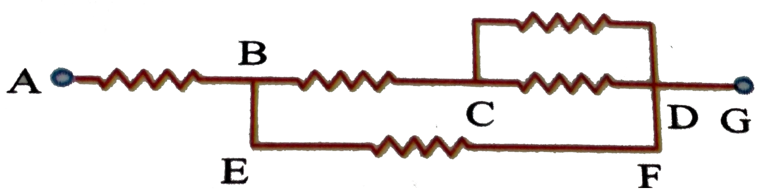
B. 40Ω

C. 80Ω

D. 60Ω

Answer: C

Watch Video Solution

10. 

Resistance of each 10Ω are connected as shown in the fig. The effective resistance between A and G is

A. 16Ω

B. 20Ω

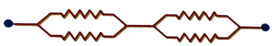
C. 12Ω

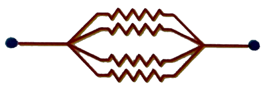
D. 8Ω

Answer: A

Watch Video Solution

11. Which arrangement of four identical resistances should be sued to draw maximum energy from cell of voltage V

A. 

B. 

C. 

D. 

Answer: B

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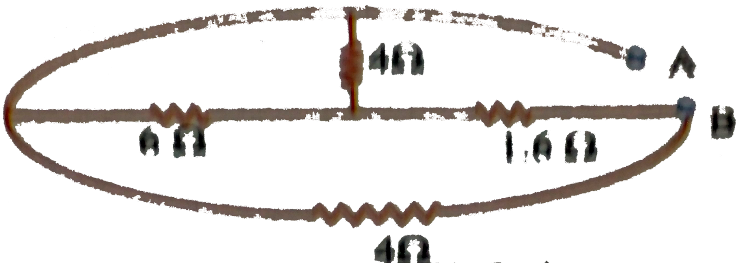
12.



If four resistances are connected as shown in the fig. between A and B the effective resistance is

A. 4Ω

B. 8Ω

C. 2.4Ω

D. 2Ω

Answer: D

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13. 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. $\frac{40}{3}\Omega$

B. $\frac{80}{3}\Omega$

C. 40Ω

D. 10Ω

Answer: B

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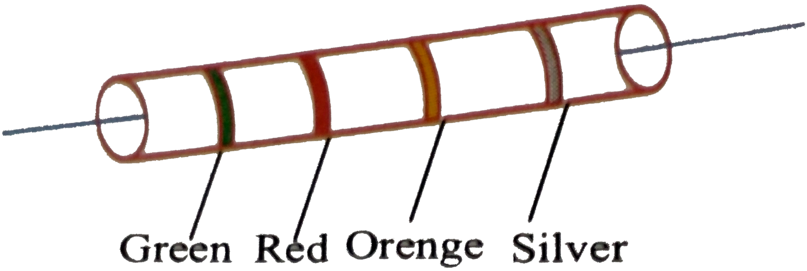
14. 

Find the value of colour coded resistance shoen in fig.

A. $520 \pm 10\%$

B. $5200 \pm 1\%$

C. $52000 \pm 10\%$

D. $52000 \pm 1\%$

Answer: C

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15. The resistance of a wire is 2Ω if it is drawn in such a way that it experiences a longitudinal strain 200% its new resistance is

A. 4Ω

B. 8Ω

C. 16Ω

D. 18Ω

Answer: D

Watch Video Solution

16. n conducting wires of same dimensions but having resistivities 1,2,3,....n are connected is series. The equivalent resistivity of the combination is

A. $\dfrac{n(n+1)}{2}$

B. $\dfrac{n+1}{2}$

C. $\dfrac{n+1}{2n}$

D. $\dfrac{2n}{n+1}$

Answer: B

Watch Video Solution

17. An Aluminium $\left(\alpha = 4 \times 10^{-3} K^{-1}\right)$ resistance R_1 and a carbon $\left(\alpha = -0.5 \times 10^{-3} K^{-1}\right)$ resistance R_2 are connected in series to have a resultant resistance of 36Ω at all temperatures. The values of R_1 and R_2 in Ω respectively are:

A. 32, 4

B. 16, 20

C. 4, 32

D. 20, 16

Answer: C

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18. The temperature coefficient of resistance of a wire is 0.00125 per $.^{o}C$. At 300K, its resistance is 1 Ω. The resistance of the wire will be 2 Ω at

A. 1154 K

B. 1100 K

C. 1400 K

D. 1127 K

Answer: D

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19. The electrical resistance of a mercury column in a cylindrical container is R the mercury is poured into another cylindrical container with half the radius of cross-section. The resistance of the mercury column is

A. R

B. $2R$

C. $16R$

D. $5R$

Answer: C

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20. Four conductors of same resistance connected to form a square. If the resistance between diagonally opposite corners is 8 ohm, the resistance between any two adjacent corners is

A. 32 ohm

B. 8 ohm

C. $\frac{1}{6}$ ohm

D. 6 ohm

Answer: D

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21. Four wires made of same material have different lengths and radii, the wire having more resistance in the following case is

A. $l = 100cm, r = 1mm$

B. $l = 50cm, r = 2mm$

C. $l = 100cm, r = \frac{1}{2}mm$

D. $l = 50cm, r = \frac{1}{2}mm$

Answer: C

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22. Two different wires have specific resistivities, lengths,a re of cross-sections are in the ratio $3:4$, $2:9$ and $8:27$ then the ratio of resistance of two wires is

A. $\frac{16}{9}$

B. $\frac{9}{16}$

C. $\frac{8}{27}$

D. $\frac{27}{8}$

Answer: B

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23. Two wires made of same material have their lengths are in the ratio $1:2$ and their masses in the ratio $3:16$ the ratio of resisstance of law wires is

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

B. $1:2$

C. $2:1$

D. $4:3$

Answer: D

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24. A wire of resistance 18 ohm is drawn until its radius reduce $\frac{1}{2}$th of its original radius then resistance of the wire is

A. 188Ω

B. 72Ω

C. 288Ω

D. 388Ω

Answer: C

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25. A piece of wire of resistance 4Ω is bent through 180° at its midpoint and the two halves are twisted together.Then the resistance is

A. 8Ω

B. 1Ω

C. 2Ω

D. 5Ω

Answer: B

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26. Given three equal resistors, how many different combination of all the three resistor can be made

A. 4

B. 3

C. 5

D. 2

Answer: A

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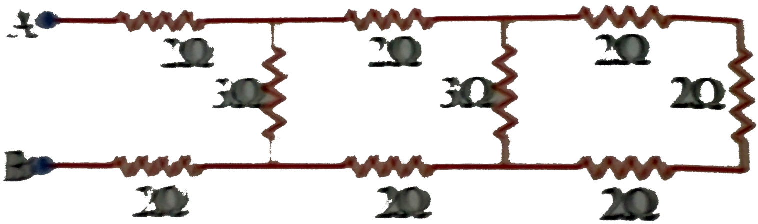
27. 

The effective resistance between A and B in the given circuit is

A. 20Ω

B. 7Ω

C. 3Ω

D. 6Ω

Answer: D

Watch Video Solution

28. How many cells each marked $(6V - 12A)$ should be connected in mixed grouping so that it may be marked $(24V - 24VA)$

A. 4

B. 8

C. 12

D. 6

Answer: A

Watch Video Solution

29. 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. 4

B. 1

C. 2

D. 3

Answer: A

Watch Video Solution

30. A 25 watt, 220 volt bulb and a 100 watt, 220 volt bulb are connected in series across 440 volt line

A. only 100 watt bulb will fuse

B. only 25 watt bulb will fuse

C. none of the bulb will fuse

D. both bulbs will fuse

Answer: B

Watch Video Solution

31. There are 5 tube-lights each of 40 W in a house. These are used on an average for 5 hours per day. In addition, there is an immersion heater of

1500 W used on an average for 1 hour per day. The nmber of units of electricity are consumed in a month is

A. 25 units

B. 50 units

C. 75 units

D. 100 units

Answer: C

Watch Video Solution

32. Three equal resistor connected in series across a source of enf together dissipate $10Wa$. If the same resistors aer connected in parallel across the same emf, then the power dissipated will be

A. 10 watt

B. 30 watt

C. $\frac{10}{3}$ watt

D. 90 watts

Answer: D

Watch Video Solution

33. Time taken by a 836 W heater to heat one litre of water from $10^\circ C \rightarrow 40^\circ C$ is

A. 50 s

B. 100 s

C. 150 s

D. 200 s

Answer: C

Watch Video Solution

34. A lamp of 600W-240V is connected to 220 V mains. Its resistance is

A. 96Ω

B. 84Ω

C. 90Ω

D. 64Ω

Answer: A

Watch Video Solution

35. A 200 W- 200 V lamp is connected to 250 V mains.it power consuption is

A. 300 W

B. 312.5 W

C. 292 W

D. 250 W

Answer: B

Watch Video Solution

36. If the current in a heater increases by 10% the percentage change in the power consuption

A. 19%

B. 21%

C. 25%

D. 17%

Answer: B

Watch Video Solution

37. The power of a heating coil is P. it is cut into two equal parts. The power of one of them across same mains is

A. 2P

B. 3P

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

D. $4P$

Answer: A

Watch Video Solution

38. In a house there are four bulbs each of $50W$ and 5 fans each of 60W. If they are used at the rate of 6 hours a day, the electrical energy consumed in a month of 30 days is

A. 64 KWH

B. 90.8KWH

C. 72KWH

D. 42KWH

Answer: B

Watch Video Solution

39. An electric kettle has two coils of same power . When one coil is switched on , it takes 15 min to boil water , and when the second coil is switched on , it takes 30 min . How long will it take to boil water when both the coils are used in i. Series and ii. parallel?

A. $9 : 2$

B. $2 : 9$

C. $4 : 5$

D. $5 : 4$

Answer: A

Watch Video Solution

40. A resistance coil of 60ω is immersed in 42 kg of water. A current of 7 A is passed through it. The rise in temperature of water per minutes is :

A. $4^\circ C$

B. $8^\circ C$

C. $1.3^\circ C$

D. $12^\circ C$

Answer: C

Watch Video Solution

41. What is the required resistance of the heater coil of an immersion heater that will increase the temperature of 1.50 kg of water from $10^\circ C$ to $50^\circ C$ in 10 minutes while operating at $240V$?

A. 25Ω

B. 12.5Ω

C. 250Ω

D. 137.2Ω

Answer: D

Watch Video Solution

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

A. $5^{\circ} C$

B. $10^{\circ} C$

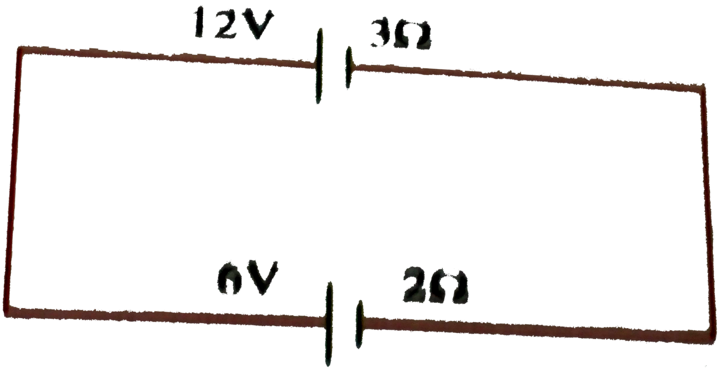
C. $20^{\circ} C$

D. $40^{\circ} C$

Answer: C

Watch Video Solution

43.



In the following diagram the pd across $6V$ cell is

A. $6V$

B. $5.6V$

C. $8.2V$

D. $8.4V$

Answer: D

Watch Video Solution

44. While connecting 6 cells in a battery in series, in a tape recorder, by mistake one cell is connected with reverse polarity. If the effective resistance of load is 24 ohm and internal resistance of each cell is one ohm and emf 1.5 V the current delivered by the battery is

A. 0.1 A

B. 0.2 A

C. 0.3 A

D. 0.4 A

Answer: B

Watch Video Solution

45. A 10 m long wire of resistance 15 ohm is connectd in series with a battery of emf 2V (no internal resistance) and a resistance of 5 ohm. The potential gradient along the wire is

A. $0.15Vm^{-1}$

B. $0.45Vm^{-1}$

C. $1.5Vm^{-1}$

D. $4.5Vm^{-1}$

Answer: A

Watch Video Solution

46. When a resistance of 2 ohm is placed across a battery the current is 1 A and when the resistance across the terminals is 17 ohm, the current is 0.25A. The emf of the battery is

A. 4.5 V

B. 5V

C. 3V

D. 6V

Answer: B

Watch Video Solution

47. A battery has six cells in series. Each has an emf 1.5 V and internal resistance 1 ohm. If an external load of 24Ω is connected to it. The potential drop across the load is

A. 7.2 V

B. 0.3V

C. 6.8V

D. 0.4 V

Answer: A

Watch Video Solution

48. 12 cells of each emf 2 V are connected in series among them, if 3 cells are connected wrongly.Then the effective emf. Of the combination is

A. 18 V

B. 12 V

C. 24 V

D. 6 V

Answer: B

Watch Video Solution

49. When a battery connected across a resistor of 16Ω the voltage across the resistor is 12 V. When the same battery is connected across a resistor of 10Ω voltage.

Across it is 11 V. The internal resistance of the battery in ohms is

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

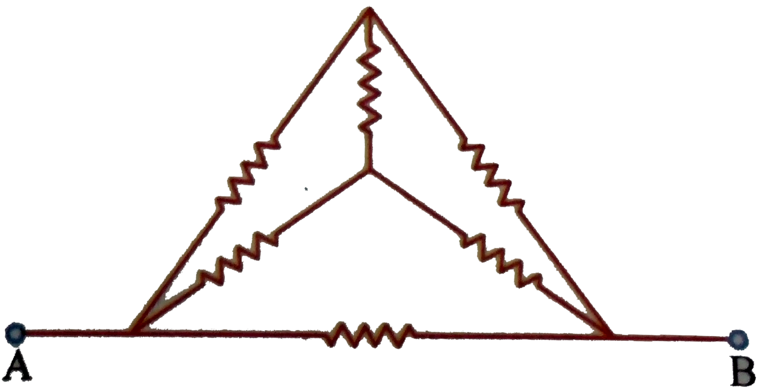
B. $\frac{20}{7}$

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

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

Answer: B

Watch Video Solution

50. 

Six resistors of each 2 ohm are connected as shown in the figure. The resultant resistance between A and B is.

A. 4Ω

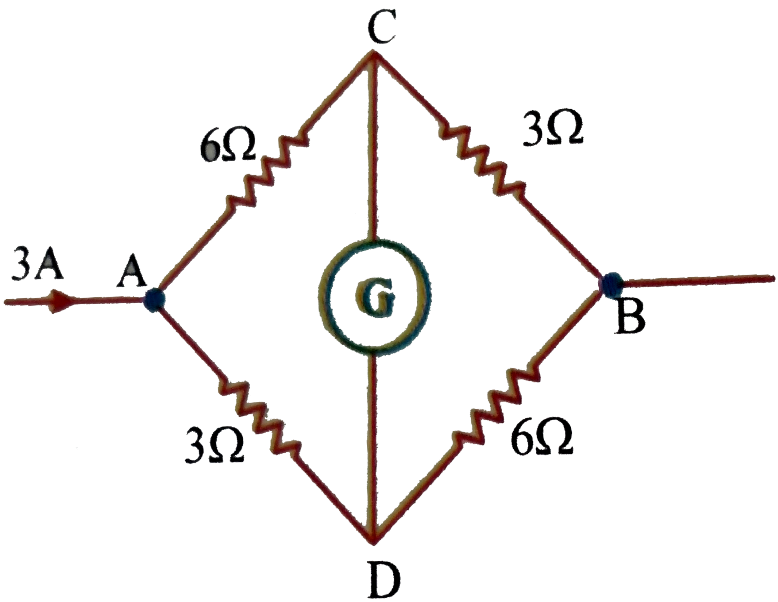
B. 2Ω

C. 1Ω

D. 10Ω

Answer: C

Watch Video Solution



51.

in the given circuit current through the galvanometer is

A. zero

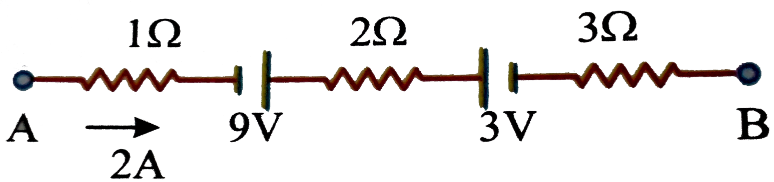
B. flows from C to D

C. flows from D to C

D. in sufficient information

Answer: C

Watch Video Solution

52. 

The potential difference between A & B in the given branch of a circuit is

A. 6 V

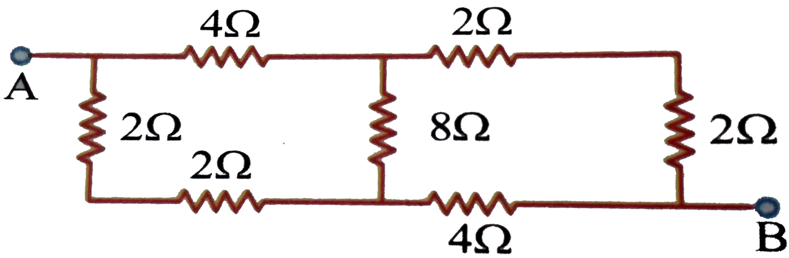
B. 12 V

C. 9 V

D. 0 V

Answer: A

Watch Video Solution



53.

The resistance between A and B is

A. 8Ω

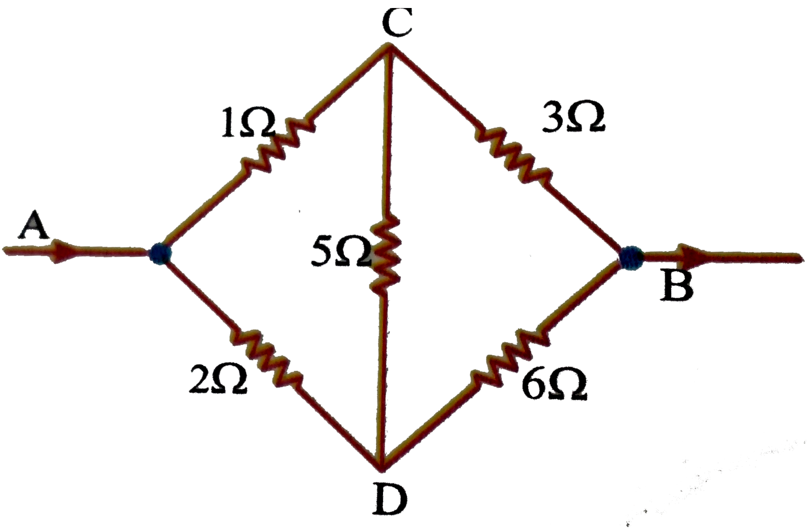
B. 4Ω

C. 3.75Ω

D. 2Ω

Answer: B

Watch Video Solution



54.

The resistance between A and B is

A. $\frac{288}{56}\Omega$

B. 12Ω

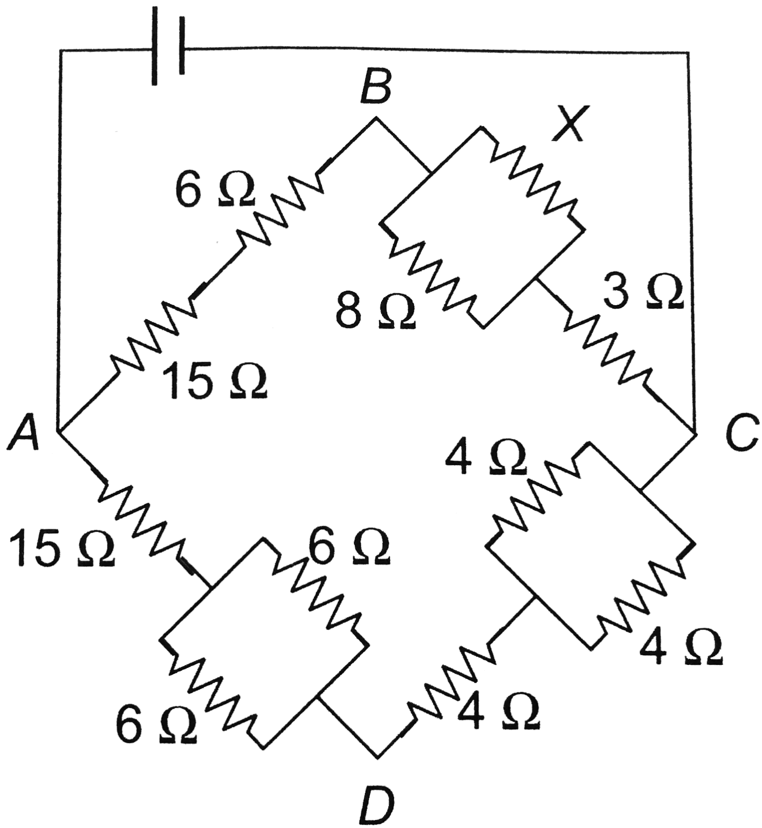
C. $\frac{8}{3}\Omega$

D. $\frac{9}{4}\Omega$

Answer: C

Watch Video Solution

55. In the figure given the value of X resistance will be, when the p.d. between B and D is zero



A. 9Ω

B. 8Ω

C. 6Ω

D. 4Ω

Answer: B

Watch Video Solution

56. When an unknown resistance and a resistance of 4Ω are connected in the left and right gaps of a meterbridge, the balance point is obtained at 50 cm. the shift in the balance point if a 4Ω resistance is now connected in parallel to the resistance in the right gap is

A. 66.7 cm

B. 16.7 cm

C. 34.6 cm

D. 14. 6 cm

Answer: B

Watch Video Solution

57. In a meter bridge, the gaps are closed by resistances 2 and 3 ohm. The value of shunt to be added to 3 ohm resistor to shift the balancing point by 22.5 cm is

A. 1Ω

B. 2Ω

C. 2.5Ω

D. 5Ω

Answer: B

Watch Video Solution

58. Two equal resistance are connected in the gaps of a metre bridge. If the resistance in the left gap is increased by 10% the balancing point shift

A. 10% to right

B. 10% to left

C. 9.6% to left

D. 4.8% to right

Answer: D

Watch Video Solution

59. A potentiometer having a wire of 4 m lengths is connected to the terminals of a battery with steady voltage. A leclanche cell has a null point at 1m. If the length of the potentiometer wire is increased by 1 m, the position of the null points is

A. 1.5 m

B. 1.25 m

C. 10.05 m

D. 1.31 m

Answer: B

Watch Video Solution

60. The emf of a battery A is balanced by a length 80 cm on a potentio meter wire. The emf of a standard cell 1 v is balanced by 50 cm. the emf of A is

A. 2V

B. 1.4V

C. 1.5V

D. 1.6V

Answer: D

Watch Video Solution

61. When 6 identical cells of no internal resistance are connected in series in the secondary cicuit of a potentio meter, the balancing length is l balancing length becomes $\frac{l}{3}$ when some cells are connected wrongly, the number of cell connected wrongly are

A. 1

B. 3

C. 2

D. 4

Answer: C

Watch Video Solution

62. In a potentiometer experiment the balancing length with a cell is 560 cm. When an external resistance of 10Ω is connected in parallel to the cell, the balancing length changes by 60 cm. Find the internal resistance of the cell.

A. 3.6

B. 2.4

C. 1.2

D. 0.6

Answer: C

Watch Video Solution

63. The resitivity of a potentio meter wire is, if the area of cross section of the wire is $4cm^2$, the current flowing in the circuit is 1A, the poetntial gradient is $7.5\frac{v}{m}$

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

B. $2 \times 10^{-6} \Omega - m$

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

D. $5 \times 10^{-4} \Omega - m$

Answer: A

Watch Video Solution

64. A potentiometer wire of 10 m length and 20 ohm resistance is connected in series with a resistance R ohms and a battery of emf 2V, negligible internal resistance, potential gradient on the wire is 0.16 millivolt/centimetre then R is ohm....

A. 50Ω

B. 60Ω

C. 230Ω

D. 46Ω

Answer: C

Watch Video Solution

Level 1 H.W

1. A current of 1.6 A is flowing in a conductor. The number of electrons flowing per second through the conductor is

A. 10^9

B. 10^{19}

C. 10^{16}

D. 10^{31}

Answer: B

Watch Video Solution

2. If an electron revolves in the circular path of radius $0.5A^\circ$ at a frequency of 5×10^{15} cycles/sec. The equivalent electric current is

A. 0.4 mA

B. 0.8 mA

C. 1.2 mA

D. 1.6 mA

Answer: B

Watch Video Solution

3. The current i flows in a wire of circular cross-section with the free electrons travelling with a drift velocity v. What is the drift velocity of electrons when a current of 2 i flows in another wire of twice the radius and of the same material ?

A. $\overrightarrow{V}$

B. $\frac{\overrightarrow{V}}{2}$

C. $\frac{\overrightarrow{V}}{4}$

D. $2\overrightarrow{V}$

Answer: C

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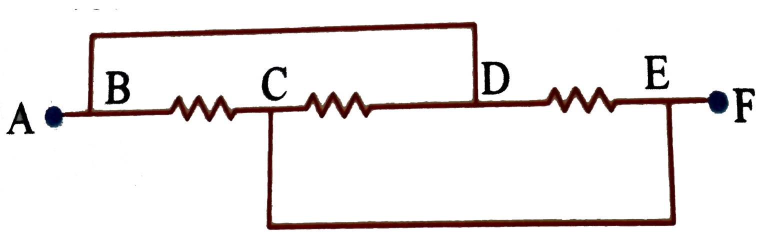
4. 

Three resistances each of 3Ω are connected as shown in fig. the resultant resistance between A and F is

A. 9Ω

B. 2Ω

C. 4Ω

D. 1Ω

Answer: D

Watch Video Solution

5. Two wires made of same material have lengths in the ratio $1:2$ and their volumes in the same ratio. The ratio of their resistances is

A. $4:1$

B. $2:1$

C. $1:2$

D. $1:4$

Answer: D

Watch Video Solution

6. Two wires made of same material have their electrical resistances in the ratio $1:4$ if their lengths are in the ratio $1:2$, the ratio of their masses is

A. $1:1$

B. $1:8$

C. $8:1$

D. $2:1$

Answer: A

Watch Video Solution

7. There are five equal resistors. The minimum resistance possible by their combination is 2 ohm. The maximum possible resistance we can make with them is

A. 25 ohm

B. 50 ohm

C. 100 ohm

D. 150 ohm

Answer: B

Watch Video Solution

8. 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. 3

B. $\frac{1}{3}$

C. $\frac{8}{9}$

D. 2

Answer: B

Watch Video Solution

9. A current of 1 A is passed through two resistances 1Ω and 2Ω connected in parallel. The current flowing through 2Ω resistor will be

A. $\frac{1}{3}A$

B. $1A$

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

D. $3A$

Answer: A

Watch Video Solution

10. The colour coded resistance of carbon resistance is (initial three bands are red and fourth band is silver)

A. $222\Omega \pm 10\%$

B. $2200\Omega \pm 10\%$

C. $333\Omega \pm 5\%$

D. $33000\Omega \pm 10\%$

Answer: B

Watch Video Solution

11. The resistance of a wire is 10 ohm. The resistance of a wire whose length is twice and the radius is half, if it is made of same material is

A. 20Ω

B. 5Ω

C. 80Ω

D. 40Ω

Answer: C

Watch Video Solution

12. The resultant resistance of two resistors when connected in series is 48 ohm.the ratio of their resistances is $3:1$ the value of each resistance is

A. $20\Omega, 28\Omega$

B. $32\Omega, 16\Omega$

C. $36\Omega, 12\Omega$

D. $24\Omega, 24\Omega$

Answer: C

Watch Video Solution

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

A. $300^\circ C$

B. $400^\circ C$

C. $500^\circ C$

D. $200^\circ C$

Answer: B

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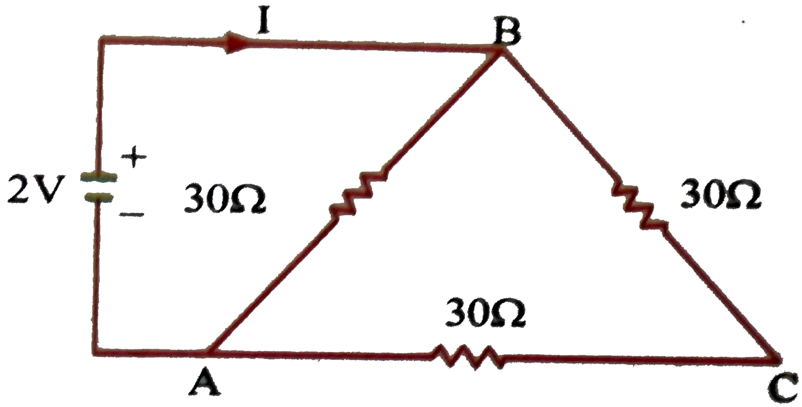
14. 

The current i in the circuit given aside is

A. 0.1 A

B. 0.2 A

C. 1.0 A

D. 2.0 A

Answer: A

Watch Video Solution

15. The combined resistance of two conductors in series is 1Ω. If the conductance of one conductor is 1.1 siemen, the conductance of the other conductor is siemen is

A. 10

B. 11

C. 1

D. 1.1

Answer: B

Watch Video Solution

16. When two resistance are connected in parallel then the equivalent resistance is $\frac{6}{5}\Omega$ When one of the resistance is removed then the effective resistance is 2Ω. The resistance of the wire removed will be

A. 3 ohm

B. 2 ohm

C. $\frac{3}{5} ohm$

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

Answer: A

Watch Video Solution

17. A material 'B' has twice the specific resistance of 'A'. A circular wire made of 'B' has twice the diameter of a wire made of 'A'. Then for the two wires to have the same resistance, the ratio l_B / l_A of their respective lengths must be

A. 1

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

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

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

Answer: D

Watch Video Solution

18. If a wire of resistance R is melted and recasted in to half of its length, then the new resistance of the wire will be

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

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

C. R

D. $2R$

Answer: A

Watch Video Solution

19. When a wire drawn until its radius decreases by 3% then percentage of increase in resistance is-

A. 10%

B. 9%

C. 6%

D. 12%

Answer: D

Watch Video Solution

20. When three wires of unequal resistances are given the number of combinations they can be made to give different resistances is

A. 6

B. 4

C. 2

D. 8

Answer: D

Watch Video Solution

21. The resistance of a coi is 4.2Ω at $100^{\circ}C$ and the temperature coefficient of resistance of its material is $\frac{0.004}{.^{\circ}C}$. Its resistance at $0^{\circ}C$ is

A. 6.5Ω

B. 5Ω

C. 3Ω

D. 2.5Ω

Answer: C

Watch Video Solution

22. You are given several identical resistors each of value 10Ω and each capable of carrying a maximum current of 1 A. It is required to make a suitable combination of these to resistances to produce a resistance of 5Ω which can carry a current of 4 A. The minimum number of resistors required for this job is

A. 4

B. 8

C. 10

D. 20

Answer: B

Watch Video Solution

23. A wire of resistance 50Ω is cut into six equal parts and they are bunbled together side by side to form a thicker wire. The resistance of the bundle is

A. $\frac{18}{25}\Omega$

B. $\frac{9}{12.5}\Omega$

C. $\frac{25}{9}\Omega$

D. $\frac{25}{18}\Omega$

Answer: D

Watch Video Solution

24. A technician has only two resistance coils. By using them in series or in parallel he is able to obtain the resistance 3,4,12 and 16 ohm. The resistance of two coils are

A. 6,10

B. 4,12

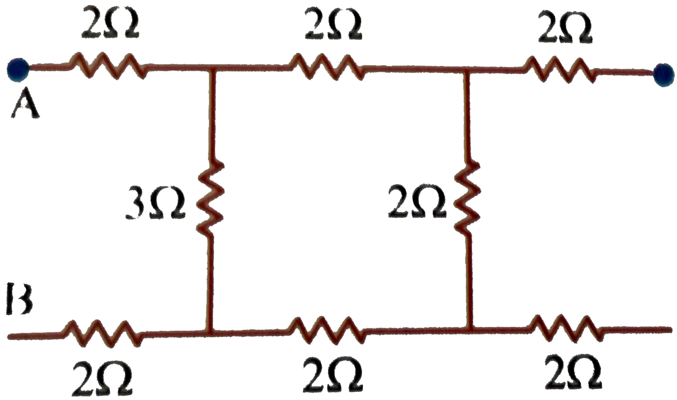
C. 7,9

D. 4,16

Answer: B

Watch Video Solution

25.



The effective between A&B in the given circuit is

A. 7Ω

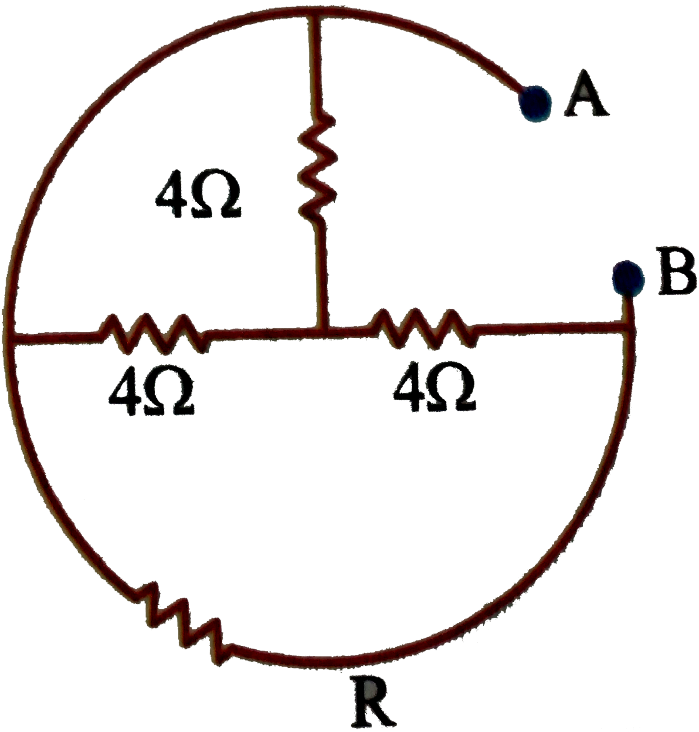
B. 2Ω

C. 6Ω

D. 5Ω

Answer: C

Watch Video Solution



26.

The effective resistance between A and B is 3Ω then the value of R is

A. 2Ω

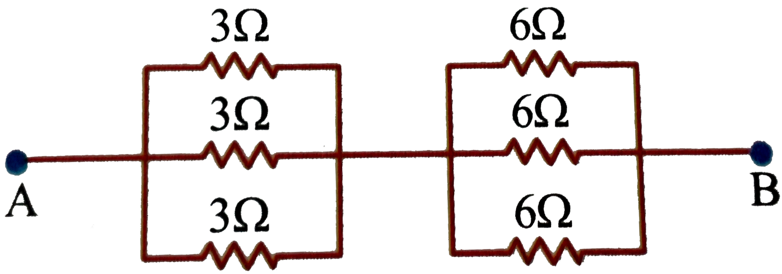
B. 4Ω

C. 6Ω

D. 8Ω

Answer: C

Watch Video Solution

27. 

The effective resistance between A and B in the given circuit is

A. 2Ω

B. 4Ω

C. 3Ω

D. 6Ω

Answer: C

Watch Video Solution

28. An electric bulb is rated 220 volt - 100 watt. The power consumed by it when operated on 110 volt will be

A. 50 watt

B. 75 watt

C. 90 watt

D. 25 watt

Answer: D

Watch Video Solution

29. A heater coil is cut into two parts of equal length and one of them is used in the leader. The ratio of the heat procued by this half coil to that by the original coil is

A. $2:1$

B. $1:2$

C. $1:4$

D. $4:1$

Answer: A

Watch Video Solution

30. if the electrc current in a lamp decreases by 5% then the power output decreases by

A. 20%

B. 10%

C. 5%

D. 2.5%

Answer: B

Watch Video Solution

31. Two electric bulbs whose resistances are in the ratio of $1:2$ are connected inparallel to a constant voltage source. The powers dissipated in them have the ratio

A. $1:2$

B. $1:1$

C. $2:1$

D. $1:4$

Answer: C

Watch Video Solution

32. A bulb rated 60 W-120 V is connected to 80 V mains. What is the current through the bulb

A. $\frac{1}{3}A$

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

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

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

Answer: A

Watch Video Solution

33. An electric bulb has the folloiwng specifications 100 watt, 220 volt. The resistance of bulb

A. 384Ω

B. 484Ω

C. 344Ω

D. 584Ω

Answer: B

Watch Video Solution

34. A 200 W and 100 W bulbs, both meant for operation at 220 V, are connected in series to 220 V. The power consumption by the combination is

A. 46 W

B. 66 W

C. 56 W

D. 75 W

Answer: B

Watch Video Solution

35. Five bulbs, each rated at 40 W-220 V are used for 5 hours daily on 20 V line. How may units of electric energy is consumed in a month of 30 days?

A. 20 units

B. 25 units

C. 15 units

D. 30 units

Answer: D

Watch Video Solution

36. An electric kettle has two heating coils. When one of them is switched on water in it boils in 6 minutes and when other is switched on water boils in 4 minutes. In what time will the water boil if both coil are switched on simultaneously

A. 1.6 min

B. 2.8 min

C. 2.4 min

D. 3 min

Answer: C

Watch Video Solution

37. A 10 V storage battery of negligible intenal resistance is connected across a 50Ω resistor. How much heat energy is produced in the resistor is 1 hour

A. 7200J

B. 6200 J

C. 5200 J

D. 4200 J

Answer: A

Watch Video Solution

38. A cell of emf 6 V is being charged by 1 A current. If the internalresistance of the cell is 1 ohm, the potential difference across the terminals of the cell is

A. 5 V

B. 7 V

C. 6 V

D. 8 V

Answer: B

Watch Video Solution

39. Two identical calls send the same current in 2Ω resistance, whether connected in series or in parallel. The internal resistance of the cell should be

A. 2 ohm

B. 1.2 ohm

C. 12 ohm

D. 21 ohm

Answer: A

Watch Video Solution

40. The emf of a daniel cell is 1.08 V. When the terminals of the cells are connected to a ressitance of 3Ω, the potential difference across the terminals is found to be 0.6 V. Then the internal resistance of the cell is

A. 1.8Ω

B. 2.4Ω

C. 3.24Ω

D. 0.2Ω

Answer: B

Watch Video Solution

41. Four cell each of emf 2 V and internal resistance 1 ohm are connected n parallel with an external resistance of 6 ohm. The current in the external resistance is

A. 0.32 A

B. 0.16 A

C. 0.2 A

D. 0.6 A

Answer: A

Watch Video Solution

42. A student is asked to connected four cells of emf of 1 V and internal resistance 0.5 ohm in series with an external resistance of 1 ohm. But one cells is wrongly connected by him with its terminal reversed, the current in the ciruit is

A. $\frac{1}{3}A$

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

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

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

Answer: B

Watch Video Solution

43. Two cells of emf $1.25V, 0.75V$ and each of internal resistance 1Ω are connected in parallel. The effective emf will be

A. 1 V

B. 1.25 V

C. 2 V

D. 0.5 V

Answer: A

Watch Video Solution

44. The emf of a cell is 2 V. When the terminals of the cell is connected to a resistance 4Ω. The potential difference across the terminals, if internal resistance of cell is 1Ω is

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

B. $\frac{8}{5}V$

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

D. $\frac{5}{8}V$

Answer: B

Watch Video Solution

45. If the external resistance is equal to internal resistance of a cell of emf E. The current across the circuit is

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

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

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

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

Answer: D

Watch Video Solution

46. Two cells each of emf 10 V and each 1Ω internal resistance are used to send a current through a wire of 2Ω resistance. The cells are arranged in parallel. Then the current through the circuit

A. 2A

B. 4A

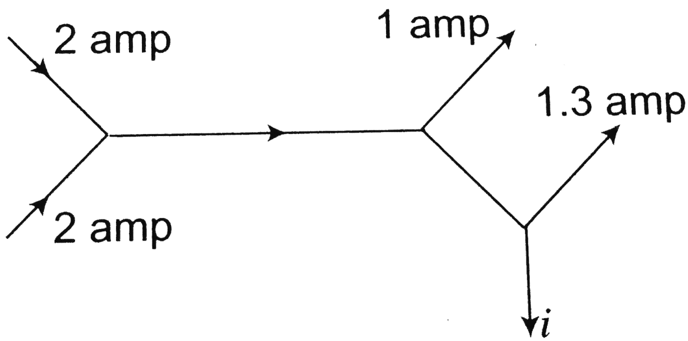
C. 3A

D. 5A

Answer: B

Watch Video Solution

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



A. $1.7amp$

B. $3.7amp$

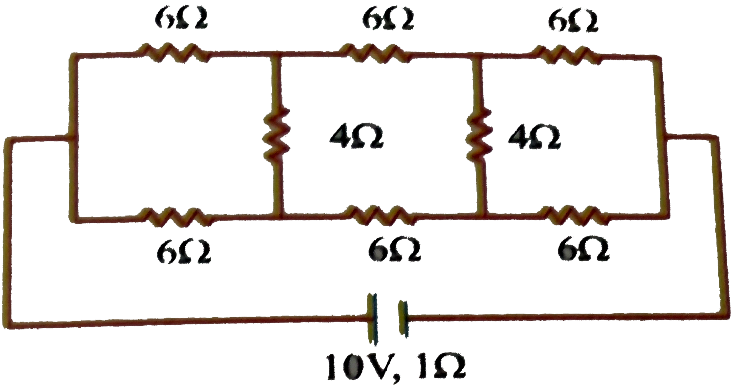
C. $1.3amp$

D. $1amp$

Answer: A

Watch Video Solution

Watch Video Solution

48. 

Current in the ain circuit shows is

A. 1.5 A

B. 0.08333333333333

C. 0.6 A

D. 1A

Answer: D

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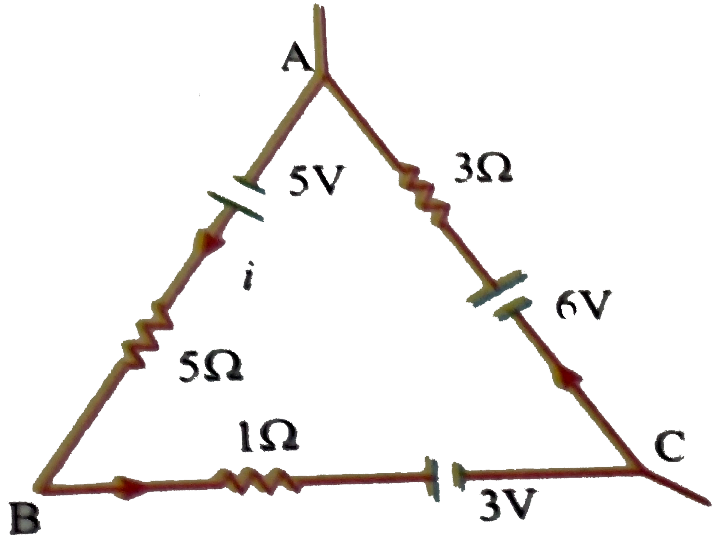
49.



Find i for the given loop.

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

B. $\frac{8}{9}A$

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

D. $1A$

Answer: B

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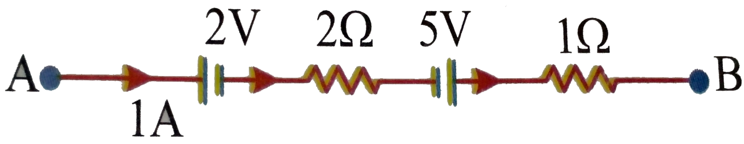
50. The potential difference between points A nd B is



A. 0 V

B. 10 V

C. 4 V

D. 5 V

Answer: A

Watch Video Solution

51. In wheat stone bridge P and Q are approximately equal. When Ris 500Ω the bridge is balanced. On interchanging P and Q, the values of R is 505Ω for balanching. The value of S is

A. 500.5Ω

B. 501.5Ω

C. 502.5Ω

D. 503.5Ω

Answer: C

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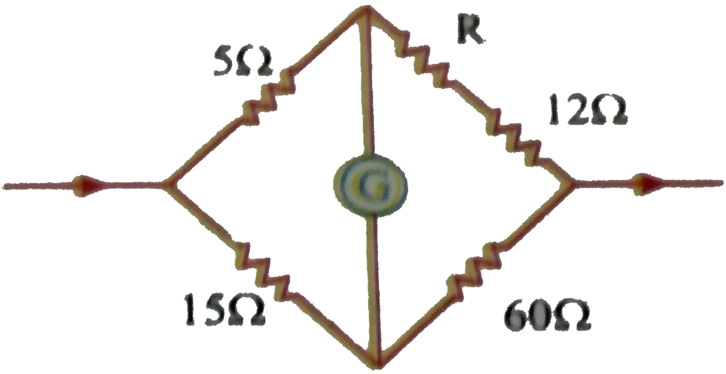
52.



