PHYSICS

BOOKS - DC PANDEY PHYSICS (HINGLISH)

CURRENT ELECTRICITY

Example Example Type

1. In a given time of $10s$, 40 electrons pass from right to left. In the same interval of time 40 protons also pass from left to right. Is the average current zero? If not, the find the value of average current.

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2. A constant current of $4A$ passes through a wire for $8s$. Find total charge flowing through that wire in the given time interval.

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3. A wire carries a current of $2.0A$. What is charge that has flowed through is cross section in $1.0s$? How many electrons does his correspond to?

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4. The current in a wire varies with time according to the relation $i = (3.0A) + (2.0A/s)t$

a. How many coulomns of charge pass a cross section of the wire in the time internal between $t = 0$ and $t = 4.0s$?

b. What constant current would transport the same charge in the same time interval?

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5. Current passing through a wire decreases linearly from $10A$ to 0 in 4s. Find total charge flowing through the wire in the given time interval.

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6. Electric field inside a conductor is always zero. Is this statement true of false?

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7. An electron beam has a aperture of $1.0mm^2$. A total of 6.0×10^{16} electrons go throgh any perpendicular cross section per second.Find a. the current and b. the current density in the beam.

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8. Calculate the drift speed of the electrons when $1A$ of current exists in a copper wire of cross section $2mm^2$ The number of free electrons in $1cm^3$ of copper is 8.5×10^{22}

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9. Two copper wires of the same length have got different diameters

a. which wire has greater resistance?

b. greater specific resistance?

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10. A wire has a resistance R. What wil will be its resistance if it is stretched to double its length?

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11. A copper wire iis stretched to make it 0.1% longer. What is the percentage change in its resistance?

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12. The resistance of a thin silver wire is 1.0Ω at $20^{\circ} C$. The wire is placed in a liquid bath and its resistance rises to 1.2Ω. What is the temperature of the bath? α for silver is $3.8 \times 10^{03} / (.^{\circ} C)$

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13. Read the following statements carefully

Y: The resistivity of semiconductor decreases with increases of temperature.

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

Select the correct statement (s) from the following

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 Z and Z is the correct reason for Y

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14. An electric toaster uses nichrome for its heating element. When a negligibly small current passes through it. It resistance at room temperature $(27.0^\circ C)$ is found to be 75.3Ω. When the toaster is connected to a $230V$ supply, the current settles, after a few seconds, to a steady value of $2.68A$. What is steady temperature of the nichrome element? The temperature coefficient of resistance of nichrome averaged over the temperature range involved , $1.70 \times 10^{-4} C^{-1}$

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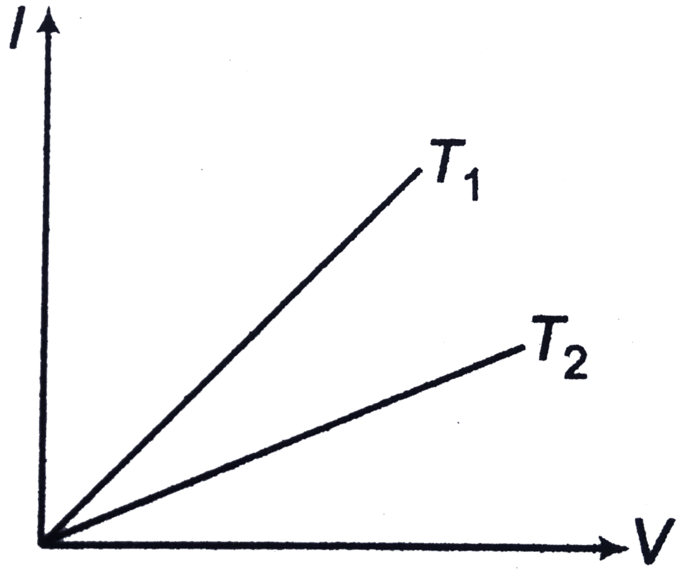
15. The current voltage graphs for a given metalic wire two different temperature T_1 and T_2 are shown in figure The temperature T_2 is greater than T_1. Is this statement true or false?



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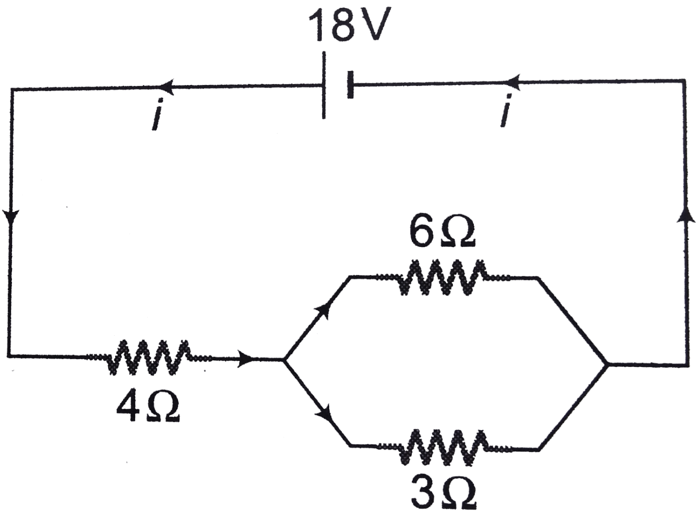
16. Compute the equivalent resistance of the network shown in figure and find the current drawn from the battery.



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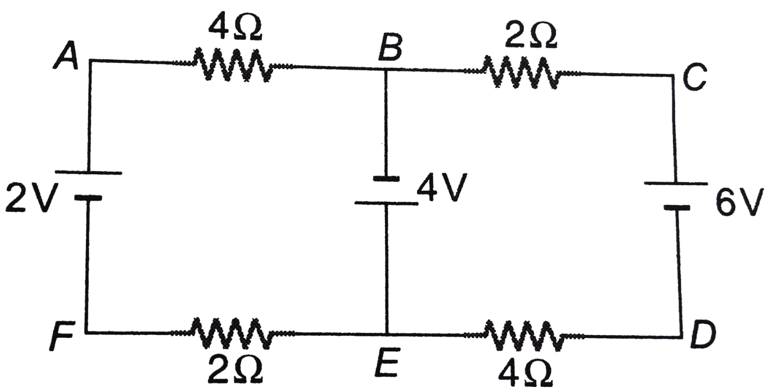
17. Find currents in different branches of th electric circuit shown in figure.



How to Proceed : In this problem there are three wires $EFAB$, BE and $BCDE$.

Therefore, we have three unknown currents i_1, i_2 and i_3. So, we require three equations. One equation will be obtained by applying Kirchhoff's junction law (either at B or at E) and the remainig two equations, we get from te second law (loop law). We can make three loops $ABEFA$, $ACDF$ and $BCDEB$. But we have to chose any two of them. Initilly, we can choose any arbitrary directions of i_1, i_2 and i_3.

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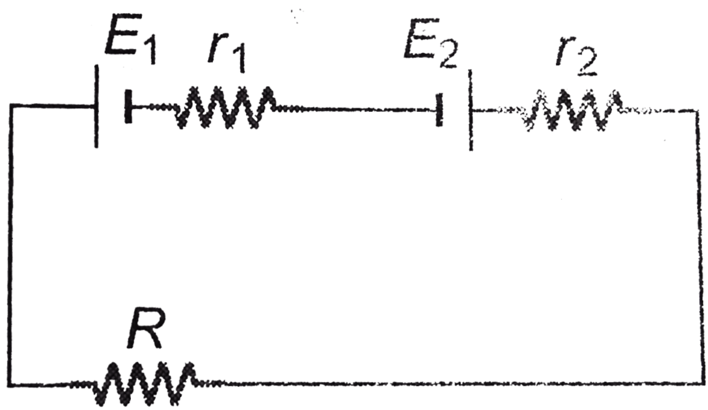
18. In the circuit shown in figure



$E_1 = 10V, E_2 = 4V, r_1 = r_2 = 1\Omega$ and $R = 2\Omega$.

Find the potential difference across battery 1 and battery 2.

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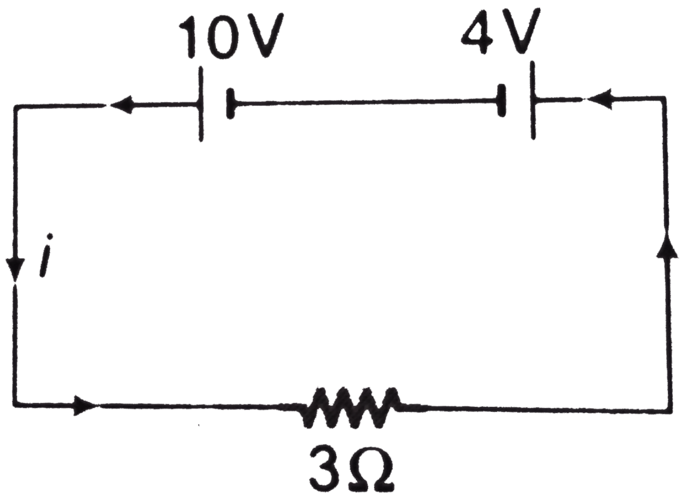
19. In the circuit shown in figure find



a. The power supplied by 10 V battery

b. The power consumed by $4V$ battery and

c. The power dissipated in 3Ω resistance.