To balance the bridge in the circuit in the circuit the values of R is

A. 8Ω

B. 4Ω

C. 20Ω

D. 12Ω

Answer: A

Watch Video Solution

53. The points in a metre bridge is at 35.6 cm. if the resistances in the gaps are interchanged, the new balance point is

A. 64.4 cm

B. 56 cm

C. 41.2 cm

D. 56.7 cm

Answer: A

Watch Video Solution

54. In a metre bridge expt, when the resistances in the gaps are interchanged the balance point is increases by 10 cm. The ratio of the resistances is

A. $\frac{15}{5}$

B. $\frac{12}{8}$

C. $\frac{11}{9}$

D. $\frac{10}{9}$

Answer: C

Watch Video Solution

55. When an unknown resistance and a resistance 6Ω are connected in the left and right gaps of a meter bridge the balance point is obtained at 50 cm. if 3Ω resistance is connected in parallel to resistance in right gap, the balance point is

A. decreases by 25 cm

B. increases by 25 cm

C. decreases by 16.7 cm

D. increases by 16.7 cm

Answer: B

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56. When unknown resistance and a resistance of 5Ω are used in left and rigt gaps of meter bridge the balance point is 50 cm. The balancing point of 5Ω resistance is now connected in seriece to the resistor in right gap

A. 20 cm

B. 33.3 cm

C. 60 cm

D. 60 cm

Answer: B

Watch Video Solution

57. 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. 114 cm

B. 80 cm

C. 50 cm

D. 70 cm

Answer: C

Watch Video Solution

58. In a potentiometer the balance length with standard cadmium cell is 509 cm. The emf of a cell which when connected I the place of the standard cell gave a balance length of 750 cm is (emf of standard cell is 1.018 V)

A. 1.5 V

B. 0.5 V

C. 1.08 V

D. 1.2 V

Answer: A

Watch Video Solution

59. Two cells of emf's E_1 and E_2 when placed in series produce null deflection at a distance of 204 cm in a potentio meter. When one cell is reversed they produce null deflection at 36 cm if E_1 1.4v then $E_2 =$

A. 0.98 V

B. 2.47 V

C. 0.098 V

D. 98.8 V

Answer: A

Watch Video Solution

60. Then 6 identical calls of no internal resistance are connected in series in the second arycircuit of a potentiometer, the balancing length is l if two of them are wrongly connected to balacing length becomes

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

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

C. l

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

Answer: B

Watch Video Solution

61. In an experiment to determine the internal resistance of a cell with potentiometer, the balancing length is 165 cm. When a resistance of 5 ohm is joined in parallel with the cell the balancing length is 150 cm. The internal resistance of cell is

A. 2.2Ω

B. 1.1Ω

C. 3.3Ω

D. 0.5Ω

Answer: D

Watch Video Solution

62. The resistivity of a potentiometer wire is $40 \times 10^{-8} \Omega - m$ and its area of cross section is $8 \times 10^{-6} m^2$. If 0.2 A current is flowing through the wire the potential gradient will be

A. $10^{-2} \frac{V}{m}$

B. $10^{-1} \frac{V}{m}$

C. $3.2 \times 10^{-2} \frac{V}{m}$

D. $1 \frac{V}{m}$

Answer: A

Watch Video Solution

63. The emf of a cell is Ev, and its its internal resistance is 1Ω. A resistance of 4Ω is joined to battery in parallel. This is connected in secondary circuit of potentiometer. The balancing length is 160 cm. If 1 V cell balances for 100 cm of potentiometer wire, the emf of cell E is

A. 1 V

B. 3 V

C. 2 V

D. 4 V

Answer: C

Watch Video Solution

Level 2 C.W

1. In a hydrogen tube it is observed that through a given cross-section 3.13×10^{15} electrons per sec, moving from right to left and3.12×10^{15} protons per sec are moving from left to right. The electric current in the discharge tube ad its direction is

A. 1 mA towards left

B. 1 mA towards right

C. 1.5 mA towards right

D. 2 mA towards right

Answer: B

Watch Video Solution

2. Anelectron of mass m, moves around the nucleus in a circular orbit of radius r under the action of ccentripetal force F. The equivalent electric current is

A. $\frac{e}{2\pi}\sqrt{\frac{F}{mr}}$

B. $\frac{e}{\pi}\sqrt{\frac{Fr}{m}}$

C. $\frac{e}{2\pi}\sqrt{\frac{Fm}{r}}$

D. $\frac{e}{\pi}\sqrt{\frac{Fm}{r}}$

Answer: A

Watch Video Solution

3. The current in a conductor varies with time t as $I = 3t + 4t^2$ Where I in amp and t in sec. The electric charge flows through the section of the conductor between $t = 1s$ and $t = 3s$

A. $\frac{100}{3}C$

B. $\frac{127}{4}C$

C. $\frac{140}{3}C$

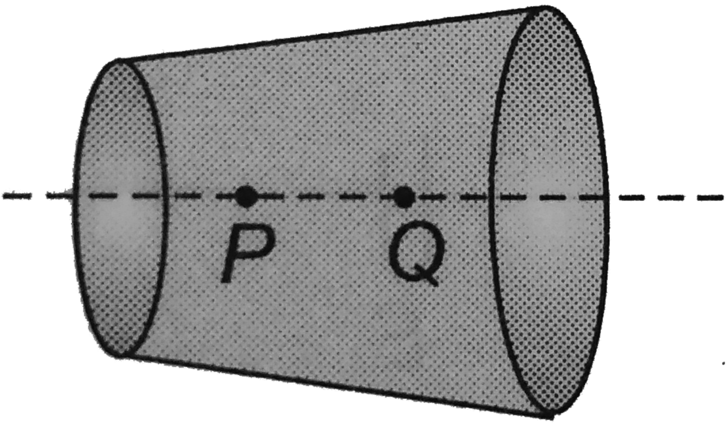
D. $\frac{150}{3}C$

Answer: C

Watch Video Solution

4. A wire has non-uniform cross-section as shown in fig. steady current flows through it. The drift speed of electrons at point P and Q is v_P and

v_Q



A. is constant throughout the wire

B. varies unpredictably

C. decreases from P & Q

D. increases from P to Q

Answer: C

Watch Video Solution

5. A current of 16 A is made to pass through a conductor in which the number of density of free electrons is $4 \times 10^{28} m^{-3}$ and its area of cross section is$10^{-5} m^2$. The average drift cross section is $10^{-5} m^2$. The average drift velocity of free electrons in the conductor is

A. $1.6 \times 10^{-4} ms^{-1}$

B. $2.5 \times 10^{-4} ms^{-1}$

C. $6.4 \times 10^{-4} ms^{-1}$

D. $3.2 \times 10^{-4} ms^{-1}$

Answer: B

Watch Video Solution

6. 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. $1.6 \times 10^{-8} \Omega m$

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

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

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

Answer: D

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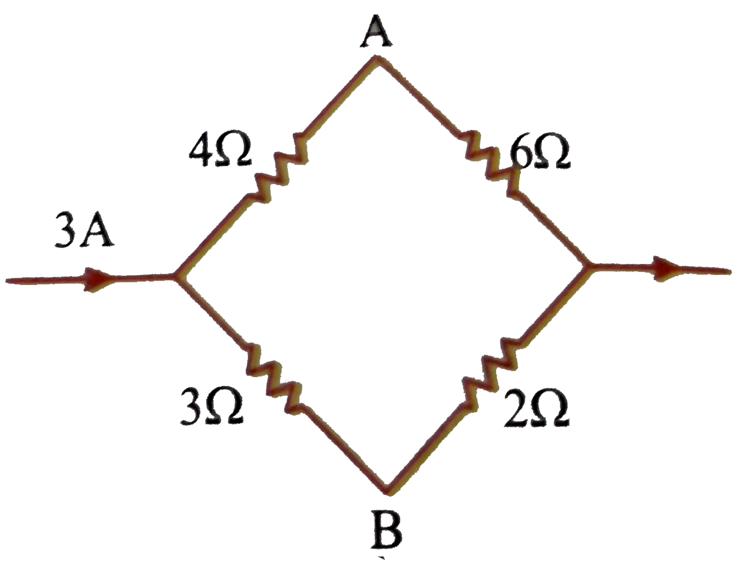
7.



A current of 3A flows in a circuit shown in the figure. The potential difference between A and b is

A. $4V$

B. $3V$

C. $2V$

D. $5V$

Answer: C

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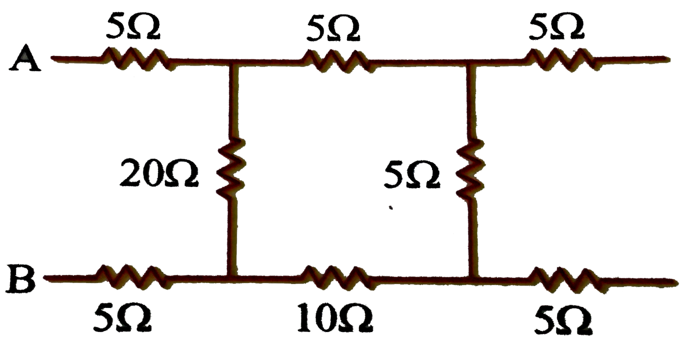
8.



The resistance of the network between the terminals A and B is

A. 30Ω

B. 20Ω

C. 50Ω

D. 60Ω

Answer: B

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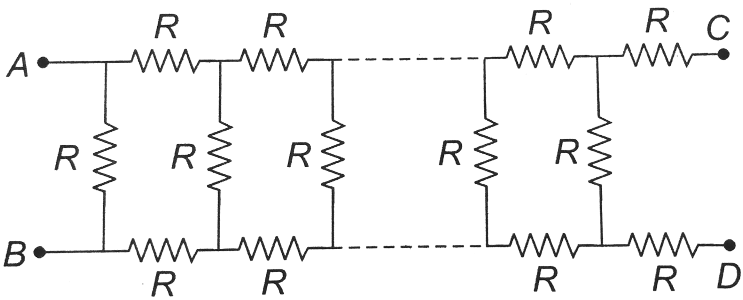
9. In the figure, the value of resistors to be connected between C and D so that the resistance of the entire circuit between A and B does not change with the number of elementary set used is



A. R

B. $R(\sqrt{3}-1)$

C. $3R$

D. $R(\sqrt{3}+1)$

Answer: B

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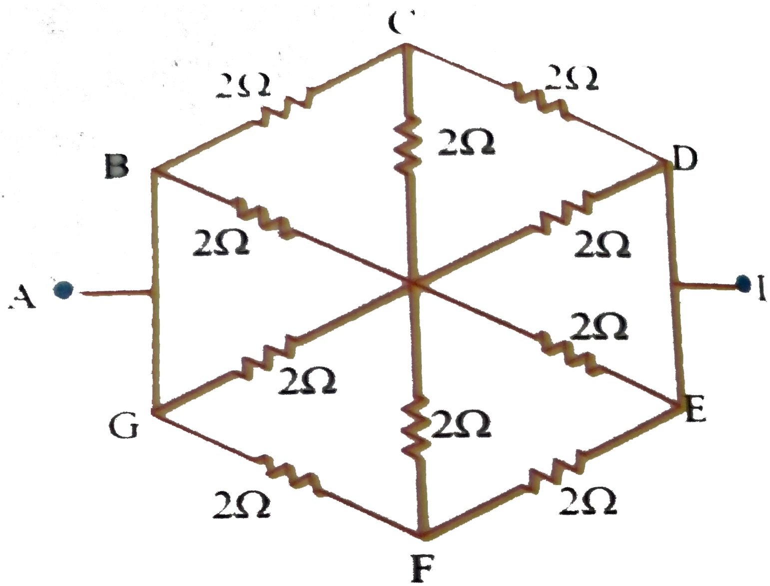
10.



The effective resistance across the points A and I is

A. 2Ω

B. 1Ω

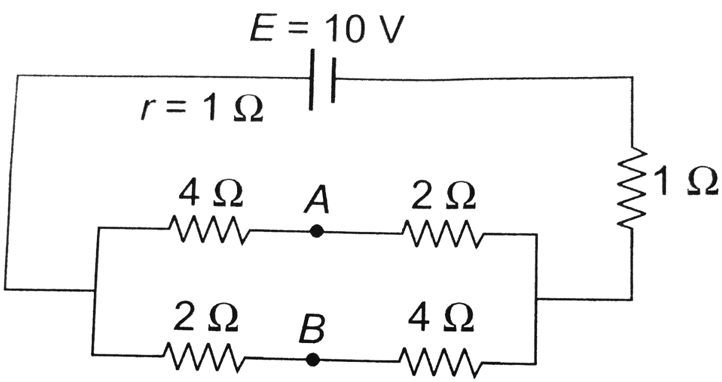
C. 0.5Ω

D. 5Ω

Answer: B

Watch Video Solution

11. In the circuit shown below, the cell has an e.m.f. of $10V$ and internal resistance of $1ohm$. The other resistances are shown in the figure. The potential difference $V_A - V_B$ is



A. $6V$

B. $4V$

C. $2V$

D. $-2V$

Answer: D

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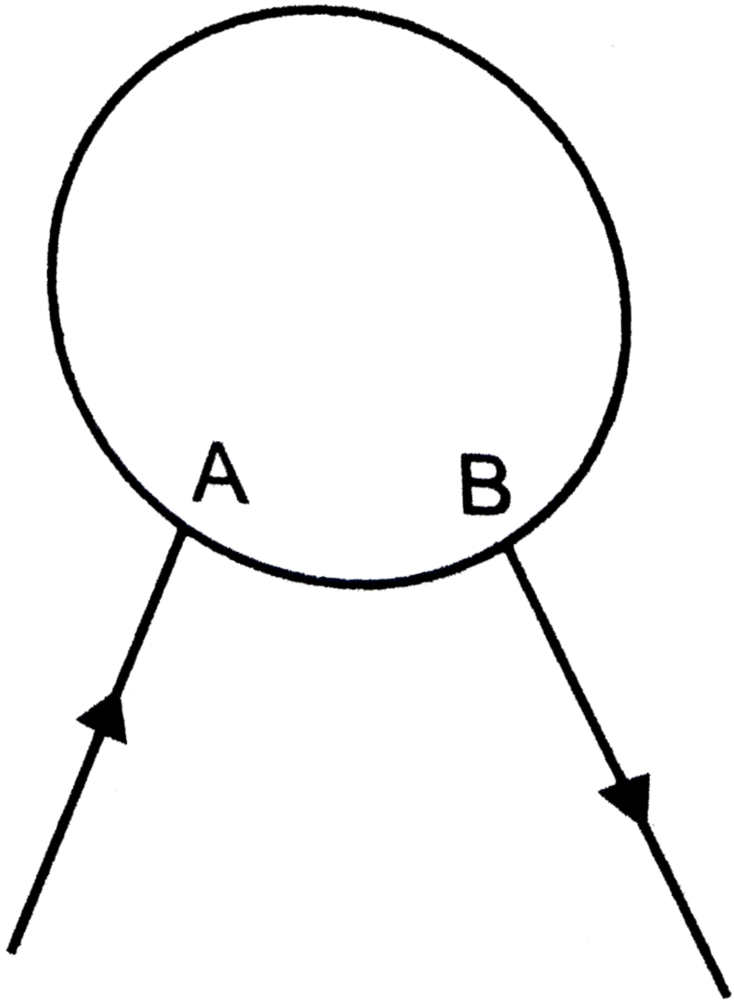
12. A uniform wire resistance 20Ω having resistance $1\Omega permeter,$ is bent in the forms of a circuit if the equal - valent resistance between A and B is

1.8Ω then length of the shorter section is



A. 2m

B. 5m

C. 1.8 m

D. 18m

Answer: A

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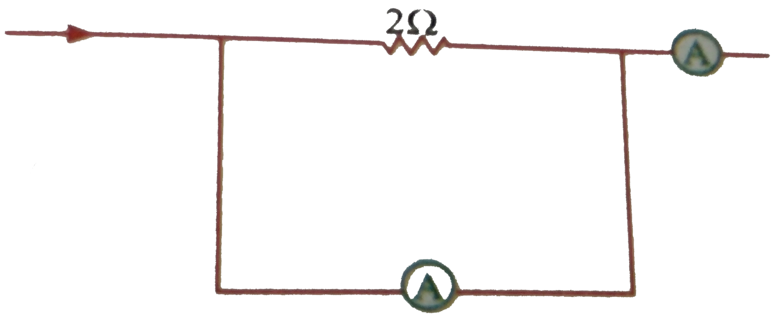
13. 

If the voltmeter reads 0.2 V and the ammeter reads 0.101A, the resistance of the voltmeter is (in ohm)

A. 500

B. 1000

C. 200

D. 400

Answer: C

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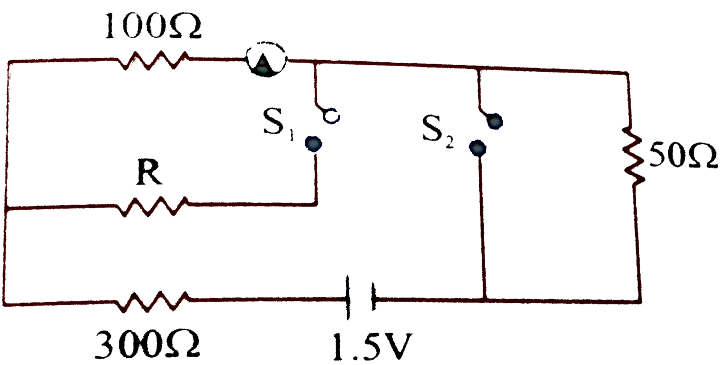
14.



In the given ciruit Ammeter reading is same when both switches S_1, S_2 are closed or opened. The value of resistance R is

A. 200Ω

B. 100Ω

C. 400Ω

D. -300Ω

Answer: D

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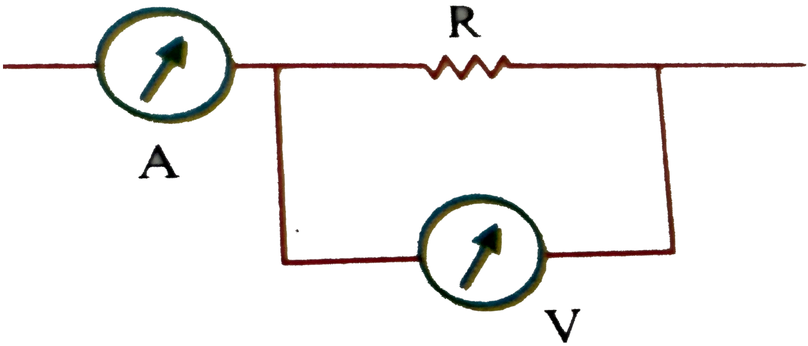
Watch Video Solution

15.



In the following diagram ammeter reading is 4A, voltmeter reading is 20V, the value of R is

A. $> 5\Omega$

B. $< 5\Omega$

C. $= 5\Omega$

D. $\leq 5\Omega$

Answer: A

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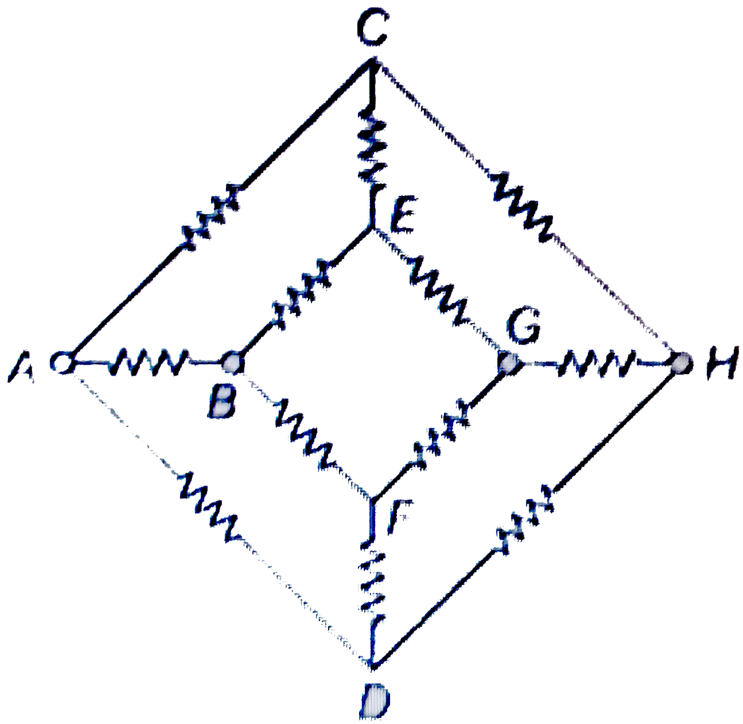
16. Twelve resistors each of resistance 1Ω are connected in the circuit shown in figure. Net resistance between point A and H would be



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

B. $\frac{7R}{6}$

C. R

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

Answer: D

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17. A resistance is made by connecting two wires (series) of same material of radii 2 mm and 5 mm and length 8cm and 5 cm. A potential difference of 22V is applied to them. The potential difference on the longer wre is

A. 15 V

B. 18 V

C. 16 V

D. 20 V

Answer: D

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18. A 220 V and 800 W electric kettle and three 220 V and 100 W bulbs are connected in parallel. On connecting this combination with 200 V supply, the total currentin the circuit will be

A. 0.15 A

B. 0.2083333333333

C. 5.5 A

D. 4.55 A

Answer: D

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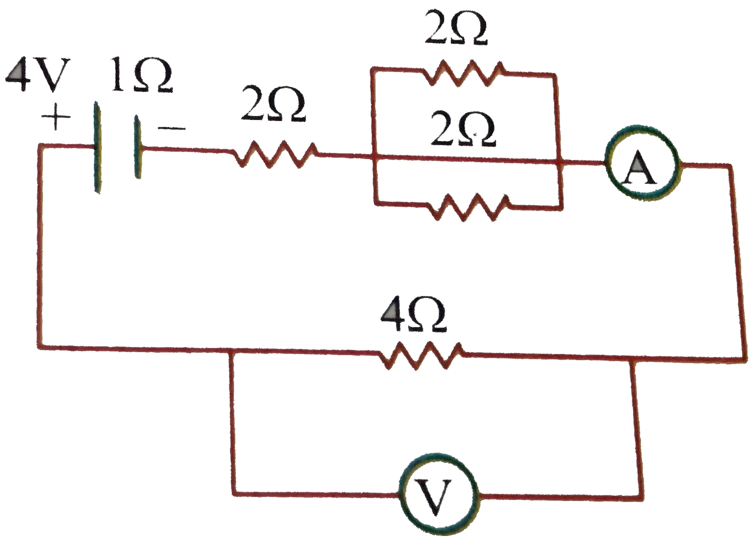
19.



What is the equivalent resistance of the circuit

A. 6Ω

B. 7Ω

C. 8Ω

D. 9Ω

Answer: C

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20. The temperature coefficient of resistance of platinum is $\alpha = 3.92 \times 10^{-3} K^{-1}$ at $20^{\circ} C$. Find the temperature at which the increase in the resistance of platinum wire is 10% of its value at $20^{\circ} C$

A. $40.5^{\circ} C$

B. $45.5^{\circ} C$

C. $48.5^{\circ} C$

D. $43.5^{\circ} C$

Answer: B

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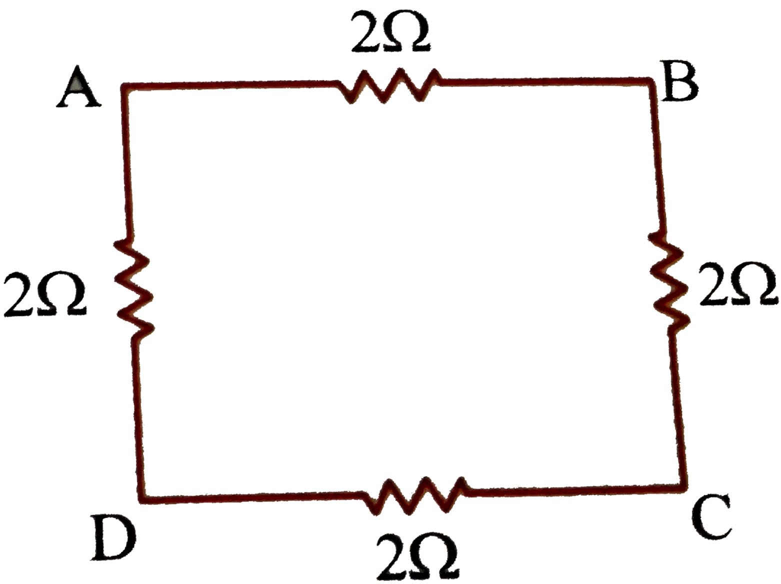
21. Four identical resistance are joined as shown in fig. the equivalent resistance between points A and B is R_1 and that between A and C is R_2. Then ratio of $\frac{R_1}{R_2}$ is



A. $1:5$

B. $3:4$

C. $2:5$

D. $1:2$

Answer: B

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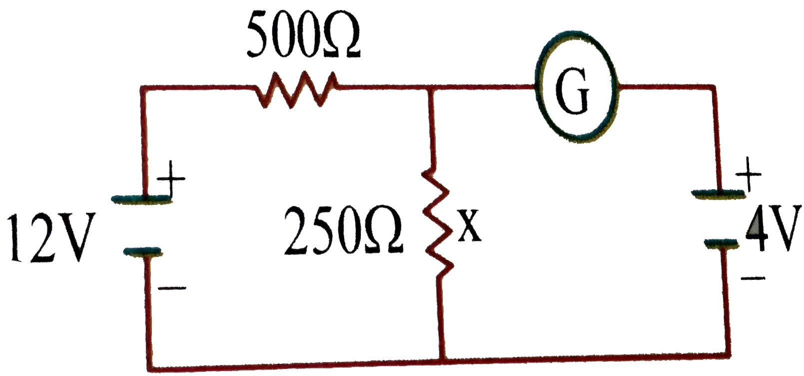
22. 

If the galvanometer reading is zero in the given circuit, the current passing through resistance 250Ω is

A. $0.016A$

B. $0.16A$

C. $0.032A$

D. $0.042A$

Answer: A

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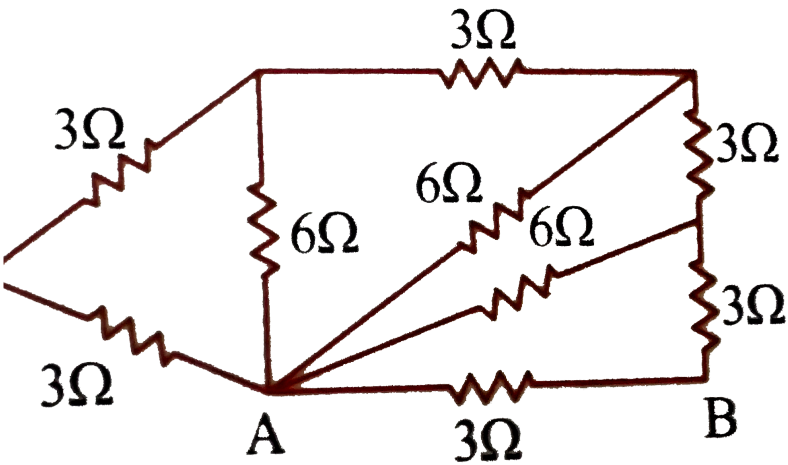
23. 

The effective resistance between A and B is the given circuit is

A. 3Ω

B. 2Ω

C. 4Ω

D. 6Ω

Answer: B

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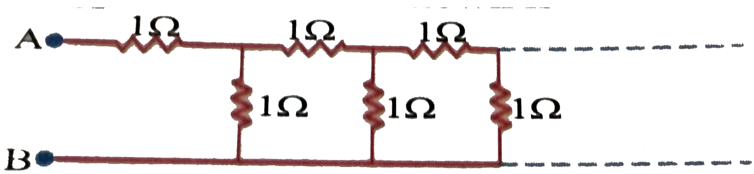
24. 

The equivalent resistance between points A and B of an infinite network of resistance each of 1Ω connected as shown is

A. $\dfrac{1+\sqrt{5}}{2}$

B. $\dfrac{2+\sqrt{5}}{4}$

C. $\dfrac{3+\sqrt{5}}{2}$

D. $\dfrac{1+\sqrt{7}}{3}$

Answer: A

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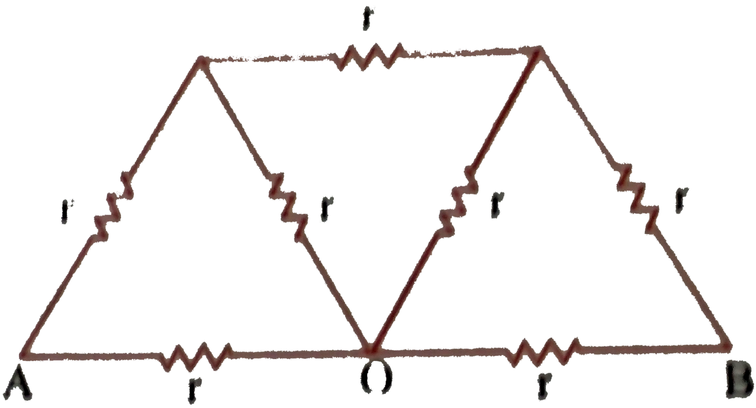
25. 

Equivalent resistance across A and B in the given circuit is

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

B. $\frac{8r}{7}$

C. $\frac{7r}{3}$

D. $6r$

Answer: B

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26. Two resistance of 400Ω and 800Ω are connected in series with 6 volt battery of negligible internal resistance. A voltmeter of resistance $10,000\Omega$ is used to measure the potential difference across 400Ω. The error in measurement of potential difference in volts approximatley is

A. 0.05V

B. 0.5V

C. 0.75V

D. 5V

Answer: A

Watch Video Solution

27. Copper and carbon wires are connected in series and the combined resistor is kept at $0^\circ C$. Assuming the combined resistance does not vary with temperature the ratio of the resistances of carbon and copper wires at $0^{\circ}C$ is (Temperature coefficient of resistivity of copper and carbon respectively are $4 \times \frac{10^{-3}}{} \hat{} (\circ)C)$ and $-0.5 \times \frac{10^{-3}}{} \hat{} (\circ)C)$

A. 2

B. 4

C. 8

D. 6

Answer: C

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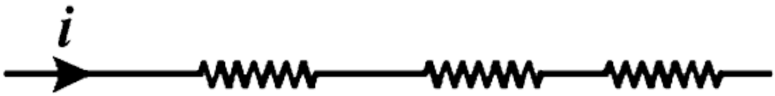
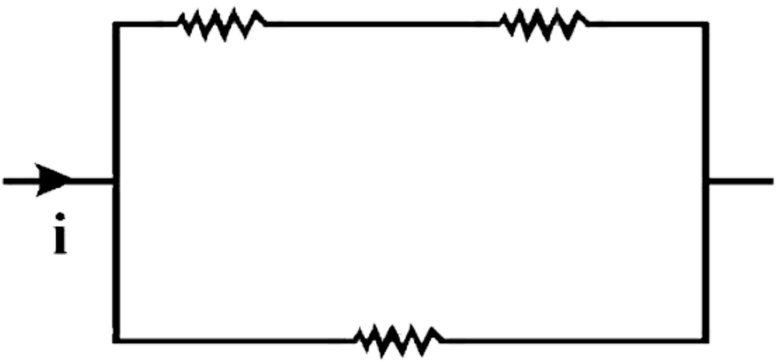
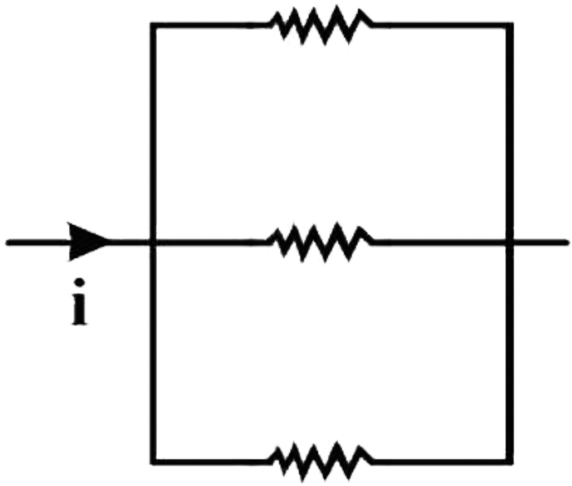
28. The three resistance of equal value are arranged in the different combination shown below. Arrange them in increasing order of power dissipation.

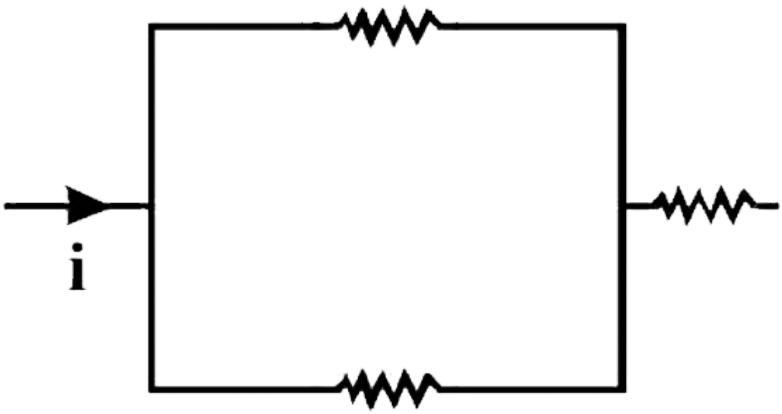


(I) (II)





(IV)



A. $(III) < (II) < (IV) < (I)$

B. $(I) < (III) < (IV) < (I)$

C. $(I) < (IV) < (III) < (II)$

D. $(I) < (III) < (II) < (IV)$

Answer: A

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

A. 5%

B. 10%

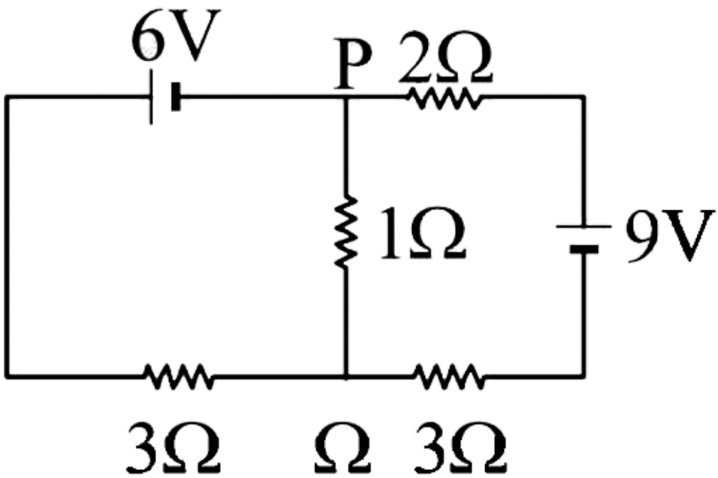
C. 15%

D. 20%

Answer: A

Watch Video Solution

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



A. $1.3A$, from P to Q

B. $0A$

C. $0.13A$, from Q to P

D. 0.13A, from P to Q

Answer: C

Watch Video Solution

31. The temperature dependence of resistance of Cu and undoped Si in the temperature range $300 - 400K$, is best described by :

A. Linear increase for Cu, exponential decrease for Si

B. Linear decrease for Cu, linear decrease for Si

C. Linear increase of Cu, linear increase for Si

D. Linear increase of Cu, expotential increase for Si

Answer: A

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32. Two wires A and B with lengths in the ratio of $3:1$ diameters in the ratio of $1:2$ and resistivities in the ratio of $1:20$ are joined in parallel with a source of emf. 2V. Ratio of the

$\frac{R_1}{R_2}$ is:

A. $5:2$

B. $2:5$

C. $5:3$

D. $3:5$

Answer: D

Watch Video Solution

33. 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. 10 minuts

B. 20 minutes

C. 15 minutes

D. 25 minutes

Answer: B

Watch Video Solution

34. Three electric bulbs of 40 W, 60 W and 100 W have the tungsten wire of the same diamter. Then the longer wire is used by

A. $60W$

B. $100W$

C. $40W$

D. All use the same length

Answer: C

Watch Video Solution

35. A fuse wire with radius of $0.2mm$ blows off with a current of 5 Amp. The fuse wire of same material,but of radius 0.3 mm will blow off with a current of

(1) $5 \times \frac{3}{2} Amp$

(2). $\frac{5\sqrt{3}}{2} Amp$

(3). $5\sqrt{\frac{27}{8}}Amp$

(4). $5Amp$

A. $5 \times \frac{3}{2}amp$

B. $\frac{5\sqrt{3}}{2}amp$

C. $5\sqrt{\frac{27}{8}}amp$

D. 5amp

Answer: C

Watch Video Solution

36. 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

37. 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

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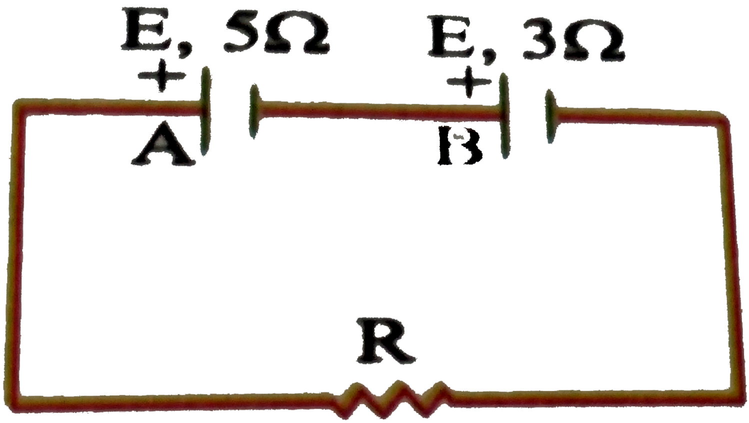
38.



In the circuit shown here, cells A and B have emf 10 V each and the internal resistance is 5Ω for A and 3Ω for B. For what value of R will the potential difference across thhe cell A will be zero?

A. zero

B. 1ohm

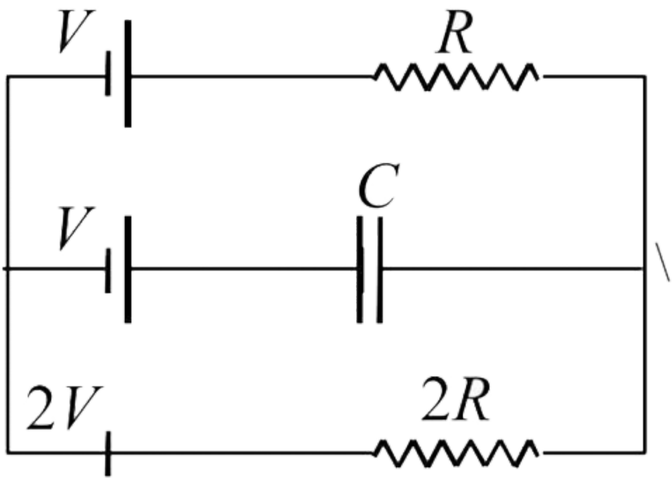
C. 2ohm

D. 3ohm

Answer: C

Watch Video Solution

39. In the given circuit, with steady current, the potential drop across the capacitor must be



A. V

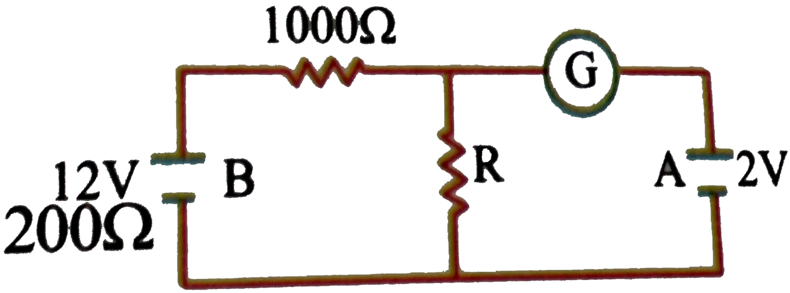
B. $\frac{V}{2}$

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

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

Answer: C

Watch Video Solution

40. 

In the circuit the galvanometer G shows zero deflection. If the betteries A and B have negligible internal resistance, the value of the resistor R will be:

A. 100Ω

B. 200Ω

C. 500Ω

D. 1000Ω

Answer: B

Watch Video Solution

41. Twenty four cells each of emf 1.5 V and internal resistance 0.5 ohms are to be connected to a 3 ohm resistance. For maximum current through this resistance the nuber of rows and number of columns that you connect these cells is.

A. 12 cells in series 2 ros in parallel

B. 8 cells in series 3 rows in parallel

C. 4 cells in series 6 rows in parallel

D. 6 cells in series 4 rows in parallel

Answer: A

Watch Video Solution

42. A battery of four cells in series each having an efm of 1.5 V and internal resistance 1Ω are connected in series with an ammeter, a coil of resistance 2Ω and a filament lamp. If the ammeter reads 0.5 A, the resistance of the filament lamp is

A. 4Ω

B. 6Ω

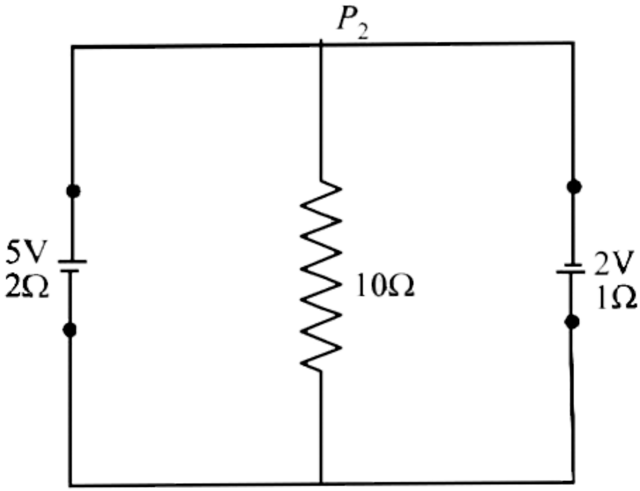
C. 2Ω

D. 12Ω

Answer: B

Watch Video Solution

43. A 5V battery with internal resistance 2Ω and a 2V battery with internal resistance1Ω are connected to a 10Ω resistor as shown in the figure.



The current in the 10Ω resistor is

A. $0.27A$

B. $0.05A$

C. $0.25A$

D. $0.3A$

Answer: C

Watch Video Solution

44. A voltmeter with resistance 500Ω is used to measure the emf of a cell of internal resistance 4Ω. The percentage error in the reading of the voltmeter will be

A. 0.4%

B. 0.6%

C. 0.8%

D. 1.2%

Answer: C

Watch Video Solution

45. When two identical cells are connected either in series or in parallel across a 4 ohm resistor, they send the same current through it. The internal resistance of the cell in ohm is

A. 4Ω

B. 2Ω

C. 1Ω

D. 7Ω

Answer: A

Watch Video Solution

46. Two cells, having the same emf, are connected in series through an external resistance R. Cells have internal resistance r_1 and $r_2(r_1 > r_2)$ respectively. When the circuit is closed, the potentail difference across the first cell is zero the value of R is

A. $r_2 - r_1$

B. $r_1 - r_2$

C. $r_1 + r_2$

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

Answer: B

Watch Video Solution

47. Two conductors have the same resistance at $0^\circ C$ but their temperature coefficient of resistanc are α_1 and α_2. The respective temperature coefficients of their series and parallel combinations are nearly

A. $\frac{\alpha_1 + \alpha_2}{2}, \alpha_1 + \alpha_2$

B. $\alpha_1 + \alpha_2, \frac{\alpha_1 + \alpha_2}{2}$

C. $\alpha_1 + \alpha_2, \frac{\alpha_1 \alpha_2}{\alpha_1 + \alpha_2}$

D. $\frac{\alpha_1 + \alpha_2}{2}, \frac{\alpha_1 + \alpha_2}{2}$

Answer: D

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48. A galvanometer having a coil resistance of 100ω gives a full scale deflection , when a current of $1mA$ is passed through it. The value of the resistance, which can convert this galvanometer into ammeter giving a full scale deflection for a current of $10A$, is :

A. 0.1Ω

B. 3Ω

C. 0.01Ω

D. 2Ω

Answer: C

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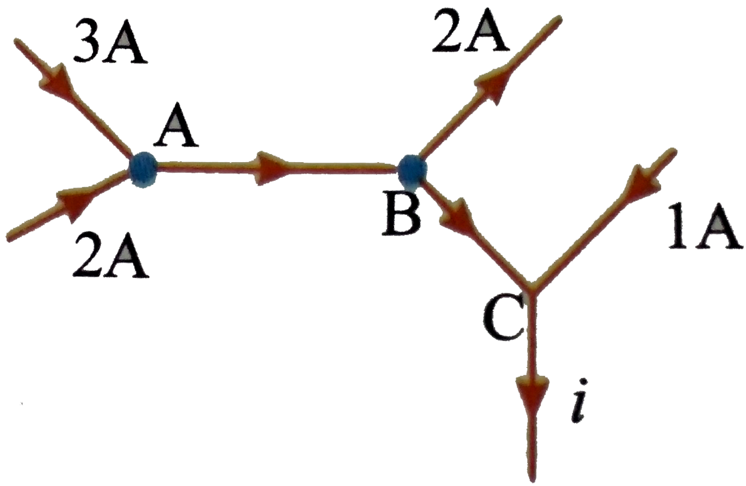

49.

The electric current I in the circuit shown is

A. 6A

B. 2A

C. 3A

D. 4A

Answer: D

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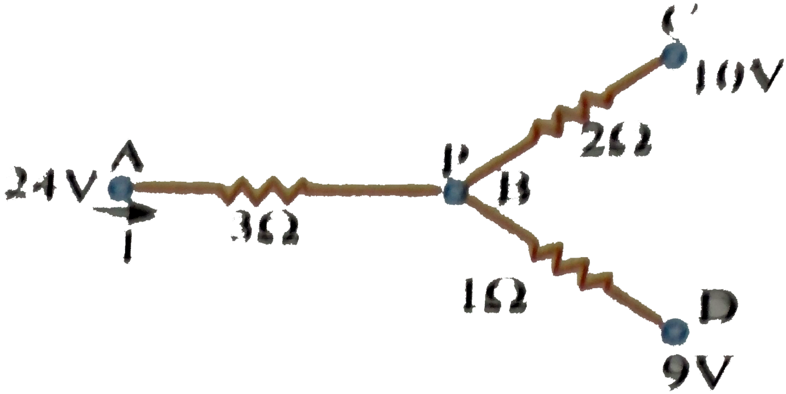

50.

In the circuit chown in the figure, the current I is

A. 6A

B. 2A

C. 4A

D. 7A

Answer: C

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51. Four resistors A,B,C and D from a wheatstone's bridge. The bridge is balanced when $C = 100\Omega$, if A and b are inter changed, the bridge balances for $C = 121\Omega$. The value of D is

A. 10Ω

B. 100Ω

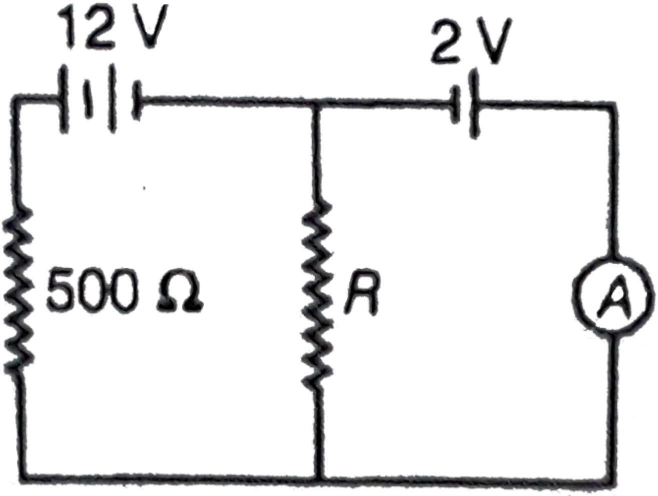
C. 110Ω

D. 120Ω

Answer: C

Watch Video Solution

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



A. 50Ω

B. 100Ω

C. 200Ω

D. 400Ω

Answer: B

Watch Video Solution

53. Two unknown resistance X and Y are connected to left and right gaps of a meter bridge and the balancing point is obtained at 80 cm from left.

When a 10Ω resisance is connected in parallel to x, balance point is 50 cm from left. The values of X and Y respectively are

A. $40\Omega, 9\Omega$

B. $30\Omega, 7.5\Omega$

C. $20\Omega, 6\Omega$

D. $10\Omega, 3\Omega$

Answer: B

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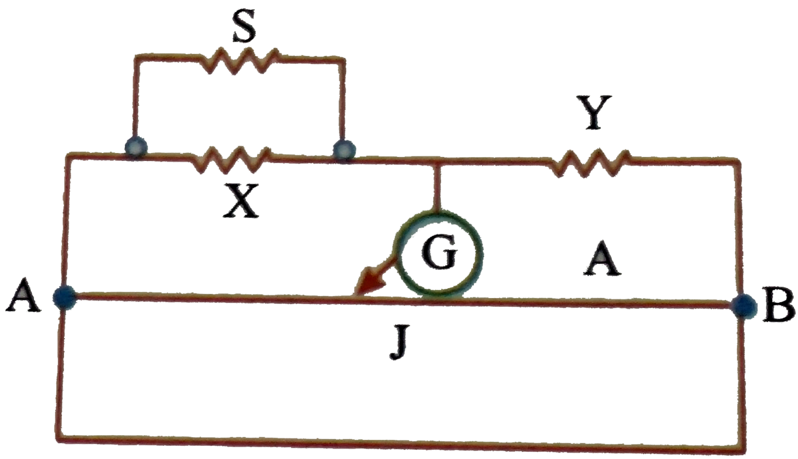


54.

In the meter bridge experiment, the length Ab of the wire is 1m. The resistors X and Y have values 5Ω and 2Ω respectively. When a shunt resistance S is connected to X, the balacing point is found to be 0.625 m from A. Then the resistance of the shunt is

A. 5Ω

B. 10Ω

C. 7.5Ω

D. 12.5Ω

Answer: B

Watch Video Solution

55. The potential gradient long the length of a unifrom wire is $10\text{volt}/meter$. B and C are the two points at $30cm$ and $60cm$ point on a meter scale fitted along the wire. The potential diffenence between B and C will be

A. 3 V

B. 0.4 V

C. 7 V

D. 4 V

Answer: A

Watch Video Solution

56. In the determination of the internal resistance of a cell using a potentiometer, when the cell is shunted by a resistance R and connected in the secondary circuit, the balance length is found to be L_1. On doubling the shunt resistance, the balance length is found to increase to L_2. The value of the internal resistance is

A. $\dfrac{2R(L_2L_1)}{(L_1 - 2L_2)}$

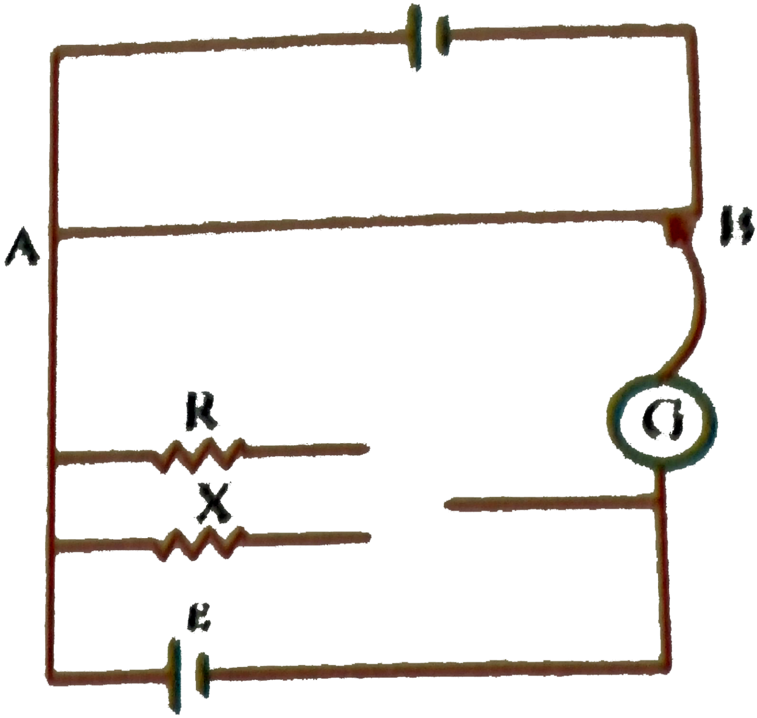
B. $\dfrac{2R(L_2 - L_1)}{(2L_1 - L_2)}$

C. $\dfrac{R(L_2 - L_1)}{(L_1 - 2L_2)}$

D. $\dfrac{R(L_2 - L_1)}{(2L_1 - L_2)}$

Answer: B

Watch Video Solution



57.

Figure shows a potentiometer circuit for comparision of two resistances. The balance point with a standard resistor $R = 10.0\Omega$ is found to be 58.3 cm, while that with the unknown resistance X is 68.5 cm. the value of X is

A. 11.75Ω

B. 12.55Ω

C. 9.55Ω

D. 12.75Ω

Answer: A

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58. In a experiment for calibration of voltmeter a standard cell of emf 1.5 V is balanced at 300 cm length of potentiometer wire. The P.D across a resistance in the circuit is balancedat 1.25 m. if a voltmeter is connected across the same resistance it reads 0.65 V. the error in the volt meter is

A. 0.5 V

B. 0.025 V

C. 0.05 V

D. 0.25 V

Answer: B

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59. 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. $1\frac{V}{m}$

B. $0.5\frac{V}{m}$

C. $0.1\frac{V}{m}$

D. $0.2\frac{V}{m}$

Answer: C

Watch Video Solution

Level 2 H.W

1. An electron of mass $9 \times 10^{-31} kg$ moves around a nucleus in a circular orbit of radius $2A^{\circ}$ under the action of centripetal force 3.2N. Then the equivalent electric current is

A. $\frac{32}{3\pi}$

B. $\frac{3\pi}{32}$

C. $\frac{16}{3\pi}$

D. $\frac{3\pi}{16}$

Answer: A

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2. The current in a conductor varies with time t as $I = 2 - 0.02t$ ampers.

The electric charge that passes from $t = 0$ to $t = 100$ sec is

A. 50 C

B. 100 C

C. 25 C

D. 75 C

Answer: B

Watch Video Solution

3. Four resistances $10\Omega, 5\Omega, 7\Omega$ and 3Ω are connected so that they form the sides of a rectangle AB, BC, CD and DA respectively. Another resistance of 10Ω is connected across the diagonal AC. The equivalent resistance between A and B is

A. 2Ω

B. 5Ω

C. 7Ω

D. 10Ω

Answer: B

Watch Video Solution

4. A 3Ω resistor and a 6Ω resistor are connected in parallel and the combination is connected in series to a battery of 5 V and a 3Ω resistor. The potential difference across the 6Ω resistor

A. $2V$

B. $4V$

C. $3V$

D. $1V$

Answer: A

Watch Video Solution

5. You are given a wire of length 100 cm and linear resistance of 1 ohm/cm. if it is cut into two parts, so that when they are in parallel, the effective resistance is 24 ohm. The lengths of the two parts are

A. 30 cm & 70 cm

B. 60 cm & 40 cm

C. 70 cm & 30 cm

D. 20 cm & 80 cm

Answer: B

Watch Video Solution

6. The resistance of a platinum wire of a platinum resistance thermometer at the ice point is 5Ω and at steam point is 5.4Ω. When the thermometer is inserted in a hot bath, the resistance of the platinum wire is 6.2Ω. Find the temperature of the hot bath.

A. $3000^\circ C$

B. $30^\circ C$

C. $300^\circ C$

D. $300K$

Answer: C

Watch Video Solution

7. Three unequal resistor in parallel are equivalent to a resistance 1 ohm If two of them are in the ratio $1:2$ and if no resistance value is fractional the largest of three resistance in ohm is

A. 4

B. 6

C. 8

D. 12

Answer: B

Watch Video Solution

8. A carbon filament has resistance of 120Ω at $0^{\circ}C$ what must be te resistance of a copper filament connected in series with resistance at all temperature

$$\left(\alpha_{\text{carbon}} = \frac{-5 \times 10^{-4}}{}\ \hat{}\ (\circ)C\right), \alpha_{\text{copper}} = \frac{4 \times 10^{-3}}{}\ \hat{}\ (C))$$

A. 120Ω

B. 15Ω

C. 60Ω

D. 210Ω

Answer: B

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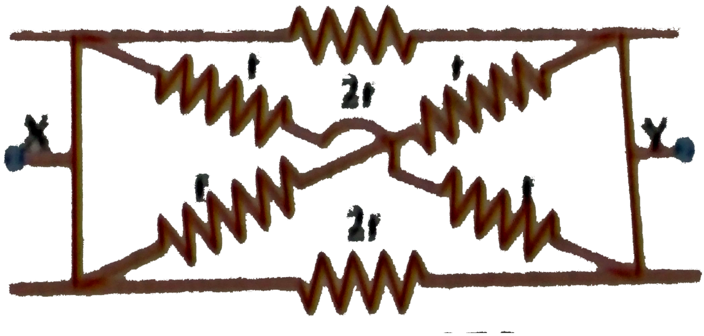
9. 

The equivalent resistance across XY in fig.

A. r

B. $2r$

C. $4r$

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

Answer: D

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10. If the resistance of a circuit having 12 V source is increased by 4Ω the current drops by 0.5 A. What is the original resistance of circuit

A. 4Ω

B. 8Ω

C. 16Ω

D. $\frac{1}{16}\Omega$

Answer: B

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11. An electric current is passed through a circuit containing two wires of the same material connected in parallel. If the lengths and radii of the wire are in the ratio $\frac{4}{3}$ and $\frac{2}{3}$, then the ratio of the currents passing through the wires will be

A. $\frac{1}{3}$

B. $\frac{3}{1}$

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

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

Answer: A

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12. When n wires which are identical are connected in series, the effective resistance exceeds that when they are in parallel by $\frac{X}{Y}\Omega$. Then the resistance of each wire is

A. $\frac{xn}{y(n^2-1)}$

B. $\frac{yn}{x(n^2-1)}$

C. $\frac{xn}{y(n-1)}$

D. $\frac{yn}{x(n-1)}$

Answer: A

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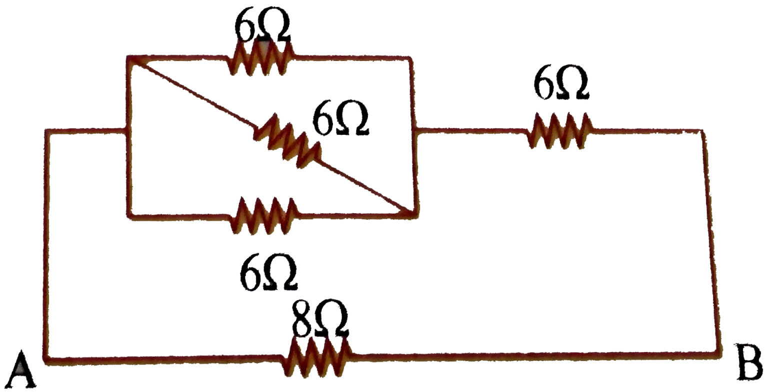
13. 

The equivalent resistance across A and B is

A. 2Ω

B. 4Ω

C. 8Ω

D. 12Ω

Answer: B

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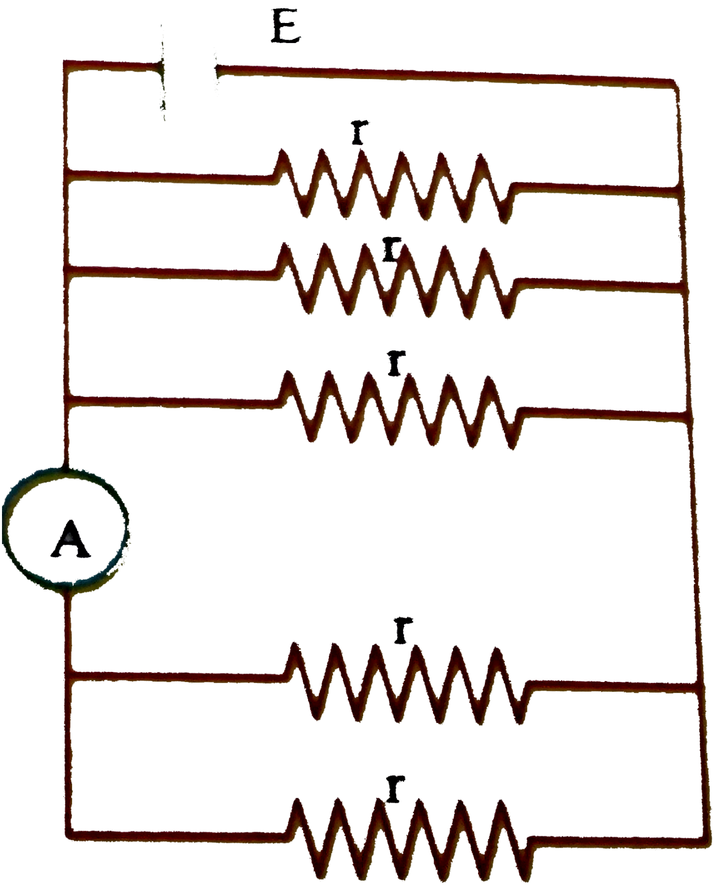
14.



An ammeter A is connected as shown in the diagram. Ammeter reading is

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

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

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

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

Answer: B

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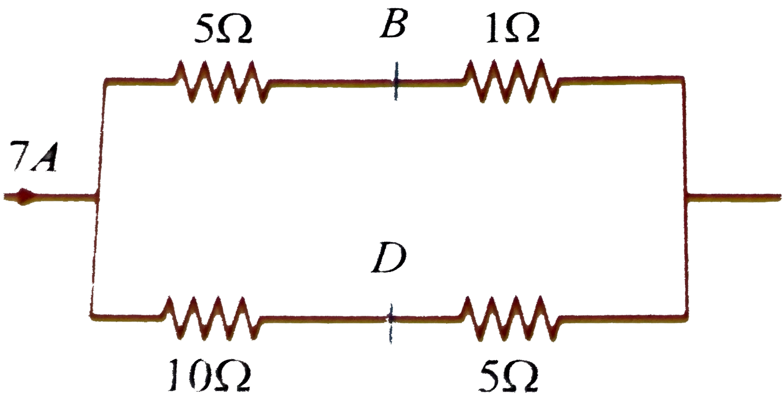
15. 

A current of 7 A flows through the circuit as shown in the figure the potential difference across points B and D is

A. $5V$

B. $3V$

C. $10V$

D. $7V$

Answer: A

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16. If a copper wire is stretched to make it 0.1% longer wha is the percentage change in its resistance?

A. increases by 0.2%

B. decreases by 0.2%

C. decreases by 0.05%

D. increases by 0.05%

Answer: A

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17. Two resistance R_1 and R_2 when connected in series and parallel with $120V$ line, power consumed will be $25W$ and $100W$ respectively. . Then the ratio of power consumed by R_1 to that consmed by R_2 will be

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

B. $\frac{1}{3}$

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

D. 1

Answer: D

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18. Two identical electric lamps marked $500W$, $220V$ are connected in series and then joined to a $110V$ line. The power consumed by each lamp is

A. $\frac{125}{4}W$

B. $\frac{25}{4}W$

C. $\frac{225}{4}W$

D. $\frac{325}{4}W$

Answer: A

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19. A conductor of resistance 3 ohm is stretched uniformly till its length is doubled. The wire now is bent in the form of an equilateral Delta. The effective resistance between the ends of any side of the Delta in ohms is

A. $\frac{9}{2}$

B. $\frac{8}{3}$

C. 2

D. 1

Answer: B

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20. Ten $50W$ bulbs are operated for 10 hours per day. The energy consumed in kWh in a 30 day month is

A. 1500

B. 15000

C. 15

D. 150

Answer: D

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21. Two electic bulbs marked $25W-220V$ and $100W-220V$ are connected in series to a 440 V supply. Which of the bulbs will fuse?

A. both

B. 100 W

C. 25 W

D. Neither

Answer: C

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22. Two batteries of different emf and internal resistances connected in series with each other and with an external load resistor. The current reversed, the current becomes 1.0 A. the ratio of the emf of the two batteries is

A. $2.5 : 1$

B. $2 : 1$

C. $3 : 2$

D. $1 : 1$

Answer: B

Watch Video Solution

23. The pd across terminals of a cell is found to be 29 volt and 28 volt respectively when it delivers a current of 1 ampere and 2 ampere respectively. The emf and internal resistance of a cell are respectively

A. $30V, 2\Omega$

B. $30V, 1\Omega$

C. $29V, 1\Omega$

D. $28V, 2\Omega$

Answer: B

Watch Video Solution

24. The current in a circuit containing a battery connected to 2Ω resistance is 0.9A. When a resistance of 7Ω connected to the same battery, the current observed in the circuit is 0.3 A. Then the internal resistance of te battery is

A. 0.1Ω

B. 0.5Ω

C. 1Ω

D. zero

Answer: B

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25. The potential difference across te terminals of a battery is 10 V when there is a current of 3 A in the battery from the negative to the positive terminal. When the current is 2A in the reverse direction, the potential difference becomes 15 V. The internal resistance of the battery is

A. 1Ω

B. 0.4Ω

C. 0.6Ω

D. 0.8Ω

Answer: A

Watch Video Solution

26. Two cells of emf 3V and 5V and internal resistance r_1 and r_2 respectively are in series with an external resistance R. if the p.d. across 1 st cell is zero, then R is

A. $\dfrac{5r_1 - 3r_2}{3}$

B. $\dfrac{2r_1 - 3r_2}{4}$

C. $\dfrac{3r_1 - 5r_2}{3}$

D. $\dfrac{4r_1 - 5r_2}{3}$

Answer: A

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27. A battery when connected by resistance of 16Ω gives a terminal voltage of 12 V. and when connected by a resistance of 10Ω gives a terminal voltage of 11V. Then the emf of the battery ad its internal resistance

A. 12.8 V

B. 13.7 V

C. 10.7 V

D. 9 V

Answer: B

Watch Video Solution

28. When a resistor of 11Ω is connected in series with an electric cell, the current following in it is $0.5A$. Instead, when a resistor of 5Ω is connected to the same electric cell in series, the current increases by $0.4A$ The internal resistance of the cell is

A. 1.5Ω

B. 2Ω

C. 2.5Ω

D. 6Ω

Answer: C

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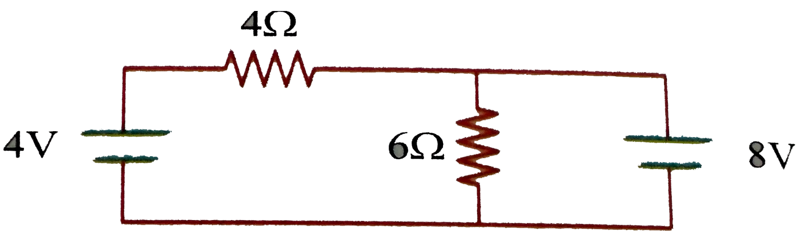
29. 

Two cells of emf 4 V and 8 V are connected to two resistor 4Ω and 6Ω as shown. If 8 V cell is short circuited. Then current through resistance 4Ω and 6Ω

A. 2A

B. 1A

C. 2.5A

D. 3A

Answer: B

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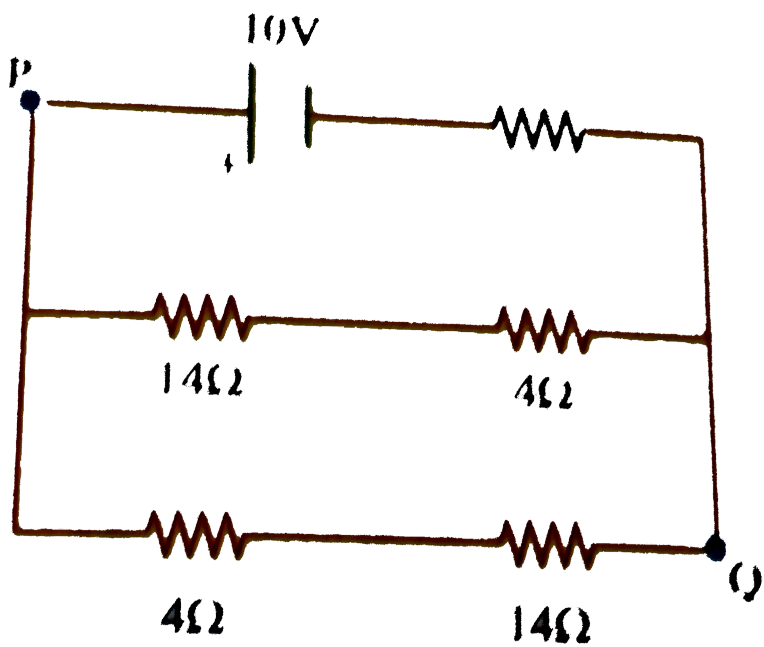
30. 

If in the circuit shown below, the internal resistance of the battery is 1Ω and V_P and V_Q are the potentials at P and Q respectively, the potential difference between te point P and Q is

A. 9 V

B. 11 V

C. 7 V

D. 6 V

Answer: A

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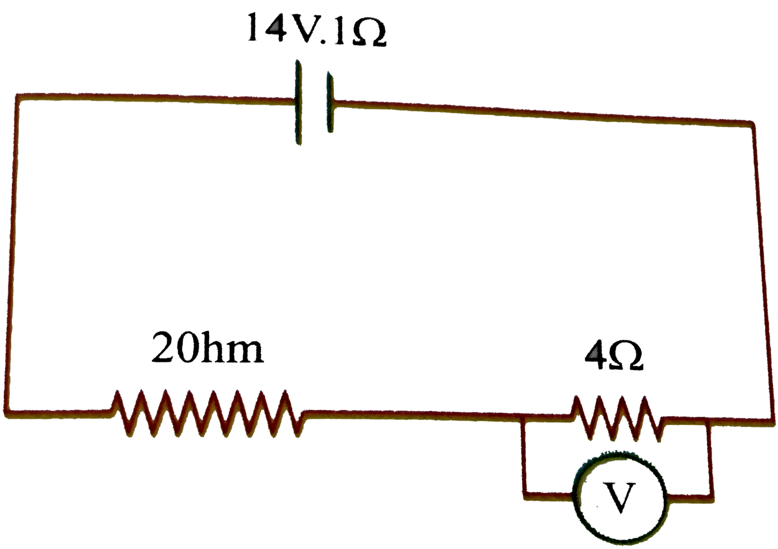
31. 

Voltmeter reading in the given circuit is (voltmeter is ideal)

A. 6 V

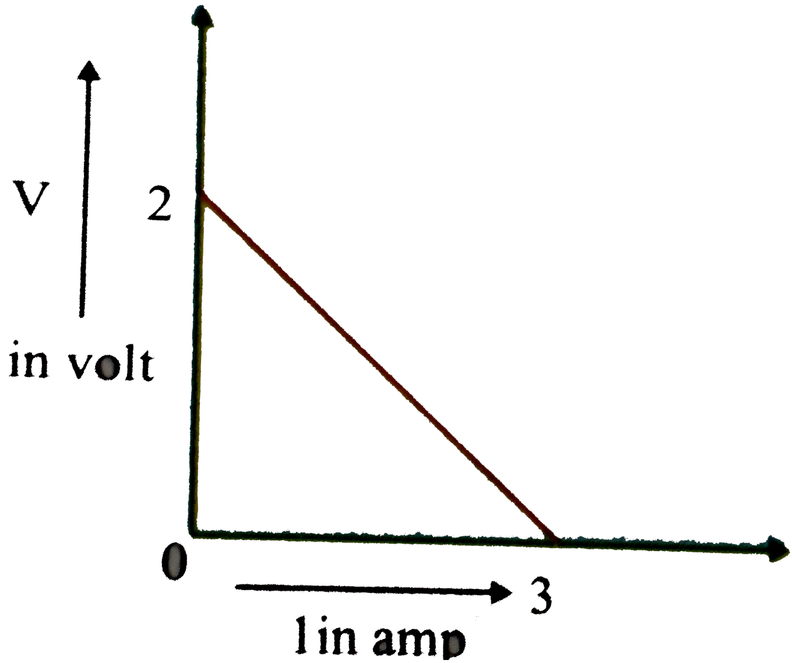
B. 8 V

C. 10 V

D. 14 V

Answer: B

View Text Solution



32.

For a cell the graph between the p.d. (v) across the terminals of the cells and the current (I) drawn from the cell as shown. The emf and internal resistance is

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

B. $\frac{1}{3}\Omega$

C. 3Ω

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

Answer: D

Watch Video Solution

33. The minimum number of cells in mixed grouping required to produced a maximum curret of 1A through external resistance of 20Ω given the emf of each cell is 2 V and internal resistance 1Ω is

A. 25

B. 20

C. 16

D. 30

Answer: B

Watch Video Solution

34. A battery of emf E and internal resistance r is connected to a resistor of restance r_1 and Q Joules of heat is produced in a certain time t. When te same battery is connected to another resistor of resistance r_2 the same quantity of heat is produced in the same time t. Then the value of r is

A. $\dfrac{r_1^2}{r_2}$

B. $\dfrac{r_2^2}{r_1}$

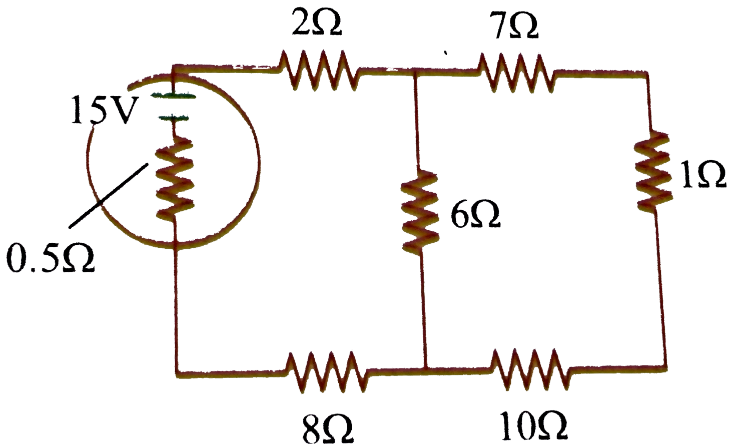
C. $\dfrac{1}{2}(r_1 + r_2)$

D. $\sqrt{r_1 r_2}$

Answer: D

Watch Video Solution

35.



The emf of a cell E is 15 V as shown in the figure with an internal resistance of 0.5Ω. Then the value of the current drawn from the cell is

A. 1A

B. 3A

C. 2A

D. 5A

Answer: A

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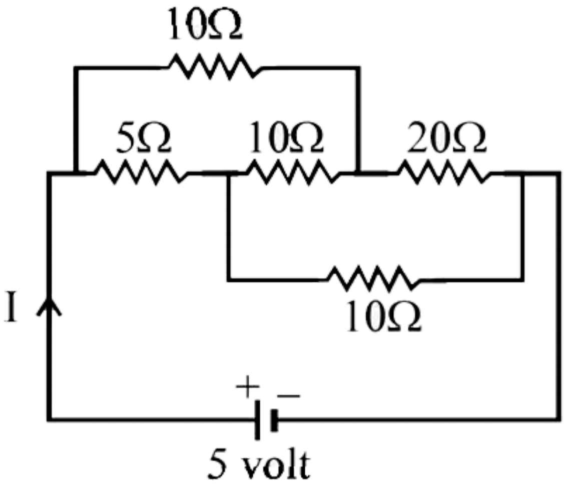
36. The current I drawn from the 5 volt source will be



A. $0.5A$

B. $2A$

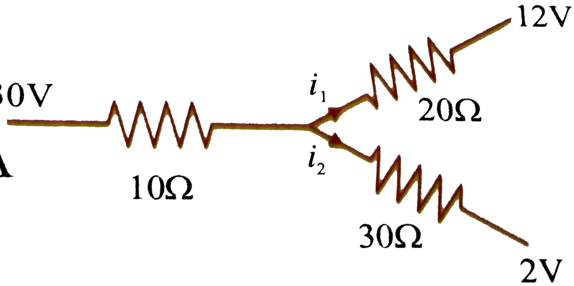
C. 1.5 A

D. $3A$

Answer: A

Watch Video Solution

2) 0.6 A

37. 

In the given circuit which is a part of closed circuit the current i_1, i_2 are respectively.

A. 0.4A

B. 0.6A

C. 1.6 A

D. 2A

Answer: B

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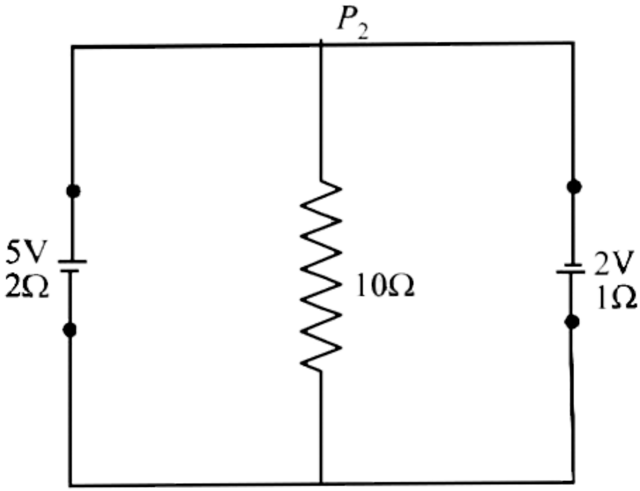
38. A 5V battery with internal resistance 2Ω and a 2V battery with internal resistance1Ω are connected to a 10Ω resistor as shown in the figure.



The current in the 10Ω resistor is

A. $0.27A$ P_2 to P_1

B. 0.03 A P_1 to P_2

C. 0.03 A P_2 to P_1

D. 0.27 A P_1 to P_2

Answer: C

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39. When a conductor is connected in the left gap and known resistance in the right gap the balancing length is 50 cm. if the wire is stretched so that its length increased by 20% new balancing length is

A. 40.98 cm

B. 38.23 cm

C. 42.56 cm

D. 48.21 cm

Answer: A

Watch Video Solution

40. In a meter bridge experiment when a resistance wire is connected in the left gap, the balance point is found at the 30^{th} cm. When the wire is replaced by another wire,t he balance point is found at the 60^{th} cm. Find the balance point when the two wires connected in parallel in the left gap successively

A. 20cm

B. 25cm

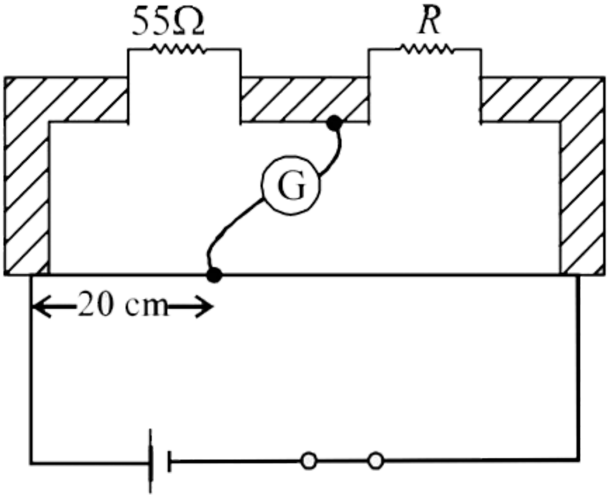
C. 23 cm

D. 30cm

Answer: B

Watch Video Solution

41. 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: B

Watch Video Solution

42. A potentiometer wire 10m long has a resistance of 40Ω. It is connected in series with a resistances box and a 2 v storage cell. If the potential gradient along the wire is $0.01\frac{V}{m}$ the resistance unplugged in the box is

A. 760Ω

B. 260Ω

C. 1060Ω

D. 960Ω

Answer: A

Watch Video Solution

43. the ratio of potential gradients is $1:2$, the resistance of two potentiometer wires of same length are $2\Omega \& 4\Omega$ respectively. The current flowing through them are in the ratio

A. $1:2$

B. $2:1$

C. $1:3$

D. $1:1$

Answer: D

Watch Video Solution

44. 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 l = 30 cm from the positive end, the e.m.f. of the battery is .

where i is the current in the potentiometer wire.

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

B. $\dfrac{30E}{100-0.5}$

C. $\dfrac{30E}{100}$

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

Answer: C

Watch Video Solution

45. 1 ohm resistance is in series with a Ammeter which is balanced by 75 cm of potentiometer wire. A standard cell of 1.02 V is balanced by 50 cm.t he ammeter shows a reading of 1.5 A. The error in the ammeter reading is

A. 0.002 A

B. 0.03 A P_1 to P_2

C. 1.01 A

D. no error

Answer: B

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Level 3

1. The electron of hydrogen atom is considered to be revolving around the proton in circular orbit of radius $\frac{h^2}{me^2}$ with velocity $\frac{e^2}{h}$, where $h = \frac{h}{2\pi}$. The curret I is

A. $\frac{4\pi^2 me^2}{h^2}$

B. $\frac{4\pi^2 me^2}{h^3}$

C. $\frac{4\pi^2 m^2 e^2}{h^3}$

D. $\frac{4\pi^2 me^5}{h^3}$

Answer: D

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2. In a straight conductor of uniform cross-section charege q is flowing for time t. Let s be the specific charge of an electron. The momentum of all the free electrons per unit length of the free electrons per unit length of the conductor, due to their drift velocity only is

A. $\frac{q}{ts}$

B. $\left(\frac{q}{ts}\right)^2$

C. $\sqrt{\frac{q}{ts}}$

D. qts

Answer: A

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3. Potential difference of 100 V is applied to the ends of a copper wire one metre long. Calculate the average drift velocity of the electrons ? Compare it with thermal velocity at $27^\circ C$. Consider there is one conduction electron per atom. The density of copper is $9.0 \times 10^3 kg/m^3$, Atomic mass of copper is 63.5 g. Avogadro's number $= 6.0 \times 10^{23}$ per gram-mole. Conductivity of copper is $5.81 \times 10^7 \Omega^{-1} m^{-1}$. Boltzmann constant $= 1.38 \times 10^{23} JK^{-1}$.

A. 3.76×10^{-6}

B. 4.3×10^{-6}

C. 6×10^{-6}

D. 5.6×10^{-6}

Answer: A

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4. The sides of rectangular block are 2 cm, 3 cm ad 4 cm. The ratio of the maximum to minimum resistance between its parallel faces is

A. 3

B. 4

C. 2

D. 1

Answer: B

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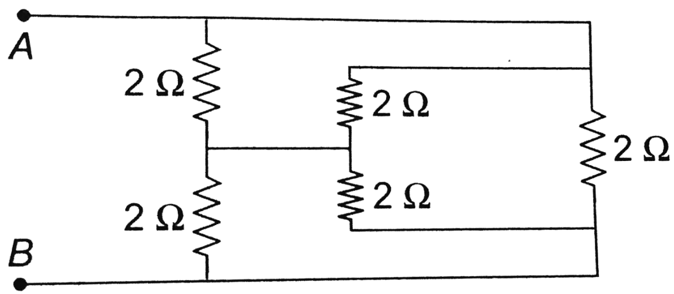
5. Find the equivalent resistance across AB :



A. 1Ω

B. 2Ω

C. 3Ω

D. 4Ω

Answer: A

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6. Two wires of the same material have length 6 cm and 10 cm and radii 0.5 mm and 1.5 mm respectively. They are connected in series across a battery of 16 V. the p.d. across the shorter wire is

A. 5 V

B. 13.5V

C. 27 V

D. 10 V

Answer: B

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7. Three ammeters P,Q and R with internal resistances r, 1.5r, 3r respectively. Q and R parallel and this combination is in series with P, the whole combination is in series with P, T the whole combination connected between X and Y. When the battery connected between X and Y, the ratio of the readings of P, Q and R is

A. $2:1:1$

B. $3:2:1$

C. $3:1:2$

D. $1:1:1$

Answer: B

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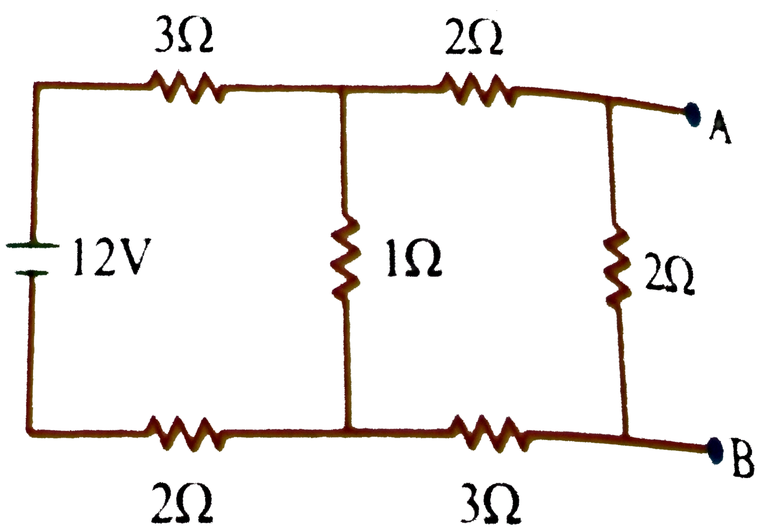
8.



The potential difference between points A and B is

A. $1.50V$

B. $2.50V$

C. $1.00V$

D. $0.50V$

Answer: D

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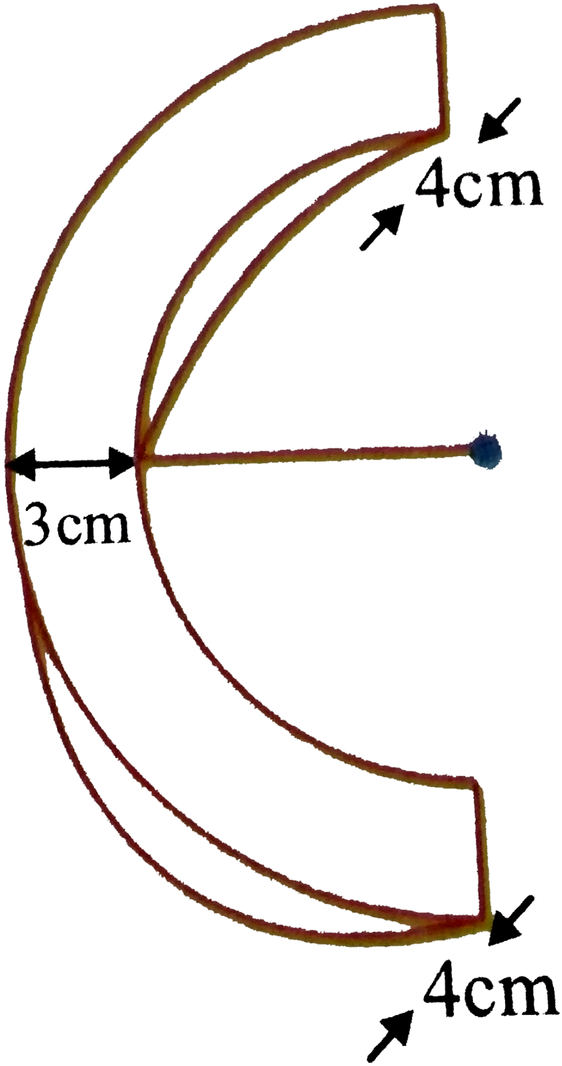
9.



The resistance of a semicircle shown in fig. Between its two end faces is

(Given that radial thickness $= 3cm$, axial thickness $= 4cm$, inner radius $= 6cm$ and resistivity $= 4 \times 10^{-6} \Omega cm$)

A. $24.15 \times 10^{-6} \Omega$

B. $7.85 \times 10^{-7}\Omega$

C. $7.85 \times 10^{-6}\Omega$

D. $7.85 \times 10^{-5}\Omega$

Answer: C

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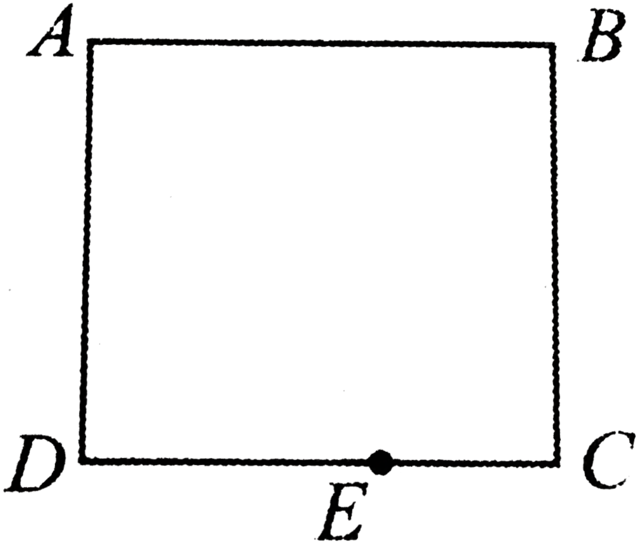
10. ABCD is a square where each side is a uniform wire of resistance 1Ω. A point E lies on CD such that if a uniform wire of resistance 1Ω is connected across AE and constant potential difference is applied across A and C, then B and E are equipotential. Then,



A. $\dfrac{CE}{ED} = 1$

B. $\dfrac{CE}{ED} = \dfrac{1}{\sqrt{2}}$

C. $\dfrac{CE}{ED} = \dfrac{1}{2}$

D. $\dfrac{CE}{ED} = \sqrt{2}$

Answer: D

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11. A heating element using nichrome connected to a 230 V supply draws an initial current of 3.2 A which settles after a few seconds to a steady value of 2.8 A. What is the steady temperature of the heating element if the room temperature is $27^{\circ}C$? Temperature coefficient of resistance of nichrome averaged over the temperature range involved is $1.70 \times 10^{-4}C^{-1}$.