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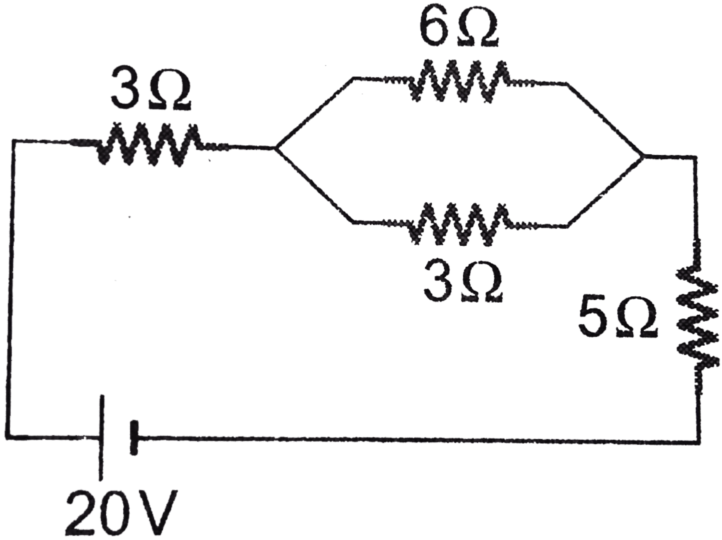
20. In the circuit shown in figure find the heat developed across each resistance in $2s$.



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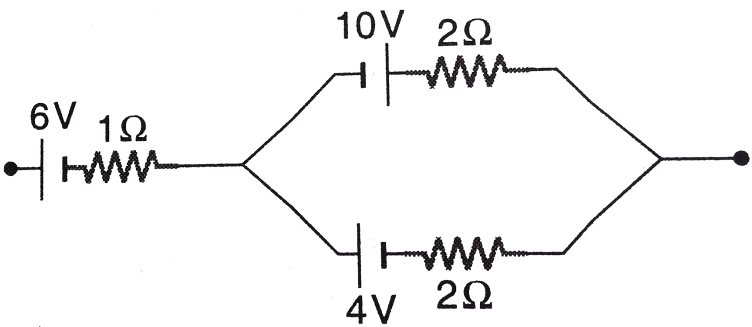
21. Find the emf and internal resistance of a single battery which is equivalent to a combination of three batteries as show in figure.



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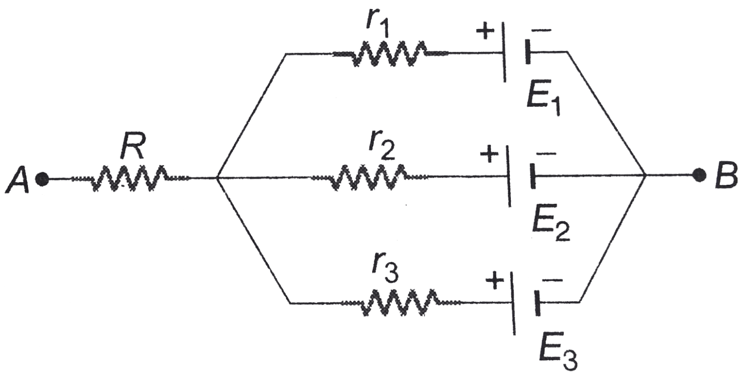
22. In the circuit in figure $E_1 = 3V, E_2 = 2V, E_3 = 1V$ and $R = r_1 - r_2 - r_3 = 1\Omega$



a. Find the potential differece between the points A and B and the currents through each branch.

b. If r_2 is short circuited and the point A is connected to point B, find the currents through E_1, E_2, E_3 and the resistor R

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23. What shunt resistance is required to make the $1.00mA$, 20Ω Galvanometer into an ammeter with a range of 0 to $50.0A$?

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24. How can we make a galvanometer with $G = 20\Omega$ and $i_g = 1.0mA$ into a voltmeter with a maximum range of $10V$?

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25. Resistance of a milli ammeter is R_1 of an ammeter is R_2 of a voltmeter is R_3 and of a kilovoltmeter is R_4. Find the correct order of R_1, R_2, R_3 and R_4.

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26. A microammeter has as resistance of 100Ω and full scale range of $50\mu A$. It can be used a voltmeter or as ahigher range ammeter provided a resistance is added to it. Pick the correct range and resistance combinations

50 V range with $10k\Omega$ resistance in series

b.$10V$ range with $200k\Omega$ resistance in series

c. 5mA rangw with 1Ω resistance in parallel

$10mA$ range with 1Ω resistance in parallel

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27. A galvanometer gives full scale deflection with $0.006A$ current. By connecting it to a 4990Ω resistance, it can be converted into a voltmeter of range $0.30V$. If connected to a $\frac{2n}{249}\Omega$ resistance, it becomes an ammeter of range $0-1.5A$. the value of n is

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28. A potentiometer wire of length 100 cm has a resistance of 10Ω. It is connected in series with a resistance R and cell of emf $2V$ and of of $40cm$ of the potentiometer wire. What is the value of R?

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29. When the switch is open in lowerpoint loop of a potentiometer, the balance point length is $60cm$. When the switch is closed with a known resistance of $R = 4\Omega$ the balance point length decreases to $40cm$. Find the internal resistance of the unknown battery.

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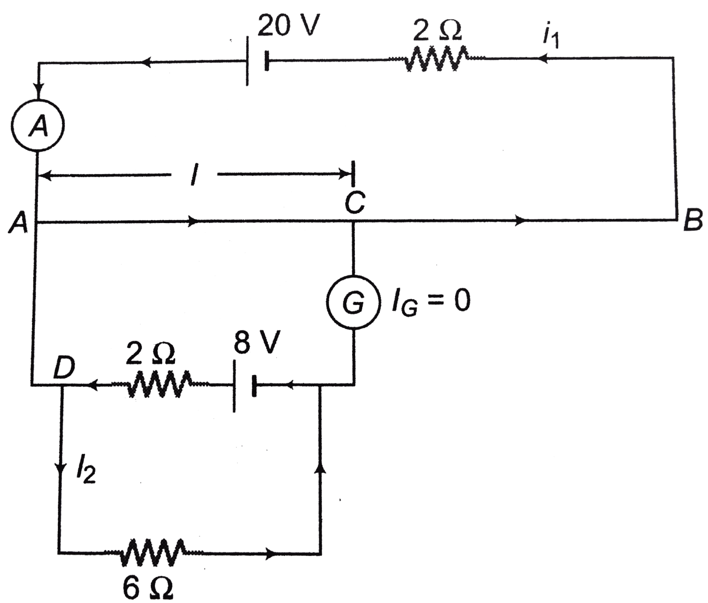
30.



In the figure shown wire AB has a length of $100cm$ and resistance 8Ω. Find the balance point length l.

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31. If resistance R_1 in resistance box is 300Ω then the balanced length is found to be $75.0cm$ from end A. The diameter of unknown wire is 1 mm and length of the unknown wire is $31.4cm$. Find the specific resistance of the unknown wire

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32. In a meter bridge, null point is $20cm$, when the known resistance R is shunted by 10Ω resistance, null point is found to be shifted by 10 cm. Find the unknown resistance X.

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33. If we use 10Ω and 200Ω in place of R and X we get null point deflection.$l = 33cm$. If we interchange the resistors, the null point length is found to be $67cm$. Find end corrections α and β.

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34. To locate null point deflection battery key (K_1) ios pressed before the galvanometer (K_2) Explanation why?

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35. What are the maximum and minimum values of unknown resistance X , which can be determined using the post office box shown in the fig.3.34?

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36. 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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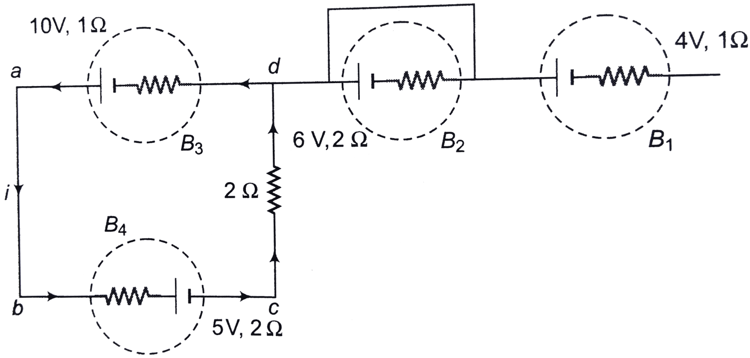
Example Type 1

1. Find the potential difference across each of the four batteries B_1, B_2, B_3 and B_4 as shown in the figure.



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2. Draw a. current versus load and b. current versus potential difference (across its two terminals) graph for a cell.

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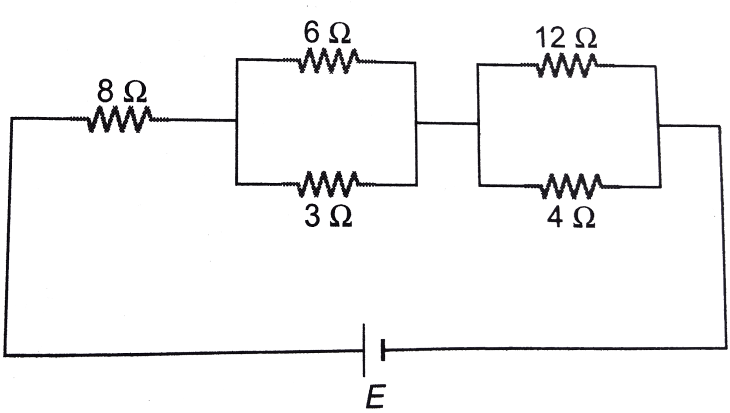
Example Type 2

1. In the circuit shown in figure potential differences across 6Ω resistance is 4 volt. Find V and i values across each resistance. Also find emf E of the applied battery.



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Example Type 3

1. Two resistors with temperature coefficients of resistance α_1 and α_2 have resistances R_{01} and R_{02} at $0^\circ C$. Find the temperature coefficient of the compound resistor consisting of the two resistors connected.

a.. In series and

b. in paralllel

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Example Type 4

1. Draw the circuit for experimental verification of Ohm's law using a source of variable DC voltage, a main resistance of 100Ω, two galvanometers and two resistances of value $10^6\Omega$ and $10^{-3}\Omega$ respectively. Clearly show the positions of the voltmeter and the ammeter.

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Example Type 5

1. Prove that $60W$ bulb glows more brightly than $100W$ bulb if by mistake they are connected in series.

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2. The rated values of two bulbs are (P_1, V) and (P_2, V). Find actual,power consued by both of them of they are connected in

a. series

b. Parallel

and V potential difference is applied cross both of them.

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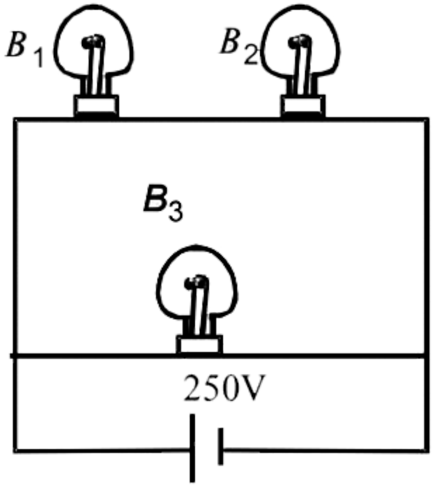
3. A 100 W bulb B_1, and two 60 W bulb B_2 and B_3, are connected to a 250 V source, as shown in figure. Now W_1, W_2 and W_3 are the output powers of the bulbs B_1, B_2 and B_3, respectively. Then



A. $W_1 > W_2 = W_3$

B. $W_1 > W_2 > W_3$

C. $W_1 < W_2 = W_3$

D. $W_1 < W_2 < W_3$

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4. An electric bulb rated for $500W$ at $100V$ is used in a circuit having a $200V$ supply. The reistance R that must be put in series with bulb, so that the bulb delivers 500W is ....Ω.

A. $10 ohm$

B. $20 ohm$

C. $30 ohm$

D. $35 ohm$

Answer: B

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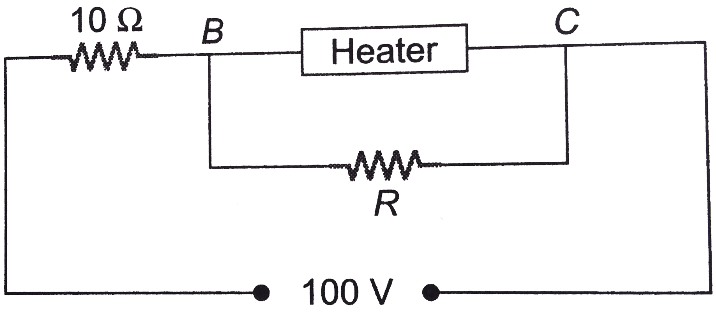
5. A heater is designed to operate with a power of $1000W$ in a $100V$ line. It is connected in combination with a resistance of 10Ω and a resistance R, to a $100V$ mains as shown in figure. What will be the value of R so that the heater operates with a power of $62.5W$?



A. $5 ohm$

B. $10 ohm$

C. $15 ohm$

D. $20 ohm$

Answer: A

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Example Type 6

1. Find the value of i in the circuit shown above.

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Miscellaneous Examples

1. Two sources of current of equal emf are connected in series and having different internal resistance r_1 and $r_2(r_2 > r_1)$. Find the external resistance R at which the potential difference across the terminals of one of the sources becomes equal to zero.

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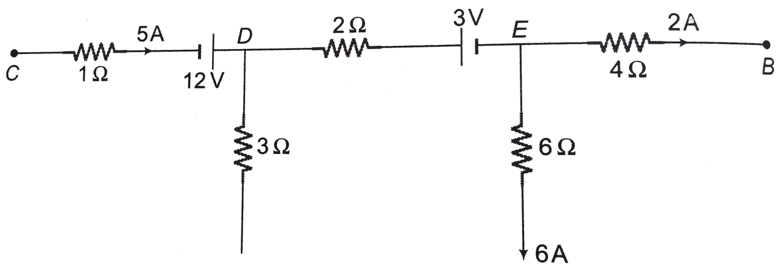

2. Figure shows the part of a circuit. Calculate the power dissipated in 3ω resistance. What is the potential difference $V_C - V_B$?

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3. The emf of a storage battery is $90V$ before charging and $100V$ after charging. When charging began the current was $10A$. What is the current at the end of charging if the internal resistance of the storge battery during the whole process of charging may be taken as constant and equal to 2Ω?

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4. A battery has an open circuit potential difference of $6V$ between its terminals. When a load resistance of 60Ω is connected across the battery,the total power supplied by the bttery is $0.4W$. What should be the load resistance R, so that maximum power will be dissipated in R. Calculated this power. What is the total power supplied by the battery when such a load is connected?

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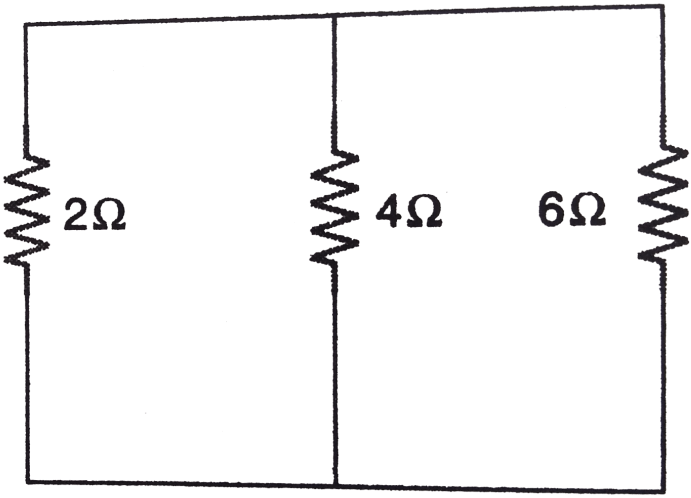
5. In which branch of the circuit shown in figure a $11V$ battery be inserted so that it dissipates minimum power. What will be the current through the 2Ω resistance for this potential of the battery?



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6. An ammeter and a voltmeter are connected in series to a battery with an emf $\xi = 6.0V$. When a certain resistance is connected in parallel with the voltmeter, the readings of the latter decreases $\eta = 2.0$ times, whereas the readings of the ammeter increase the same number of times, Find the voltmeter readings after the connection of the resistance.

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7. A voltmeter of resistance R_1 and an ammeter of resistance R_2 are connected in series across a battery oif negligible internal resistance. When as resistance R is connected in parallel to voltmeter reading of ammeter increases three times white that of voltmeter reduces to one third. Find R_1 and R_2 in terms of R.

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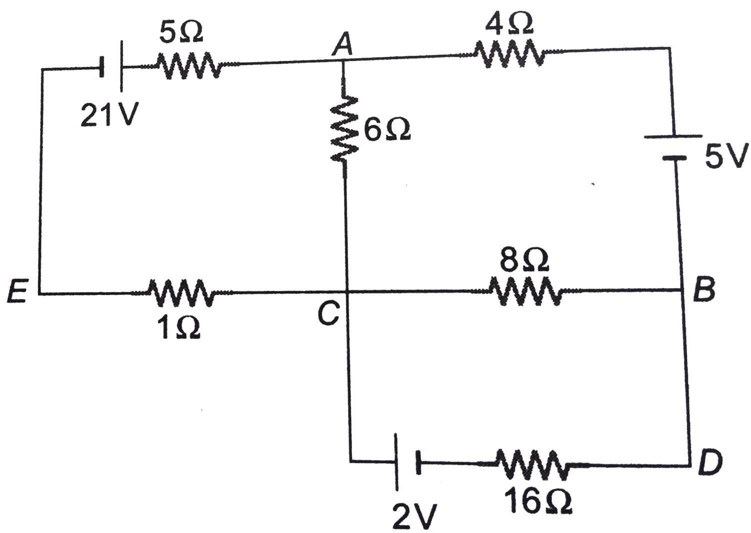
8. Find the current in each branches of the circuit.



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9. 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?

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Exercise 23.1

1. How many electrons per second pass through a section of wire carrying a current of $0.7A$?

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2. A current of 3.6 flows through an automobile headlight. How many coulombs of charge flow through the headlight in $3.0h$?

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3. A current of $7.5A$ is maintained in wire of $45s$. In this time

a. how much charge and

(b) how many electrons flow through the wire?

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4. In the bohr model, the electron of a hydrogen atom moves in circular orbit of radis 5.3×10^{-11} m with speed of $2.2 \times 10^{6} m/s$. Determine its frequency f and the current I in the orbit.

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

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6. In an electrolyte, the positive ions move from left to right and negative ions from right to left. Is there anet current? If yes, in what direction?

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Exercise 23.2

1. All points of a conductor are always at same potential, is this statement true of false?

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Exercise 23.3

1. When a wire carries a current of $1.20A$, the drift velocity is $1.20 \times 10^{-4} m/s$. What is the drift velocity when the current is $6.00A$?

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2. Find the velocity of charge leading to $1A$ current which flows in a copper conductor of cross section $1cm^2$ and length $10km$. Free electron density of copper is $8.5x10^{28} / m^3$. How long will it take the electric charge to travel from one end of the conductor to the other?

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Exercise 23.4

1. In house wiring, copper wire $2.05mm$ in diameter is often used. Find the resistane of $35.0m$ long wire. Specific resistance of copper is $1.72 \times 10^{-8}\Omega - m$.

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2. The product of resistivity and conductivity of a conductor is constant. Is this statement true or false?