A. $680^{\circ}C$

B. $51^{\circ}C$

C. $920^{\circ}C$

D. $750^{\circ}C$

Answer: B

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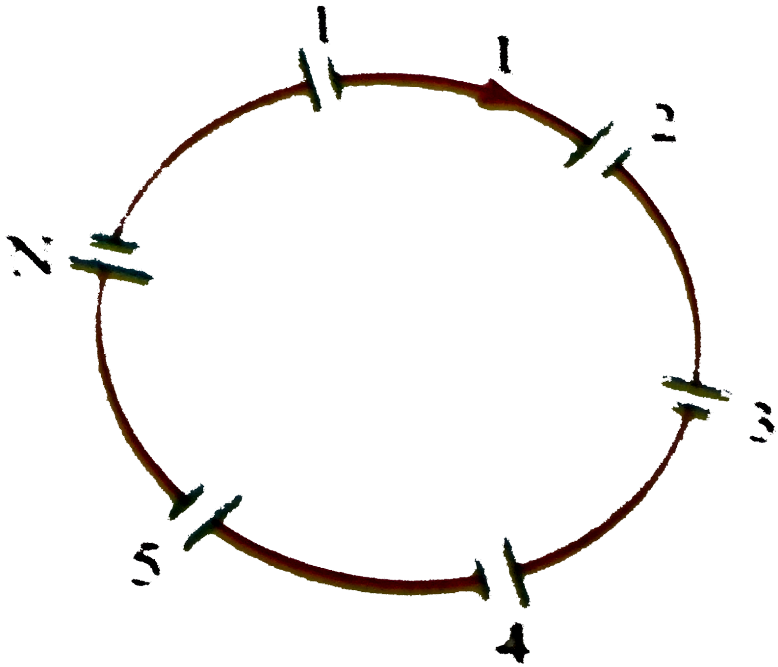

12.

A group of N cells where e.m.f. varies directly with the internal resistance as per the equation $E_N = 1.5r_N$ are connected as shown in the figure. The current I in the circuit is:

A. 0.51 A

B. 5.1 A

C. 0.15 A

D. 1.5 A

Answer: D

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13. Cell A has emf 2 E ad internal resistance 4 r. Cell B has emf E and internal resistance r. The negative of A is connected to the positive of B and a load resistance of R is connected across the battery formed. If the terminal potential difference across A is zero, then R is equal to

A. $3r$

B. $2r$

C. r

D. $5r$

Answer: C

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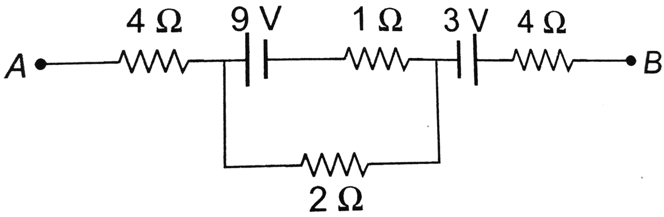
14. In the circuit shown in figure potential difference between point A and B is $16V$. Find the current passing through 2Ω resistance.



A. $3.5A$

B. $3A$

C. $4.5A$

D. $5.5A$

Answer: A

Watch Video Solution

15. Find the minimum number of cells required to produce a current of $1.5A$ through a resistance of 30Ω. Given that the emf of each cell is $1.5V$ and the internal resistance is 1Ω.

A. 30

B. 120

C. 40

D. 60

Answer: B

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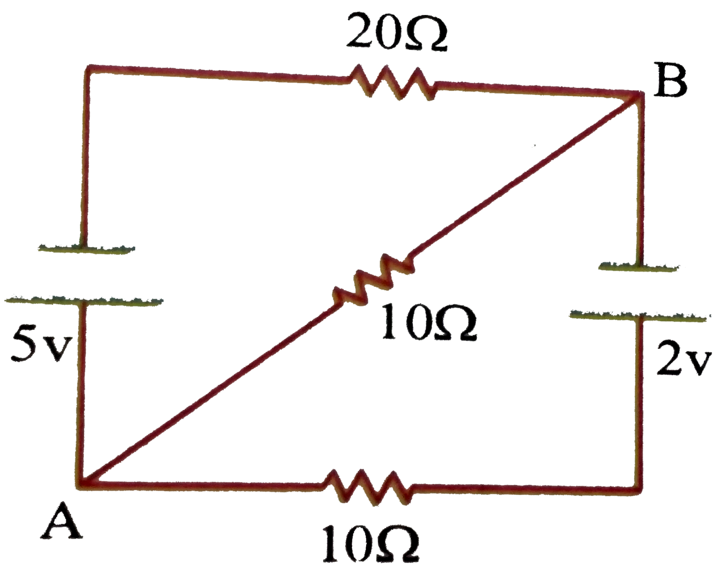

16.

The p.d between the terminals A & B is

A. 2 V

B. 3.6 V

C. 1.8 V

D. 2.8

Answer: C

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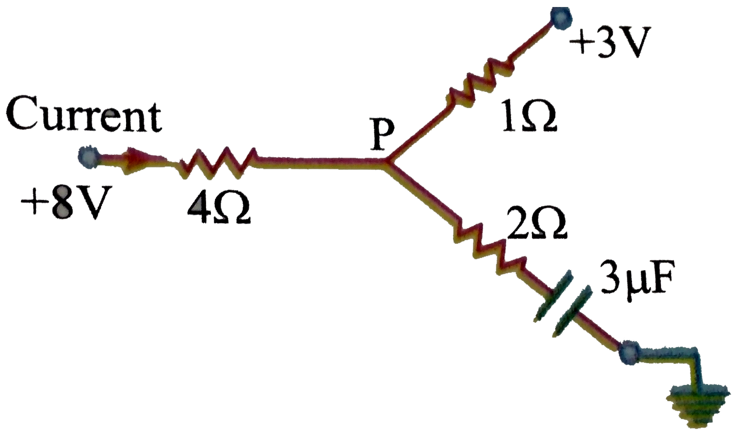
17.



the energy stored in the capacitor is

A. $12\mu J$

B. $24\mu J$

C. $36\mu J$

D. $48\mu J$

Answer: B

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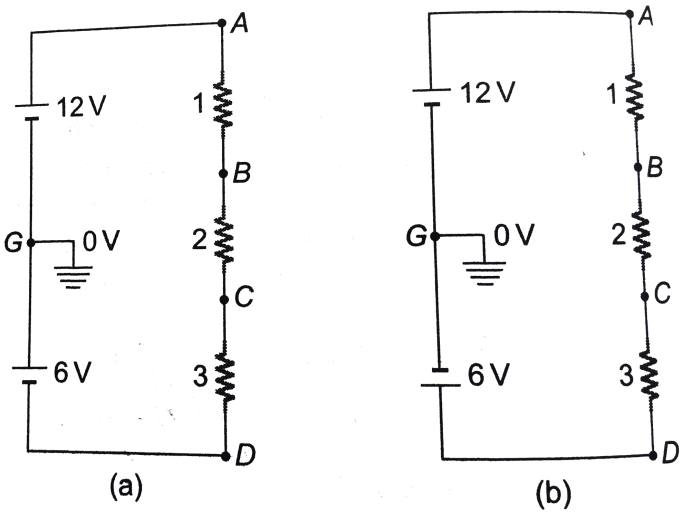
18. Calculate the potentials of points A, B, C and D as shown in Fig. a. What would be the new potential values if connections of $6V$ battery are reversed as shown in fig b. All resistance are on ohm.



A. $V_B = 6V, V_C = 9V, V_D = 11V$

B. $V_B = 11V, V_C = 9V, V_D = 6V$

C. $V_B = 9V, V_C = 11V, V_D = 6V$

D. $V_B = 9V, V_C = 6V, V_D = 11V$

Answer: B

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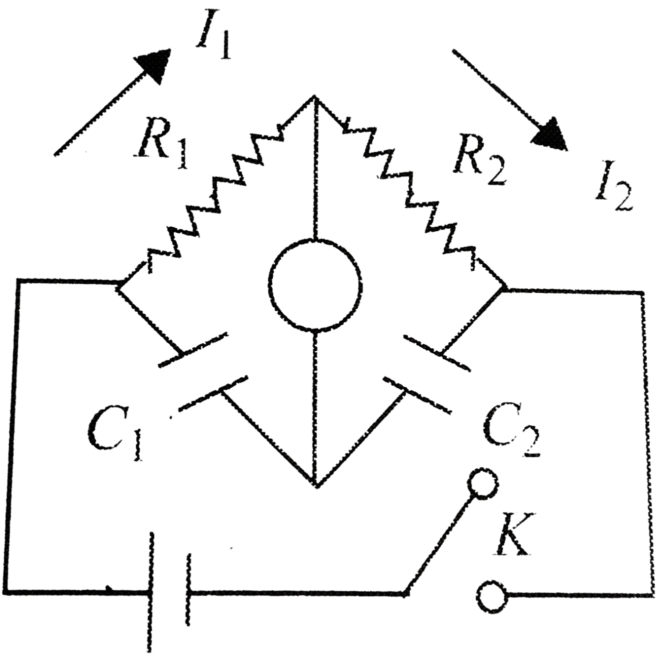
19. In the circuit in fig. If no current flows through the galvanometer when the key k is closed, the bridge is balanced. The balancing condition for bridge is



A. $\frac{R_1}{R_2} = \frac{C_1}{C_2}$

B. $\frac{R_1}{R_2} = \frac{C_2}{C_1}$

C. $\frac{R_1}{R_1 + R_2} = \frac{C_1}{C_1 - C_2}$

D. $\frac{R_1}{R_1 - R_2} = \frac{C_1}{C_1 + C_2}$

Answer: C

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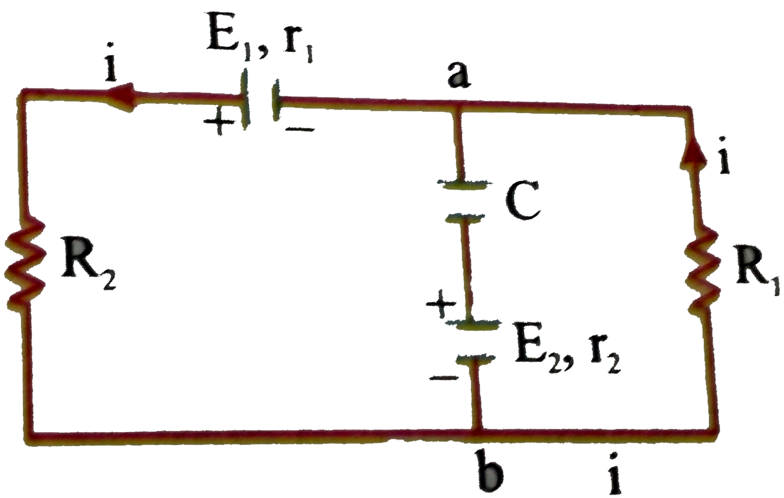

20.

In the steady state, the energy stored in the capacitor is:

A. $\frac{1}{2}C(E_1 + E_2)^2$

B. $\frac{1}{2}C(E_1 - E_2)^2$

C. $\frac{1}{2}C\left(\frac{E_1R_1 + E_1R_2}{r_1 + r_2 + R_1 + R_2}\right)^2$

D. $\frac{1}{2}C\left(E_2 + \frac{E_1R_1}{r_1 + R_1 + R_2}\right)^2$

Answer: D

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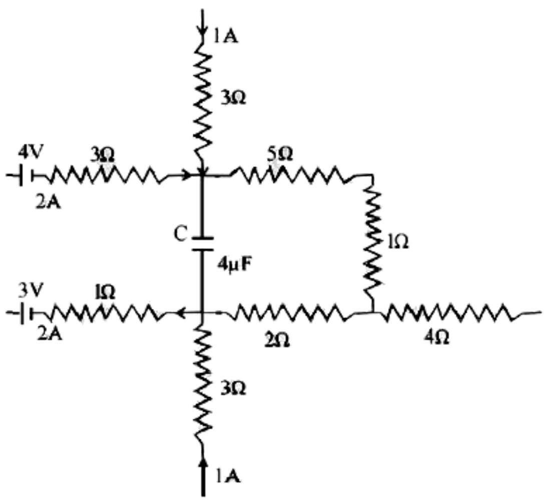
21. A part of circuit in a steady state along with the currents flowing in the branches, the values of resistance etc., is shown in the figure. Calculate the energy stored in the capacitor C (4muF)`



A. $8 \times 10^{-1} J$

B. $8 \times 10^{-2} J$

C. 8×10^{-3}J

D. $8 \times 10^{-4} J$

Answer: D

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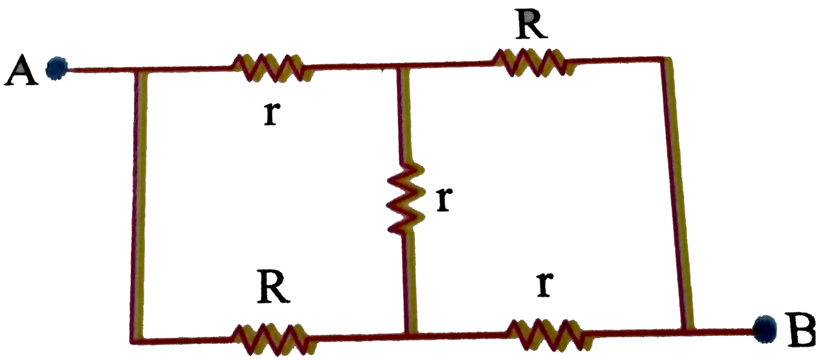

22.

Equivalent resistace across A and B in the given circuit if $r = 10\Omega$, $R = 20\Omega$ is

A. 7Ω

B. 14Ω

C. 35Ω

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

Answer: B

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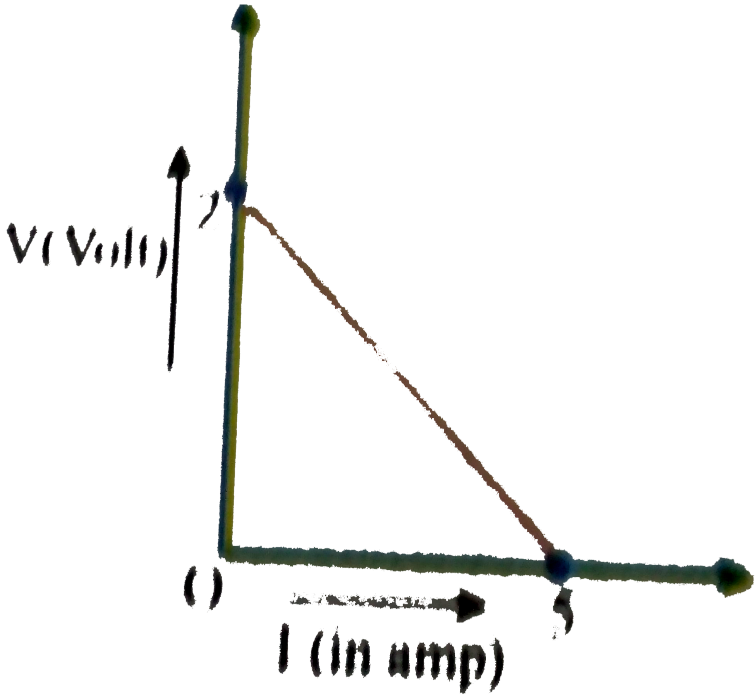
23. for a cell, the graph between the p.d. (V) across the terminals of the cell ad te current I drawn from the cell is shown in the fig. the emf and the internal resistance of the cell is E and r respectively.



A. $E = 2V, r = 0.5\Omega$

B. $E = 2V, r = 0.4\Omega$

C. $E > 2, r = 0.5\Omega$

D. $E > 2V, r = 0.4\Omega$

Answer: B

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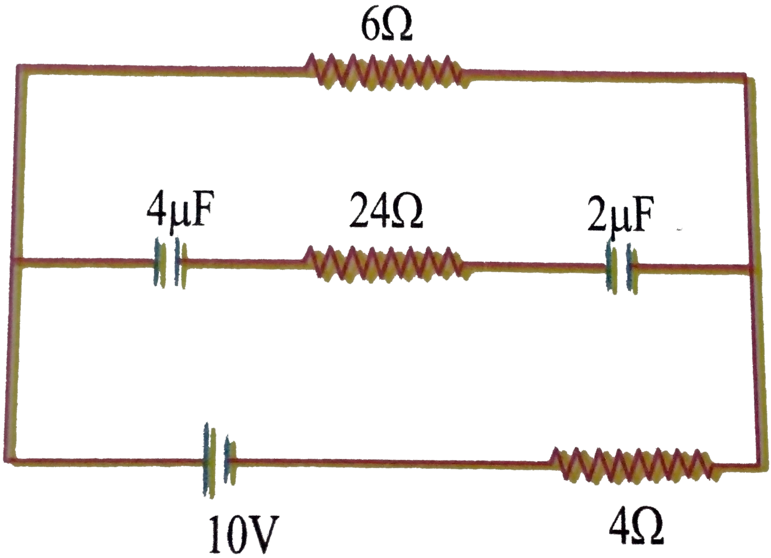

24.

The charge developed on $4 \mu F$ condenser is

A. $18 \mu C$

B. $4 \mu C$

C. $8 \mu C$

D. zero

Answer: C

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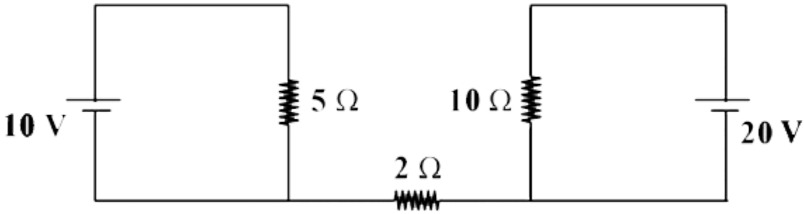
25. Find out the value of current through 2Ω resistance for the given circuit.



A. 0

B. $1.6A$

C. $2.4A$

D. $3A$

Answer: A

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26. Same mass of copper is drawn into 2 wires of 1 mm thick ad 3 mm thick. Two wires are connected in series and current is passed. Heat produced in the wires is the ratio of

A. $3:1$

B. $9:1$

C. $81:1$

D. $1:81$

Answer: C

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27. Masses fo three are in the ratio $1:3:5$ their lengths are in the ratio $5:3:1$ when they are connected in series to an external source, te amounts of heats produced in them are in the ratio

A. $125:15:1$

B. $1 : 15 : 125$

C. $5 : 3 : 1$

D. $1 : 3 : 5$

Answer: A

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28. A heater coil rated at 1000 W s connected to a 110 V mains. How much time will take to melt 625 gm of ice at $0^{\circ} C$. (for ice $L = 80 \frac{Cal}{gm}$)

A. $100 s$

B. $150 s$

C. $200 s$

D. $210 s$

Answer: D

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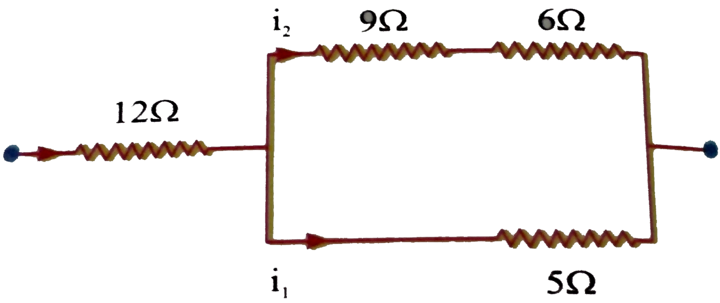
29.



In the following circuit, 5Ω resistor develops 45 J/s due to current flowing through it. The power developed across 12Ω resistor is

A. 16 W

B. 192 W

C. 36 W

D. 64 W

Answer: B

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30. Two wires $'A'$ and $'B'$ of the same material have their lengths in the ratio $1:2$ and radii in the ratio $2:1$ The two wires are connected in parallel across a battery. The ratio of the heat produced in $'A'$ to the heat produced in $'B'$ for the same time is

A. $1:2$

B. $2:1$

C. $1:8$

D. $8:1$

Answer: D

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31. An electric motor operating on 50 volt D.C. supply draws a current of 10 amp. If the efficiency of motor is 40% then the resistance of the winding of the motor is

A. 1.5Ω

B. 3Ω

C. 4.5Ω

D. 6Ω

Answer: B

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32. Find the resistance of $240V - 200$ watt electric bulb when glowing. If this resistance is 10 times the resistance at $0^\circ C$ and the temperature of the glowing filament is $2000^\circ C$, then find the temperature coefficient of resistance of the filament.

A. $28.8\Omega, \dfrac{4.5 \times 10^{-3}}{.^\circ C}$

B. $14.4\Omega, \dfrac{4.5 \times 10^{-3}}{.^\circ C}$

C. $28.8\Omega, (3.5 \times 10^{-3})^{\hat{}(\circ)C}$

D. $14.4\Omega, (3.5 \times 10^{-3})^{.^\circ C}$

Answer: A

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33. A wire of length L and 3 identical cells of negligible internal resistance are connected in series. Due to the current, the temperature of the wire is raised by ΔT in a time t. A number N of similar cells is now connected in series with a wire of the same material and cross-section but of length 2L. The temperature of the wire is raised by the same amount ΔT in the same time t. the value of N is

A. 3

B. 2

C. 6

D. 4

Answer: C

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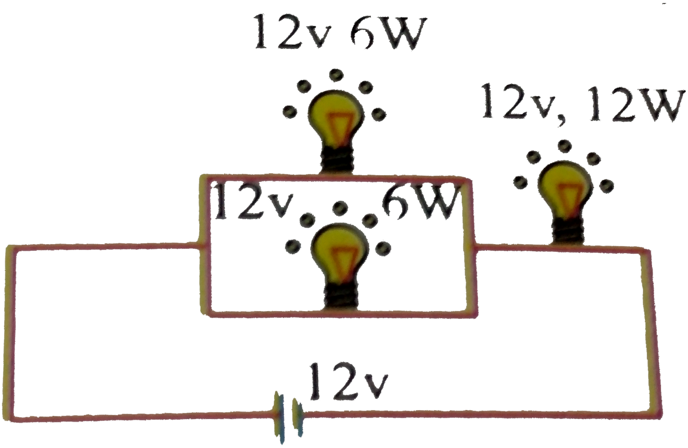
34.



Three bulbs with their power and working voltage are connected as shown in the circuit diagram to a 12 V battery. The total power consumed by the bulbs is (ignore the internal resistance of the battery shown)

A. 24 W

B. 12 W

C. 6 W

D. 15 W

Answer: C

Watch Video Solution

35. A cell of emf 12 V and internal resistance 6Ω is connected in parallel with another cell of emf 6 V ad internal resistance 3Ω, such that the positive of the first cell joins the positive to the second cell and similarly the negative of first cell joins the negative of the second cell. A bulb of filament resistance 14Ω is connected across the combination. The power delivered to be bulb is

A. 4.0 W

B. 3.5 W

C. 8.5 W

D. 2.5 W

Answer: B

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36. A cell develops the same power across two resistances R_1 and R_2 separately. The internal resistance of the cell is

A. $\sqrt{R_1 R_2}$

B. $\sqrt{2R_1 R_2}$

C. $R_1 + R_2$

D. $R_1 - R_2$

Answer: A

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37. A metallic conductor at $10^\circ C$ connected in the left gap of meter bridge gives balancing length 40 cm. When the conductor is at $60^\circ C$, the balancing point shifts by --- cm, (temperature coefficient of resistance of the material of the wire is $\left.\frac{\frac{1}{220}}{.^\circ C}\right)$

A. 4.8

B. 10

C. 15

D. 7

Answer: A

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38. When a conducting wire is connected in the right gap and known resistance in the left gap, the balancing length is 60 cm. the balancing length becomes 42.4 cm when the wire is stretched so that its length increases by

A. 10%

B. 20%

C. 25%

D. 42.7%

Answer: D

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39. n identical resistors are taken $\frac{n}{2}$ resistors are connected in series and the remaining are connected in paralle. The series connected group is kept in the left gap of a meter bridge and the parallel connected group in the right gap. The distance of te balance point from the left end of the wire is

A. $\frac{100n^2}{n^2+4}$

B. $\frac{100n^2}{n^2+1}$

C. $\frac{400}{n^2+4}$

D. $\frac{400}{n^2+1}$

Answer: A

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40. In a metere bridge, the balance length from left end (standard resistance of 1Ω is in the right gap) is found to be 20 cm, the length of resistance wire in left gap) is found to be 20 cm the length of resistance wire in left gap is $\frac{1}{2}$ m and radius is 2mm its specific resistance is

A. $\pi \times 10^{-6} ohm - m$

B. $2\pi \times 10^{-6} ohm - m$

C. $\frac{\pi}{2} \times 10^{-6} ohm - m$

D. $3\pi \times 10^{-6} ohm - m$

Answer: B

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41. In an experiment with a potentiometer to measure the internal resistance of a cell. when the cell in the secondary circuit is by shounted by 5Ω, the null point is at $220 cm$. When the cell is shunted by 20Ω the null point is at $300 cm$. Find the internal resistance of the cell.

A. 2Ω

B. 4Ω

C. 6Ω

D. 8Ω

Answer: B

Watch Video Solution

42. A potentiometer wire of lengthh 100 cm has resistance 5Ω. It is connected in series with a resistance and a cell of emf 2 v and of negligible internal resistance. A source of emf 5 mv balanced by 10 cm length of potentiometer wire. The value of external resistance is___

A. 540Ω

B. 195Ω

C. 190Ω

D. 990Ω

Answer: B

Watch Video Solution

43. 1 ohm resistance is in series with a Ammeter which is balanced by 75 cm of potentiometer wire. A standard cell of 1.02 V is balanced by 50 cm.t he ammeter shows a reading of 1.5 A. The error in the ammeter reading is

A. 0.002 A

B. 0.03 A

C. 1.01 A

D. no error

Answer: B

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44. A potentiometer wire of lengthh 100 cm has resistance 5Ω. It is connected in series with a resistance and a cell of emf 2 v and of negligible internal resistance. A source of emf 5 mv balanced by 10 cm length of potentiometer wire. The value of external resistance is___

A. 180Ω

B. 190Ω

C. 195Ω

D. 200Ω

Answer: C

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45. In an experiment for calibration of voltmeter, standard cell of emf 1.5 V is balanced at 300 cm length of potentiometer wire. The P.D. Across a resistace in the circuit is balanced at 1.25 m. if a voltmeter, it reads 0.65 V. The error I te volt meter is

A. 0.05V

B. 0.025 V

C. 0.5 V

D. 0.25 V

Answer: B

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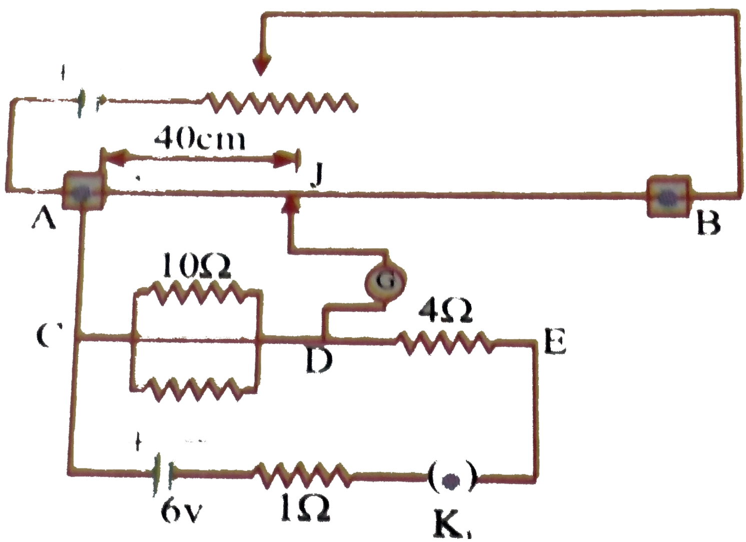
46. 

In the circuit shown in fig. the potential difference between the points C and D is balanced against 40 cm length of potentiometer wire of total length 100 cm. In order to balance the potential difference between the points D and E The jockey to be pressed on potentiometer wire at a distance of

A. $16cm$

B. $32cm$

C. $56cm$

D. $80cm$

Answer: B

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NCERT Based Questions

1. Consider a current carrying wire (current I) in the shape of a circle. Note that as the current progresses along the wire, the direction of $\vec{J}$ (current density) changes in an exact manner, while the current I remains unaffected. The agent that is essentially responsible for is

A. source of emf

B. electric field produced by charges accumulated on the surface of wire

C. the charges just behind a give segment of wire which push them just the right way by repulsion

D. the charges ahead

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2. A metel rod of the length 10cm and a rectangular cross-section of 1 cm xx $1/2$ cm is connected to a battery across opposite faces. The resistance will be

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

B. maximum when the battery is connected across $10cm \times 1cm$ faces

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

D. same irrespective of the three faces

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3. Which of the follwing characteristies of electrons determines the current in a conductor?

A. drift velocity alone

B. thermal velocity alone

C. both drift velocity and thermal velocity

D. neither drift nor thermal velocity

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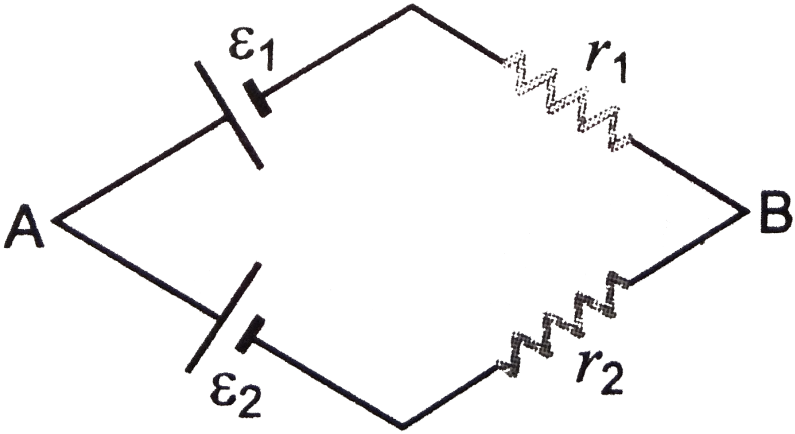
4. Two batteries of emf ε_1 and $\varepsilon_2 (\varepsilon_2 > \varepsilon_1$ and internal resistances r_1 and r_2 respectively are connected in parallel as shown in Fig. 2 (EP).1.



A. two equivalent emf ε_{eq} of the two cells is between ε_1 and ε_2, i.e.,

$\varepsilon_1 < \varepsilon_{eq} < \varepsilon_2$

B. the equivalent emf ε_{eq} is smaller than ε_1

C. The ε_{eq} is given by $\varepsilon_{eq} = \varepsilon_1 + \varepsilon_2$ always

D. ε_{eq} is independent of internal resistance r_1 and r_2

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5. Two cells of emfs approximately 5V and 10V are to be accurately compared using a poteniometer of length 400 cm.

A. The battery that runs the potentiometer should have voltage of 8 V

B. The battery of potentiometer can have a voltage of 15 V and R adjusted so that the potential drop across the wire slightly exceeds 10 V

C. The first portion of 50 cm of wire itself should have a potential drop of 10 V

D. Potentiometer is usually used for comparing resistance and not voltages

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6. A resistance R is to be measured using a meter bridge. Student chooses the standared resistance S to be 100Ω. He finds the null point at $l_1 = 2.9cm$. He is told to attempt to improve the accuracy. Which of the folllowing is a useful way?

A. He should measure I_1 more accurately

B. he should changes to 1000Ω and repeat the experiment

C. He should change S to 3 Ω and repeat the experiment

D. He should given up hoe of a more accurate measurement with a meter bridge

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7. Temperature dependence of resistivity p(T) of semiconductors, insulators and metals is significantly based on the following factors:

A. number of charge carriers can change with temperature T

B. time interval between two successive collisisons can depend on T

C. length of material can be a function of T

D. mass of carriers is a function of T

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8. Kirchoff's junction rule is a reflection of

A. conservation of current densit vector

B. conservation of charge

C. the fact that the momentum with which a charged particle approaches a junction is unchanged (as a vector) as the charged particle leaves the junction

D. the fact that there is no accumulation of charged at a junction

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9. The measurement of an unknown resistance R is to be carried out using Wheatstone bridge (see Fig. 2(EP).3). Two students perform an experiment in two way. The first student takes $R_2 = 10\Omega$ and $R_1 = 5\Omega$.

The other student takes $R_2 = 1000\Omega$ and $R_1 = 500\Omega$. In the standard arm, both take $R_3 = 5\Omega$. Both find $R = \frac{R_2}{R_1} R_3 = 10\Omega$ within errors.

A. The errors of measurement of the two students are the same

B. Errors of measurement do depend on the accuracy with which R_2 and R_1 can be measured

C. if the student uses large values of R_2 and R_1 the currents through the arms will be feeble. This will make determination of null point accurately more difficult

D. Wheatstone bridge is a very accurate instrument and has no errors of measurement

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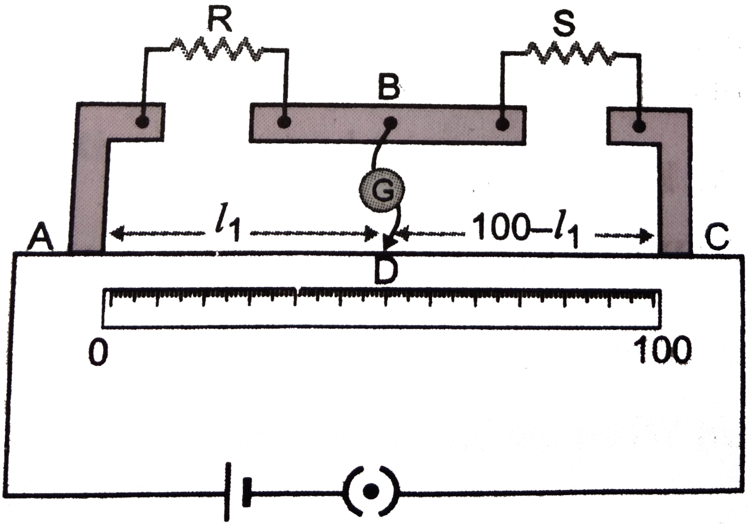
10. In a meter bridge the point D is a neutral point (Fig. 2(EP).4).



A. The meter bridge can have no other neutral. A point for this set of resistance

B. When the jocky contacts a point on meter wire left of D, current flows to B from the wire

C. When the jockey contacts a point on the meter wire to the right of D, current flows from B to the wire through galvanometer

D. When R is increased, the neutral point shifts to left

Watch Video Solution

11. A room AC run for 5 hour at a voltage of $220V$ The wiring of the room constant of Cu of $1mm$ ratio and a length of $10m$ consumption per day is 10 commerclal unit What fraction of it goes in the joule heated in wire? What would happen if the wiring is made of aluminum of the same distances? $\left[\rho_{cu} = 1.7 \times 10^{-8}\Omega, \rho_{A1} = 2.7 \times 10^{-8}\Omega m\right]$

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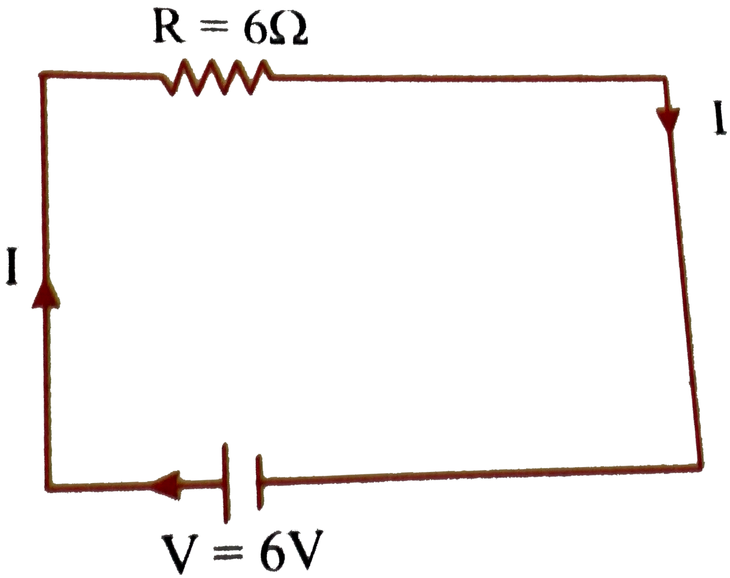

12.

(A) Consider circuit in figure. How much energy is absorbed by electrons from the initial state of no current (Ignore thermal motion) to the state of drift velocity?

(b) electrons give up energy at the rate of RI^2 per second tot he thermal energy. What time scale would number associate with energy in problem (a)? $n =$ number of electron/volume $= \frac{10^{29}}{m^3}$ length of circuit $= 10cm$, cross-section $A = (1mm)^2$

Watch Video Solution

13. A cell of emf ε and internal resistance r is connected across a variable resistor R. Plot a graph showing variation of terminal voltage V of the cell versus the current I. Using the plot, show how the emf of the cell and its internal resistance can be determined.

Watch Video Solution

Level 5

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

A. each of them increses

B. each of them decreases

C. copper increases and germanium decreases

D. copper decreases and germanium increases

Answer: D

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2. Read the following statements carefully :

Y : The resistivity of a semiconductor decreases with increase of temperature.

Z : In a conducing solid, the rate of collisions between free electrons and ions increase with increase of temperature.

Select the correct statement (s) from the followin :

A. Y is true but Z is false

B. Y is false but Z is true

C. Both Y and Z are true

D. Y is true and Z is the correct reason for Y

Answer: C

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3. A Steady current flows in a metalic conductor of non uniform cross section. The quantity/quantities which remain constant along the length of the conductor is/are

A. current electric field ad drift speed

B. drift speed only

C. current and drift speed

D. current only

Answer: D

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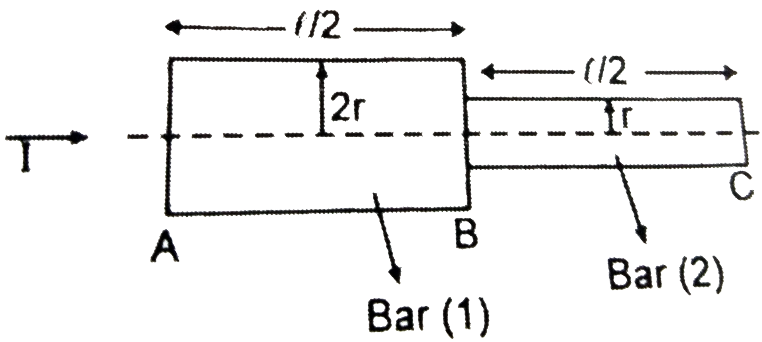
4. Two bars of equal resistivity ρ and radius 'r' and '2r' are kept in contact as show. An electric current is passed through the bars. Which one of the following is correct ?



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

B. Electric field in both halves is equal

C. Current density across AB is double that of across BC

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

Answer: A

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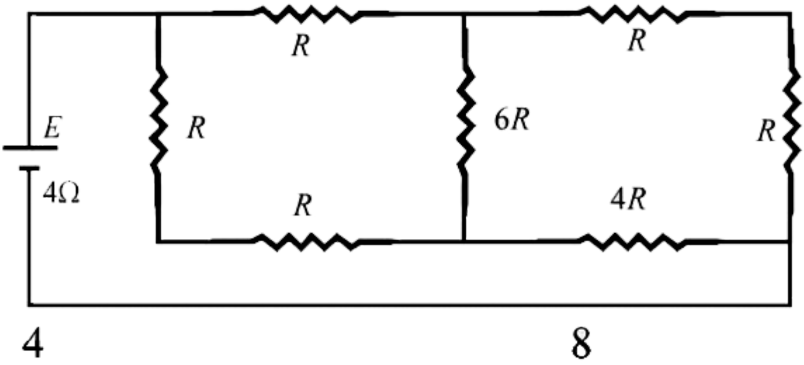
5. A battery of internal resistance 4Ω is connected to the network of resistance as shown . In order that the maximum power can be delivered to the network, the value of R in Ω should be



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

B. 2

C. $\frac{8}{3}$

D. 18

Answer: B

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6. The effective resistance between points P and Q of the

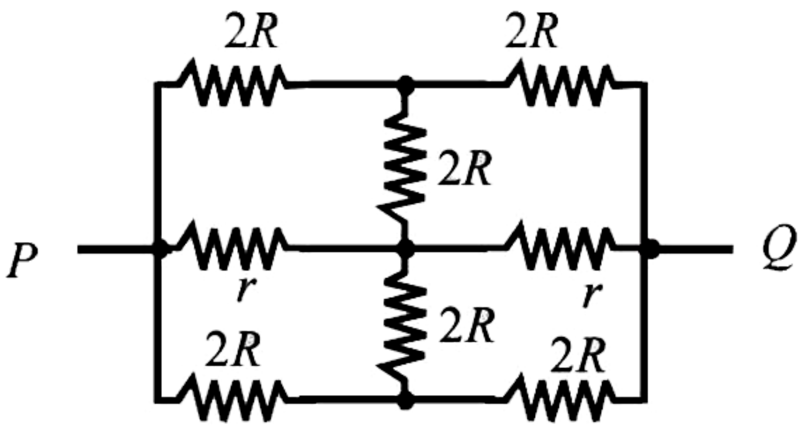
electrical circuit shown in the figure is

(a) $\frac{2Rr}{R+r}$

(b) $\frac{8R(R+r)}{3R+r}$

(c) $2r+4R$

(d) $\frac{5R}{2}+2r$.



A. $\frac{2Rr}{R+r}$

B. $\frac{8R(R+r)}{3R+r}$

C. $2r+4R$

D. $\frac{5R}{2}+2r$

Answer: A

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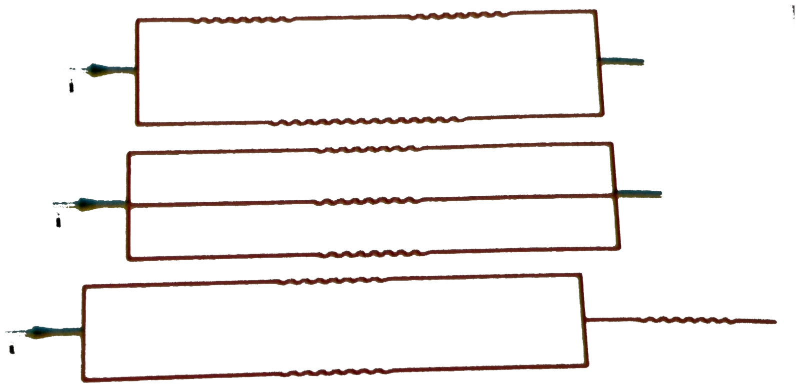
7. 

The three resistances of equal value are arranged in the different combinations shown below. Arrange them in increasing order of power dissipation

A. $II < I < III$

B. $I > III > II$

C. $I < III < II$

D. $I < II < III$

Answer: A

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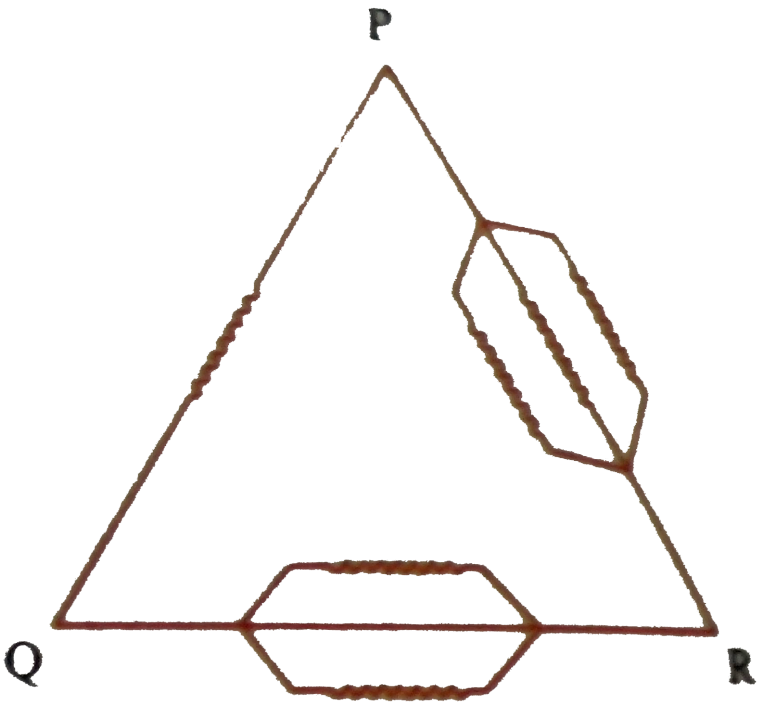

8.

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

A. P and Q

B. Q and R

C. P and R

D. any two points

Answer: A

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9. A rigid container with thermally insulated walls contains a coil of resistance 100Ω, carrying current 1A. Change in internal energy after 5 min will be

A. zero

B. 10kJ

C. 20kJ

D. 30kJ

Answer: D

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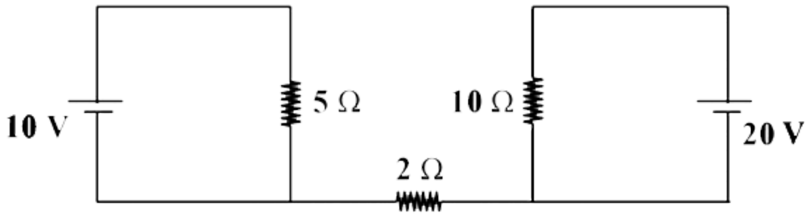
10. Find out the value of current through 2Ω resistance for the given circuit.