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3. You need produce a set of cylindrical copper wire $3.50m$ long will have a resistance of 0.125Ω each. What will be the mass of each of these wires? Specific resistance of copper $= 1.72 \times 10^{-8} \Omega - m$,density of copper $= 8.9 \times 10^3 kg / m^3$

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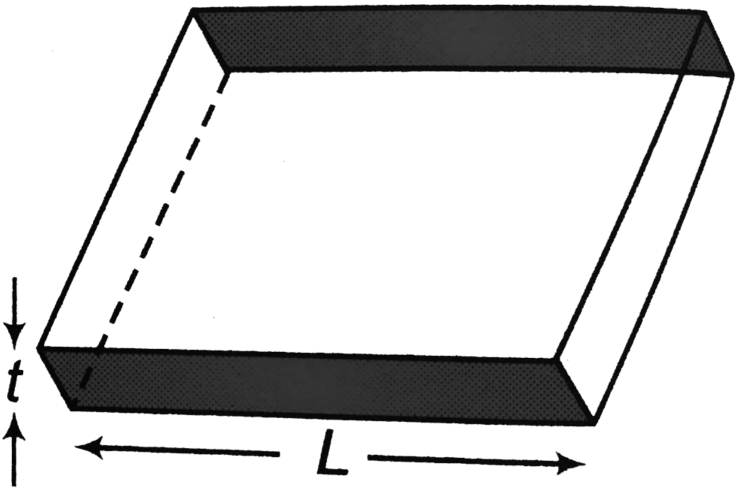
4. Consider a thin square sheet of side L and thickness t, made of a material of resistivity ρ. The resistance between two opposite faces, shown by the shaded areas in the figure is



A. directly proportional to L

B. directly proportional to t

C. independent of L

D. independent of t

Answer: C

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Exercise 23.5

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

A. each of them increases

B. each of them decreases

C. copper increases and germanium decreases

D. copper decreases and germanium increases

Answer: D

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2. The resistance of a copper wire and an iron at $20^{\circ}C$ are 4.1Ω and 3.9Ω respectively. Neglecting any thermal expansion, find the temperature at which resistane of both are equal.

$\alpha_{Cu} = 4.0 \times 10^{-3}K^{-1}$ an $\alpha_{Fe} = 5.0 \times 10^{-3}K^{-1}$

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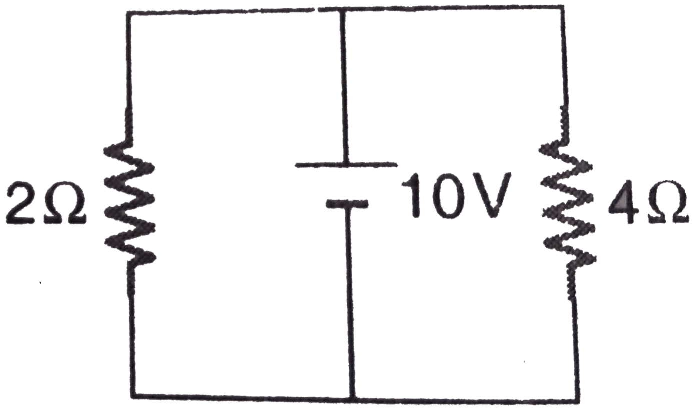
Exercise 23.6

1. Find the current through 2Ω and 4Ω resistance.



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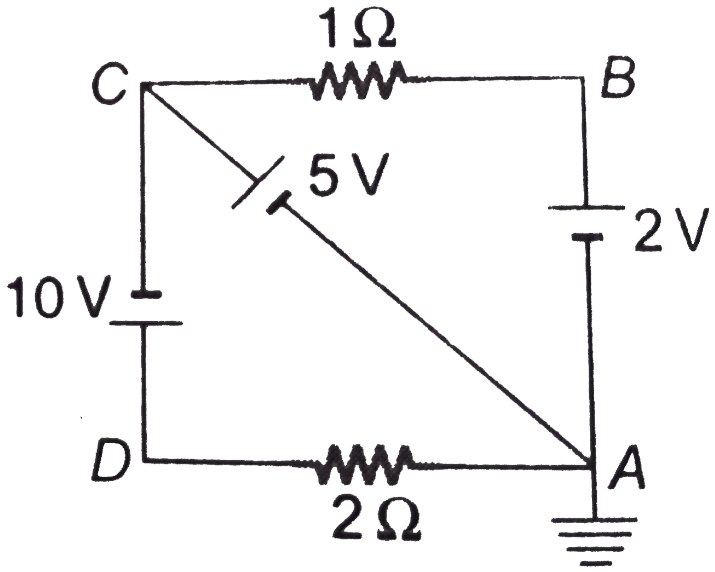
2. In the circuit shown in figure find the potentials of A, B, C and D and the current through 1Ω and 2Ω resistance.



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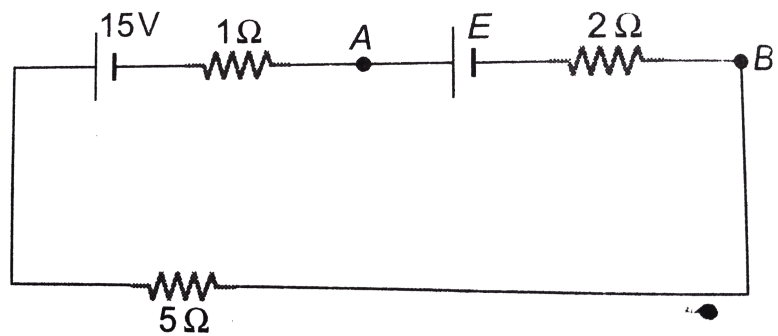
3. For what value of E the potential of A is equal to the potential of B?



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4. Ten cells each of emf $1V$ and internal resistance 1Ω are connected inseries. In this arrangement, polarity of two cells is reversed and the system is connected to an external resistance of 2Ω. Find the current in the circuit.

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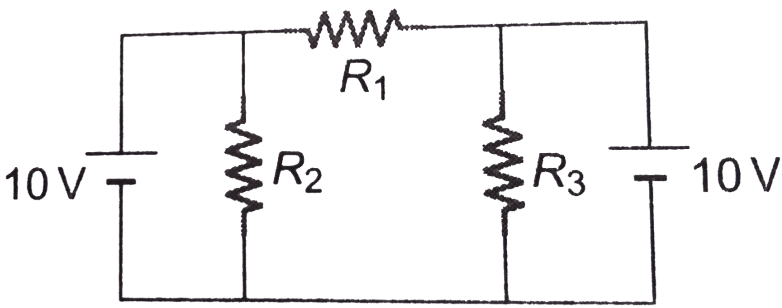
5. In the curcuit shown in figure $R_1 = R_2 = R_3 = 10\Omega$. Find the currents through R_1 and R_2



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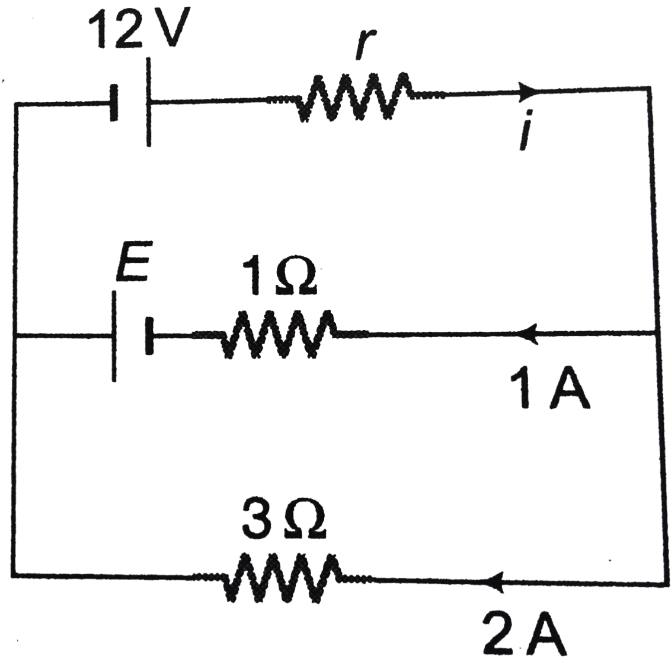
Exercise 23.7

1. In the circuit shown in figure a $12V$ battery with unknown internal resistance r is connected to another battery with unknown emf E and internal resistance 1Ω and to a resistance of 3Ω carrying a current of $2A$. The current through the rechargeable battery is $1A$ in the direction shown. Figure the unknown current i internal resistance r and the emf E.



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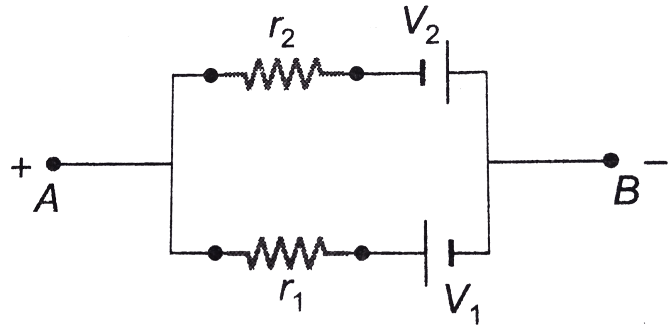
Exercise 23.8

1. 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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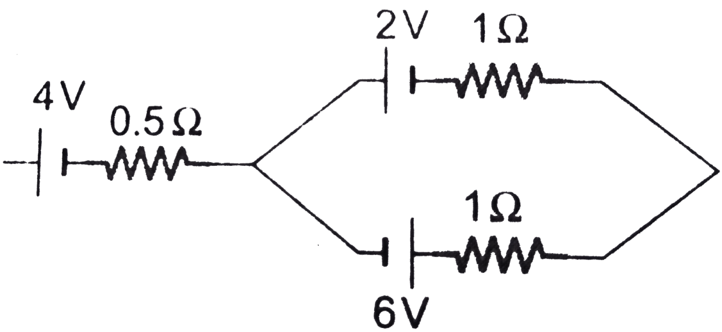
2. Find the net emf of the three batteries shown in figure



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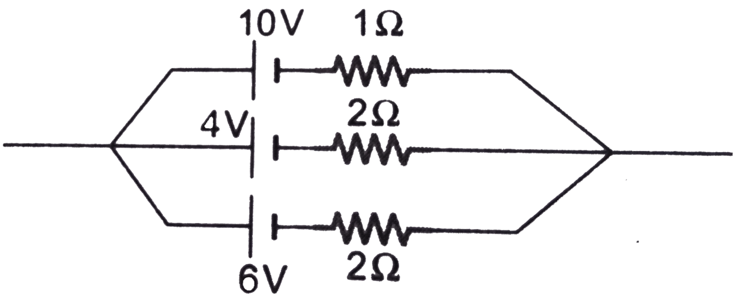
3. Find the equivalent emf and internal resistance of the arrangement shown in figure.



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Exercise 23.9

1. The full scale deflection current of a galvanometer of resistance 1Ω is $5mA$. How will you convert it into a voltmeter of range of V?

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2. A micrometer has a resistance of 100Ω and full scale deflection current of $50\mu A$. How can it be made to work as an ammeter of range $5mA$?

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3. A voltmeter has a resistance G and range V. Calculate the resistance to be used in series with it to extend its range to nV.

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Exercise 23.10

1. In a potentiometer experiment it is found that no current passes through the galvanometer when the terminals of the cell are connected across $0.52m$ of the potentiometer wire. If the cell is shunted by a resistance of 5Ω balance is obtained when the cell connected across$0.4m$ of the wire. Find the internal resistance of the cell.

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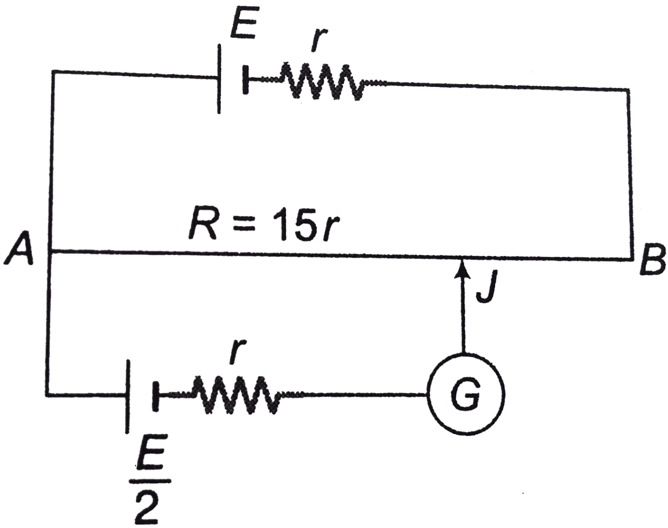
2. The potentiometer wire AB is 600 cm long.



a. At what distance from A should be jockey J touch the wire to get zero deflection i the galvanometer.

b. If the jockey touches the wire at a distance $560cm$ from A, what will be the current through the galvanometer.

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Exercise 23.11

1. 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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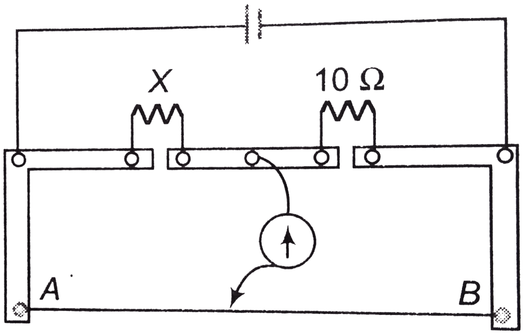
2. A meter bridge is setup as shown in figure, to determine an unknown resistance X using a standard 10Ω resistor. The galvanometer shows null point when tapping key is at $52cm$ mark. The end correctiosnn are $1cm$

and $2cm$ respectively for the ends A and B. The determined value of X is



A. 10.2Ω

B. 10.6Ω

C. 10.8Ω

D. 11.11Ω

Answer: B

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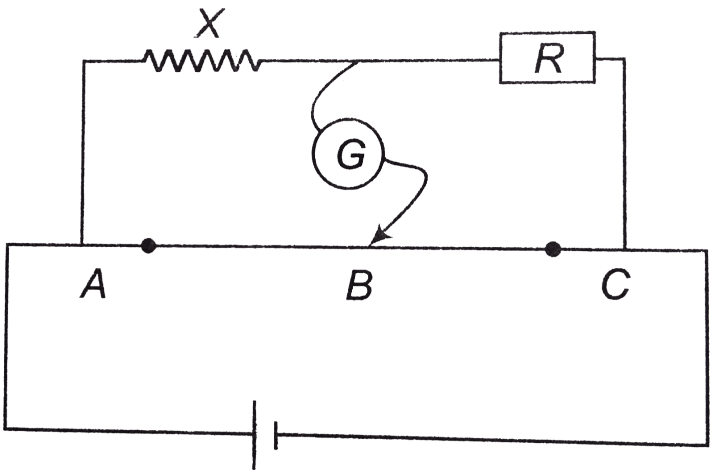
3. R_1, R_2, R_3 are different values of R, A, B and C are the null points obtained corresponding to R_1, R_2 and R_3 respectively. For which resistor, the value of X will be the most accurate and why?



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Exercise 23.12

1. In post office box experiment $\frac{Q}{P} = \frac{1}{10}$. In R if 142 Ω is used then we get deflection towards righ and if $R = 143\Omega$, then deflection is towards left. What is the range of unknown resistance?

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2. What is the change in experiment if battery is connected between B and D and galvanometer is connected across A and C ?

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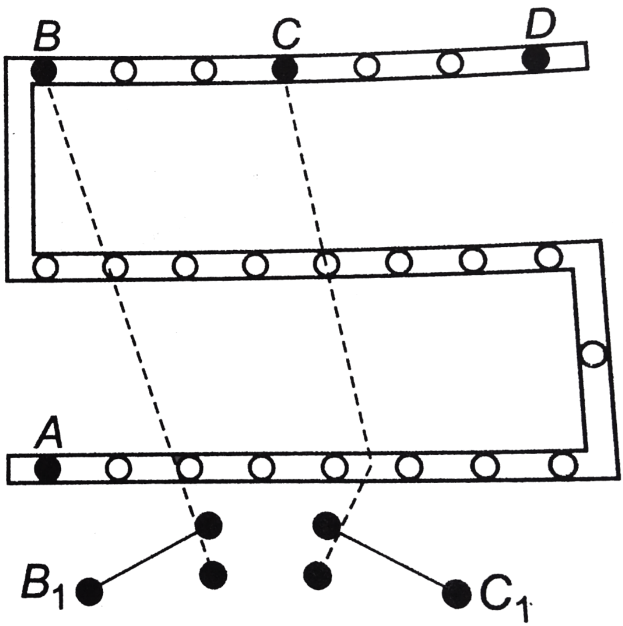
3. For the post office arrangement to determine the value of unknown resistance, the unknown resistance should be connected between.



A. B and C

B. C and D

C. A and D

D. B_1 and C_1

Answer: C

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Exercise 23.13

1. For the given carbon resistor, let the first strip be yellow, second strip be red, third strip be orange and fourth be gold. What its resistance?

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2. The resistance of the given carbon resistor is $(24 \times 10^6 \pm 5\%)\Omega$. What is the sequence of colours on the strips provided on resistor?

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Level 1 Assertion And Reason

1. Assertion : If potential difference across two points is zero, current between these two points should be zero.

Reason : Current passing from a resistor $I = \frac{V}{R}$

A. If both Assertion and Reason are true and the Reason is correct explanation of the Assertion.

B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

C. If Assertion is true, but the Reason is false.

D. If Assertion is false but the Reason is true.

Answer: D

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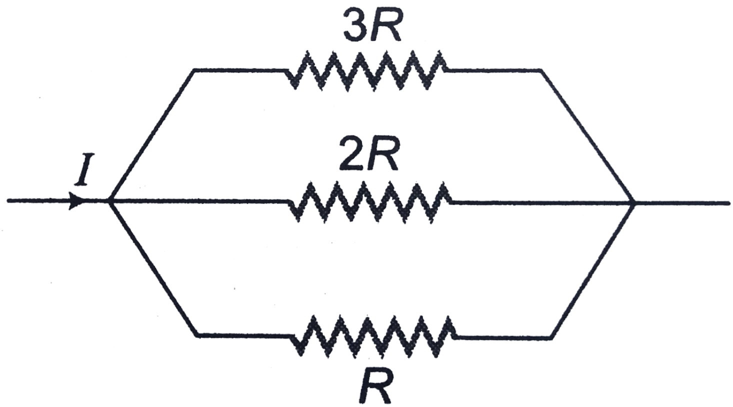
2. Assertion: In the part of the circuit shown in figure, maximum power is produced across R.

Reason : Power $P = \frac{V^2}{R}$



A. If both Assertion and Reason are true and the Reason is correct explanation of the Assertion.

B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

C. If Assertion is true, but the Reason is false.

D. If Assertion is false but the Reason is true.

Answer: A::B

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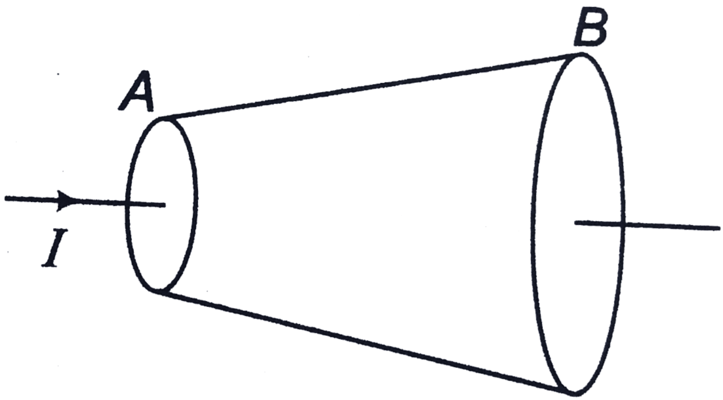
3. 