A. 5A

B. 6A

C. zero

D. 1A

Answer: C

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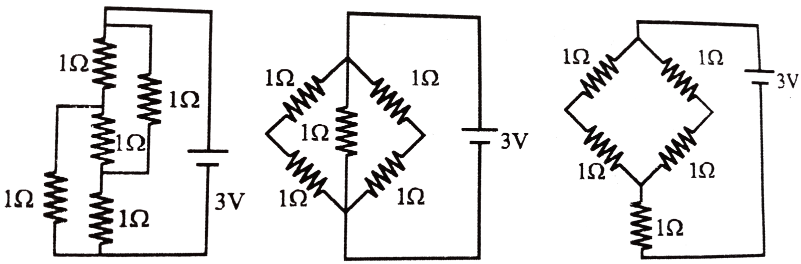
11. Figure shows three resistor configurations R_1, R_2 and R_3 connected to $3V$ battery. If the power dissipated by the configurations R_1, R_2 and R_3 is P_1, P_2 and P_3 respectively, then



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

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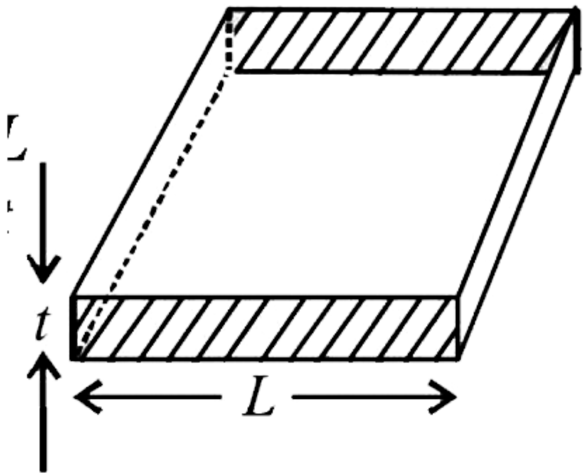
12. Consider a thin square sheet of side L and thickness t, made of a material of resistivity ρ. The resistance between two opposite faces, shown by the shaded areas in the figure is



A. directly proportional to L

B. derectly proportional to t

C. independent of L

D. independent of t

Answer: C

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13. Incandescent bulbs are designed by keeping in mind that the resistance of their filament increases with the increase in temperature. If at room temperature, $100W, 60W$ and $40W$ bulbs have filament resistances R_{100}, R_{60} and R_{40}, respectively, the relation between these resistances is

A. $\dfrac{1}{R_{100}} = \dfrac{1}{R_{40}} = \dfrac{1}{R_{60}}$

B. $R_{100} = R_{40} + R_{60}$

C. $R_{100} > R_{60} > R_{40}$

D. $\dfrac{1}{R_{100}} > \dfrac{1}{R_{60}} > \dfrac{1}{R_{40}}$

Answer: D

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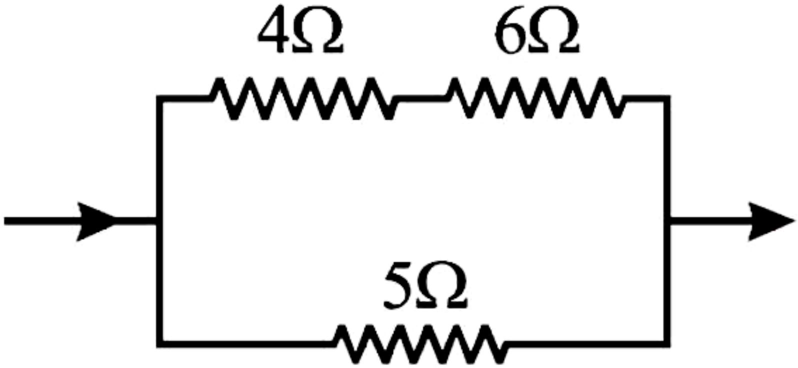
14. In the circuit shown in fig the heat produced in the 5 ohm resistor due to the current flowing through it is 10 calories per second.



The heat generated in the 4 ohms resistor is

A. $1\frac{cal}{s}$

B. $2\frac{cal}{s}$

C. $3\frac{cal}{s}$

D. $4\frac{cal}{s}$

Answer: B

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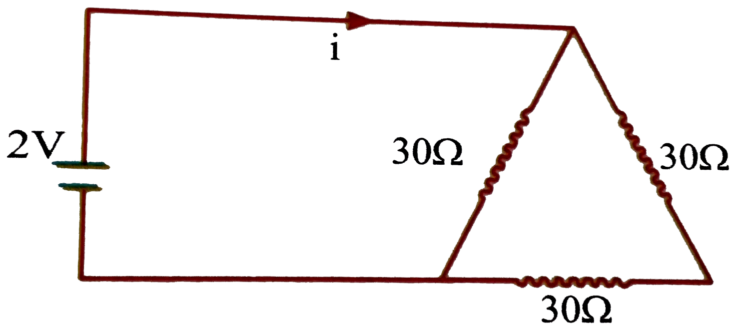

15.

The current i in the circuit (see figure) is

A. $\frac{1}{45}A$

B. $\frac{1}{15}A$

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

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

Answer: C

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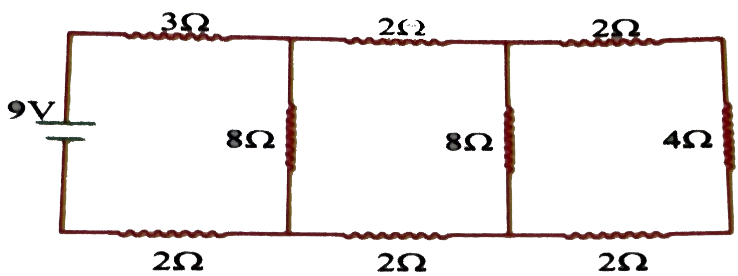
16.



In the circuit shown in the figure, the current through

A. the 3Ω resistor is 0.50 A

B. the 3Ω resistor is $0.25A$

C. The 4Ω resistor is 0.50 A

D. the 4Ω resistor is 0.25A

Answer: D

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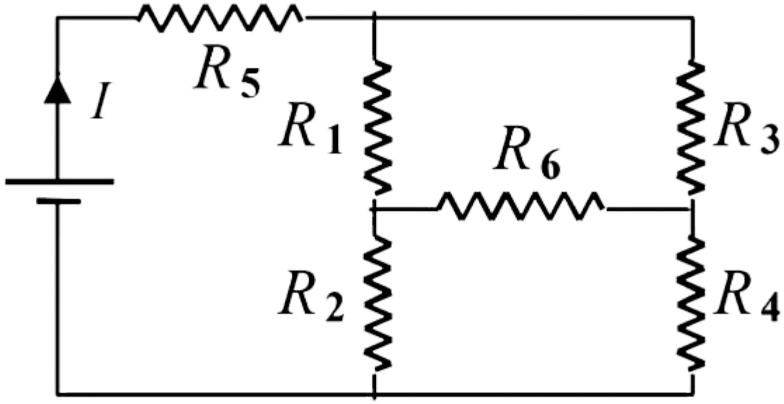
17. In the given circuit, it is observed that the current I is independent of the value of the resistance R_6. Then the resistance values must satisfy



A. $R_1R_2R_5 = R_3R_4R_6$

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

C. $R_1R_4 = R_2R_3$

D. $R_1R_3 = R_2R_4$

Answer: C

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18. A wire of length L and 3 identical cells of negligible internal resistance are connected in series. Due to the current, the temperature of the wire is raised by ΔT in a time t. A number N of similar cells is now connected in series with a wire of the same material and cross-section but of length 2L. The temperature of the wire is raised by the same amount ΔT in the same time t. the value of N is

A. 4

B. 6

C. 8

D. 9

Answer: B

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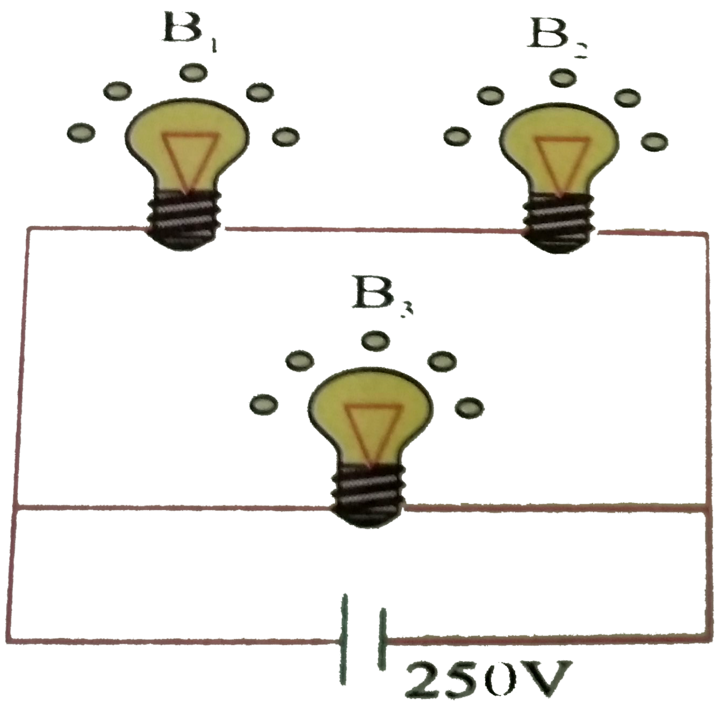
19.



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

A. $W_1 > W_2 = W_3$

B. $W_1 > W_2 > W_3$

C. $W_1 < W_2 = W_3$

D. $W_1 < W_2 < W_3$

Answer: D

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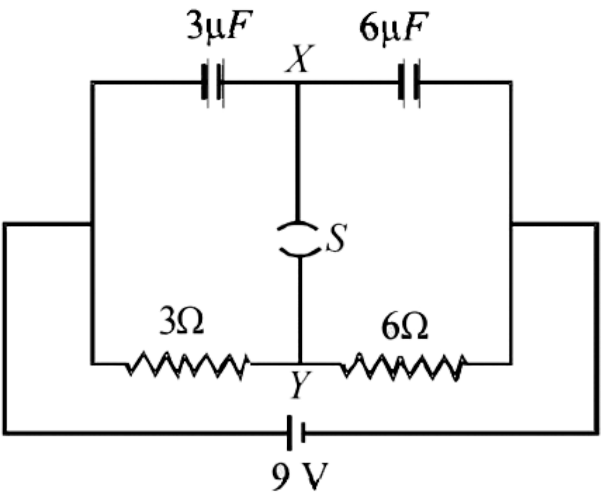
20. A circuit is connected as shown in the figure with the switch S open. When the switch is closed, the total amount of charge that flows from Y to X is



A. zero

B. $54\mu C$

C. $27\mu C$

D. $81\mu C$

Answer: C

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21. A resistance of 2Ω is connected across one gap of a meter bridge (the length of the wire is $100cm$) and an unknown resistance, greater than 2Ω is conneted across the other gap. When these resistances are interchanged, the balance point shifts by $20cm$. Neglecting any corrections,the unknown resistance is

A. 3Ω

B. 4Ω

C. 5Ω

D. 6Ω

Answer: A

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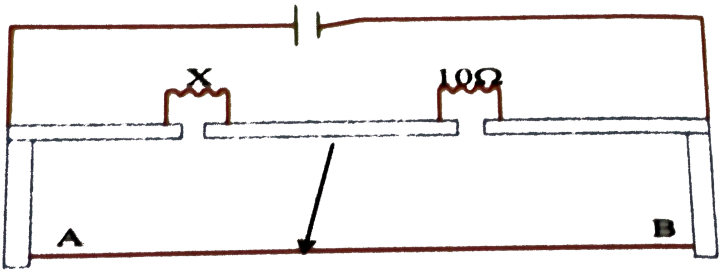
22.



A meter bridge is set-up as shown in figure to determine an unknown resistance X using a standard 10Ω resistor. The galvanometer shown null point when tapping key is at 52 cm mark. The end corrections are 1 cm and 2 cm respectively for the ends A and B. the determined value of X is

A. 10.2Ω

B. 10.6Ω

C. 10.8Ω

D. 11.1Ω

Answer: B

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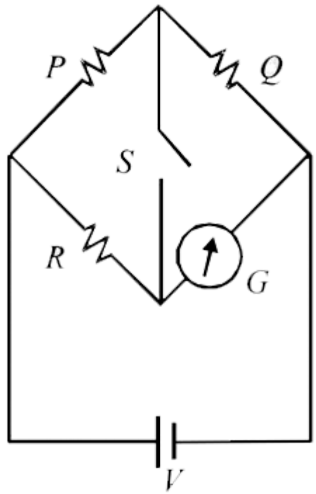
23. In the circuit $P \neq R,$ the reading of the galvanometer is same with switch S open or closed. Then



A. $I_R = I_G$

B. $I_P = I_G$

C. $I_Q = I_G$

D. $I_Q = I_R$

Answer: A

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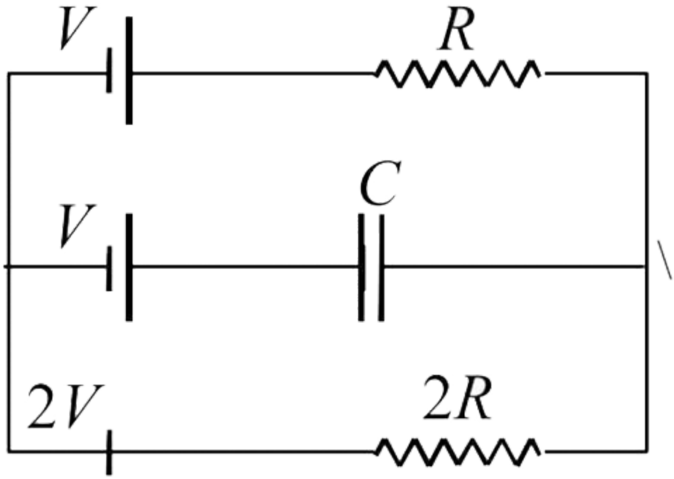
24. In the given circuit, with steady current, the potential drop across the capacitor must be



A. V

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

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

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

Answer: C

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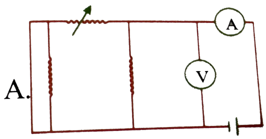
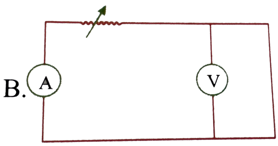
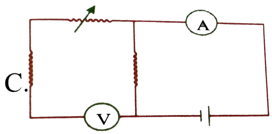
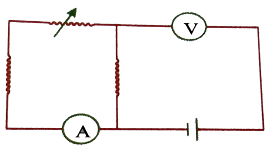
25. Express which of the following set ups can be used to verify ohm's law?

A. 

B. 

C. 

D. 

Answer: A

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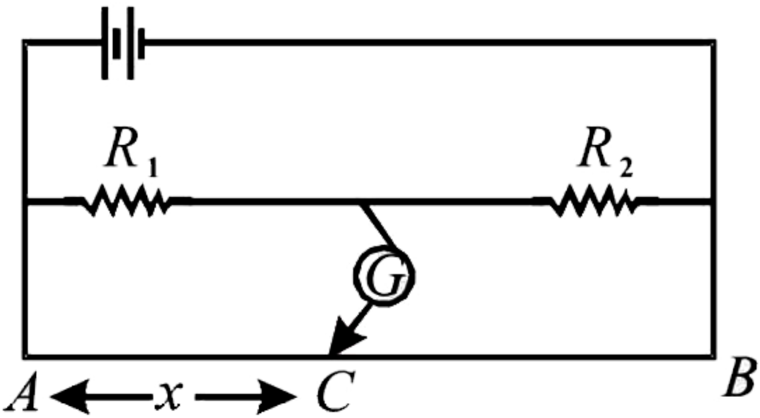
26. In the shown arrangement of the experiment of the meter bridge if AC corroesponding to null deflection of galvanometer is x, what would be its value if the radius of the wire AB is doubled?



A. x

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

C. $4x$

D. $2x$

Answer: A

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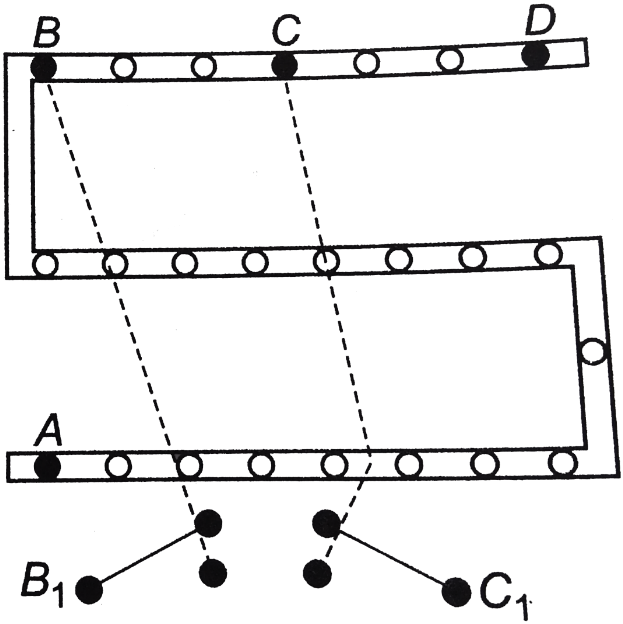
27. For the post office arrangement to determine the value of unknown resistance, the unknown resistance should be connected between.



A. B^1 and C^1

B. A and D

C. C and D

D. B and D

Answer: B

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28. A moving coil galvanometer of resistance 100Ω is used as an ammeter using a resistance 0.1Ω. The maximum diflection current in the galvanometer is $100\mu A$. Find the minimum current in the circuit so that the ammeter shows maximum deflection

A. $100.1mA$

B. $1000.1mA$

C. $10.01mA$

D. $1.01mA$

Answer: A

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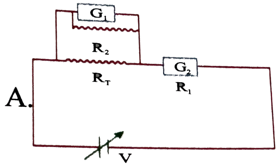
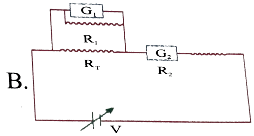
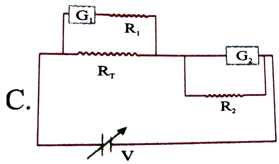
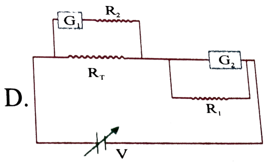
29. To verify Ohm's law, a student is provided with a test resistor R_T, a high resistance R_1 . a small resistance R_2, two identical galvometers G_1

and G_2 and voltage source V. The correct circuit to carry out the experiment is.

A. 

B. 

C. 

D. 

Answer: C

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30. A microameter has a resistance of 100ω and a full scale range of $50\mu A$. It can be used as a voltmeter or as a higher range ammeter provides a resistance is added to it . Pick the correct range and resistance combination(s)

A. 50 V range with $10k\Omega$ resistance in series

B. $10V$ range with $200k\Omega$ resistance in series

C. $5mA$ range with 1Ω resistance in parallel

D. 10 mA range with 1Ω resistance in parallel

Answer: B::C

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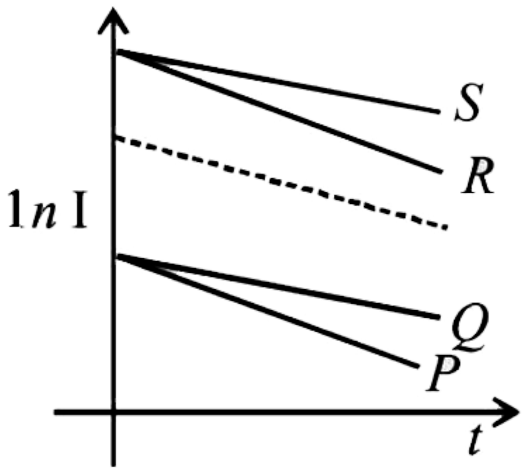
31. A capacitor is charged using an external battery with a resistance x in series. The dashed line showns the variation of In I with respect to time. If the resistance is changed to 2x, the new graph will be



A. P

B. Q

C. R

D. S

Answer: B

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32. A $4\mu F$ capacitor, a resistance of $2.5M\Omega$ is in series with $12V$ battery. Find the time after which the potential difference across the capacitor is 3 times the potential difference across the resistor. [Given In (2) = 0.693]

A. $14.86s$

B. $6.93s$

C. $7s$

D. $14s$

Answer: A

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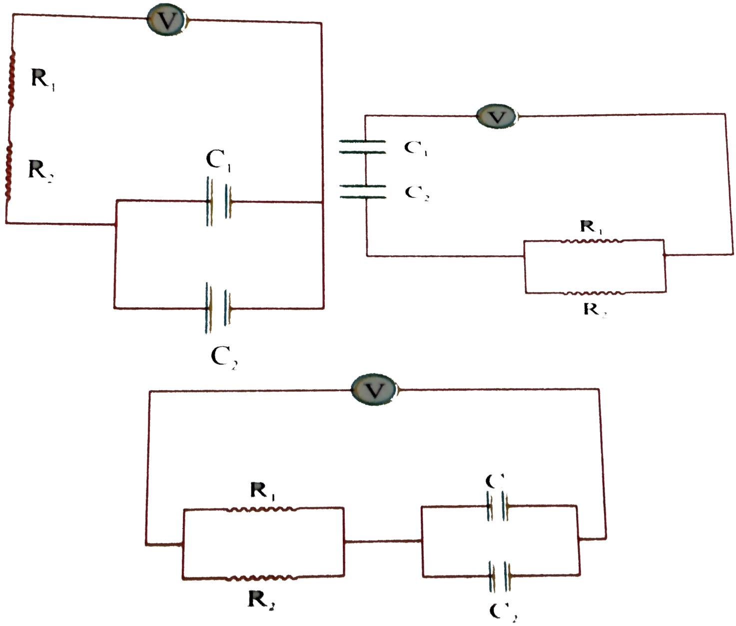
33.



Find the time constant for the given RC circuits in correct order (in μs)

$R_1 = 1\Omega$, $R_2 = 2\Omega$, $C_1 = 4\mu F$, $C_2 = 2\mu F$

A. $18, 4, \frac{8}{9}$

B. $18, \frac{8}{9}, 4$

C. $4, 18, \frac{8}{9}$

D. $4, \frac{8}{9}, 18$

Answer: B

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34. Capacitor C_1 of capacitance 1 micro-farad and capacitor C_2 of capacitance 2 microfarad are separately charged fully by a common battery. The two capacitors are then separately allowed to discharged through equal resistors at time t = 0.

A. The current in each of the two discharging circuits is zero at $t = 0$

B. The current in the two discharging circuits at $t = 0$ are equal but not zero

C. The currents in the two discharging circuits at $t = 0$ unequl

D. Capacitor C_1, loses 50% of its initial charge sooner than C_2 loses 50% of its initial charge

Answer: B

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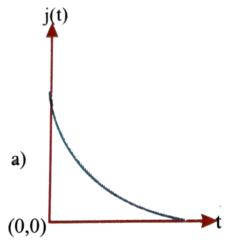
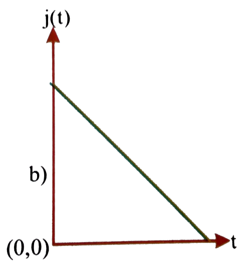
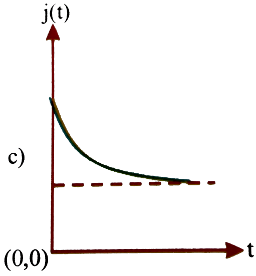
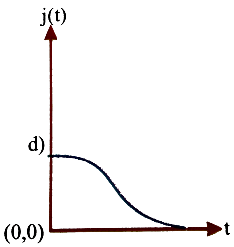
35. An infinite line charge of uniform electric charge density λ lies along the axis of an electrically conducting infinite cylindrical shell of radius R. At time $t = 0$, the space inside the cylinder is filled with a material of permittivity ε and electrical conductivity σ. The electrical conduction in the material follows Ohm's law. Which one of the following graphs best describes the subsequent variation of the magnitude of current density j(t) at any point in the material ?

A. 

B. 

C. 

D. 

Answer: A

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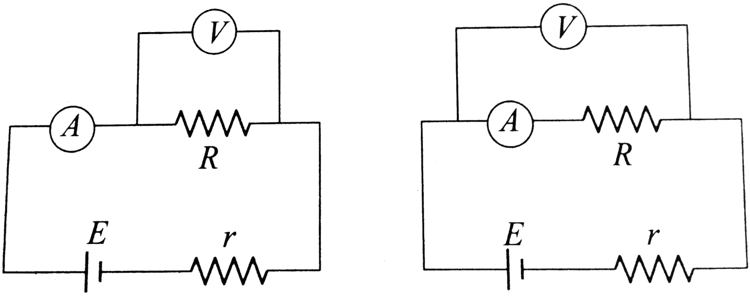
36. The value of resistance of an unknown resistor is calculated using the formula $R = V/I$ where V and I are the readings of the voltmeter and the ammeter, respectivley. Consider the circuits below. The internal resistances of the voltmeter and the ammeter $(R_V \text{ and } R_G, respectively)$ are finite and nonzero.



(a) (b)

,

Let R_A and R_B be the calculated values in the two cases A and B , respectively.

The relation between R_A and the actual value of R is

A. $R > R_A$

B. $R < R_A$

C. $R = R_A$

D. dependent upon E and r.

Answer: A

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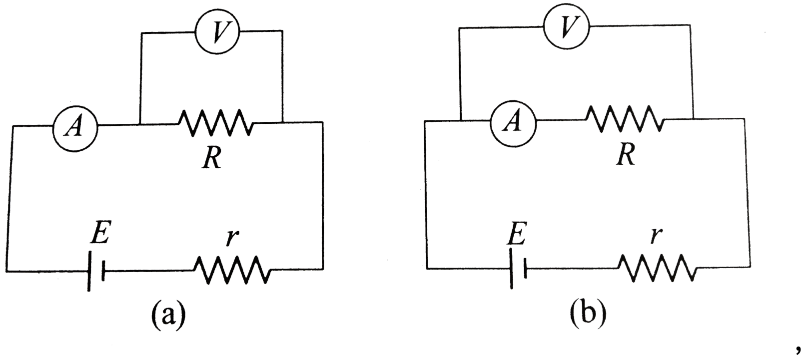
37. The value of resistance of an unknown resistor is calculated using the formula $R = V/I$ where V and I are the readings of the voltmeter and the ammeter, respectivley. Consider the circuits below. The internal resistances of the voltmeter and the ammeter $(R_V \text{ and } R_G, respectively)$ are finite and nonzero.



Let R_A and R_B be the calculated values in the two cases A and B , respectively.

The relation between R_A and the actual value of R is

A. $R > R_B$

B. $R > R_B$

C. $R = R_B$

D. dependent upon E and r.

Answer: A

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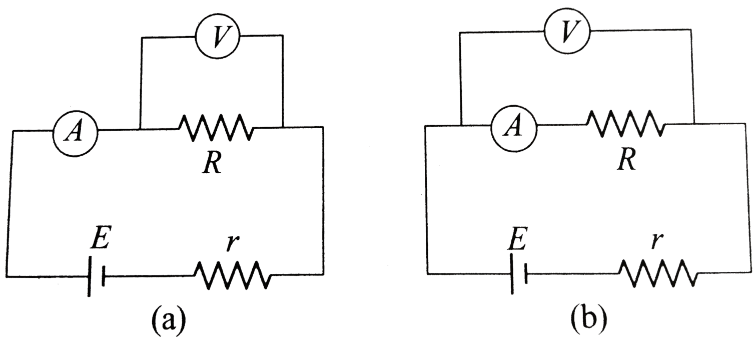
38. The value of resistance of an unknown resistor is calculated using the formula $R = V / I$ where V and I are the readings of the voltmeter and the ammeter, respectivley. Consider the circuits below. The internal resistances of the voltmeter and the ammeter $(R_V$ and $R_G, respectively)$ are finite and nonzero.



,

Let R_A and R_B be the calculated values in the two cases A and B , respectively.

If the resistance of voltmeter is $R_V = 1k\Omega$ and the percentage error in the measurement of R (the value of R is nearly 10Ω)is

A. zero in both cases

B. non zero but equal in both cases

C. more in circuit A

D. more in circuit B

Answer: D

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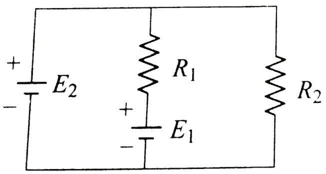
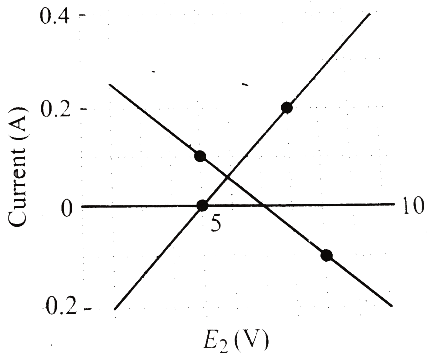
39. In the circuit given in the figure, both batteries are ideal . Emf E_1 of battery 1 has a fixed value, but emf E_2 of battery 2 can be varied between $1.0V$ and $10.0V$. The graph gives the currents through the two batteries as a function of E_2 but are not marked as which plot corresponds to which battery. But for both plots, current is assumed to be negative when the direction of the current through the battery is opposite to the direction of that battery's emf (direction of emf is from negative to positive.)





The value of emf E_1 is

A. 8 V

B. 6 V

C. 4 V

D. 2 V

Answer: B

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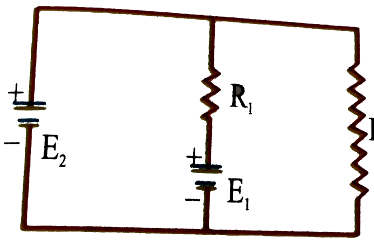
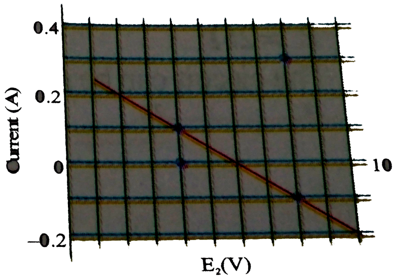
40.





In the circuit givenn below, both batteries are ideal. EMF E_1 of battery 1 has a fixed value but emf E_2 of battery 2 can be varied between 1.0 V and 10.0 V the graph gives the currents through the two batteries as a function of E_2, but are not marked as shown plot corresponds to which battery. but both plots, current is assumed to be negative when the direction of the current through the battery is opposite the direction of that battery's emf. (direction of emf is from negative to positive).

Q. The resistance R_1 has value

A. 10Ω

B. 20Ω

C. 30Ω

D. 40Ω

Answer: B

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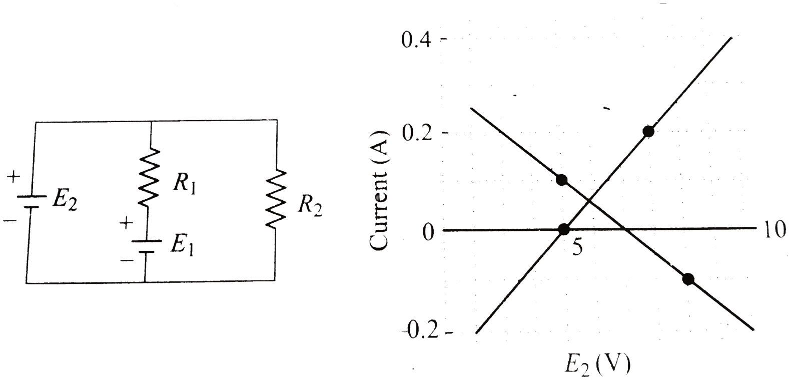
41. In the circuit given in the figure, both batteries are ideal . Emf E_1 of battery 1 has a fixed value, but emf E_2 of battery 2 can be varied between $1.0V$ and $10.0V$. The graph gives the currents through the two batteries as a function of E_2 but are not marked as which plot corresponds to which battery. But for both plots, current is assumed to be negative when the direction of the current through the battery is opposite to the direction of that battery's emf (direction of emf is from negative to positive.)



,

The resistance R_2 is equal to

A. 10Ω

B. 20Ω

C. 30Ω

D. 40Ω

Answer: D

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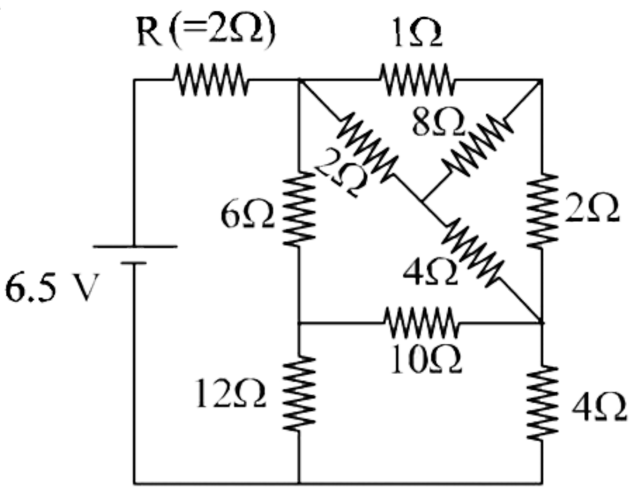
42. In the following circuit, the current through the resistor $R(=2\Omega)$ is I amperes. The value of I is



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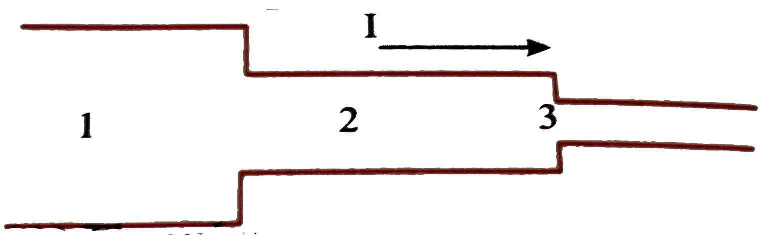
Level 6

1. 

A steady current flows through the conductor of variable cross-sectional area. Now select the correct options.

A. The value of current is same through the cross sections 1,2, and 3

B. The current density is the maximum at the cross sections 3

C. The drift velocity is greater at the cross-section 1

D. The electric field is maximum at the cross section 3.

Answer: A::B::D

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2. Select the correct statement(s)

A. A current carrying conductor is electrically neutral.

B. In a current carrying conductor, it is possible, all the free electrons can have same drft velocity.

C. In a current carrying conductor, the speed of the all the free electrons need not be same.

D. The electric field at any point inside the current carring conductor is non-zero, The electic field just outside the current carrying conductor is non-zero.

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3. Two conducting layers of length L each specific resistivites ρ_1 and ρ_2 and cross-sectional areas A_1 and A_2 respectively are connected to a voltage source V such that current flow lines do not cross from one layer to the other.

(i). Find the total current in the system and describe how it is divided between the 2 layers

(ii). Find the total current when a third layer of cross-sectional area $A_1 + A_2$, length L and specific resistivity ρ_3 is attached at one of the ends of the given system.

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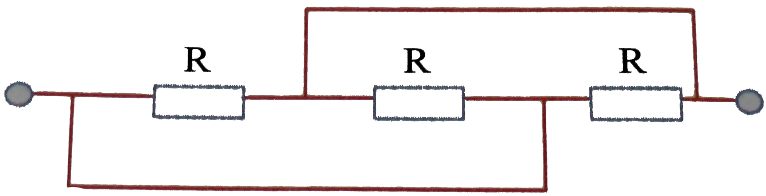
4. 

A dc source with internal resistance R_0 is loaded with three identical resistance R as shown in the figure. At what value of R will the thermal power generated in this circuit be the highest?

A. $R = 2R_0$

B. $R = 3R_0$

C. $R = \frac{R_0}{3}$

D. $R = R_0$

Answer: B

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5. What amount of heat will be generated in a coil of resistance R due to a charge q passing through it if the current in the coil

a. decreases down to zero uniformly during a time interval t_0?

b. decrases down to zero having its value every t_0 seconds?

A. $\dfrac{2q^2R}{3\Delta t}$

B. $\dfrac{3q^2R}{2\Delta t}$

C. $\dfrac{4q^2R}{3\Delta t}$

D. $\dfrac{3q^2R}{4\Delta t}$

Answer: C

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6. What amount of heat will be generated in a coil of resistance R due to a charge q passing through it if the current in the coil

a. decreases down to zero uniformly during a time interval t_0?

b. decrases down to zero having its value every t_0 seconds?

A. $\dfrac{q^2 \ln 2}{3\Delta t}R$

B. $\dfrac{q^2 \ln 2}{4\Delta t}R$

C. $\dfrac{q^2 \ln 2}{\Delta t}R$

D. $\dfrac{q^2 \ln 2}{2\Delta t}R$

Answer: D

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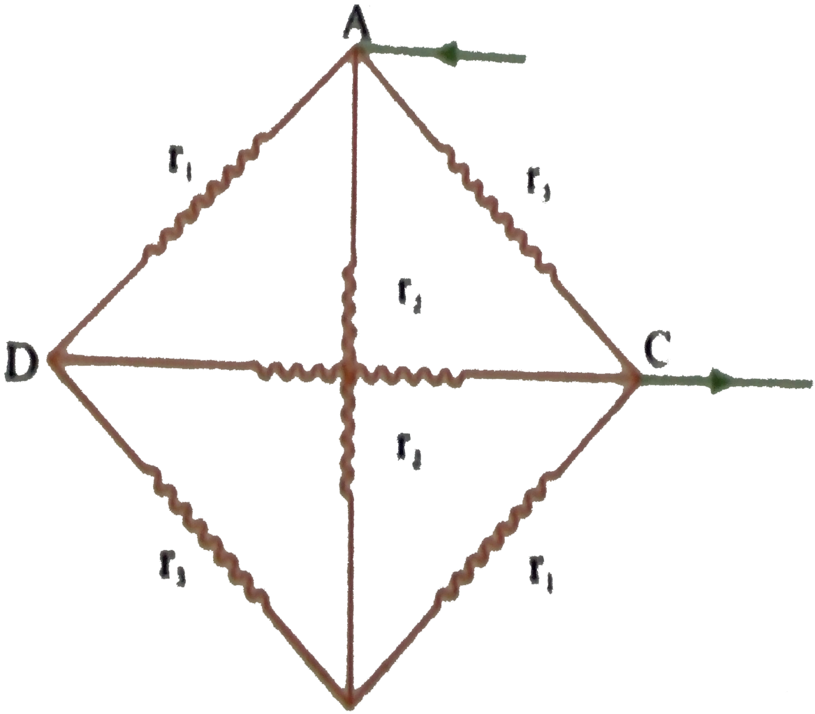
7.



Six resistors are connected so as to form the edges of a tetrahedron ABCD, the resistances of opposite pairs being equal. (Note that the resistors AB and CD do not touch each other) find the equivalent resistance between A and C.

A. $\frac{r_3}{2}\left[\frac{2r_1r_2+r_3(r_1+r_2)}{(r_1+r_3)(r_2+r_3)}\right]$

B. $\frac{r_2}{2}\left[\frac{2r_1r_2+r_3(r_1+r_2)}{(r_1+r_3)(r_2+r_3)}\right]$

C. $\frac{r_1}{2}\left[\frac{2r_1r_2+r_3(r_1+r_2)}{(r_1+r_3)(r_2+r_3)}\right]$

D. $\frac{r_3}{2}\left[\frac{2r_1r_3+r_2(r_1+r_2)}{(r_1+r_3)(r_2+r_3)}\right]$

Answer: A

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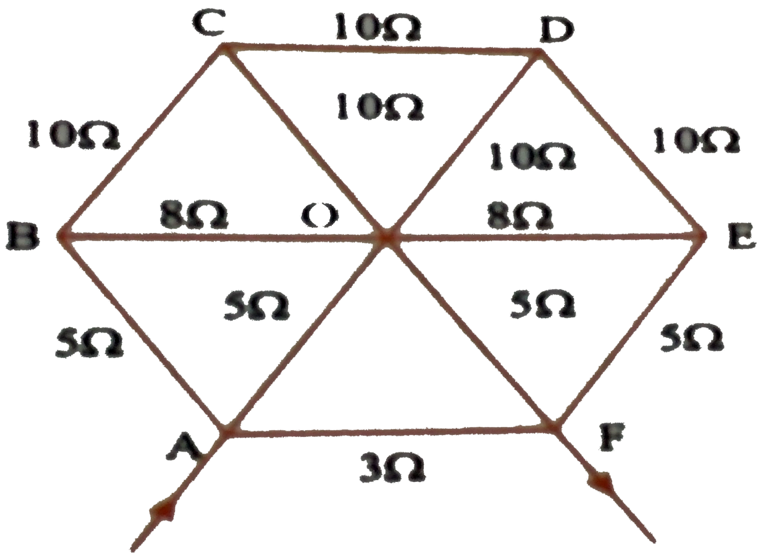

8.

12 wires of different resistances are connected as shown. Find the equivalent resistance A and F.

A. $\frac{60}{29}$

B. $\frac{50}{29}$

C. $\frac{40}{29}$

D. $\frac{20}{29}$

Answer: A

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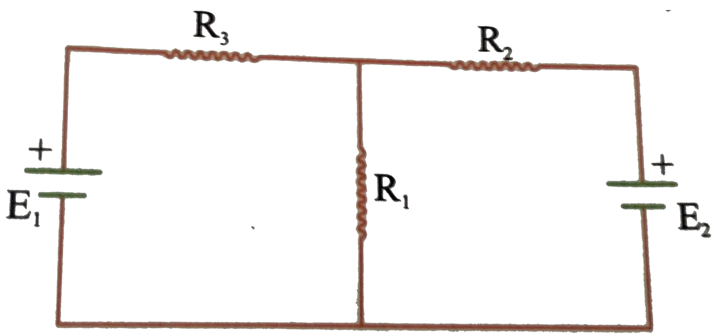
9.



In the electrical network, shown in the diagram $R_1 = 5\Omega$, $R_2 = 2\Omega$, $R_3 = 3\Omega$ and $E_1 = 2E_2 = 10V$, sources have negligible internal resistance. For this network,

A. The power generated in R_1 is $6.4 J/s$

B. if the sources of e.m.f. E_1 and E_2 were physically inter changed, without changing the polarities, the power generated in R_1 will be the same.

C. If the polarities of the sources E_1 and E_2 were both reversed,the power generated in R_1 will be the same.

D. The ratio of the power generated in R_2 and R_3 $1:30$

Answer: A::C::D

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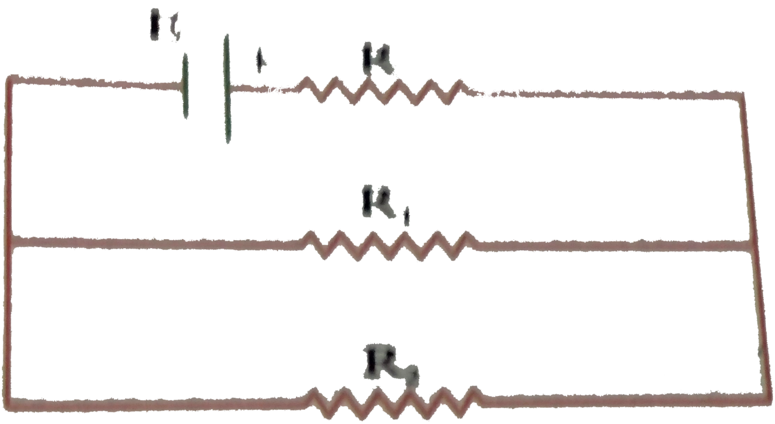
10.



In the given network, the powers generated in the resistor R_1 and R_2 are P_1 and P_2 and the power generated in R is P. For this network.

A. if $P_1 = P_2$ it necessarily follows that $R_1 = R_2$

B. if $R = R_1 + R_2$, then $P > P_1 + P_2$

C. if $P = P_1 + P_2$ then $R \leq \dfrac{R_1 + R_2}{4}$

D. if $R_1 = R_2$ then it necessarily follows that $P = P_1 + P_2$

Answer: A::B::C

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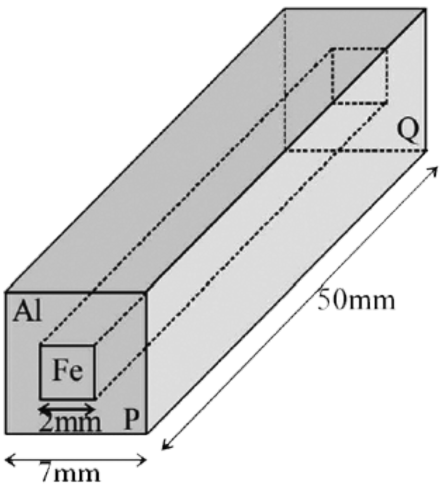
11. In an aluminium (Al) bar of square cross section, a square hole is drilled and is filled with iron (Fe) as shown in the figure. The electrical resistivities of Al and Fe are $2.7 \times (10^{-8}) \Omega m$ and $1.0 \times (10^{-7}) \Omega m$, respectively. The electrical resistance between the two faces P and Q of the composite bar is



A. $\frac{2475}{64}\mu\Omega$

B. $\frac{1875}{64}\mu\Omega$

C. $\frac{1875}{49}\mu\Omega$

D. $\frac{2775}{132}\mu\Omega$

Answer: B

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12. Consider two identical galvanometers and two identical resistors with resistance R. If the internal resistance of the galvanometers $R_c < R/2$, which of the following statement(s) about any one of the galvanometers is (are) true?

A. The maximum voltage range is obtained when all the components are connected in series

B. The maximum voltage range is obtained when the two resistors and one galvanometer are connected in series and the second galvanometer is connected in parallel to the first galvanometer

C. The maximum current range is obtained whhen all the components are connected in parallel

D. The maximum current range is obtained when the two galvanometers are connected in series and the combination is connected in parallel with both the resistors.

Answer: A::C

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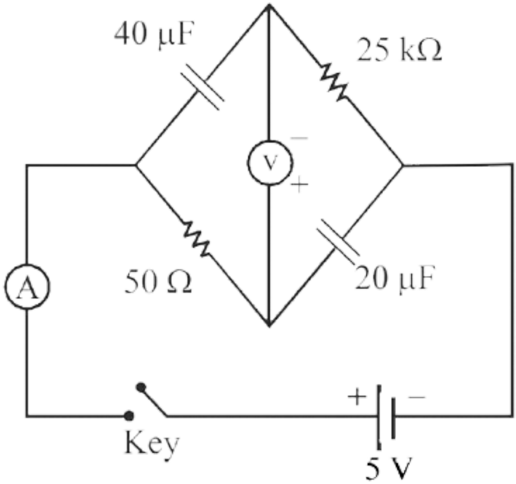
13. In the circuit shown below, the key is pressed at time t = 0 . Which of the following statements (s) is (are) true?



A. The voltmeter desplays $-5V$ as soon as the key is pressed, and displays $+5V$ after long time.

B. The voltmeter will display $0V$ at time $t = \ln 2$ seconds

C. The current in the ammeter becomes $1/e$ of the initial value after 1 second

D. The current in the ammeter becomes zero after a long time.

Answer: A::B::C::D

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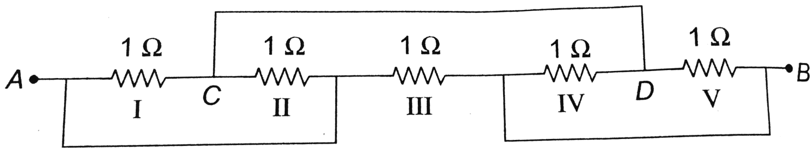
14. Five 1Ω resistance are connected as shown in the figure. The resistance in the conneting wires is negligilbe. The equivalent resistance between A and B is



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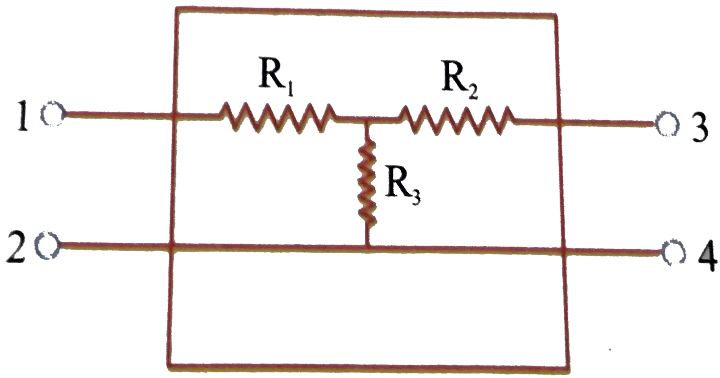
15.



If voltage is applied between terminals 1 and 2 when terminals 3 and 4 are open the power liberated is $P_1 = 40W$ and when terminals 3 and 4 are connected, the power liberated is $P_2 = 80W$. If the same source is connected to the terminals 3 and 4, the power liberated in the circuit when terminals 1 and 2 are open in $P_3 = 20W$. Determine the power P_4 consumed in the circuit when the terminals 1 and 2 are connected and the same voltage is applied between the terminals 3 and 4.

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16. A storage battery with emf $\varepsilon = 2.6V$ loaded with an external resistance produces a currnet $I = 1.0A$ in this case the potential current $I = 1.0A$. In this case the potential difference between the terminals of the battery is $V \equiv 2.0V$ now

A. The thermal power generated in the batery is 0.6 W

B. The power developed in the external resistance is 2.0 W

C. The thermal power generated in the battery is 0.5 W

D. the power developed in the external resistance is 4.0 W

Answer: A::B

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17. Two batteris of emf ε_1 and ε_2 wit respective internal resistance r_1 and r_2 are connected in parallel. Now

A. The effective emf of this parallel combination is $\dfrac{(\varepsilon_1 r_1 + \varepsilon_2 r_2)}{(r_1 + r_2)}$

B. The effective internal resistance of this combination is $\dfrac{2r_1 r_2}{(r_1 + r_2)}$

C. the effective emf of this parallel combination is $\dfrac{(\varepsilon_1 r_2 + \varepsilon_2 r_1)}{(r_1 + r_2)}$

D. The effective internal resistance of this combination is $\dfrac{r_1 r_2}{(r_1 + r_2)}$

Answer: C::D

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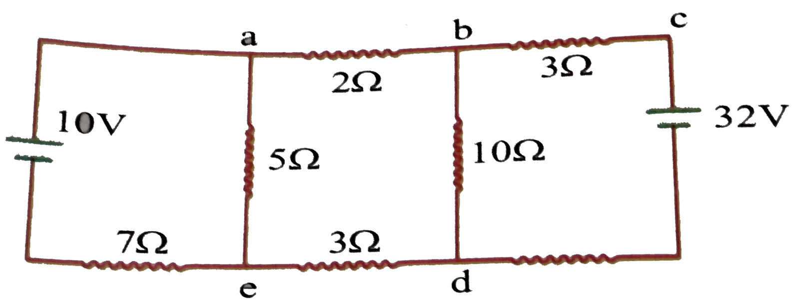
18.



In the circuit diagram shown in the figure,

A. The potential difference between the points (a and d) is 16 V

B. The current through the battery of 10 V is zero

C. The current through 5Ω resistor is 2 A

D. The cuurent through 10Ω resistor is 2A

The current through 32Ω battery is 4A

the current through 2Ω resistor is 2A

The potential difference between the points c and e is 26 V

The potential difference between along 7Ω resistor is zero

Answer: A::B::C::D

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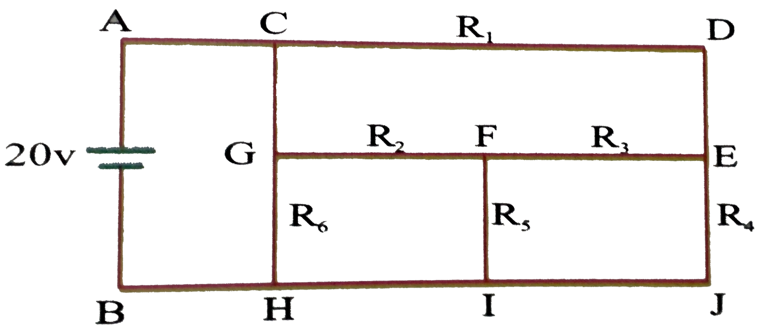
19. In the given circuit the resistance of all the resistors is equal to 2Ω, find the current flowing through each resistor under steady state. Select the correct options.



A. current through $R_1 \rightarrow 5A$

B. currenth through $R_2 \rightarrow 5A$

C. current through $R_3 \rightarrow$ zero

D. current through $R_4 \rightarrow 5A$

Current through $R_5 \rightarrow 5A$

Current through $R_6 \rightarrow 10A$

Answer: A::B::C::D

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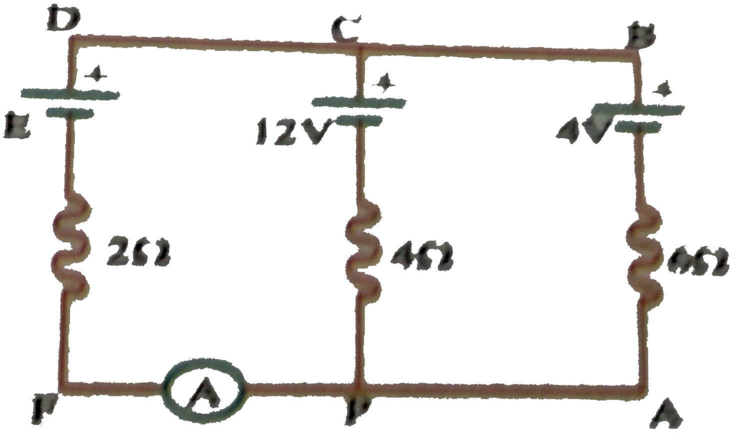
20.



ABCDFPA is a network of three batteries of the e.m.f's E, 12 V and 4 V respectively and three resistance 2Ω, 4Ω and 6Ω connected as shown in the diagram. An ideal ammeter connected between F and P shows a current reading of 0.5 A. Then the value of the e.m.f. E is

A. $6V$

B. $6.6V$

C. $8V$

D. $5.5V$

Answer: B

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21. In a metere bridge, the wire consists of two parts one of length 30 cm and of radius r and the other of radius 2r. Where will the null point occur if the resistance in the left and right gaps are 5Ω and 8Ω respectively? The material of the wires is the same.

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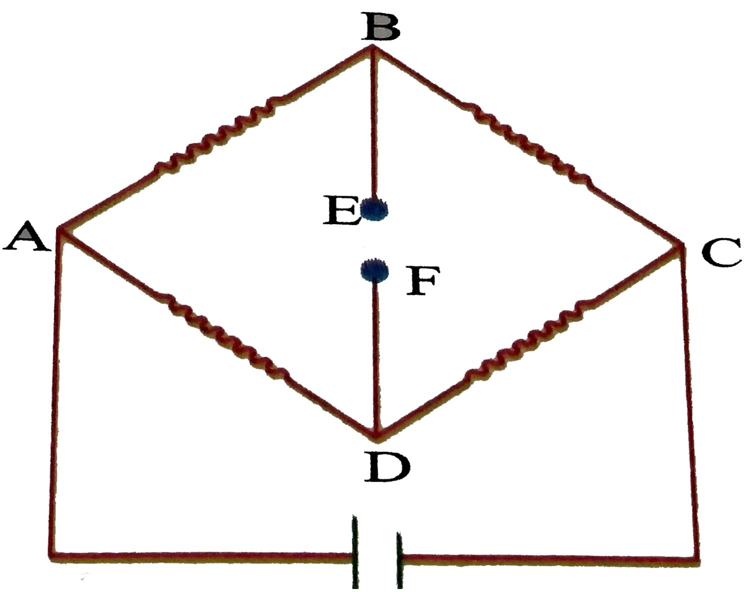
22. 

When an ideal voltmeter is connected between the [points E and F the reading of the meter is V_0. When an ideal ammeter is connected between

E and F, reading is I_0 find the current I through resistor R connected between E and F.

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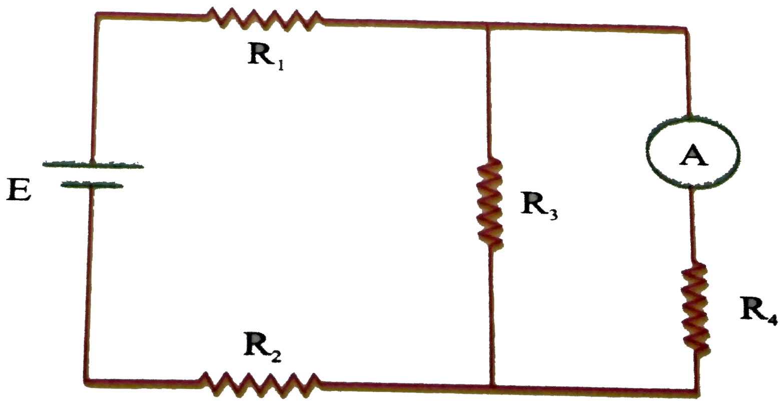
23. A network of four unequal resistor R_1, R_2, R_3 and R_4 are connected in a network (see diagram) that contains a source of e.m.f E and an ammeter A. The source has negligible internal resistance. For this network,



A. If $R_3 > R_4$ the current in the resistor R_3 will be less than that shown by the ammeter

B. if $R_3 < R_4$ the current in the resistor R_2 will be greater than that shown by the ammeter

C. if the source of e.m.f and the ammeter were physically interchanged in the network the ammeter will show the same current.

D. If the resistors R_2 and R_1 were physically interchanged, the ammeter will show the same current.

Answer: A::B::C::D

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24. A galvanometer with a coil resistance of 100Ω shows a full-scale deflection when a current of 1 mA is passed through it. What is value of the resistance which can convert this galvanometer into an ammeter showing a full scale deflection for a current 10 A? A resistance of the required value is available but it will get burnt if the energy dissipated in it is greater then 1 W. Can it be used for the conversion of the galvanometer described above?

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25. When the modified galvanometer of previous question is connected across te terminal of a battery, it shows a current of 4A. The current drops to 1A When resistance of 1.5Ω is connected in series withh the modified galvanometer. Find the emf and the internal resistance of the battery.

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26. An ammeter and a voltmeter are connected in series to a battery of emf $E = 6.0V$. When a certain resistance is connected in parallel with the voltmeter, the readding of the voltmeter decreases two times, whereas the reading of the ammeter increases the same number of times. Find the voltmeter reading after the connection of the resistance.

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27. It is required to measure the resistance of a circuit operating at $120V$. There is only one galvanometer of current sensitivity 10^{-6} A per division. How should the galvanometer be connected in the circuit to operate an ammeter? Why minimum resistance can be measured with such a galvanometer if its full-scale has 40 divisions?

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28. The resistance of a potentiometer wire 8 m long is 8 ohm. A high resistance box and a 2-volt accumulator are connected in series with it. What should be the value of the resistance in the box, if it is desired to have a potential drop of 1 micro volt per mm?

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29. The terminals of a cell are cnnected to resistance R and the falll of potential across R is balaced against the fall of potential on a potentiometer wire.When R is 20 Ω and 10 Ω respectively, the corresponding lengths of potentiometer wire are 1.5 m and 1.2 m Claculate the internal resistance of the cell

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30. An accumulator of emf $2V$ and negligible internal resistance is connected across a uniform wire of length 10 m and resistance 30Ω The appropriate terminals of a cell of emf $1.5V$ and internal resistance 1Ω is connected to one end of the wire and the other terminal of the cell is connected through a sensitive galvanometer to a slider on the wire. What is the length of the wire that will be required to produce zero deflection of the galvanometer? How will the balancing length change?

(a) When a coil of resistance 5Ω is placed in series with the accumulator.

(b) The cell of $1.5V$ is shunted with 5Ω resistor?

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31. A certain thermocouple (treat it as a seat of e.m.f) which has a total resistance of 10Ω has one junction in melting ice and the other junction in melting ice and the other junction is steam. The e.m.f. between its ends as measured with a potentiometer is 4 millivolt. What would be its reading when it is connected to a milli volt meter which has a resistance of 50 ohm?

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32. A 10 m wire potentiometer has resistance 10Ω and is connected to an accumulator of 2 volt and negligible internal resistance. There are two resistance boxes R_1 and R_2 is series with the accumulator and one can have any integral values of resistance from resistance boxes. A standard Cd-cell of 1.018 V having a sensitive galvanometer in series with it is connected across R_1. How would you proceed with the above arrangement to obtain a potential drop $1\mu V$ per mm of the potentiometer wire? Calculate value of R_1 and R_2 required. What length of this potentiometer will balance the thermo e.m.f. of iron-copper couple at $300^\circ C$ which develops $17\mu V/^\circ C$?

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33. A five wire potentiometer is connected to an accumulator of e.m.f 2.2 V and 1Ω internal resistance. The potentiometer wire has resistance 1Ω per metre. What is the maximum voltage that you can measure with this particular arrangement of potentiometer? What length of this potentiometer will balance the e.m.f of a daniell cell (e.fm.f $= 1.18V$)? what resistance to balance this cell exactly at the centre of the last wire?

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34. A potentiometer wire of length 1000 cm has a resistance of 10 ohms. It is connected in series with a resistance and a cell of e.m.f 2 volts and of negligible internal resistance. A source of e.m.f 10 millivolts is balanced against a length of 40 cm of the potentiometer wire. What is the value of the external resistance?

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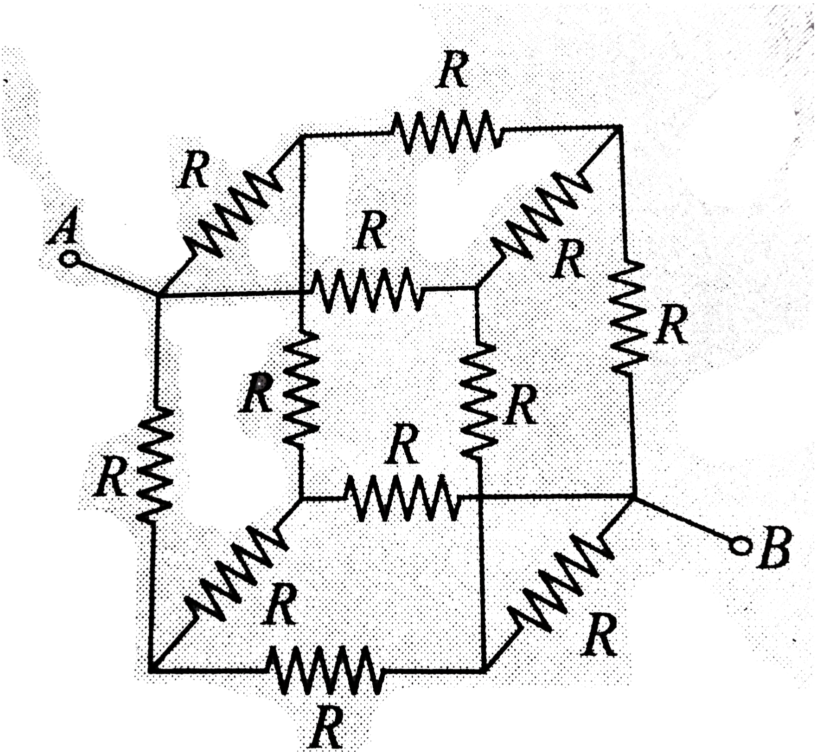
35. Twelve identical resistances arranged on all edges of a cube. The resistors are all the same. Then find the equivalent resistance between the edges A and B as shown in figure.



A. $\frac{R}{12}\left(10+4K-5K^2\right)$

B. $\frac{R}{6}\left(10+4K-5K^2\right)$

C. $\frac{R}{12}\left(5+2K-5K^2\right)$

D. $\frac{R}{6}\left(5+2K-5K^2\right)$

Answer: A

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36. Twelve straight uniform wires of length a and resistance R are joined to form the edges of a cube of side a. Current enters the system at one corner andd leaves from a point on one of the edges meeting at the opposite corner at a distance $Ka(< K < 1)$ from it.

Q. The equivalent resistance is maximum, when

A. $K = \frac{4}{5}$

B. $K = \frac{2}{5}$

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

D. $K = 0$

Answer: B

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37. Twelve straight uniform wires of length a and resistance R are joined to form the edges of a cube of side a. Current enters the system at one corner andd leaves from a point on one of the edges meeting at the opposite corner at a distance $Ka(< K < 1)$ from it.

Q. The maximum value of the equivalent resistance is

A. $\frac{9R}{5}$

B. $\frac{9R}{2}$

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

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

Answer: C

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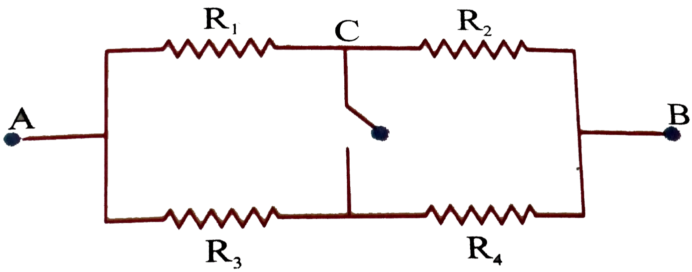
38.



Four resistors R_1, R_2, R_3 and R_4 are connected between two terminals A and B iin a network as shown in the diagram. A key K can connect the two points (see diagram) C and D. A constant potential difference $(V_A - V_B) = V$ is maintained between thhe points A and B

Q. If $V = 25, R_1 = 1\Omega, R_2 = 2\Omega, R_3 = 3\Omega$ and $R_4 = 4\Omega$ the current that will flow from C to D on connecting key K is

A. zero

B. infinity

C. $+1A$

D. $-1A$

Answer: C

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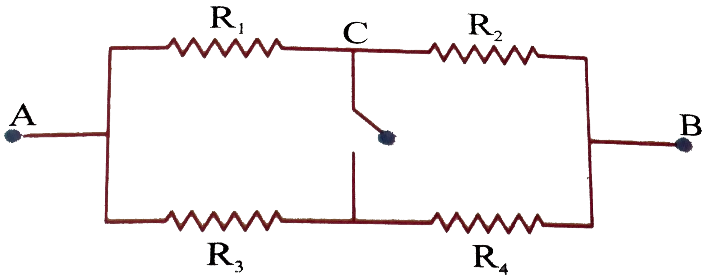
39.



Four resistors R_1, R_2, R_3 and R_4 are connected between two terminals A and B iin a network as shown in the diagram. A key K can connect the two points (see diagram) C and D. A constant potential difference $(V_A - V_B) = V$ is maintained between thhe points A and B

Q. In on connecting the key K, no current flows through the segment CD, whatever potential difference V exists between A and B which of the following cases will satisfy this condition?

A. $R_1 = 1\Omega,\ R_2 = 2\Omega,\ R_3 = 3\Omega,\ R_4 = 4\Omega$

B. $R_1 = 2\Omega,\ R_2 = 1\Omega,\ R_3 = 4\Omega,\ R_4 = 2\Omega$

C. $R_1 = 1\Omega,\ R_2 = 2\Omega,\ R_3 = 2\Omega,\ R_4 = 1\Omega$

D. $R_1 = R_2 = 2\Omega,\ R_3 = 2R_4 = 4\Omega$

Answer: B

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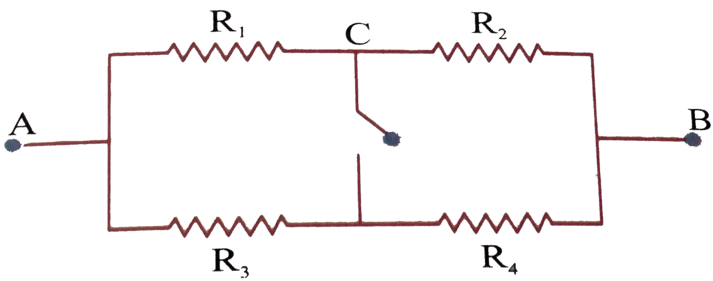
40.



Four resistors R_1, R_2, R_3 and R_4 are connected between two terminals A and B iin a network as shown in the diagram. A key K can connect the two points (see diagram) C and D. A constant potential difference $(V_A - V_B) = V$ is maintained between thhe points A and B

Q. If $R_1 = R_4 = 1\Omega$ and $R_2 = R_3 = 2\Omega$, the effective resistance between the terminals A and B will change, on closing the key K, by

A. an increase of 0.5Ω

B. a decrease of 0.16Ω

C. an increase of 0.16Ω

D. a decrease of 0.5Ω

Answer: B

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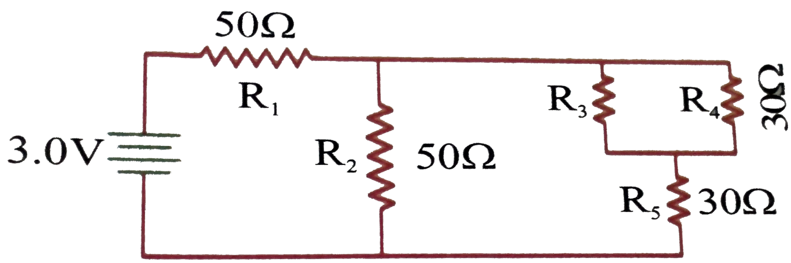
41.



In the circuit shown, the resistances are given in ohms and the battery is assumed ideal withh emf equal to 3.0 volts.

Q. The resistor that dissipates maximum power

A. R_1

B. R_2

C. R_4

D. R_5

Answer: A

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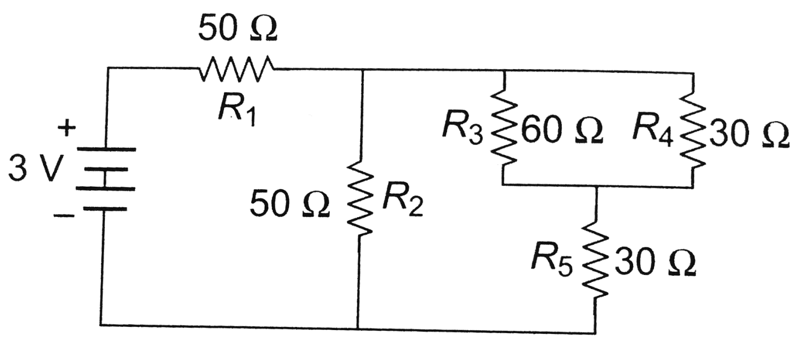
42. In circuit shown below, the resistance are given in ohms and the battery is assumed ideal with emf equal to 3 volt The voltage across the resistance R_4 is



A. 0.4 V

B. 0.6 V

C. 1.2 V

D. 1.5 V

Answer: A

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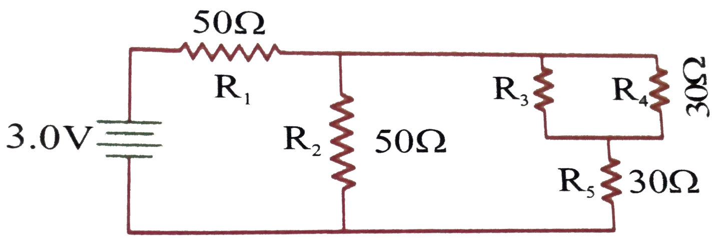
43.



In the circuit shown, the resistances are given in ohms and the battery is assumed ideal withh emf equal to 3.0 volts.

Q. The current passing through 3 V battery is

A. 10 mA

B. 30 mA

C. 40 mA

D. 60 mA

Answer: C

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ILLUSTRATION

1. In a hydrogen atom, electron moves in an orbit of radius $5 \times 10^{-11} m$ with a speed of $2.2 \times 10^6 \frac{m}{s}$. Calculate the equivalent current.

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2. The current through a wire depends on time as

$I = i_0 + \alpha t$,

where $i_0 = 10A$ and $\alpha = 4As^{-1}$.Find the charge crossed through a section of the wire in 10 second

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3. Consider a wire of length 4m and cross-sectional areal $1mm^2$ carrying of 2A. If each cubic metre of the material contains 10^{29}free electrons, find the average time taken by an electron to cross the length of the wire.

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4. A rectangular block has dimensions $5cm \times 5cm \times 10cm$. Calculate the resistance measured between (a) two square ends and (b) the opposite rectangular ends. Specific resistance of the material is $3.5 \times 10^{-5} \Omega m$.

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5. The temperature coefficient of resistance of platinum is $\alpha = 3.92 \times 10^{-1} K^{-1}$ at 10° C. Find the temperature at which the increase in the resistance of platinum wire is 10% of its value at 10° C.

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6. The resistance of iron wire is 10Ω and $\alpha = 5 \times \frac{10^{-3}}{.^{\circ} C}$. If a current of 30A is flowing in it at $20^{\circ} C$ keeping the potential difference across its length constant, if the temperature is incresed to $120^{\circ} C$ what is the current flowing through that wire?

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7. Resistance of a resistor at temperature $t^\circ C$ is $R_f = R_0(1 + \alpha t + \beta t^2)$. Here R_0 is the resistance at $0^\circ C$ .The temperature coefficient of resistance at temperature $t^\circ C$ is

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8. A silver wire has a resistance of 2.1Ω at $27.5^\circ C \& 2.7\Omega$ at $100^\circ C$ Determine the temperature coefficient of resistivity of silver.

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9. V-I graph of a conductor at temperature T_1 and T_2 are shown in the figure $(T_2 - T_1)$ is proportional to

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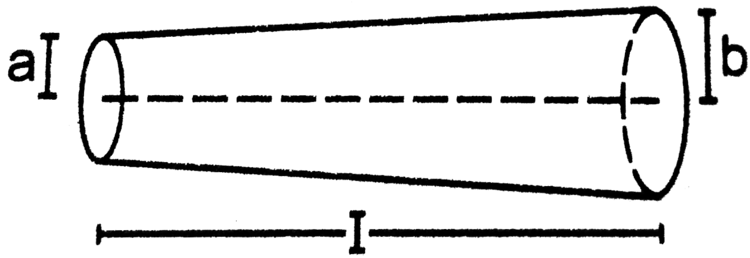
10. Shown a conductor of length l having a circular cross section. The radius of cross section varies linearly form $a \rightarrow b$. The resistivity of the material is(ρ).Assuming that $b - a < \; < l$,find the resistance of the conductor.



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11. A hollow cylinder of specific resistance ρ, inner radius R, outer radius $2R$ and length l is as shown in figure. What is the net resistance between the inner and outer surfaces?

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12. There are two concentric spheres of radius a and b respectively. If the space between them is filled with medium of resistivity ρ, then the resistance of the intergap between the two spheres will be (Assume $b > a$)

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13. A hollow copper cylinder is of inner radius 4 cm outer radius 5 cm. Now hollow portion is completely filled with suitable copper wires. Find percentage change in its electric resistance.

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14. Resistivity of the material of a conductor of uniform cross-section varies along its length as $\rho = \rho_0(1 + \alpha x)$. Find its resistance if its length is L and area of cross-section is A.

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15. How many number of turns of nichrome wire of specific resistance $10^{-6}\Omega m$ and diameter 2mm that should be wound on a cylinder of diameter 5 cm to obtain a resistance of 40Ω?

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

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17. For a circuit shown in fig find the value of resistance R_2 and current I_2 flowing through R_2

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18. Two wires of equal diameters of resistivities ρ_1 and ρ_2 and length x_1 and x_2 respectively are joined in series. Find the equivalent resistivity of the combination.

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19. Find equivalent resistance of the network in Fig. between points (i) A and B and (ii) A and C.

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20. Find potential difference between points A and B of the network shown in Fig. and distribution of given main current through different resistors.

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21. P and Q are two points on a uniform ring of resistance R. The equivalent resistance between P and Q is

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22. Determine the current drawn from a 12 V supply with internal resistance 0.5. by the infinite network shown in fig. Eachh resistor has 1Ω. Resistance

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23. A fuse wire with radius of $0.2mm$ blows off with a current of 5 Amp. The fuse wire of same material,but of radius 0.3 mm will blow off with a current of

(1) $5 \times \frac{3}{2} Amp$

(2). $\frac{5\sqrt{3}}{2} Amp$

(3). $5\sqrt{\frac{27}{8}}Amp$

(4). $5Amp$

A. $5 \times \frac{3}{2}$ Amp

B. $\frac{5\sqrt{3}}{2}$ Amp

C. $5\sqrt{\frac{28}{8}}$ Amp

D. 5 Amp

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24. A $1kW$ heater is meant to operate at $200V$.

(a) What is the resistance?

(b) How much power will it consume if the line voltage drops to $100V$?

(c) How many units of electrical energy will it consume in a month $(of 30 days)$ if it operates $10h$daily at the specified voltage $(200V)$?

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25. A lamp of 100 W works at 220 volts. What is the its resistance and current capacity?

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26. 100 W,220V V bulb is connected to 110V source. Calculate the power consumed by the bulb.

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27. A $100W$ and a $500W$ bulbs are joined in series and connected to the mains which bulb will glow brighter?

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28. A cell develops the same power across two resistances R_1 and R_2 separately. The internal resistance of the cell is

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

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30. A battery if internal resistance 4Ω is connected to the network of resistance as shown. What must be the value of R so that maximum power is delivered to the network? Find the maximum power?

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31. When a current drawn from a battery is 0.5 A, its terminal potential difference is 20 V. And when current drawn from it is 0.2 A, the terminal voltage reduces to 16 V. Find out, emf and internal resistance of the battery.

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32. An ideal battery sends a current of 5A in a resistor.When another resistor of value $10\Omega$is connected in parallel ,the current through the battery is increased to 6A.Find the resistance of the first resistor.

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33. When a bettery is connected to the resistance of 10Ω the current in the circuit is 0.12 A the same battery gives $0.07A$ current with 20Ω calculate $e.m.f$ and internal resistance of the battery.

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34. Two cells A and B with same $e.m.f$ of 2 V each and with internal resistances $r_A = 3.5\Omega$ and $r_B = 0.5\Omega$ are connected in series with an external resistance $R = 3\Omega$ Find the terminal voltages across the two cells.

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35. Two cells A and B each of 2 V are connected in series to an external resistance $R = 1$ ohm.The internal resistance of A is $r_A = 1.9$ ohm and B is $r_B = 0.9$ ohm. Find the potential difference between the terminals of A.

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36. In the given circuit as shown as shown below, calculate the magnitude and direction of the current.

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37. A voltmeter resistance 500Ω is used to measure the emf of a cell of internal resistance 4Ω. The percentage error in the reading of the voltmeter will be

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38. Find the emf (V) and internal resistance (r) of a single battery which is equivalent to a parallel combination of two batteries of emfs V_1 and V_2 and internal resistance r_1 and r_2 respectively, with polarities as shown in fig- are

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39. In the given cirucit values are as follows

$\varepsilon_1 = 2V, \varepsilon_2 = 4V, R_1 = 1\Omega$ and $R_2 = R_3 = 1\Omega$.

Calculate the Currents through R_1, R_2 and R_3.

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40. Solve for current values in figure.

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41. Determine the current in each brand of the network shown in fig.

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42. In the shown arrangement of the experiment of the meter bridge if AC corresponding to null deflection of galvanometer is x, what would be its value if the radius of the wire. AB is doubled?

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43. A resistance of 2Ω is connected across one gap of a metre-bridge(the length of the wire is 100 cm) and an unknown resistance, greater than 2Ω, is connected across the other gap. When these resistances are interchanged, the balance points shifts by 20 cm. Neglecting any corrections, the unknown resistance is

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44. The length of a potentiometer wire is 1m and its resistance is 4Ω A current of 5 mA is flowing in it. An unknown source of emf is balanced on 40 cm length of this wire, then find the emf of the source.

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45. A cell of emf 2 volt and internal resistance 1.5Ω is connected to the ends of 1 m long wire. The resistance of wire is $0.5\frac{\Omega}{m}$. Find the value of potential gradient on the wire.

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46. In a potentiometer experiment the balancing length with a cell is 560 cm. When an external resistance of 10Ω is connected in parallel to the cell, the balancing length changes by 60 cm. Find the internal resistance of the cell.

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47. In a potentiometer experiment when a battery of emf 2V is included in the secondary circuit the balance point is 500 cm. Find the balancing length of the same end when a cadimum cell of emf 1.018V is connected to the secondary circuit.

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C.U.Q (ELECTRIC CURRENT AND DRIFT VELOCITY)

1. 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. $\dfrac{ml}{\mathrm{ne}^2 tA}$

B. $\dfrac{2mA}{\mathrm{ne}^2\tau}$

C. $\mathrm{ne}^2\tau A$

D. $\dfrac{\mathrm{ne}^2\tau A}{2m}$

Answer: A

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2. For which of the following depndences of drift velocity, v_d on electric field E, Ohm's law obeyed?

A. $v_d \alpha E$

B. $v_d \alpha E^2$

C. $v_d \alpha \sqrt{E}$

D. v_d = constant

Answer: A

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3. A steady current is passing through a linear conductor of non-uniform cross-section. The net quantity of charge crossing any cross-section per second is.

A. independent of area of cross-section

B. directly proportional to the length of the conductor

C. directly proportional to the area of cross section.

D. inversely proportional to the area of the conductor.

Answer: A

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4. A current passes through a wire of nonuniform cross-section. Which of the following quantites are independent of the cross section?

A. current, electric field and drift speed

B. drift speed only

C. current and drift speed

D. current only

Answer: D

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5. When electric field $\left(\vec{E}\right)$ is applied on the ends of a conductor, the free electrons starts moving in direction

A. similar to $\overrightarrow{E}$

B. Opposite to $\overrightarrow{E}$

C. Perpendicular to $\overrightarrow{E}$

D. cannot be predicted

Answer: B

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6. The drift speed of an electron in a metal is in the order of ??

A. 10^{-13} m/s

B. 10^{-3} mm/s

C. 10^{-4} m/s

D. 10^{-30} m/s

Answer: C

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7. In metals and vaccum tubes charge carriers are

A. electrons

B. protons

C. both

D. positrons

Answer: A

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8. The electric intesity E, current density j and conductivity σ are related as:

A. $j = \sigma E$

B. $j = E / \sigma$

C. $jE = \sigma$

D. $j = \sigma^2 E$

Answer: A

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

A. $E \propto J^{-1}$

B. $E \propto J$

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

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

Answer: B

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10. Assertion: A current flows in a conductor only when there is an electric field within the conductor:

Reason: The drift velocity of electron in presence of electric field decreases.

A. both A and R are true and R is the correct explanation of A.

B. Both A and R are true but R is not the correct explanation of A.

C. A is true but R is false

D. A is false but R is true

Answer: C

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C.U.Q (OHM.S LAW & FACTORS EFFECTING RESISTANCE)

1. In an electric circuit containing a battery,the charge (assumed positive)inside the battery.

A. always goes from the positive terminal to the negative terminal

B. may move from the positive terminal to the negative terminal

C. always goes from the negative terminal to the positive terminal

D. does not move

Answer: B

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2. The quantity in electricity analogous to temperature is

A. potential

B. resistance

C. current

D. charge

Answer: A

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3. The flow of the electric current through a metallic conductor is

A. only due to electrons

B. only due to +ve charges

C. due to both nuclei and electrons

D. can not be predicted.

Answer: A

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4. For making standard resistance, wire of following materials is used

A. Nichrome

B. Copper

C. Silver

D. manganin

Answer: D

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5. Material used for heating coils is

A. Nichrome

B. Copper

C. Silver

D. manganin

Answer: A

View Text Solution

6. A piece of silver and another of silicon are heated from room temperature The resistance of

A. each of them increases

B. each of them decreases

C. silver increases and silicon decreases

D. silver decrease and silicon increases

Answer: C

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7. A certain piece of copper is to be shaped into a conductor of minimum resistance, its length and cross sectional area should be

A. L and A

B. 2L and A/2

C. L/2 and 2A

D. 3L and A/3

Answer: C

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8. When light falls on semiconductors, their resistance

A. decrease

B. increases

C. does not change

D. can't be predicted

Answer: A

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9. With the increase of temperature, the ratio of conductivity to resistivity of a metal conductor

A. Decrease

B. Remains same

C. Increase

D. May increase or decrease

Answer: A

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10. The conductivity of a super conductor is

A. zero

B. infinity

C. depends on temp

D. depends on free electron

Answer: B

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11. When a piece of aliminium wire of finite length is drawn through a series of dies to reduce its diameter to half its original value, its resistance will become

A. two times

B. four times

C. eight times

D. sixteen times

Answer: D

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12. Metals have

A. zero resistivity

B. high resistivity

C. low resistivity

D. infinite resistivity

Answer: A

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13. Consider a rectangular slab of length L, and area of cross-section A. A current I is passed through it if the length is doubled the potential drop across the end faces

A. Becomes half of the initial value

B. becomes one-forth of the initial value

C. becomes double the initial value

D. remains same

Answer: C

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14. A metallic block has no potential difference applid across it, then the mean velocity of free electrons is $(T =$ absolute temperature of the block)

A. Proportional to T

B. Proportional to $\sqrt{T}$

C. Zero

D. Finite but independent of temperature.

Answer: C

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15. The resistance of a metallic conductor increases with temperature due to.

A. The collisions of the conducting electrons with the electrons increases.

B. The collisions of the conducting electrons with the lattice consisting of the ions of the metal increses.

C. The number of the conduction electron increases

D. The number of conduction electrons increase.

Answer: B

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16. In the absence of applied potential, the electric current flowing through a metallic wire is zero because

A. The average velocity of electron is zero

B. The electrons are drifted in random direction with a speed of the order of 10^2 cm/s.

C. The electrons move in random direction with a speed of the order close to that of velocity of light.

D. Electrons and ions move in opposite direction.

Answer: A

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17. A long constan wire is connected across the terminals of an ideal battery. If the wire is cut in to two equal pieces and one of them is now connected to the same battery, what will be the mobility of free electrons not in the wire compared to that in the first case?

A. same as that of previous value

B. double that of previous value

C. half that of previous value

D. four times that of previous value

Answer: A

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18. Ohm's law is not applicable for

A. insulators

B. semi conductors

C. vaccum tube

D. all the above

Answer: D

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19. Wires of nichrome and copper of equal dimensions are connected in series in electrical circuit. Then

A. more current will flow in copper wire

B. more current will flow in Nichrome wire

C. Copper wire will get heated more

D. Nichrome wire will get heated more

Answer: D

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20. At absolute zero silver wire behaves as

A. super conductor

B. semi conductor

C. perfect insulator

D. semi insulator

Answer: A

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21. Fuse wire is a wire of :

A. low meltinig point and low value of

B. high melting pointand high value of

C. high melting point and low value of

D. low melting point and high value of

Answer: D

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22. Assertion: Material used in the construction of a standard resistance is constantan or manganin.

Reason: Temperatures coefficient of constan is very small.

A. both A and R are true and R is the correct explanation of A.

B. Both A and R are true but R is not the correct explanation of A.

C. A is true but R is false

D. A is false but R is true

Answer: A

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23. Assertion (A): Bending of a conducting wire effects electrical resistance.

Reason(R): Resistance of a wire depends on resistivity of that material.