Assertion : Current I is flowing through a cylindrical wire of non-uniform cross-section as shown. Section of wire near A will be more heated compared to the section near B.

Reason : Current density near A is more.

A. If both Assertion and Reason are true and the Reason is correct explanation of the Assertion.

B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

C. If Assertion is true, but the Reason is false.

D. If Assertion is false but the Reason is true.

Answer: B

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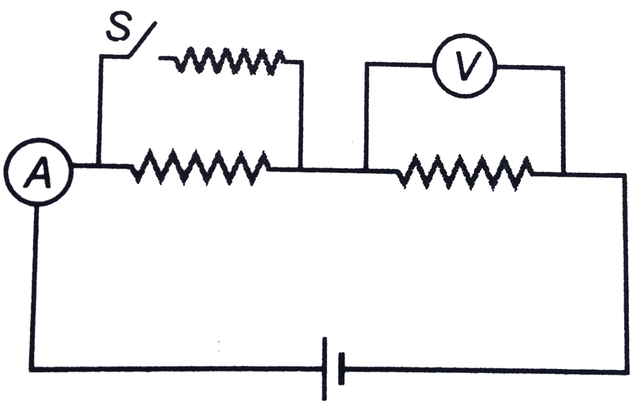
4. 

Assertion: In the circuit shown in figure after closing the switch S reading of ammeter will increase while that of voltmeter will decrease.

Reason : Net resistance decreases as parallel combination of resistors is increased,

A. If both Assertion and Reason are true and the Reason is correct explanation of the Assertion.

B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

C. If Assertion is true, but the Reason is false.

D. If Assertion is false but the Reason is true.

Answer: D

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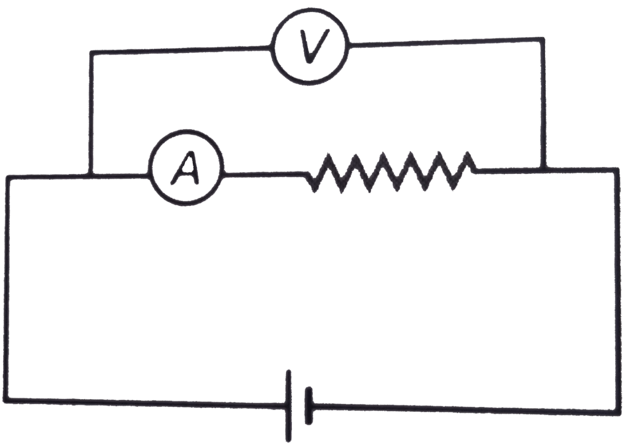

5.

Assertion : In the circuit shown in figure ammeter and voltmeter are non-ideal. Why positions of ammeter and voltmeter are changed, reading of ammeter will increase while of voltmeter will decrease.

Reason : Resistance of an ideal ammeter is zero while that of an ideal voltmeter is infinite.

A. If both Assertion and Reason are true and the Reason is correct explanation of the Assertion.

B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

C. If Assertion is true, but the Reason is false.

D. If Assertion is false but the Reason is true.

Answer: B

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6. 

Assertion:In the part of a circuit shown in figure, given that $V_b > V_a$. The current should flow from b to a.

Reason: Direction of current inside a battry is always from negative terminal to positive terminal.

A. If both Assertion and Reason are true and the Reason is correct explanation of the Assertion.

B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

C. If Assertion is true, but the Reason is false.

D. If Assertion is false but the Reason is true.

Answer: C

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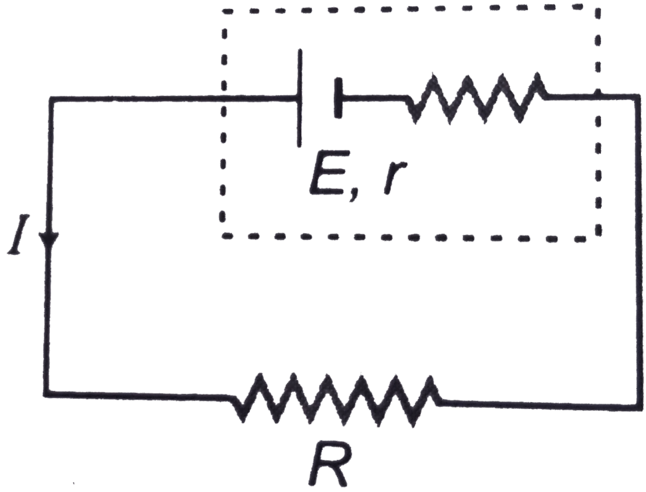
7.



Assertion :In the circuit shown in figure R is variable. Value of current I is maximum when $R = r$.

Reason: At $R = r$, maximum power is produced across R.

A. If both Assertion and Reason are true and the Reason is correct explanation of the Assertion.

B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

C. If Assertion is true, but the Reason is false.

D. If Assertion is false but the Reason is true.

Answer: D

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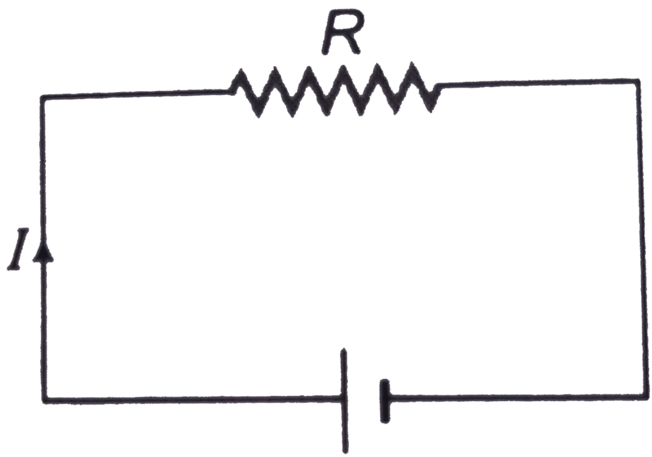
8. 

Assertion: If variation in resistance due to temperature is taken into consideration, then current in the circuit I and power produced across the resistance P both will decrease with time.

Reason: $V = IR$ is ohm's law.

A. If both Assertion and Reason are true and the Reason is correct explanation of the Assertion.

B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

C. If Assertion is true, but the Reason is false.

D. If Assertion is false but the Reason is true.

Answer: C

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9. Assertion : When a potential difference is applied across a conductor, free electrons start travelling with a constant speed called drift speed.

Reason : Due to potential difference an electric field is produced inside the conductor, which electrons experience a force.

A. If both Assertion and Reason are true and the Reason is correct explanation of the Assertion.

B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

C. If Assertion is true, but the Reason is false.

D. If Assertion is false but the Reason is true.

Answer: D

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10. Assertion : When temperature of a conductor is increased, its resistance increases.

Reason : Free electrons collide more frequently.

A. If both Assertion and Reason are true and the Reason is correct explanation of the Assertion.

B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

C. If Assertion is true, but the Reason is false.

D. If Assertion is false but the Reason is true.

Answer: A

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11. Assertion : Two non-ideal batteries are connected in parallel with same polarities on same: side. The equivalent emf is smaller than either of the two emfs.

Reason : Two non-ideal batteries are connected in parallel, the equivalent inter resistance is smaller than either of the two internal resistances.

A. It both Assertion and Reason are true and the Reason is correct explanation of the Assertion.

B. It both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

C. It Assertion is true, but the Reason is false.

D. It Assertion is false but the Reason is true.

Answer: D

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Level 1 Objective

1. The net resistance of an ammeter should be small to ensure that

A. to show large deflection

B. to generate less heat

C. to prevent the galvanometer

D. so that it maynot change the value of the actual current in the circuit

Answer: D

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2. 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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3. If M = mass, L = length, T = time and I = electric current, then the demensional formula of resistance R will be given by

A. $[R] = [ML^2T^{-3}I^{-2}]$

B. $[R] = [ML^2T^{-3}I^2]$

C. $[R] = [ML^2T^3I^{-2}]$

D. $[R] = [ML^2T^3I^2]$

Answer: A

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4. The unit of electrical conductivity is

A. $ohm - m^{-2}$

B. $ohm \times m$

C. $ohm^{-1} \times m^{-1}$

D. none of these

Answer: C

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5. Through an electrolyte an electrical current is due to drift of

A. free electrons

B. positive and negative ions

C. free electrons and holes

D. protons.

Answer: B

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6. The current in a circuit with an external resistance of 3.75Ω is $2.5A$. When a resistance of Ω is introduced into the circuit, the current becomes $0.4A$. The emf of the power source is

A. $1V$

B. $2V$

C. $3V$

D. $4V$

Answer: B

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7. The deflection in a galnometer falls from 50 divisions to 20 divisions, when a 12Ω shunt is applied. The galvanometer resistance (in Ω) is

A. 18Ω

B. 24Ω

C. 30Ω

D. 36Ω

Answer: 18

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8. If 2% of the main current is to be passed through the galvanometer of resistance G, the resistance of shunt required is

A. $\frac{G}{49}$

B. $\frac{G}{50}$

C. $49G$

D. $50G$

Answer: A

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9. If the length of the filament of a heater is reduced by 10%, the power of the heater will