A. both A and R are true and R is the correct explanation of A.

B. Both A and R are true but R is not the correct explanation of A.

C. A is true but R is false

D. A is false but R is true

Answer: B

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24. Assertion (A): When the radius of a copper wire is doubled, its specific resistance gets increased

Reason (R): specific resistance is independent of cross-section of material used

A. both A and R are true and R is the correct explanation of A.

B. Both A and R are true but R is not the correct explanation of A.

C. A is true but R is false

D. A is false but R is true

Answer: D

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C.U.Q (THERMISTOR)

1. The thermistors are usually made of

A. metals with low temperature coefficient of resistivity

B. metals with high temperature coefficient of resistivity

C. metal oxides with high temperature coefficient of ressistivity

D. semiconductors coefficient of resistivity

Answer: C

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2. For a chosen non-zero value of voltage, there can be more than one value of current in

A. copper wire

B. thermistor

C. zener diode

D. manganin wire

Answer: B

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C.U.Q (ELECTRIC POWER)

1. If a heater coil is cut into two equal parts and only one part is used in the heater, the heat generated will be

A. become one fourth

B. halved

C. doubled

D. become four times

Answer: C

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2. Two lamps have resistance r and R, R being greater than r. If they are connected in paralled in an electric circuit, then

A. the lamp with resistance R will shine more brightly

B. the lamp with resistance r will shine more brightly

C. the two lamps will shine equal brightly

D. The lamp with resistance R will not shine at all.

Answer: B

Watch Video Solution

3. Two bulbs are fitted in a room in the domestic electric installation. If one of them glows brighter than the other, then

A. the brighter bulb has smaller resistance

B. the brighter bulb has larger resistance

C. both the bulbs have the same resistance

D. nothing can be said about the resistance unless other factors are known.

Answer: A

Watch Video Solution

4. The potential difference across a conductor is doubled, the rate of generation of heat will

A. become one fourth

B. be halved

C. be doubleitmes

D. become four times

Answer: D

Watch Video Solution

5. Two metallic wires of same material and same length have different diameter. When the wires are connected in parallel across an ideal battery the rate of heat produced in thinner wire is Q_1 and that in thicker wire is Q_1. The correct statements is

A. $Q_1 = Q_2$

B. $Q_1 < Q_2$

C. $Q_1 > Q_2$

D. It will depend on the emf of the battery

Answer: B

Watch Video Solution

6. There are two metallic wires of same material, same length but of different radii. When these are connected to an ideal bettery in series, heat produced is H_1 but when connected in parallel, geat produced is H_2 for the same time.Then the correct statement is

A. $H_1 = H_2$

B. $H_1 < H_2$

C. $H_1 > H_2$

D. No relation

Answer: B

Watch Video Solution

7. Two electric bulbs rated P_1 watt and V volt, are connected in series, across V-volt supply. The total power consumed is

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

B. $\sqrt{P_1 . P_2}$

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

D. $(P_1 + P_2)$

Answer: C

Watch Video Solution

8. In above question, if the bulbs are connected in parallel, total power consumed is

A. $\dfrac{P_1 + P_2}{2}$

B. $\sqrt{P_1 . P_2}$

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

D. $(P_1 + P_2)$

Answer: D

Watch Video Solution

9. Which of the following causes production of heat, when current is set up in a wire

A. Fall of electron from higher orbits to lower orbits

B. inter atomic collisions

C. inter electronn collisions

D. collision of conduction electrons with atoms.

Answer: D

Watch Video Solution

10. A constant voltage is applied between the two ends of a metallic wire. If both the length and the radius of the wire are doubled, the rate of heat developed in the wire

A. will be doubled

B. will be halved

C. will remain the same

D. will be quadrupled

Answer: A

Watch Video Solution

11. A resistor R_1 dissipates the power P when connected to a certain generator. If the resistor R_2 is put in series with R_1, the power dissipated by R_1

A. Decreases

B. Increases

C. Remains the same

D. Any of the above depending upon the relative values of R_1 and R_2

Answer: A

Watch Video Solution

C.U.Q (CELL-INTERNAL RESISTANCE EMF)

1. Back emf of a cell is due to

A. Electroytic polarization

B. Peltier effect

C. Magnetic effect of current

D. Internal resistance

Answer: A

Watch Video Solution

2. The direction of current in a cell is

A. (-) ve pole to (+) ve pole during discharging

B. (+) ve pole to (-) ve pole during discharging

C. always (-) ve pole to (+) ve pole

D. always flows from (+) ve pole to (-) ve pole

Answer: A

Watch Video Solution

3. When an electric cell drives current through load resistance, its back emf,

A. Supports the original emf

B. Oppose the original emf

C. Supports if internal resistance is low

D. oppose if load resistance is large

Answer: B

Watch Video Solution

4. The terminal voltage of a cell is greater than its emf, when it is

A. being charged

B. an open circuit

C. being discharged

D. it never happens

Answer: A

Watch Video Solution

5. What is constant in a battery (also called a source of emf)?

A. current supplied by it

B. terminal potential by it

C. internal resistance

D. emf

Answer: D

Watch Video Solution

6. From the following the standard cell is

A. Daniel cell

B. Cadmium cell

C. Leclanche cell

D. Lead accumulator

Answer: B

Watch Video Solution

7. A cell is to convert

A. chemical energy into electrical energy

B. electrical energy into chemical energy

C. heat energy into potential energy

D. potential energy into heat energy

Answer: A

Watch Video Solution

8. n identical calls, each of internal resistance (r) are first connected in parallel and then connected in series across a resistance (R). If the current through R is the same in both cases, then

A. $R = r/2$

B. $r = R/2$

C. R=r

D. r=0

Answer: C

Watch Video Solution

9. The value of internal resistance of ideal cell is

A. zero

B. infinite

C. 1Ω

D. 2Ω

Answer: A

Watch Video Solution

10. In a circuit two or more cell of the same emf are connected in parallel in order

A. Increases the pd across a resistance in the circuit

B. Decrease pd across a resistance in the circuit

C. Facilitate drawing more current from the battery system

D. Change the emf across the system of batteries.

Answer: C

Watch Video Solution

11. The resistance of an open circuit is

A. Inifinity

B. Zero

C. Negative

D. cann't be predicted

Answer: A

Watch Video Solution

12. According to Joule's law, if the potential difference across a conductor having a material of specific resistance remains constant, then the heat produced in the conductor is directly proportinal to

A. ρ

B. ρ^2

C. $\frac{1}{\sqrt{\rho}}$

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

Answer: D

Watch Video Solution

13. Internal resistance of a cell depends on

A. concentration of electrolyte

B. distance between the electrodes

C. area of electrode

D. all the abvoe

Answer: D

Watch Video Solution

14. When cells are arranged in series

A. the current capacity decreases

B. the current capacity increases

C. the emf increases

D. the emf decreases

Answer: C

Watch Video Solution

15. To supply maximum current cells should be arrange in

A. series

B. parallel

C. mixed grouping

D. depends on the internal and external resistance

Answer: D

Watch Video Solution

16. The terminal Pd of a cell is equal to its emf if

A. external resistance is infinitiy

B. internal resistance is zero

C. both 1 and 2

D. internal resistance is 5Ω

Answer: C

Watch Video Solution

17. The electric power transferred by a cell to an external resistance is maximum when the external resistance is equal to (r internal resistance)

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

B. 2r

C. r

D. r^2

Answer: C

Watch Video Solution

18. Which depolarizers are used to neutralizes hydrogen layer in cells

A. Potassium dichromate

B. Manganese dioxide

C. 1 or 2

D. hydrogen peroxide

Answer: C

Watch Video Solution

19. Assertion: Series combination of cells is used when their internal resistance is much smaller than the external resistance.

Reason: $I = \frac{n\varepsilon}{R + nr}$ where is symbols have their standard meaning in series connection

A. both A and R are true and R is the correct explanation of A.

B. Both A and R are true but R is not the correct explanation of A.

C. A is true but R is false

D. A is false but R is true

Answer: A

Watch Video Solution

20. Assertion: To draw more current at low P.d, parallel connection of cells is preferred.

Reason: In parallel connection, current

$i = \frac{nE}{r}$ if $r > \, > R$

A. both A and R are true and R is the correct explanation of A.

B. Both A and R are true but R is not the correct explanation of A.

C. A is true but R is false

D. A is false but R is true

Answer: A

Watch Video Solution

C.U.Q (KIRCHHOFF.S LAWS WHEATSTONE BRIDGE)

1. Kirchoff's law of meshes is in accordance with law of conservation of

A. charge

B. current

C. energy

D. angular momentum

Answer: C

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2. Kirchoff's law of junction is also called the law of conservation of

A. energy

B. charge

C. momentum

D. angular momentum

Answer: B

Watch Video Solution

3. Wheatstone's bridge cannot be used for measurnment of very .... Resistance.

A. high

B. low

C. high

D. zero

Answer: B

Watch Video Solution

4. In a balanced wheatstone's network, the resistances in the arms Q and S are interchanged. As result of this:

A. galvanometer and the cell must be interchanged to balance

B. galvanometer shows zero deflection

C. network is not balanced

D. network is still balanced

Answer: C

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5. If galvanometer and battery are interchanged in balanced wheatstone bridge, then

A. the battery discharges

B. the bridges still balances

C. the balance point is changed

D. the galvanometer is damaged due to flow of high current.

Answer: B

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6. Wheatstone bridge can be used

A. To compare two unknown resistance

B. to measure small strains produced in hardmetals.

C. as the working principle of meterbridge

D. all the above

Answer: D

Watch Video Solution

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

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

C. $\frac{P}{Q}=\left(R\frac{S_1+S_2}{S_1S_2}\right)$

D. $\frac{P}{Q} = \left(R\frac{S_1 + S_2}{2S_1S_2}\right)$

Answer: C

Watch Video Solution

8. Assertion: At any junction of a network algebraic sum of various currents is zero

Reason: At steady state there is no accumulation of charge at the junction.

A. both A and R are true and R is the correct explanation of A.

B. Both A and R are true but R is not the correct explanation of A.

C. A is true but R is false

D. A is false but R is true

Answer: A

Watch Video Solution

C.U.Q (METERBRIDGE)

1. Metal wire is connected in the left gap, semi conductor is connected in the right gap of meter bridge and balancing point is found. Both are heated so that change of resistances in them are same. Then the balancing point

A. will not shift

B. shifts towards left

C. shifts towards right

D. depends onn rise of temperature

Answer: C

Watch Video Solution

2. A metre bridge is balanced with known resistance in the right gap and a metal wire in the left gap. If the metal wire is heated the balance point.

A. shifts towards left

B. shifts towards right

C. does not change

D. may shift towards left or right depending on the nature of the metal.

Answer: B

Watch Video Solution

3. In meter brigde of Wheatstone bridge for measurment of resistance, the known and the unknown resistance are interchanged. The error so removed is

A. end correction

B. index error

C. due tp temperature effect

D. random error

Answer: A

Watch Video Solution

4. In a metre-bridge experiment, when the resistances in the gaps in the gaps are interchanged, the balance-point did not shift at all. The ratio of resistances must be

A. Very large

B. Very small

C. equaly to unity

D. zero

Answer: C

Watch Video Solution

5. Assertion: meterbridge wire is made up of manganin

Reason: The temperature coefficient of resistance is very small for manganin

A. both A and R are true and R is the correct explanation of A.

B. Both A and R are true but R is not the correct explanation of A.

C. A is true but R is false

D. A is false but R is true

Answer: A

Watch Video Solution

C.U.Q (POTENTIOMETER)

1. A potentiometer is an ideal device of measuring potential difference because

A. voltmeter has high resistance

B. resistance of potentiometer wire is quite low

C. potentiometer does not draw any current from the unknown source of emf, to be measured

D. sensitivity of potentiometer is higher than that of a voltmeter

Answer: C

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2. In comparing emf's of 2 cells with the helf of potentiometer, at the balance point, the current flowing through the wire is taken from

A. any one of these cells

B. boith of these cells

C. battery in the primary circuit

D. From an unknown source.

Answer: C

Watch Video Solution

3. A potentiometer wire is connected across the ideal battery now, the radius of potentiometer wire is doubled without changing its length. The values of potential gradient

A. increases 4 times

B. increases two times

C. Does not change

D. becomes half

Answer: C

Watch Video Solution

4. In a potentiometer of ten wires each of $1m$, the balance point is obtained on the sixth wire. To shift the balance point to eighth wire, we should

A. increase resistance in the primary circuit.

B. decrease resistance in the primary circuit.

C. decreases resistance in series with the cells whose emf, has to be measured.

D. increases resistance in series with the cell whose emf, has to be measured.

Answer: A

Watch Video Solution

5. If the emf of the cell in the primary circuit is doubled, with out changing the cell in the secondary circuit, the balancing length is

A. Doubled

B. Halved

C. Unchanged

D. Zero

Answer: B

Watch Video Solution

6. The potential gradients on the potentiometer wire are V_1 and V_2 with an ideal cell and a real cell of same emf in the primary circuit, then

A. $V_1 = V_2$

B. $V_1 > V_3$

C. $V_1 < V_2$

D. $V_1 \le V_2$

Answer: B

Watch Video Solution

7. If the current in the primary circuit is decreased, then balancing length is obtained at

A. Lower length

B. Higher length

C. Same length

D. 1/3rd length

Answer: B

Watch Video Solution

8. Temperature coefficient of resistance α and resistivity ρ of a potentiometer wire must be

A. high and low

B. low and high

C. low and low

D. high and high

Answer: B

Watch Video Solution

9. A series high resistance is preferable than shunt resistance in the galvanometer circuit of potentiometer. Because

A. shunt resistance are costly

B. shunt resistance damages the galvanometer

C. series resistance reduces the current through galvanometer in an unbalanced circuit

D. high resistances are easily available

Answer: C

Watch Video Solution

10. A cell of emf E and internal resistance r connected in the secondary gets balanced against length l of potentiometer wire. If a resistance R is connected in parallel with the cell, then the new balancing length for the cell will be

Watch Video Solution

11. A cell of emf E and internal resistance r connected in the secondary gets balanced against length l of potentiometer wire. If a resistance R is connected in parallel with the cell, then the new balancing length for the cell will be

A. $\left(\frac{R}{R-r}\right)l$

B. $\left(\frac{R-r}{R}\right)l$

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

D. $\left(\frac{R}{R+r}\right)l$

Answer: D

Watch Video Solution

12. Potentiometer is an ideal instrument because

A. no current is drawn from the source of unknown emf

B. current is drawn from the source of unknown emf

C. it gives deflection even at null point

D. it has variable potential gradient.

Answer: A

Watch Video Solution

13. On increasing the resistance of the primary circuit of potentiometer, its potential gradient will

A. becomes more

B. becomes less

C. not change

D. becomes infinite

Answer: B

Watch Video Solution

14. If the value of potential gradient on potentiometer wire is decreased, then the new null point will be obtained at

A. lower length

B. Higher length

C. same length

D. nothing can be said

Answer: B

Watch Video Solution

15. A cell of negligible internal resistance is connected to a potentiometer wire and potential gradient is found. Keeping the length as constant, if the radius of potentiometer wire is increased four times, the potential gradient will become (no series resistance in primary)

A. 4 times

B. 2 times

C. half

D. constant

Answer: D

Watch Video Solution

16. For a potentiometer to function, the emf of the cell (E) in the primary circuit compared to the emf of the cell (E^1) in the secondary circuit should have a realtion

A. $E > E^1$

B. $E < E^1$

C. Both the above

D. $E = E^1$

Answer: A

Watch Video Solution

17. The balancing lengths of potentiometer wire are l_1 and l_2 when two cells of emf E_1 and E_2 are connected in the secondary circuit in series first to help eachg other and next to oppose each other $\frac{E_1}{E_2}$ is equal to $(E_1 > E_2)$

A. $\frac{l_1}{l_2}$

B. $\frac{l_1 - l_2}{l_1 + l_2}$

C. $\frac{l_1 + l_2}{l_1 - l_2}$

D. $\frac{l_2}{l_1}$

Answer: C

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18. At the moment when the potentiometer is balanced.

A. Current flows only in the secondary circuit

B. Current flows only in the secondary circuit

C. current flows both in primary and secondary circuits

D. current does not flow in any circuit

Answer: A

Watch Video Solution

19. The quantity that cannot be measured by a potentiometer is....

A. Resistance

B. emf

C. current in the wire

D. Inductance

Answer: D

Watch Video Solution

EXERCISE -1 (C, W) (ELECTRIC CURRENT & DRIFT VELOCITY)

1. If the electron in a Hydrogen atom makes 6.25×10^{15} revolutions in one second, the current is

A. 1.12 mA

B. 1 mA

C. 1.25 mA

D. 1.5 mA

Answer: B

Watch Video Solution

2. The current through a wire connected to a condenser varies with time as $i = (2t + 1)A$ the charge transport to the condenser from $t = 0$ to $t = 5s$ is

A. 5C

B. 55C

C. 30C

D. 60C

Answer: C

Watch Video Solution

3. A copper wire of cross sectional area 2.0 mm^2, resistivity $= 1.7 \times 10^{-8} \Omega m$, carries a current of 1 A. The electric field in the copper wire is

A. $8.5 \times 10^{-5} \frac{V}{m}$

B. $8.5 \times 10^{-4} \frac{V}{m}$

C. $8.5 \times 10^{-3} \frac{V}{m}$

D. $8.5 \times 10^{-2} \frac{V}{m}$

Answer: C

Watch Video Solution

4. Using three wires of resistances 1 ohm, 2 ohm and 3 ohm, then no.of different values of resistances that possible are

A. 6

B. 4

C. 10

D. 8

Answer: D

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5. Six resistances of each 12 ohm are connected as shown in the fig. The effective resistance between the terminals A and B is

A. $8ohm$

B. $6ohm$

C. $4ohm$

D. $12ohm$

Answer: C

View Text Solution

6. Current 'I' coming from the battery and ammeter reading are

A. $\frac{3}{8}A,\ \frac{1}{8}A$

B. $\frac{1}{8}A,\ \frac{1}{8}A$

C. $2A,\ \frac{1}{8}A$

D. $2A,\ \frac{1}{8}A$

Answer: A

View Text Solution

7. In the current shown, the reading of the voltmeter and the ammeter are

A. 4V, 0.2A

B. 2V, 0.4A

C. 3V, 0.6A

D. 4V, 0.04A

Answer: D

View Text Solution

8. The resistance of a wire of 100 cmlength is 10Ω. Now, it is cut into 10 equal parts and all of them are twisted to form a single bundle. Its resistances is

A. $1ohm$

B. $0.5ohm$

C. $5ohm$

D. $0.1ohm$

Answer: D

Watch Video Solution

9. A metallic wire of resistance 20 ohm stretched until its length is doubled. Its resistances is

A. $20 ohm$

B. $40 ohm$

C. $80 ohm$

D. $60 ohm$

Answer: C

Watch Video Solution

10. Resistance of each $10 ohm$ are connected a shown in the fig. The effective resistance between A and G is

A. $16 ohm$

B. $20 ohm$

C. $12 ohm$

D. $8 ohm$

Answer: A

View Text Solution

11. Which arrangement of four identical resistances should be used to draw maximum energy from a cell of voltage V

A.

B.

C.

D.

Answer: B

View Text Solution

12. If four resistance are connected as shown in the fig. between A and B the effective resistance is

A. $4ohm$

B. $8ohm$

C. $2.4ohm$

D. $2ohm$

Answer: D

View Text Solution

13. 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. 40/3 ohm

B. 80/3 ohm

C. $40 ohm$

D. $10 ohm$

Answer: B

Watch Video Solution

14. Find the value of colour coded resistance shown in fig

A. $520 \pm 10 \%$

B. $5200 \pm 1\%$

C. $52000 \pm 10\%$

D. $520000 \pm 1\%$

Answer: C

View Text Solution

15. The resistance of a wire is 2Ω if it is drawn in such a way that it experiences a longitudinal strain 200% its new resistance is

A. $4ohm$

B. $8ohm$

C. $16ohm$

D. $18ohm$

Answer: D

Watch Video Solution

16. n conducting wires of same dimensions but having resistivities 1,2,3,....n are connected is series. The equivalent resistivity of the combination is

A. $\dfrac{n(n+1)}{2}$

B. $\dfrac{n+1}{2}$

C. $\dfrac{n+1}{2n}$

D. $\dfrac{2n}{n+1}$

Answer: B

Watch Video Solution

17. An Aluminium $\left(\alpha = 4 \times 10^{-3} K^{-1}\right)$ resistance R_1 and a carbon $\left(\alpha = -0.5 \times 10^{-3} K^{-1}\right)$ resistance R_2 are connected in series to have a resultant resistance of 36Ω at all temperatures. The values of R_1 and R_2 in Ω respectively are:

A. 32, 4

B. 16, 20

C. 4, 32

D. 20, 16

Answer: C

Watch Video Solution

18. The temperature coefficient of resistance of a wire is 0.00125 per $.^{o} C$. At 300K, its resistance is 1 Ω. The resistance of the wire will be 2 Ω at

A. 1154 K

B. 1100 K

C. 1400 K

D. 1127 K

Answer: D

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19. The electrical resitance of a mercury column in a cylindrical container with half the radius of cross-section. The resistance of the mercury column is

A. R

B. 2R

C. 16R

D. 5R

Answer: C

Watch Video Solution

20. Four conductors of same resistance connected to form a square. If the resistance between diagonally opposite corners is $8 ohm$, the resistive between any two adjacent corners is

A. 32 ohm

B. 8 ohm

C. $\frac{1}{6}$ ohm

D. 6 ohm

Answer: D

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21. Four wires made of same material have different lengths and radii, the wire having more resistance in the following case is

A. $l = 100cm, r = 1mm$

B. $l = 50cm, r = 2mm$

C. , $= 100cm, r = \left(\frac{1}{2}\right)mm$

D. $l = 50cm, r = \left(\frac{1}{2}\right)mm$

Answer: C

Watch Video Solution

22. Two different wires have specific resistivities, lengths,a re of cross-sections are in the ratio $3:4$, $2:9$ and $8:27$ then the ratio of resistance of two wires is

A. $\frac{16}{9}$

B. $\frac{9}{16}$

C. $\frac{8}{27}$

D. $\frac{27}{8}$

Answer: B

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23. Two wires made of same material have their lengths are in the ratio $1:2$ and their masses in the ratio $3:16$ the ratio of resisstance of law wires is

Watch Video Solution

24. A wire of resistance 18 ohm is drawn until its radius reduce $\frac{1}{2}th$ of its original radius then resistance of the wire is

A. $188ohm$

B. $72ohm$

C. $288ohm$

D. $388ohm$

Answer: C

Watch Video Solution

25. A piece of wire of resistance 4 ohm s is bent through 180° at its mid point and the two halves are twisted together, then the resistance is

A. $8ohm$

B. $1ohm$

C. $2ohm$

D. $5ohm$

Answer: B

Watch Video Solution

26. If three wires of equal resistance are given then number of combination they cany be made to give different resistance is

A. 4

B. 3

C. 5

D. 2

Answer: A

Watch Video Solution

27. The effecitive resistance between A and B in the given circuit is

A. $20 ohm$

B. $7 ohm$

C. $3 ohm$

D. $6 ohm$

Answer: D

View Text Solution

28. How many cells each marked $(6V - 12A)$ should be connected in mixed grouping so that it may be marked $(24V - 24A)$

A. 4

B. 8

C. 12

D. 6

Answer: A

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29. The efffective resistance in series combination of two equal resistance is 's'. When they are joined in parallel the total resistance is p. If s = np then the maximum possible value of 'n' is

A. 4

B. 1

C. 2

D. 3

Answer: A

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30. A 25 watt, 220 volt bulb and a 100 watt, 220 volt bulb are connected in series across 440 volt line

A. only 100 watt bulb will fuse

B. only 25 watt bulb will fuse

C. none of the bulb will fuse

D. both bulbs are fuse

Answer: B

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31. There are 5 tube-lights each of 40 W in a house. These are used on an average for 5 hours per day. In addition, there is an immersion heater of 1500 W used on an average for 1 hour per day. The nmber of units of electricity are consumed in a month is

A. 25 units

B. 50 units

C. 75 units

D. 100 units

Answer: C

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32. Three equal resistor connected in series across a source of enf together dissipate $10Wa$. If the same resistors aer connected in parallel across the same emf, then the power dissipated will be

A. 10 watt.

B. 30 watt

C. 10/3 watt

D. 90 watt

Answer: D

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33. Time taken by a 836 W heater to heat one litre of water from $10^{\circ} C \rightarrow 40^{\circ} C$ is

A. 50 s

B. 100 s

C. 150 s

D. 200 s

Answer: C

Watch Video Solution

34. A lamp of 600W-240V is connected to 220 V mains. Its resistance is

A. $96 ohm$

B. $84 ohm$

C. $90 ohm$

D. $64 ohm$

Answer: A

Watch Video Solution

35. A 200 W- 200 V lamp is connected to 250 V mains.it power consuption is

A. 300 W

B. 312.5 W

C. 292 W

D. 250 W

Answer: B

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36. If the current in a heater increases by 10% the percentage change in the power consuption

A. 0.19

B. 0.21

C. 0.25

D. 0.17

Answer: B

Watch Video Solution

37. The power of a heating coil is P. it is cut into two equal parts. The power of one of them across same mains is

A. 2P

B. 3P

C. P/2

D. 4P

Answer: A

Watch Video Solution

38. In a house there are four bulbs each of $50W$ and 5 fans each of 60W. If they are used at the rate of 6 hours a day, the electrical energy consumed in a month of 30 days is

A. 64 KWH

B. 90.8 KWH

C. 72 KWH

D. 42 KWH

Answer: B

Watch Video Solution

39. An electric kettie has two coils. When one coil is switched on it takes 15 minutes and the other takes 30 minutes to boil certain mass of water. The ratio of times taken by them, when connected in series and in parallel to boil the same mass of water is

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40. A resistance coil of 60ω is immersed in 42 kg of water. A current of 7 A is passed through it. The rise in temperature of water per minutes is :

A. $4^{\circ}C$

B. $8^{\circ}C$

C. $1.36^{\circ}C$

D. $12^{\circ}C$

Answer: C

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41. What is the required resistance of the heater coil of an immersion heater that will increase the temperature of 1.50 kg of water from $10^{\circ} C$ to $50^{\circ} C$ in 10 minutes while operating at $240V$?

A. $25 ohm$

B. $12.5 ohm$

C. $250 ohm$

D. $137.2 ohm$

Answer: D

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

A. 5°

B. 10°

C. 20°

D. 40°

Answer: C

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43. While connecting 6 cells in a battery in series, in a tape recorder, by mistake one cell is connected with reverse polarity. If the effective resistance of load is 24 ohm and internal resistance of each cell is one ohm and emf 1.5 V the current delivered by the battery is

A. 0.1A

B. 0.2 A

C. 0.3 A

D. 0.4 A

Answer: B

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44. A 10 m long wire of resistance 15 ohm is connectd in series with a battery of emf 2V (no internal resistance) and a resistance of 5 ohm. The potential gradient along the wire is

A. $0.1 Vm^{-1}$

B. $0.45 Vm^{-1}$

C. $1.5 Vm^{-1}$

D. $4.5 Vm^{-1}$

Answer: C

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45. When a resistance of 2 ohm is placed across a battery the current is 1 A and when the resistance across the terminals is 17 ohm, the current is 0.25A. The emf of the battery is

A. 4.5 V

B. 5 V

C. 3 V

D. 6 V

Answer: C

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46. A battery has six cells in series. Each has an emf 1.5 V and internal resistance 1 ohm. If an external load of 24Ω is connected to it. The potential drop across the load is

A. 7.2V

B. 0.3V

C. 6.8V

D. 0.4 V

Answer: A

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47. 12 cells of each emf 2 V are connected in series among them, if 3 cells are connected wrongly.Then the effective emf Of the combination is

A. 18 V

B. 12 V

C. 24 V

D. 6 V

Answer: B

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

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

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

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

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

Answer: B

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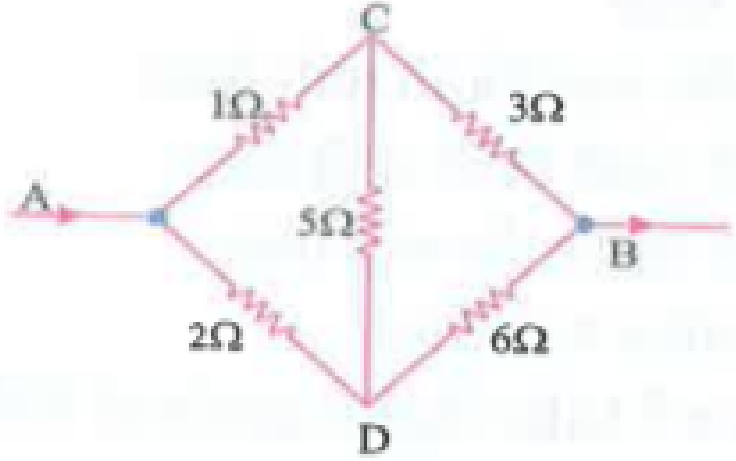
49. In the circuit it shown in the figure, the value of Resistance X, when potential difference between the points B and D is zero will be



A. $9ohm$

B. $8ohm$

C. $6ohm$

D. $4ohm$

Answer: B

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50. When an unknown resistance and a resistance of $4ohm$ are connected in the left and right gaps of Meterbridge, the balance point is obtained at

50 cm. The shift in the balance point if 4 ohm resistance is connectedin parallel in the right gap is

A. 66.7 cm

B. 16.7 cm

C. 34.6 cm

D. 14.6 cm

Answer: B

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51. In a meter bridge, the gaps are closed by resistances 2 and 3 ohms. The value of shunt to be added to 3 ohm resistor to shift the balancing point by 22.5 cm is

A. $1 ohm$

B. $2 ohm$

C. $2.5 ohm$

D. $5 ohm$

Answer: B

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52. Two equal resistance are connected in the gaps of a metre bridge. If the resistance in the left gap is increased by 10% the balancing point shift

A. 10% to right

B. 10% to left

C. 9.6% to right

D. 4.8% to right

Answer: D

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53. A potentiometer having a wire of 4 m lengths is connected to the terminals of a battery with steady voltage. A leclanche cell has a null point at 1m. If the length of the potentiometer wire is increased by 1 m, the position of the null points is

A. 1.5m

B. 1.25m

C. 10.05m

D. 1.31 m

Answer: B

Watch Video Solution

54. The emf of a battery A is balanced by a length 80 cm on a potentio meter wire. The emf of a standard cell 1 v is balanced by 50 cm. the emf of A is

A. 2 V

B. 1.4 V

C. 1.5 V

D. 1.6 V

Answer: D

Watch Video Solution

55. When 6 identical cells of no internal resistance are connected in series in the secondary cicuit of a potentio meter, the balancing length is l balancing length becomes $\frac{l}{3}$ when some cells are connected wrongly, the number of cell connected wrongly are

A. 1

B. 3

C. 2

D. 4

Answer: C

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56. In a potentiometer experiment, the balancing length with a cell is 560cm. When an external resistance of 10ohms is connected in parallel to the cell the balancing length changs by 60cm. The internal resistance of the cell in ohm is

A. 3.6

B. 2.4

C. 1.2

D. 0.6

Answer: C

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57. The resitivity of a potentio meter wire is, if the area of cross section of the wire is $4cm^2$, the current flowing in the circuit is 1A, the poetntial gradient is $7.5\frac{v}{m}$

A. $3 \times 10^{-3} ohms - m$

B. $2 \times 10^{-6} ohms - m$

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

D. $5 \times 10^{-4} ohms - m$

Answer: A

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58. A potentiometer wire of 10 m length and 20 ohm resistance is connected in series with a resistance R ohms and a battery of emf 2V, negligible internal resistance, potential gradient on the wire is 0.16 millivolt/centimetre then R is ohm....

A. $50 ohms$

B. $60 ohms$

C. $230 ohms$

D. $46 ohms$

Answer: C

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EXERCISE 1 (H.W) (ELECTRIC CURRENNT & DRIFT VELOCITY)

1. A current of 1.6 A is flowing in a conductor. The number of electrons flowing per second through the conductor is

A. 10^9

B. 10^{19}

C. 10^{16}

D. 10^{31}

Answer: B

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2. If an electron revolves in the circular path of radius $0.5A^{\circ}$ at a frequency of 5×10^{15} cycles/sec. The equivalent electric current is

A. 0.4 mA

B. 0.8 mA

C. 1.2 mA

D. 1.6 mA

Answer: B

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3. A current flows in a wire of circular cross section with the free electrons travelling with drift velocity $\overrightarrow{V}$. If an equal current flows in a wire of twice the radius, new drift velocity is

A. $\overrightarrow{V}$

B. $\frac{\overrightarrow{V}}{2}$

C. $\frac{\overrightarrow{V}}{4}$

D. $2\overrightarrow{V}$

Answer: C

Watch Video Solution

EXERCISE 1 (H.W) (OHM.S LAW AND COMBINATION OF RESISTANCE)

1. Three resistances each of 3Ω are connected as shown in fig. The resultant resistance between A and F is

A. 9Ω

B. 2Ω

C. 4Ω

D. 1Ω

Answer: D

View Text Solution

2. Two wires made of same material have lengths in the ratio $1:2$ and their volumes in the same ratio. The ratio of their resistances is

A. $4:1$

B. $2:1$

C. $1:2$

D. $1:4$

Answer: D

Watch Video Solution

3. Two wires made of same material have their electrical resistances in the ratio $1:4$ if their lengths are in the ratio $1:2$, the ratio of their masses is

A. $1:1$

B. $1:8$

C. $8:1$

D. $2:1$

Answer: A

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4. There are five equal resistors. The minimum resistance possible by their combination is 2 ohm. The maximum possible resistance we can make with them is

A. 25 ohm

B. 50 ohm

C. 100 ohm

D. 150 ohm

Answer: B

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5. An electric current is passed through a circuit containing two wires of the same material connected in parallel. If the lengths and radii of the wire are in the ratio $\frac{4}{3}$ and $\frac{2}{3}$, then the ratio of the currents passing through the wires will be

A. 3

B. $1/3$

C. $8/9$

D. 2

Answer: B

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6. A current of 1 A is passed through two resistances 1Ω and 2Ω connected in parallel. The current flowing through 2Ω resistor will be

A. 1/3 A

B. $1A$

C. $2/3$ A

D. 0.125

Answer: A

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7. The colour coded resistance of carbon resistance is (initial three bands are red and fourth band is silver)

A. $222\Omega \pm 10\%$

B. $2200\Omega \pm 10\%$

C. $333\Omega \pm 5\%$

D. $33000\Omega \pm 10\%$

Answer: B

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8. The resistance of a wire is 10 ohm. The resistance of a wire whose length is twice and the radius is half, if it is made of same material is

A. 20Ω

B. 5Ω

C. 80Ω

D. 40Ω

Answer: C

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9. The resultant resistance of two resistors when connected in series is 48 ohm.the ratio of their resistances is $3:1$ the value of each resistance is

A. $20\Omega, 28\Omega$

B. $32\Omega, 16\Omega$

C. $36\Omega, 12\Omega$

D. $24\Omega, 24\Omega$

Answer: C

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

A. 300° C

B. 400° C

C. 500° C

D. 200° C

Answer: B

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11. The current 'I' in the circuit given aside is

A. 0.1 A

B. 0.2 A

C. 1.0 A

D. 2.0 A

Answer: A

View Text Solution

12. The combined resistance of two conductors in series is 1Ω. If the conductance of one conductor is 1.1 siemen, the conductance of the other conductor is siemen is

A. 10

B. 11

C. 1

D. 1.1

Answer: B

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13. When two resistance are connected in parallel then the equivalent resistance is $\frac{6}{5}\Omega$ When one of the resistance is removed then the effective resistance is 2Ω. The resistance of the wire removed will be

A. 3 ohm

B. 2 ohm

C. $\frac{3}{5}$ ohm

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

Answer: A

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14. A material 'B' has twice the specific resistance of 'A'. A circular wire made of 'B' has twice the diameter of a wire made of 'A'. Then for the two wires to have the same resistance, the ratio l_B/l_A of their respective lengths must be

A. 1

B. $1/2$

C. $1/4$

D. $2/1$

Answer: D

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15. If a wire of resistance R is melted and recasted in to half of its length, then the new resistance of the wire will be

A. $R/4$

B. $R/2$

C. R

D. 2R

Answer: A

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16. When a wire drawn until its radius decreases by 3% then percentage of increase in resistance is-

A. 0.1

B. 0.09

C. 0.06

D. 0.12

Answer: D

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17. When three wires of unequal resistances are given the number of combinations they can be made to give different resistances is

A. 6

B. 4

C. 2

D. 8

Answer: D

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18. The resistance of a coil is 4.2Ω at $100^{\circ}C$ and the temperature coefficient of resistance of its material is $\frac{0.004}{.^{\circ}C}$. Its resistance at $0^{\circ}C$ is

A. 6.5Ω

B. 5Ω

C. 3Ω

D. 2.5Ω

Answer: C

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19. You are given several identical resistors each of value 10Ω and each capable of carrying a maximum current of 1 A. It is required to make a suitable combination of these to resistances to produce a resistance of

5Ω which can carry a current of 4 A. The minimum number of resistors required for this job is

A. 4

B. 8

C. 10

D. 20

Answer: B

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20. A wire of resistance 50Ω is cut into six equal parts and they are bunbled together side by side to form a thicker wire. The resistance of the bundle is

A. $\frac{18}{25}\Omega$

B. $\frac{9}{12.5}\Omega$

C. $\frac{25}{9}\Omega$

D. $\frac{25}{18}\Omega$

Answer: D

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21. A technician has only two resistance coils. By using them in series or in parallel he is able to obtain the resistance 3,4,12 and 16 ohm. The resistance of two coils are

A. 6,10

B. 4,12

C. 7,9

D. 4,16

Answer: B

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22. The effective resistance between A & B in the given circuit is

A. 7Ω

B. 2Ω

C. 6Ω

D. 5Ω

Answer: C

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23. The effective resistance between A and B is 3Ω then the value of R is

A. 2Ω

B. 4Ω

C. 6Ω

D. 8Ω

Answer: C

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24. The effective resistance A and B in the given circuit is

A. 2Ω

B. 4Ω

C. 3Ω

D. 6Ω

Answer: C

View Text Solution

EXERCISE 1 (H.W) (ELECTRIC POWER & JOULES LAW)

1. An electric bulb is rated 220 volt - 100 watt. The power consumed by it when operated on 110 volt will be

A. 50 watt

B. 75 watt

C. 90 watt

D. 25 watt

Answer: D

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2. A heater coil is cut into two parts of equal length and one of them is used in the leader. The ratio of the heat procued by this half coil to that by the original coil is

A. $2:1$

B. $1:2$

C. $1:4$

D. $4:1$

Answer: A

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3. if the electrc current in a lamp decreases by 5% then the power output decreases by

A. 20%

B. 10%

C. 5%

D. 2.5%

Answer: B

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4. Two electric bulbs whose resistances are in the ratio of $1:2$ are connected inparallel to a constant voltage source. The powers dissipated in them have the ratio

A. $1:2$

B. $1:1$

C. $2:1$

D. $1:4$

Answer: C

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5. A bulb rated 60 W-120 V is connected to 80 V mains. What is the current through the bulb

A. $\frac{1}{3}$ A

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

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

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

Answer: A

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6. An electric bulb has the folloiwng specifications 100 watt, 220 volt. The resistance of bulb

A. 384Ω

B. 484Ω

C. 344Ω

D. 584Ω

Answer: B

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7. A 200 W and 100 W bulbs, both meant for operation at 220 V, are connected in series to 220 V. The power consumption by the combination is

A. 46 W

B. 66 W

C. 56 W

D. 75 W

Answer: B

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8. Five bulbs, each rated at 40 W-220 V are used for 5 hours daily on 20 V line. How many units of electric energy is consumed in a month of 30 days?

A. 20 units

B. 25 units

C. 15 units

D. 30 units

Answer: D

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9. An electric kettle has two heating coils. When one of them is switched on water in it boils in 6 minutes and when other is switched on water boils in 4 minutes. In what time will the water boil if both coil are switched on simultaneously

A. 1.6 min

B. 2.8 min

C. 2.4 min

D. 3 min

Answer: C

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10. A 10 V storage battery of negligible intenal resistance is connected across a 50Ω resistor. How much heat energy is produced in the resistor is 1 hour

A. 7200 J

B. 6200 J

C. 5200 J

D. 4200 J

Answer: A

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EXERCISE 1 (H.W) (CELLS AND COMBINATION OF CELLS)

1. A cell of emf 6 V is being charged by 1 A current. If the internal resistance of the cell is 1 ohm, the potential difference across the terminals of the cell is

A. 5 V

B. 7 V

C. 6 V

D. 8 V

Answer: B

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2. When two identical cells are connected either in series or in parallel across a 4 ohm resistor, they send the same current through it. The internal resistance of the cell in ohm is

A. 2 ohm

B. 1.2 ohm

C. 12 ohm

D. 21 ohm

Answer: A

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3. The emf of a daniel cell is 1.08 V. When the terminals of the cells are connected to a ressitance of 3Ω, the potential difference across the terminals is found to be 0.6 V. Then the internal resistance of the cell is

A. 1.8Ω

B. 2.4Ω

C. 3.24Ω

D. 0.2Ω

Answer: B

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4. Four cell each of emf 2 V and internal resistance 1 ohm are connected n parallel with an external resistance of 6 ohm. The current in the external resistance is

A. 0.32 A

B. 0.16 A

C. 0.2 A

D. 0.6 A

Answer: A

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5. A student is asked to connected four cells of emf of 1 V and internal resistance 0.5 ohm in series with an external resistance of 1 ohm. But one cells is wrongly connected by him with its terminal reversed, the current in the ciruit is

A. $\frac{1}{3}A$

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

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

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

Answer: B

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6. Two cells of emf $1.25V, 0.75V$ and each of internal resistance 1Ω are connected in parallel. The effective emf will be

A. 1 V

B. 1.25 V

C. 2 V

D. 0.5 V

Answer: A

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7. The emf of a cell is 2 V. When the terminals of the cell is connected to a resistance 4Ω. The potential difference across the terminals, if internal resistance of cell is 1Ω is

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

B. $\frac{8}{5}$ V

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

D. $\frac{5}{8}$ V

Answer: B

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8. If the external resistance is equal to internal resistance of a cell of emf E. The current across the circuit is

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

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

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

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

Answer: D

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9. Two cells each of emf 10 V and each 1Ω internal resistance are used to send a current through a wire of 2Ω resistance. The cells are arranged in parallel. Then the current through the circuit

A. 2A

B. 4A

C. 0.125

D. 0.2083333333333

Answer: B

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EXERCISE 1 (H.W) (KIRCHOFF.S LAWS, WHEATSTONE BRIDGE)

1. In wheat stone bridge P and Q are approximately equal. When Ris 500Ω the bridge is balanced. On interchanging P and Q, the values of R is 505Ω for balanching. The value of S is

A. 500.5Ω

B. 501.5Ω

C. 502.5Ω

D. 503.5Ω

Answer: C

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2. To balance the bridge in the circuit, the values of R is

A. 8Ω

B. 4Ω

C. 20Ω

D. 12Ω

Answer: A

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EXERCISE 1 (H.W) (METRE BRIDGE)

1. The points in a metre bridge is at 35.6 cm. if the resistances in the gaps are interchanged, the new balance point is

A. 64.4 cm

B. 56 cm

C. 41.2 cm

D. 56.7 cm

Answer: A

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2. In a metre bridge expt, when the resistances in the gaps are interchanged the balance point is increases by 10 cm. The ratio of the resistances is

A. $\frac{15}{5}$

B. $\frac{12}{8}$

C. $\frac{11}{9}$

D. $\frac{10}{9}$

Answer: C

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3. When an unknown resistance and a resistance 6Ω are connected in the left and right gaps of a meter bridge the balance point is obtained at 50 cm. if 3Ω resistance is connected in parallel to resistance in right gap, the balance point is

A. decreases by 25 cm

B. increases by 25 cm

C. decreases by 16.7 cm

D. increase by 16.7 cm

Answer: B

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4. When unknown resistance and a resistance of 5Ω are used in left and rigt gaps of meter bridge the balance point is 50 cm. The balancing point of 5Ω resistance is now connected in seriece to the resistor in right gap

A. 20 cm

B. 33.3 cm

C. 60 cm

D. 60 cm

Answer: B

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5. In a meter bridge experiment two unknown resistance X and y are connected to left and right gaps of a meter bridge and the balancing point is obtained at 20 cm from right $(X > Y)$ the new position of the null point from left if one decides balance a resistance of 4 X against Y.