A. increase by about 9%

B. increase by about 11%

C. increase by about 19%

D. decrease by about 10%

Answer: B

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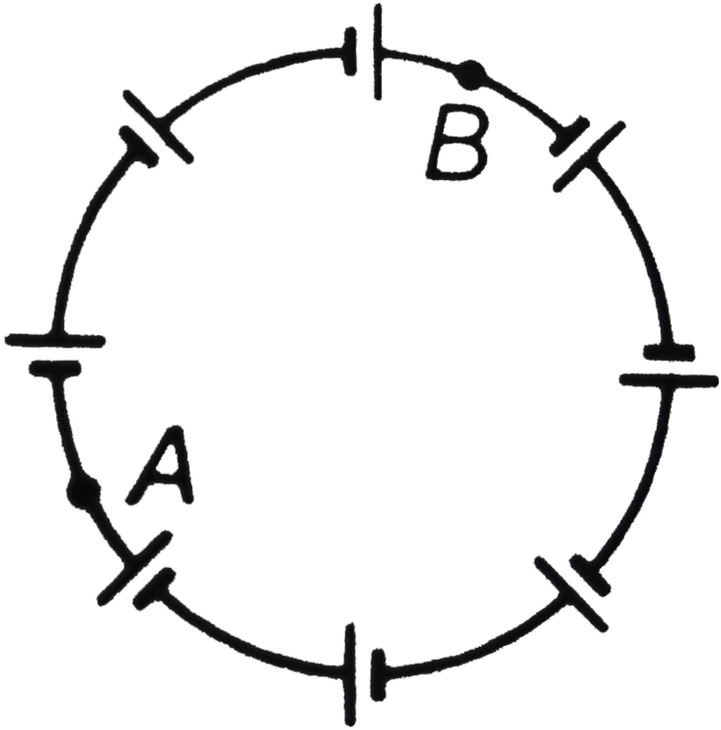
10. N identical current sources each of emf E and internal resistance r are connected to form a closed loop as shown in figure. The potential difference between points A and B which divides the circuit into n and (N-

n) units is



A. NE

B. $(N - n)E$

C. nE

D. zero

Answer: D

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11. A 2.0 V potentiometer is used to determine the internal resistance of $1.5V$ cell. The balance point of the cell in the circuit is $75cm$. When a resistor of 10Ω is connected across cel, the balance point sifts to $60cm$. The internal resistance of the cell is

A. 1.5Ω

B. 2.5Ω

C. 3.5Ω

D. 4.5Ω

Answer: B

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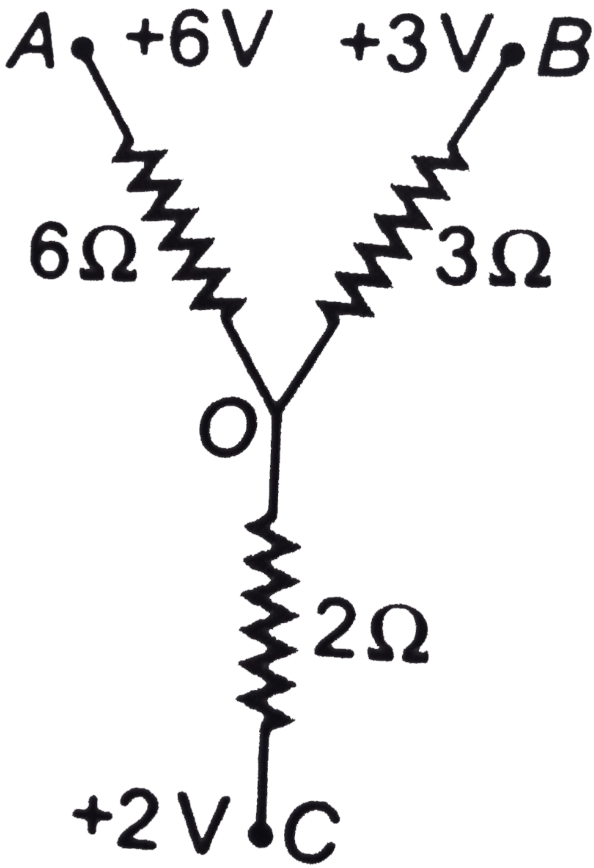
12. Three resistance are joined together to form a letter Y, as shown in figure. If the potentials of the terminals A, B and C are $6V$, $3V$ and $2V$

respectively, then the potential of the point O will be



A. $4V$

B. $3V$

C. $2.5V$

D. $0V$

Answer: B

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13. The drift velocity of free elecrons in a conductor is v, when a current i is flowing in it. If both the radius and current are doubled, then the drift velocity wil be

A. v

B. $v/2$

C. $v/4$

D. $v/8$

Answer: B

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14. A galvanometer is to be converted into an ammeter or voltmeter. In which of the following cases the resistance of the device is largest?

A. an ammeter of range $10A$

B. a voltmeter of range $5V$

C. an ammeter of range $5A$

D. a voltmeter of range $10V$

Answer: D

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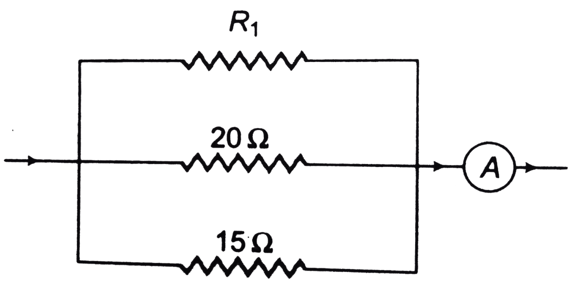
15. In the given circuit current flowing through the resistance 20Ω is $0.3A$, while the ammeter reads 0.8 A. What is the value of R_1



A. 30Ω

B. 40Ω

C. 50Ω

D. 60Ω

Answer: D

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16. An ammeter and a voltmeter are joined in sereis to a cell. Their readings are A and V respectively. If a resistance is now joinding parallel with the voltmeter. Then

A. both A and V will increase

B. both and V will decreases

C. A will decrease, V will increase

D. A will increase, V will decrease

Answer: D

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17. A resistor R has power of dissipation P with cell voltage E. The resistor is cut in equal parts and all parts are connected in parallel with same cell. The new power dissipation is

A. nP

B. nP^2

C. n^2P

D. n/P

Answer: C

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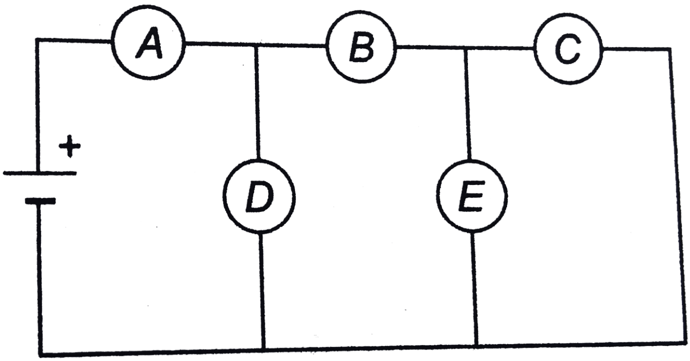
18. In the circuit diagram shown in figure, a fuse bulb can cause all other bulbs to go out. Identify the bulb



A. B

B. C

C. A

D. D or E

Answer: C

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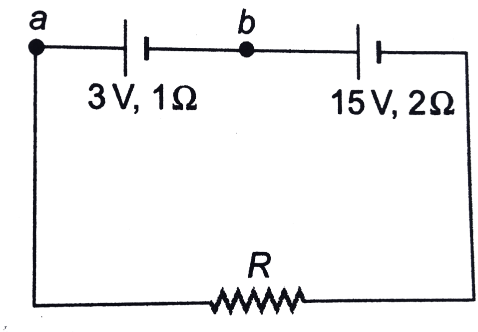
19. Two batteries one of the emf $3V$, internal resistance 1Ω and the other of emf $15V$, internal resistance 2Ω are connected in series with a resistance R as shown. If the potential difference between points a and b is zero, the resistance R in Ω is



A. 5

B. 7

C. 3

D. 1

Answer: C

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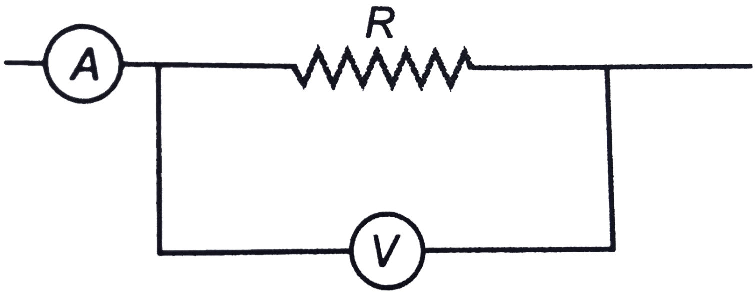
20. A part of a circuit is shown in figure. Here reading of ammeter is $5A$ and voltmeter is $100V$. If voltmeter resistance is $2500 ohm$, then the resistance R is approximately



A. 20Ω

B. 10Ω

C. 100Ω

D. 200Ω

Answer: A

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21. A copper wire of resistance R is cut into ten parts of equal length. Two pieces each are joined in series and then five such combination are joined in parallel. The new combination will have resistance

A. R

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

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

D. $\frac{R}{25}$

Answer: D

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22. Two resistances are connected in two gaps of a meter bridge. The balance point is $20cm$ from the zero end. A resistance of 15Ω is connected in series with the smaller of the two. The null point shifts to $40cm$. The value of the smaller resistance in Ω is