A. 114 cm

B. 80 cm

C. 53.3 cm

D. 70 cm

Answer: C

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EXERCISE 1 (H.W) (POTENTIO METER)

1. In a potentiometer the balance length with standard cadmium cell is 509 cm. The emf of a cell which when connected I the place of the standard cell gave a balance length of 750 cm is (emf of standard cell is 1.018 V)

A. 1.5 V

B. 0.5 V

C. 1.08 V

D. 1.2 V

Answer: A

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2. Two cells of emf's E_1 and E_2 when placed in series produce null deflection at a distance of 204 cm in a potentio meter. When one cell is reversed they produce null deflection at 36 cm if E_1 1.4v then $E_2 =$

A. 0.98 V

B. $2.47V$

C. 0.098 V

D. 98.8` V

Answer: A

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3. Then 6 identical cells of no internal resistance are connected in series in the second arycircuit of a potentiometer, the balancing length is l if two of them are wrongly connected to balacing length becomes

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

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

C. l

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

Answer: B

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4. In an experiment to determine the internal resistance of a cell with potentiometer, the balancing length is 165 cm. When a resistance of 5 ohm is joined in parallel with the cell the balancing length is 150 cm. The internal resistance of cell is

A. 2.2Ω

B. 1.1Ω

C. 3.3Ω

D. 0.5Ω

Answer: D

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5. The resistivity of a potentiometer wire is $40 \times 10^{-8} \Omega - m$ and its area of cross section is $8 \times 10^{-6} m^2$. If 0.2 A current is flowing through the wire the potential gradient will be

A. $10^{-2}V/m$

B. 10^{-1} V/m

C. 3.2×10^{-2} V/m

D. 1 V/m

Answer: A

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6. The emf of a cell is Ev, and its its internal resistance is 1Ω. A resistance of 4Ω is joined to battery in parallel. This is connected in secondary circuit of potentiometer. The balancing length is 160 cm. If 1 V cell balances for 100 cm of potentiometer wire, the emf of cell E is

A. 1 V

B. 3 V

C. 2 V

D. 4 V

Answer: C

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EXERCISE 2 (C.W) ELECTRIC CURRENT AND DRIFT VELOCITY

1. In a hydrogen atube it is observed that through a given cross-section 3.13×10^{15} electrons per sec, moving from right to left and3.12×10^{15} protons per sec are moving from left to right. The electric current in the discharge tube ad its direction is

A. 1 mA towads left

B. 1 mA towards right

C. 1.5 mA towards right

D. 2 mA towards left

Answer: B

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2. Anelectron of mass m, moves around the nucleus in a circular orbit of radius r under the action of ccentripetal force F. The equivalent electric current is

A. $\frac{e}{2\pi}\sqrt{\frac{F}{mr}}$

B. $\frac{e}{\pi}\sqrt{\frac{Fr}{m}}$

C. $\frac{e}{2\pi}\sqrt{\frac{Fm}{r}}$

D. $\frac{e}{\pi}\sqrt{\frac{Fm}{r}}$

Answer: A

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3. The current in a conductor varies with time t as $I = 3t + 4t^2$ Where I in amp and t in sec. The electric charge flows through the section of the conductor between $t = 1s$ and $t = 3s$

A. $\frac{100}{3}$ C

B. $\frac{127}{3}$ C

C. $\frac{140}{3}$ C

D. $\frac{150}{3}$ C

Answer: C

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4. A conductor has a non-uniform section as shown in the figure. A steady currents is flowing through it. Then the drift speed of the electrons

A. is constant throughout the wire

B. varies unpredictably

C. decreases from P & Q

D. increases from P & Q

Answer: C

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5. A current of 16 A is made to pass through a conductor in which the number of density of free electrons is $4 \times 10^{28} m^{-3}$ and its area of cross section is$10^{-5} m^2$. The average drift cross section is $10^{-5} m^2$. The average drift velocity of free electrons in the conductor is

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6. 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. $1.6 \times 10^{-8} \Omega$ m

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

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

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

Answer: D

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EXERCISE 2 (C.W) OHM.S LAW AND COMBINATION OF RESISTANCES

1. The resistance of the network between the terminals A and B is

A. 30Ω

B. 20Ω

C. 50Ω

D. 60Ω

Answer: B

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2. In the figure, the value of resistance to be connected between C and D so that the resistance of the entire circuit between A and B does not change with the number of elementary sets used is

A. R

B. $R(\sqrt{3}-1)$

C. 3R

D. $R(\sqrt{3}+1)$

Answer: B

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3. The effective resistance across the points A and I is

A. 2Ω

B. 1Ω

C. 0.5Ω

D. 5Ω

Answer: B

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4. In the circuit shown below, the cell has an emf of 10 V and internal resistance of 1 ohm, the other resistances are shown in the figure. The potential difference $V_A - V_B$ is

A. 6V

B. 4V

C. 2V

D. $-2V$

Answer: D

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5. A uniform wire of resistance 20Ω having resistance $1\Omega/m$ is bent in the form of circle as shown in fig. If the equivalent resistance between M and N is 1.8Ω, then the length of the shorter section is

A. 2m

B. 5 m

C. 1.8 m

D. 18 m

Answer: A

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6. If the voltmeter reads 0.2 V and the ammeter reads 0.101 A, the resistance of the voltmeter is (in ohm)

A. 500

B. 1000

C. 200

D. 400

Answer: C

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7. In the given circuit Ammeter reading is same when both switches S_1, S_2 are closed or opened. The value of resistance R is

A. 200Ω

B. 100Ω

C. 400Ω

D. -300Ω

Answer: D

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8. In the following diagram ammeter reading is 4A, voltmeter reading is 20 V, the value of R is

A. $> 5\Omega$

B. $< 5\Omega$

C. $= 5\Omega$

D. $\leq 5\Omega$

Answer: A

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9. Twelve resistances each of resistance R are connected in the circuit as shown in fig. Net resistance between poinits A and C would be

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

B. $\frac{7R}{6}$

C. R

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

Answer: D

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10. A resistance is made by connecting two wires (series) of same material of radii 2 mm and 5 mm and length 8cm and 5 cm. A potential difference of 22V is applied to them. The potential difference on the longer wre is

A. 15 V

B. 18 V

C. 16 V

D. 20 V

Answer: D

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11. A 220 V and 800 W electric kettle and three 220 V and 100 W bulbs are connected in parallel. On connecting this combination with 200 V supply, the total currentin the circuit will be

A. 0.15 A

B. 0.208333333333333

C. 5.5 A

D. 4.55 A

Answer: D

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12. What is the equivalent resistance of the circuit

A. 6Ω

B. 7Ω

C. 8Ω

D. 9Ω

Answer: C

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13. The temperature coefficient of resistance of platinum is $\alpha = 3.92 \times 10^{-3} K^{-1}$ at $20^{\circ} C$. Find the temperature at which the increase in the resistance of platinum wire is 10% of its value at $20^{\circ} C$

A. 40.5° C

B. 45.5°

C. 48.5°

D. 43.5° C

Answer: B

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14. Four identical resistance are joined as shown in fig. The equivalent resistance between points A and B is R_1 and that between A and C is R_1. Then ratio of $\frac{R_1}{R_2}$ is

A. $1:5$

B. $3:4$

C. $2:5$

D. $1:2$

Answer: B

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15. If the galvanometer reading is zero in the given circuit, the current passing through resistance 250Ω is

A. 0.016 A

B. $0.16A$

C. $0.032A$

D. $0.042A$

Answer: A

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16. The effective resistance between A and B is the given circuit is

A. 3Ω

B. 2Ω

C. 4Ω

D. 6Ω

Answer: B

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17. The equivalent resistanc between points A and B of an infinite network of resistance each of 1Ω connected as shown is

A. $\dfrac{1+\sqrt{5}}{2}$

B. $\dfrac{2+\sqrt{5}}{4}$

C. $\frac{3+\sqrt{5}}{2}$

D. $\frac{1+\sqrt{7}}{3}$

Answer: A

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18. Equivalent resistances across A and B in the given circuit is

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

B. $\frac{8r}{7}$

C. $\frac{7r}{3}$

D. 6r

Answer: B

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19. Two resistance of 400Ω and 800Ω are connected in series with 6 volt battery of negligible internal resistance. A voltmeter of resistance $10,000\Omega$ is used to measure the potential difference across 400Ω. The error in measurement of potential difference in volts approximatley is

A. 0.05 V

B. 0.5 V

C. 0.75 V

D. 5 V

Answer: A

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20. Copper and carbon wires are connected in series and the combined resistor is kept at $0^\circ C$. Assuming the combined resistance does not vary with temperature the ratio of the resistances of carbon and copper wires at $0^{\circ} C$ is (Temperature coefficient of resistivity of copper and carbon respectively are $4 \times \frac{10^{-3}}{} \hat{} (\circ) C)$ and $-0.5 \times \frac{10^{-3}}{} \hat{} (\circ) C)$

A. 2

B. 4

C. 8

D. 6

Answer: C

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21. Three resistance of equal values are arranged in four different configuration as shown below. Power dissipation in the increasing order is

A. $III < II < IV < I$

B. $II < III < IV < I$

C. $I < IV < III < II$

D. $I < III < II < IV$

Answer: A

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

A. 5%

B. 10%

C. 15%

D. 20%

Answer: A

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23.

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

A. 1.3 A, from P to Q

B. 0

C. 0.13 A, form Q to P

D. 0.13 A, from P to Q

Answer: C

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24. The temperature dependence of resistance of Cu and undoped Si in the temperature range $300 - 400K$, is best described by :

A. Linear increase for Cu, exponential decrease for Si

B. Linear decrease for Cu, linear decrease for Si

C. Linear increase of Cu, linear increase for Si

D. Linear increase for Cu, exponential increase for Si

Answer: A

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EXERCISE 2 (C.W) ELECTRIC POWER

1. Two wires A and B with lengths in the ratio of $3:1$ diameters in the ratio of $1:2$ and resistivities in the ratio of $1:20$ are joined in parallel with a source of emf. 2V. Ratio of the $\frac{R_1}{R_2}$ is:

A. $5:2$

B. $2:5$

C. $5:3$

D. $3:5$

Answer: C

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2. 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. 10 minutes

B. 20 minutes

C. 15 minutes

D. 25 minutes

Answer: B

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3. Three electric bulbs of 40 W, 60 W and 100 W have the tungsten wire of the same diamter. Then the longer wire is used by

A. 60 W

B. 100 W

C. 40 W

D. All use the same length.

Answer: C

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4. A fuse wire with radius of $0.2mm$ blows off with a current of 5 Amp. The fuse wire of same material,but of radius 0.3 mm will blow off with a current of

(1) $5 \times \frac{3}{2} Amp$

(2). $\frac{5\sqrt{3}}{2} Amp$

(3). $5\sqrt{\frac{27}{8}} Amp$

(4). $5 Amp$

A. $5 \times \frac{3}{2}$ amp

B. $\frac{5\sqrt{3}}{2}$ amp

C. $5\sqrt{\frac{27}{8}}$ amp

D. 5 amp

Answer: C

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5. 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

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6. 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. 1 ohm

C. 2 ohm

D. 3 ohm

Answer: D

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EXERCISE 2 (C.W) INTERNAL RESISTANCE AND EMF

1. In the circuit shown here, cells A and B have emf 10 V each and the internal resistance is 5Ω for A and 3Ω for B. For what value of R will the potential difference across the cell A will be zero?

A. zero

B. 1 ohm

C. 2 ohm

D. 3 ohm

Answer: C

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2. In the circuit of fig. with stready current, the potential drop across the capacitor is

A. V

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

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

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

Answer: C

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3. In the circuit, the galvanometer G shows zero deflection. If the batteries A and B have negligible intenal resistance, the value of the resistor R will b e

A. 100Ω

B. 200Ω

C. 500Ω

D. 1000Ω

Answer: B

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4. Twenty four cells each of emf 1.5 V and internal resistance 0.5 ohms are to be connected to a 3 ohm resistance. For maximum current through this resistance the nuber of rows and number of columns that you connect these cells is.

A. 12 cells in series 2 rows in parallel

B. 8 cells in series 3 rows in parallel

C. 4 cells in series 6 rows in parallel

D. 6 cells in series 4 rows in parallel

Answer: A

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5. A battery of four cells in series each having an efm of 1.5 V and internal resistance 1Ω are connected in series with an ammeter, a coil of resistance 2Ω and a filament lamp. If the ammeter reads 0.5 A, the resistance of the filament lamp is

A. 4Ω

B. 6Ω

C. 2Ω

D. 12Ω

Answer: B

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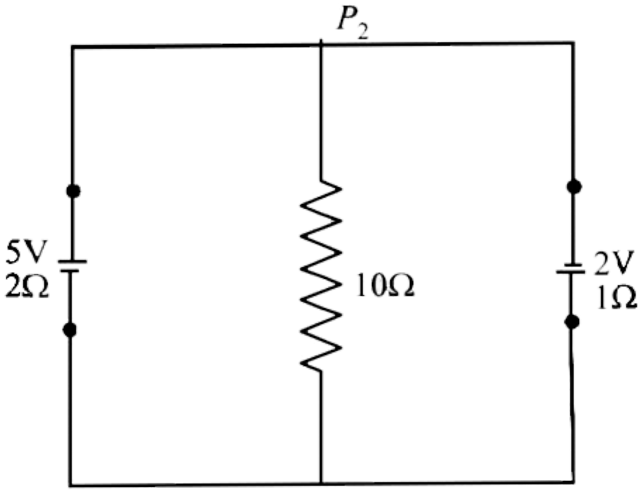
6. A 5V battery with internal resistance 2Ω and a 2V battery with internal resistance1Ω are connected to a 10Ω resistor as shown in the figure.



The current in the 10Ω resistor is

A. 0.27 A

B. 0.05 A

C. 0.25 A

D. 0.3 A

Answer: C

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7. A voltmeter resistance 500Ω is used to measure the emf of a cell of internal resistance 4Ω. The percentage error in the reading of the voltmeter will be

A. 0.4%

B. 0.6%

C. 0.8%

D. 1.2%

Answer: C

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8. When two identical cells are connected either in series or in parallel across a 4 ohm resistor, they send the same current through it. The internal resistance of the cell in ohm is

A. 4Ω

B. 2Ω

C. 1Ω

D. 7Ω

Answer: A

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

A. $r_2 - r_1$

B. $r_1 - r_2$

C. $r_1 + r_2$

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

Answer: B

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10. Two conductors have the same resistance at $0^{\circ} C$ but their temperature coefficient of resistanc are α_1 and α_2. The respective temperature coefficients of their series and parallel combinations are nearly

A. $\dfrac{\alpha_1+\alpha_2}{2}, \alpha_1+\alpha_2$

B. $\alpha_1+\alpha_2, \dfrac{\alpha_1+\alpha_2}{2}$

C. $\alpha_1+\alpha_2, \dfrac{\alpha_1\alpha_2}{\alpha_1+\alpha_2}$

D. $\dfrac{\alpha_1+\alpha_2}{2}, \dfrac{\alpha_1+\alpha_2}{2}$

Answer: D

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11. A galvanometer having a coil resistance of 100ω gives a full scale deflection , when a current of $1mA$ is passed through it. The value of the resistance, which can convert this galvanometer into ammeter giving a full scale deflection for a current of $10A$, is :

A. 0.1Ω

B. 3Ω

C. 0.01Ω

D. 2Ω

Answer: C

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EXERCISE 2 (C.W) KIRCHOFF.S LAWS AND WHEAT SHONE.S BRIDGE

1. The electric current i in the circuit shown is

A. $6A$

B. $2A$

C. $3A$

D. $4A$

Answer: D

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2. In the circuit, shown in the figure, the current 'I' is

A. $6A$

B. $2A$

C. $4A$

D. $7A$

Answer: C

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3. Four resistors, A,B,C and D form a wheatstone's bridge. The bridge is balanced when $C = 100\Omega$. If A and B are inter changed, the bridge balances for $C = 121\Omega$. The value of D is

A. 10Ω

B. 100Ω

C. 110Ω

D. 120Ω

Answer: C

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

A. 50Ω

B. 100Ω

C. 200Ω

D. 400Ω

Answer: B

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EXERCISE 2 (C.W) METRE BRIDGE

1. Two unknown resistance X and Y are connected to left and right gaps of a meter bridge and the balancing point is obtained at 80 cm from left. When a 10Ω resisance is connected in parallel to x, balance point is 50 cm from left. The values of X and Y respectively are

A. $40\Omega, 9\Omega$

B. $30\Omega, 7.5\Omega$

C. $20\Omega, 6\Omega$

D. $10\Omega, 3\Omega$

Answer: B

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2. In the meter bridge experiment, the lengths AB of the wire is 1m. The resistors X and Y have values 5Ω and 2Ω respectively. When a shunt resistance S is connected to X, the balancing point is found to be 0.625 m from A. Then, the resistance of the shunt is

A. 5Ω

B. 10Ω

C. 7.5Ω

D. 12.5Ω

Answer: B

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EXERCISE 2 (C.W) PLOTTED METER

1. The potential gradient long the length of a unifrom wire is $10\text{volt}/meter$. B and C are the two points at $30cm$ and $60cm$ point on a meter scale fitted along the wire. The potential diffenence between B and C will be

A. 3 V

B. 0.4 V

C. 7 V

D. 4 V

Answer: A

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2. In the determination of the internal resistance of a cell using a potentiometer, when the cell is shunted by a resistance R and connected in the secondary circuit, the balance length is found to be L_1. On doubling the shunt resistance, the balance length is found to increase to L_2. The value of the internal resistance is

A. $\left(2R\frac{L_2 - L_1}{L_1 - 2L_2}\right)$

B. $\left(2R\frac{L_2 - L_1}{2L_1 - L_2}\right)$

C. $\left(R\frac{L_2 - L_1}{L_1 - 2L_2}\right)$

D. $\left(R\frac{L_2 - L_1}{2L_1 - L_2}\right)$

Answer: B

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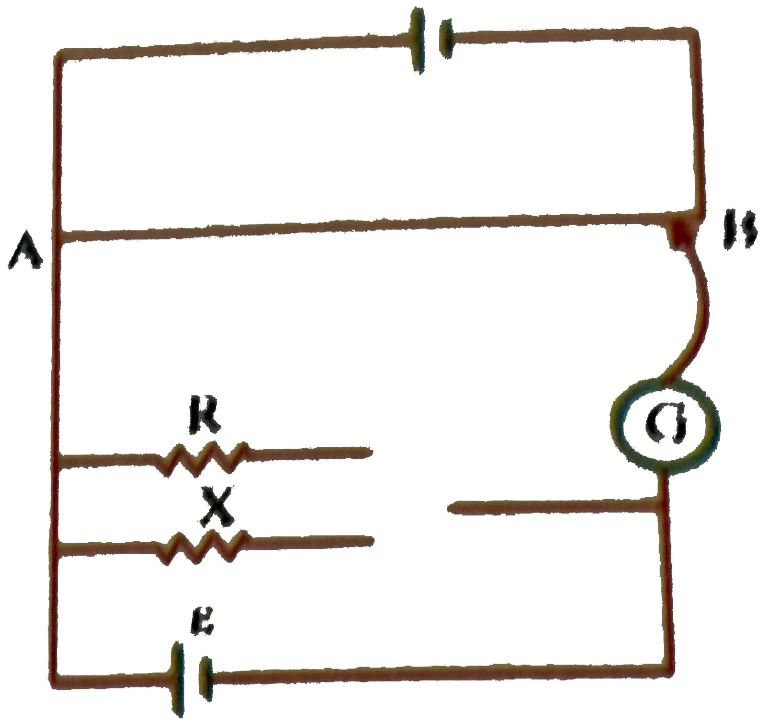

3.

Figure shows a potentiometer circuit for comparision of two resistances. The balance point with a standard resistor $R = 10.0\Omega$ is found to be 58.3 cm, while that with the unknown resistance X is 68.5 cm. the value of X is

A. 11.75Ω

B. 12.55Ω

C. 9.5Ω

D. 12.75Ω

Answer: A

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4. In a experiment for calibration of voltmeter a standard cell of emf 1.5 V is balanced at 300 cm length of potentiometer wire. The P.D across a resistance in the circuit is balancedat 1.25 m. if a voltmeter is connected across the same resistance it reads 0.65 V. the error in the volt meter is

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5. If the current in the primary circuit of a potentiometer wire of specific resistance is $40 \times 10^{-8} \Omega$ -m and area of cross-section $8 \times 10^{-6} m^2$ is 0.5 amp. Then potential gradient of wire is –

A. V/m

B. 0.5 V/m

C. 0.1 V/m

D. 0.2 V/m

Answer: C

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EXERCISE 2 (H,W) ELECTRIC CURRENT AND DRIFT VELOCITY

1. An electron of mass $9 \times 10^{-31} kg$ moves around a nucleus in a circular orbit of radius $2A^{\circ}$ under the action of centripetal force 3.2N. Then the equivalent electric current is

A. $\dfrac{32}{3\pi}$

B. $\dfrac{3\pi}{32}$

C. $\dfrac{16}{3\pi}$

D. $\dfrac{3\pi}{16}$

Answer: A

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2. The current in a conductor varies with time t as $I = 2 - 0.02t$ ampers. The electric charge that passes from $t = 0$ to $t = 100$ sec is

A. 50 C

B. 100 C

C. 25 C

D. 75 C

Answer: B

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EXERCISE 2 (H,W) OHM.S LAW AND COMBINATION OF RESISTANCES)

1. Four resistances 10Ω, 5Ω, 7Ω and 3Ω are connected so that they form the sides of a rectangle AB, BC, CD and DA respectively. Another resistance of 10Ω is connected across the diagonal AC. The equivalent resistance between A and B is

A. $2ohm$

B. $5ohm$

C. $7ohm$

D. $10ohm$

Answer: B

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2. A 3Ω resistor and a 6Ω resistor are connected in parallel and the combination is connected in series to a battery of 5 V and a 3Ω resistor. The potential difference across the 6Ω resistor

A. 2 V

B. 4 V

C. 3 V

D. 1 V

Answer: A

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3. You are given a wire of length 100 cm and linear resistance of 1 ohm/cm. if it is cut into two parts, so that when they are in parallel, the effective resistance is 24 ohm. The lengths of the two parts are

A. 30 cm & 70 cm

B. 60 cm & 40 cm

C. 70 cm & 30 cm

D. 20 cm & 80 cm

Answer: B

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4. The resistance of a platinum wire of a platinum resistance thermometer at the ice point is 5Ω and at steam point is 5.4Ω. When the thermometer is inserted in a hot bath, the resistance of the platinum wire is 6.2Ω. Find the temperature of the hot bath.

A. 3000° C

B. $30^\circ C$

C. $300^\circ C$

D. 300 K

Answer: C

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5. Three unequal resistor in parallel are equivalent to a resistance 1Ω If two of them are in the ratio 1:2 and if no resistance value is fractional the largest of the three resistance in ohm is

A. 4

B. 6

C. 8

D. 12

Answer: B

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6. A carbon filament has resistance of 120Ω at $0^{\circ}C$ what must be te resistance of a copper filament connected in series with resistance and combined resistance remained constant at all temperature

$$\left(\alpha_{\text{carbon}} = \frac{-5 \times 10^{-4}}{} \hat{} (\circ)C\right), \alpha_{\text{copper}} = \frac{4 \times 10^{-3}}{} \hat{} (C))$$

A. $120 ohm$

B. $15 ohm$

C. $60 ohm$

D. $210 ohm$

Answer: B

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7. The equivalent resistance across XY in fig.

A. r

B. 2r

C. 4r

D. r/2

Answer: D

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8. If the resistance of a circuit having 12 V source is increased by 4Ω the current drops by 0.5 A. What is the original resistance of circuit

A. $4 ohm$

B. $8 ohm$

C. $16 ohm$

D. $\frac{1}{16} ohm$

Answer: B

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9. An electric current is passed through a circuit containing two wires of the same material connected in parallel. If the lengths and radii of the wire are in the ratio $\frac{4}{3}$ and $\frac{2}{3}$, then the ratio of the currents passing through the wires will be

A. $\frac{1}{3}$

B. $\frac{3}{1}$

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

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

Answer: A

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10. When n wires which are identical are connected in series, the effective resistance exceeds that when they are in parallel by $\frac{X}{Y}\Omega$. Then the resistance of each wire is

A. $\frac{xn}{y(n^2-1)}$

B. $\frac{yn}{x(n^2-1)}$

C. $\frac{xn}{y(n-1)}$

D. $\frac{yn}{x(n-1)}$

Answer: A

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11. The equivalent resistance across A and B is

A. $2ohm$

B. $4ohm$

C. $8ohm$

D. $12ohm$

Answer: B

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12. An ammeter A is connected as shown in the diagram. Ammeter reading is

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

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

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

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

Answer: B

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13. A current of 7A flows throught the circuit as shown in the figure the potential difference across points B and D is

A. 5 V

B. 3 V

C. 10 V

D. 7 V

Answer: A

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14. If a copper wire is stretched to make it 0.1% longer wha is the percentage change in its resistance?

A. increase by 0.2%

B. decrease by 0.2%

C. decrease by 0.05%

D. increase by 0.05%

Answer: A

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EXERCISE 2 (H,W) ELECTRIC POWER

1. Two resistance R_1 and R_2 when connected in series and parallel with $120V$ line, power consumed will be $25W$ and $100W$ respectively. . Then the ratio of power consumed by R_1 to that consmed by R_2 will be

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

B. $\frac{1}{3}$

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

D. 1

Answer: D

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2. Two identical electric lamps marked $500W$, $220V$ are connected in series and then joined to a $110V$ line. The power consumed by each lamp is

A. $\frac{125}{4}W$

B. $\frac{25}{4}W$

C. $\frac{225}{4}W$

D. $\frac{325}{4}W$

Answer: A

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3. A conductor of resistance 3Ω is stretched uniformly till its length if doubled. The wire is now bent in the form of an equivalent triangle. The effective resistance between the ends of any side of the triangle in ohm is

A. $\frac{9}{2}$

B. $\frac{8}{3}$

C. 2

D. 1

Answer: B

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4. Ten $50W$ bulbs are operated for 10 hours per day. The energy consumed in kWh in a 30 day month is

A. 1500

B. 15000

C. 15

D. 150

Answer: D

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5. Two electic bulbs marked $25W - 220V$ and $100W - 220V$ are connected in series to a 440 V supply. Which of the bulbs will fuse?

A. Both

B. 100 W

C. 25 W

D. Neither

Answer: C

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EXERCISE 2 (H,W) INTERNAL RESISTANCE AND EMF

1. 3.0 A current passing through Two batteries of different emf and internal resistances connected in series with each other and with an external load resistor. The current reversed, the current becomes 1.0 A. the ratio of the emf of the two batteries is

A. $2.5:1$

B. $2:1$

C. $3:2$

D. $1:1$

Answer: B

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2. The pd across terminals of a cell is found to be 29 volt and 28 volt respectively when it delivers a current of 1 ampere and 2 ampere respectively. The emf and internal resistance of a cell are respectively

A. $30V, 2ohm$

B. $30V, 1ohm$

C. $29V, 1ohm$

D. $28V, 2ohm$

Answer: B

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3. The current in a circuit containing a battery connected to 2Ω resistance is 0.9A. When a resistance of 7Ω connected to the same battery, the

current observed in the circuit is 0.3 A. Then the internal resistance of te battery is

A. $0.1 ohm$

B. $0.5 ohm$

C. $1 ohm$

D. Zero

Answer: B

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4. The potential difference across the terminals of a battery is 10 V when there is a current of 3 A in the battery from the negative to the positive terminal. When the current is 2A in the reverse direction, the potential difference becomes 15 V. The internal resistance of the battery is

A. $1 ohm$

B. $0.4 ohm$

C. $0.6 ohm$

D. $0.8 ohm$

Answer: A

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5. Two cells of emf 3V and 5V and internal resistance r_1 and r_2 respectively are in series with an external resistance R. if the p.d. across 1 st cell is zero, then R is

A. $\frac{5r_1 - 3r_2}{3}$

B. $\frac{2r_1 - 3r_2}{4}$

C. $\frac{3r_1 - 5r_2}{3}$

D. $\frac{4r_1 - 5r_2}{3}$

Answer: A

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6. A battery when connected by resistance of 16Ω gives a terminal voltage of 12 V. and when connected by a resistance of 10Ω gives a terminal voltage of 11V. Then the emf of the battery ad its internal resistance

A. 12.8 V

B. 13.7 V

C. 10.7 V

D. 9 V

Answer: B

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7. When a resistor of 11Ω is connected in series with an electric cell, the current following in it is $0.5A$. Instead, when a resistor of 5Ω is connected to the same electric cell in series, the current increases by $0.4A$ The internal resistance of the cell is

A. $1.5 ohm$

B. $2 ohm$

C. $2.5 ohm$

D. $6 ohm$

Answer: C

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8. The minimum number of cells in mixed grouping required to produced a maximum curret of 1A through external resistance of 20Ω given the emf of each cell is 2 V and internal resistance 1Ω is

A. 25

B. 20

C. 16

D. 30

Answer: B

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9. A battery of emf E and internal resistance r is connected to a resistor of restance r_1 and Q Joules of heat is produced in a certain time t. When the same battery is connected to another resistor of resistance r_2 the same quantity of heat is produced in the same time t. Then the value of r is

A. $\frac{r_1^2}{r_2}$

B. $\frac{r_2^2}{r_1}$

C. $\frac{1}{2}(r_1 + r_2)$

D. $\sqrt{r_1 r_2}$

Answer: D

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10. The emf of a cell E is 15 B as shown in the figure with an internal resistance of $0.5 ohm$. Then, the value of the current drawn from the cell is

A. $1A$

B. $3A$

C. $2A$

D. $5A$

Answer: A

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EXERCISE 2 (H,W) KIRCHOFF.S LAWS AND WHEAT SHONE.S BRIDGE

1. The current i drawn from the 5 volt source will be

A. $0.5A$

B. $2A$

C. $1.5A$

D. $3A$

Answer: A

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2. In the given circuit which is a part of a closed circuit the current i_1, i_2 are respectively.

A. $0.4A$

B. $0.06A$

C. $1.6A$

D. $2A$

Answer: B

View Text Solution

3. A 5V battery with internal resistance $2ohm$ and a 2V battery with internal resistance $1ohm$ are connected to a $10ohm$ resistor as shown in the figure

The current in the $10ohm$ resistor is

A. $0.27A \rightarrow P_2 \rightarrow P_1$

B. $0.03A \rightarrow P_1 \rightarrow P_2$

C. $0.03A \rightarrow P_2 \rightarrow P_1$

D. $0.027A \rightarrow P_1 \rightarrow P_2$

Answer: C

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4. When a conductor is connected in the left gap and known resistance in the right gap the balancing length is 50 cm. if the wire is stretched so that its length increased by 20% new balancing length is

A. 40.98 cm

B. 38.23 cm

C. 42.56 cm

D. 48.21 cm

Answer: A

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5. In a meter bridge experiment when a resistance wire is connected in the left gap, the balance point is found at the 30^{th} cm. When the wire is replaced by another wire,t he balance point is found at the 60^{th} cm. Find the balance point when the two wires connected in parallel in the left gap successively

A. 20 cm

B. 25 cm

C. 23 cm

D. 30 cm

Answer: B

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6. A potentiometer wire 10 long has a resistance of 40Ω. It is connected in series with a resistances box and a 2 v storage cell. If the potential gradient along the wire is $0.01\frac{V}{m}$ the resistance unplugged in the box is

A. $760ohm$

B. $260ohm$

C. $1060ohm$

D. $960ohm$

Answer: A

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7. the ratio of potential gradients is $1:2$, the resistance of two potentiometer wires of same length are $2\Omega \& 4\Omega$ respectively. The current flowing through them are in the ratio

A. $1:2$

B. $2:1$

C. $1:3$

D. $1:1$

Answer: D

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8. 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 l = 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. $\frac{30E}{100}$

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

Answer: C

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9. 1 ohm resistance is in series with a Ammeter which is balanced by 75 cm of potentiometer wire. A standard cell of 1.02 V is balanced by 50 cm.t he ammeter shows a reading of 1.5 A. The error in the ammeter reading is

A. 0.002 A

B. 0.03 A

C. 1.01 A

D. no error

Answer: B

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EXERCISE - 3

1. When a wire of uniform cross-section a, length l and resistance R is bent into a complete circle, resistance between any two of diametrically opposite points will be

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

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

C. $\frac{R}{8}$

D. 4R

Answer: B

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2. In potentiometer experiment when terminates of the cell is at distance of 52 cm, then no current flows through it. When $5 ohm$ shunt resistance is connected in it then balance length is at 40 cm. The internal resistance of the cell is

A. 5

B. $\frac{200}{52}$

C. $\frac{52}{8}$

D. 1.5

Answer: D

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3. A potentiometer wire has resistance 40Ω and its length is 10m. It is connected by a resistance of 760Ω in series if emf of battery is 2V then potential gradient is:-

A. $0.5 \times 10^{-6} \frac{V}{m}$

B. $1 \times 10^{-6} \frac{V}{m}$

C. $1 \times 10^{-2} \frac{V}{m}$

D. $2 \times 10^{-6} \frac{V}{m}$

Answer: C

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4. A $5 - A$ wire can withstand a maximum power of $1W$ in circuit. The resistance of the fuse wire is

A. $0.2 ohm$

B. $5 ohm$

C. $0.4 ohm$

D. $0.04 ohm$

Answer: D

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5. For the network shown in the figure, the value of the current i is

A. $\frac{9V}{35}$

B. $\frac{5V}{18}$

C. $\frac{5V}{9}$

D. $\frac{18V}{5}$

Answer: B

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

A. 15 V

B. 30 V

C. 14 V

D. 18 V

Answer: C

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7. In the circuit show, if a conducting wire is connected between points A and B, the current in this wire will:

A. flows from A to B

B. flow in the direction which will be decided by the value of V

C. be zero

D. flows from B to A

Answer: D

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8. Two cells, having the same emf, are connected in series through an external resistance R. Cells have internal resistance r_1 and $r_2 (r_1 > r_2)$ respectively. When the circuit is closed, the potentail difference across the first cell is zero the value of R is

A. $r_1 - r_2$

B. $(r_1 + r_2)$/2

C. $\dfrac{(r_1 - r_2)}{2}$

D. $r_1 + r_2$

Answer: A

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9. Power dissipated across the $8 ohm$ resistor in the circuit shown here is 2W. The power U dissipated in watt units across the $3 ohm$ resistor is

A. 2

B. 1

C. 0.5

D. 3

Answer: C

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10. Kirchhoff's first and second laws for electrical circuits are consequences of

A. conservation of energy

B. conservation of electric charge and energy respectively

C. conservation of electric charge

D. conservation of energy and electric charge respectively

Answer: B

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11. Four wires of the same diameter are connected, in turn, between two points maintained at a constant potential difference, Their resistivities and lengths are, ρ and $L(\text{wire } 1) 1.2\rho$ and $1.2L(\text{wire } 2), 0.9\rho$ and $0.9L(\text{wire } 3)$ and ρ and . Rank the wires according to hte rates at which energy is dissipated as heat, greatest first,

A. $4 > 3 > 1 > 2$

B. $4 > 2 > 1 > 3$

C. $1 > 2 > 3 > 4$

D. $3 > 1 > 2 > 4$

Answer: D

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12. The total power dissipated in waatt in the circuit shown here is

A. 4

B. 16

C. 40

D. 54

Answer: D

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13. Three resistance P, Q, R each of 2Ω and an unknown resistance S from the four amrs of a Wheatstone's bridge circuit. When a resistance of 6Ω is connected in parallel to S the bridge gets balanced. What is the value of S ?

A. 1Ω

B. 2Ω

C. 3Ω

D. 6Ω

Answer: C

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14. In the circuit shown, the current throught the 4W resisotr is 1 amp when the points P and M are connected to a d.c. voltage source. The potential difference between the points M and N is:

A. 0.5 volt

B. 3.2 volt

C. 1.5 volt

D. 1.0 volt

Answer: B

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15. A current of 3 ampere flows throught the $2 - ohm$ resistor shown in the circuit. The power dissipated in the $5 ohm$ resistor is:

A. 1 watt

B. 5 watt

C. 4 watt

D. 2 watt

Answer: B

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16. 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. 6Ω

B. $0.6\pi\Omega$

C. 3Ω

D. $6\pi\Omega$

Answer: B

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17. See the electrical circuit shown in this figure. Which of the following equations is a correct equation for it?

A. $\varepsilon_1 - (i_1 + i_2)R + i_1 r_1 = 0$

B. $\varepsilon_1 - (i_1 + i_2)R - i_1 r_1 = 0$

C. $\varepsilon_2 - i_1 r_2 - \varepsilon_1 - i_1 r_1 = 0$

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

Answer: B

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18. A student measures the terminal potential difference (V) of a cell (of emf ε and internal resistance r) as a function of the current (I) flowing through it. The slope and intercept of the graph between V and I, then respectively, equal

A. $-\varepsilon$ and r

B. ε and $-\tau$

C. $-r$ and ε

D. r and $-\varepsilon$

Answer: C

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19. A potentiometer circuit is set up as shwon. The potentiometer gradient, acroos the potentiometer wire is k volt/cm and the ammeter, present in the circuit reads 1.0 A when two way key is switched off. The balance points, when the key between the termiinals (i) 1 and 2 (ii) 1 and 3, is plugged in, are found to be at lengths l_1 cm and l_2 cm respectively. The magnitudes, of the resistors R and X, in ohms, are then, equal respectively, to:

A. kl_1 and kl_2

B. $k(l_2 - l_1)$ and kl_2

C. kl_1 and $k(l_2 - l_1)$

D. $k(l_2 - l_1)$ and kl_1

Answer: C

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20. Consider the following two statement.

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

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

Which of the following is correct ?

A. both a and B are correct

B. both a and b are wrong

C. A is correct and b is wrong

D. a is wrong and b is correct

Answer: A

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21. For the current loops shown in the figure, Kirchhoff's loop rule for the loops AHDCBA and AHDEFGA yields these equations respectively

A. $-30I_1 - 41I_3 + 45 = 0$ & $-30I_1 + 21I_2 - 80 = 0$

B. $30I_1 - 41I_3 + 45 = 0$ & $30I_1 - 21I_2 - 80 = 0$

C. $30I_1 - 41I_3 - 45 = 0$ & $-30I_1 + 21I_2 + 80 = 0$

D. $-30I_1 - 41I_3 - 45 = 0$ & $-30I_1 + 21I_2 - 80 = 0$

Answer: D

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22. 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. 0.5 W

B. 1/3 volt

C. 1/4 W

D. 1 W

Answer: D

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23. If power dissipated in the 9W resistor in the circuit shown in 36 Watt, the potential difference across the 2W resistor is:

A. 4 volt

B. 8 volt

C. 10 volt

D. 2 volt

Answer: C

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24. In the circuit shown in the figure, if the potential at point A is taken to be zero, the potential at point B is:

A. $+1V$

B. $-1V$

C. $+2V$

D. $-2V$

Answer: A

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25. A ring is made of a wire having a resistance $R_0 = 12\Omega$. Find the points A and B as shown in the figure at which a current carrying conductor should be connected so that the resistance R of the sub circuit between these points is equal to $\frac{8}{3} ohm$

A. $\frac{l_1}{l_2} = \frac{3}{8}$

B. $\frac{l_1}{l_2} = \frac{1}{2}$

C. $\frac{l_1}{l_2} = \frac{5}{8}$

D. $\frac{l_1}{l_2} = \frac{1}{3}$

Answer: B

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26. In the circuit shown the cells A and B have negligible resistance. For $V_A = 12V, R_1 = 500\Omega$ and $R = 100\Omega$ the galvanometer (G) shows no deflection. The value of V_B is:

A. 12 V

B. 6 V

C. 4 V

D. 2 V

Answer: D

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27. The power dissipated in the circuit shown in the figure is 30 Watss. The value of R is:

A. 10Ω

B. 30Ω

C. 20Ω

D. 15Ω

Answer: A

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28. 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: A

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29. The value of current i for the given circuit is

A. $10A$

B. 5A

C. 2.5 A

D. 20 A

Answer: B

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30. Calculate the heat emitted by a bulb of 100 W in 1 min.

A. 100 J

B. 10003 J

C. 600 J

D. 6000 J

Answer: D

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31. If voltage across a bulb rated 22 volt 100 watt drops by 2.5% of its rated value, the percentage of the rated value by which the power would decrease is

A. 0.05

B. 0.1

C. 0.2

D. 0.025

Answer: A

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

A. 16Ω

B. 2Ω

C. 4Ω

D. 8Ω

Answer: A

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

A. 1.0Ω

B. 2Ω

C. 4Ω

D. none

Answer: D

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34. The resistance of the four arms P, Q, R and S in a Wheatstone's bridge are $10ohm 30 ohm$ and $90 ohm$ rerspectively. The e.m.f. and internal resistance of the cell are $7vo <$ and $5 ohm$ respectively. If the galvanometer resistance is $50 ohm$, the current drawn for the cell will be

A. 2.0 A

B. 1.0 A

C. 0.2 A

D. 0.1 A

Answer: C

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35. In the potentiometer circuit shown in the figure, the balance length AJ = 60 cm when switch S is open. When switch S is closed and the value of $R = 5 ohm$, the balance length AJ = 50 cm. The internal resistance of the cell C' is

A. 1.2Ω

B. 1.0Ω

C. 0.8Ω

D. 0.6Ω

Answer: B

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36. A circuit consisting of five resistors each of resistance R, forming a wheatstone bridge. What is the equivalent resistance of the circuit?

A. 2 R

B. R

C. 2R/3

D. R/2

Answer: B

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37. Two cities are 150 km apart . Electric power is sent from one city to another city through copper wires . The fall of potential per km is 8 volt and the averge resistance per km is 0.5Ω .The power loss in the wire is

A. 19.2 W

B. 19.2 kW

C. 19.2 J

D. 12.2 kW

Answer: B

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38. The resistance in the two arms of the meter bridge are 5W and RW, 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

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39. A potentiometer circuit has been setup for finding. The internal resistance of a given cell. The main battery used a negligible internal resistance. The potentiometer wire itsefl is $4m$ long. When the resistance, R, connected across the given cell, has value of

(i) Infinity 9.5Ω,

(ii) the 'balancing length' , on the potentiometer wire are found to be $3m$ and $2.85m$, respectively.

The value of internal resistance of the cell is

A. 0.25Ω

B. 0.95Ω

C. 0.5Ω

D. 0.75Ω

Answer: C

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40. A circuit contains an ammeter, a battery of $30V$ and a resistance $40.8ohm$ all connected in series. If the ammeter has a coil of resistance $480ohm$ and a shunt of $20ohm$, the reading in the ammeter will be

A. 0.0416666666666667

B. 0.5 A

C. 0.2 A

D. none

Answer: D

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41. A, B and C are voltmeters of resistance R, 1.5R and 3R respectively as shown in the figure. When some potential difference is applied between X and Y, the voltmeter readings are $V_A, V_B \text{and} V_C$ respectively, then

A. $V_A \neq V_B \neq V_C$

B. $V_A = V_B = V_C$

C. $V_A \neq V_B = V_C$

D. $V_A = V_B \neq V_C$

Answer: B

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42. A potentiometer wire has length $4m$ and resistance 8Ω. The resistance that must be connected in series with the wire and an accumulator of e.m.f. $2V$, so as the get a potential gradient $1mV$ per cm` on the wire is

A. 48 W

B. 32 W

C. 40 W

D. 44 W

Answer: B

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43. A potentiometer wire is $100cm$ long hand a constant potential difference is maintained across it. Two cells are connected in series first to support one another and then in opposite direction. The balance points are obatined at $50cm$ and $10cm$ from the positive end of the wire in the two cases. The ratio of emfs is:

A. $5:1$

B. $5:4$

C. $3:4$

D. $3:2$

Answer: D

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44. The potential difference $(V_A - V_B)$ between the points A and B in the given figure is:

A. $-3V$

B. $+3V$

C. $+6V$

D. $+9V$

Answer: D

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EXERCISE - 4 (SINGLE ANSWER TYPE)

1. Consider a current carryiing wire (current I) in the shape of a circle

A. source of emf

B. electric field produced charges accumulated on the surface of wire

C. the charges just behind a given segment of wires which push them just the right way by repulsion

D. the charges ahead

Answer: B

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2. A metel rod of the length 10cm and a rectangular cross-section of 1 cm xx $1/2$ cm is connected to a battery across opposite faces. The resistance will be

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

B. maximum when the battery is connected across 10 cm x 1 cm faces.

C. maximum when the battery is connected across 10 cm x 1 cm faces

D. maximum when the battery is connected across 10 cm x 1/2 cm faces

Answer: A

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3. Which of the follwing characteristies of electrons determines the current in a conductor?

A. Drift velocity alone

B. Thermal velocity alone

C. Both drift velocity and thermal velocity

D. Neither drift nor thermal velocity

Answer: A

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4. The batteries of emf ε_1 and $\varepsilon_2(\varepsilon_2 > \varepsilon_1)$ and internal resistance r_1 and r_2 respectively are connected in parallel as shown in figure.

A. Two equivalent emf ε_{eq} of the two cells is between ε_1 and ε_2, i.e., $\varepsilon_1 < \varepsilon_{eq} < \varepsilon_2$

B. The equivalent emf ε_{eq} is smallerr than ε_1

C. The ε_{eq} is given by $\varepsilon_{eq} = \varepsilon_1 + \varepsilon_2$ always

D. ε_{eq} is independent of internal resistance r_1 and r_2

Answer: A

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5. Two cells of emfs approximately 5V and 10V are to be accurately compared using a poteniometer of length 400 cm.

A. The battery that runs the potentiometer should have voltage of 8 V

B. The battery of potentiometer can have a voltage of 15 V and R adjusted so that the potential drop across the wire slightly exceeds

10 V

C. The first portion of 50 cm of wire itself should have a potential drop of 10 V

D. Potentiometer is usually used for comparing resistance and not voltages.

Answer: B

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6. A resistance R is to be measured using a meter bridge. Student chooses the standared resistance S to be 100Ω. He finds the null point at $l_1 = 2.9cm$. He is told to attempt to improve the accuracy. Which of the folllowing is a useful way?

A. He should measure I_1 more accurately

B. He should changes s to 1000Ω and repeat the experiment

C. He should change S to 3Ω and repeat the experiment

D. He should given up hoe of a more accurate measurnment with a meter bridge.

Answer: C

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EXERCISE - 4 (MORE THAN ONE ANSWER TYPE QUESTIONS)

1. Temperature dependence of resistivity p(T) of semiconductors, insulators and metals is significantly based on the following factors:

A. number of charge carriers can change with temperature T

B. time interval between two successive collisions can depend on T

C. length of material can be a function of T

D. mass of carriers is a function of T

Answer: A::B

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2. Kirchhoff's junction rule is a reflection of

A. conservation of current density vector

B. conservation of charge

C. the fact that the momentum with which a charged particle approaches a junction is unchanged (as a vector) as the charged particle leaves the junction

D. the fact that there is no accumulation of charges at a junction.

Answer: B::D

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3. The measurement of an unknown resistance R is to be carried out using Wheatstone bridge (see Fig. 2(EP).3). Two students perform an experiment in two way. The first student takes $R_2 = 10\Omega$ and $R_1 = 5\Omega$.

The other student takes $R_2 = 1000\Omega$ and $R_1 = 500\Omega$. In the standard arm, both take $R_3 = 5\Omega$. Both find $R = \frac{R_2}{R_1}R_3 = 10\Omega$ within errors.

A. The errors of measurnment of the two students are the same.

B. Errors of measurnment do depend on the accuracy with which R_2 and R_1 can be measured.

C. If the students uses larger values of R_2 and R_1 the currents through the arms will be feeble. This will make determination of null point accurately more difficult.

D. Wheatstone bridge is a very accurate instrument and has no errors of measurnment.

Answer: B::C

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4. In a meter bridge, the point D is a neutral point (figure).

A. The meter bridge can have no other neutral. A point for this set of resistance.

B. When the jocky contains a point on metre wire left of D, current flows to B from the wire.

C. When the jockey contains a point on the meter wire to the right of D, current flows from B to the wire through galvanometer.

D. When R is increased, the neutral point shifts to left.

Answer: A::C

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ASSERTION AND REASON TYPE

1. Assertion : Potentiometer si much better than a voltmeter for measuring emf of cell

Reason: A potentiometer drawn no current while measuring emf of a cell.

A. both A and R are true and R is the correct explanation of A.

B. Both A and R are true but R is not the correct explanation of A.

C. A is true but R is false

D. A is false but R is true

Answer: A

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2. Assertion: The emf of the cell in secondary circuit must be less than emf of cell in primary circuit in potentiometer.

Reason: Balancing length cannot be more than length of potentiometer wire.

A. both A and R are true and R is the correct explanation of A.

B. Both A and R are true but R is not the correct explanation of A.

C. A is true but R is false

D. A is false but R is true

Answer: A

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