A. 3

B. 6

C. 9

D. 12

Answer: C

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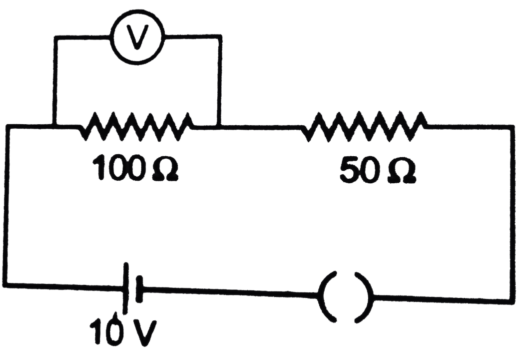
23. In the given circuit, the voltmeter records 5 volt. The resistance of the voltmeter in Ω is



A. 200

B. 100

C. 10

D. 50

Answer: B

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24. The wire of potentiometer has resistance 4Ω and length $1m$. It is connected to a cell of emf 2 volt and internal resistance 1Ω. If a cell of emf 1.2 volt is balanced by it, the balancing length will be

A. $90cm$

B. $60cm$

C. $50cm$

D. $75cm$

Answer: D

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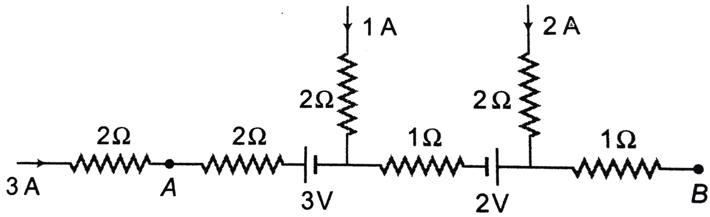
25. The potential difference between points A and B, in a section of a circuit shown in



A. 5 volt

B. 1 volt

C. 10 volt

D. 17 volt

Answer: D

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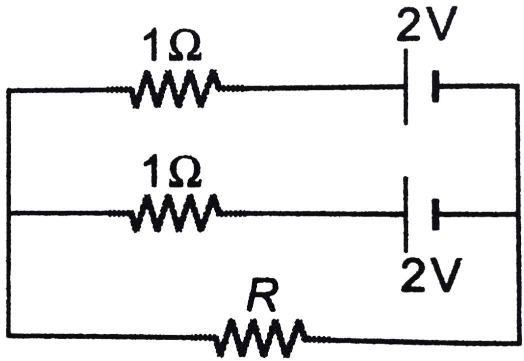
26. Two identical batteries, each of emf $2V$ and internal resistance $r = 1\Omega$ are connected as shown. The maximum power that can be developed across R using these batteries is



A. $3.2W$

B. $8.2W$

C. $2W$

D. $4W$

Answer: C

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27. For a cell, the terminal potential difference is $2.2V$, when circuit is open and reduces to $1.8V$. When cell is connected to a resistance $R = 5\Omega$, the internal resistance of cell (R) is

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

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

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

D. $\frac{5}{9}\Omega$

Answer: A

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

A. 4.9Ω

B. 7.9Ω

C. 5.9Ω

D. 6.9Ω

Answer: A

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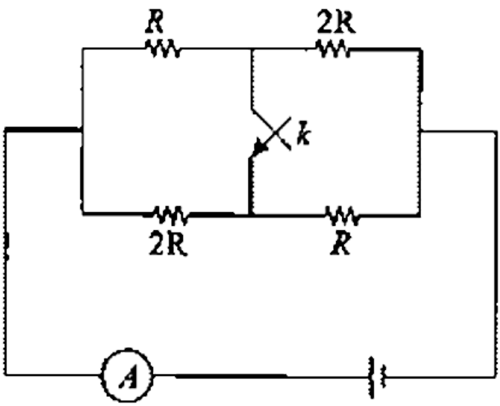
29. Find the ratio of currents as measured by ammeter in two cases when the key is open and when the key is closed :



A. $9/8$

B. $10/11$

C. $8/9$

D. none of these

Answer: C

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30. A galvanometer has a resistance of 3663Ω. A shunt S is connected across it such that $(1/34)$ of the total current passes through the galvanometer. Then the value of the shunt (in Ω) is

A. 222Ω

B. 111Ω

C. 11Ω

D. 22Ω

Answer: 111

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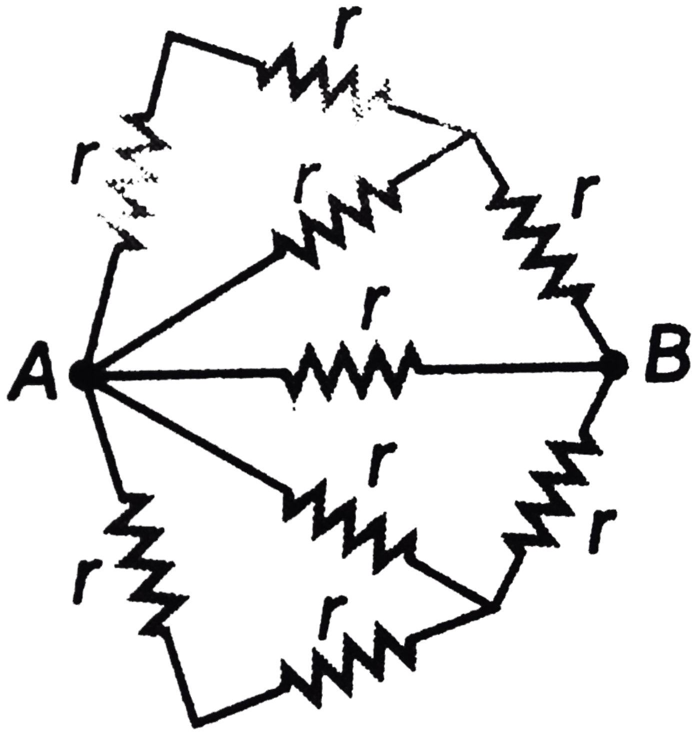
31. The network shown in figure is an arrangement of nine identical resistors. The resistance of the network between points A and B is 1.5Ω. The resistance r is



A. 1.1Ω

B. 3.3Ω

C. 1.8Ω

D. 1.6Ω

Answer: B

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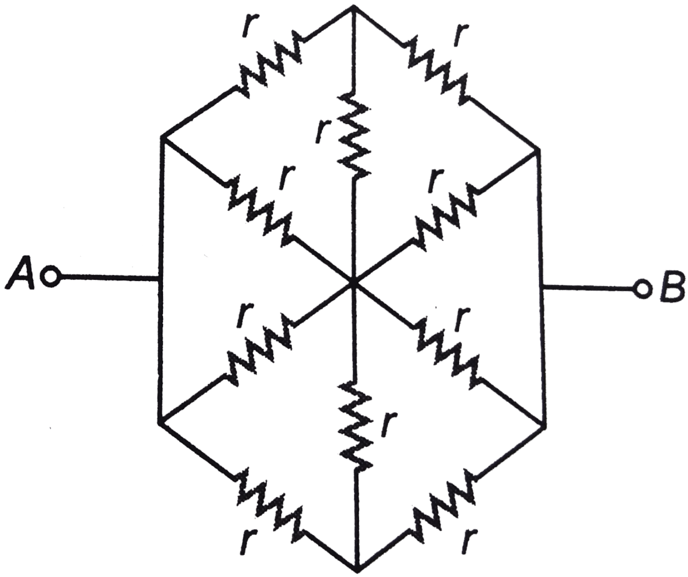
32. The equivalent resistance of the hexagonal network as shown figure between points A and B is



A. r

B. $0.5r$

C. $2r$

D. $3r$

Answer: B

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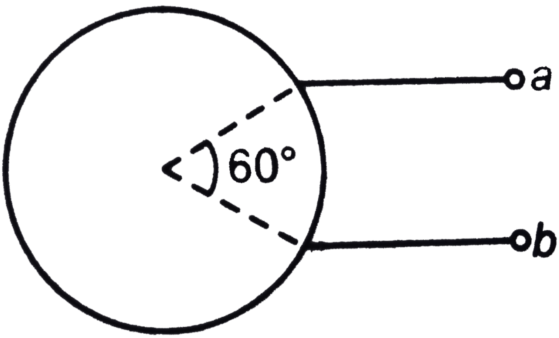
33. A uniform wire of resistance 18Ω is bent in the form of a circle. The effective resistance across the points a and b is



A. 3Ω

B. 2Ω

C. 2.5Ω

D. 6Ω

Answer: C

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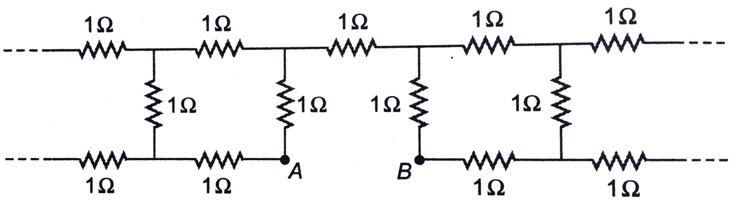
34. Each resistor shown in figure is an infinite network of resistance1Ω.

The effective resistance Between points A and B is



A. less than 1Ω

B. 1Ω

C. more thn 1Ω but less than 3Ω

D. 3Ω

Answer: C

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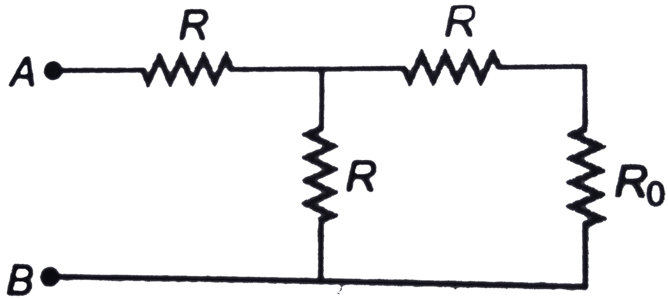
35. In the circuit shown in figure the total resistance between points A and B is R_0. The value of resistance R is



A. R_0

B. $\sqrt{3}R_0$

C. $\frac{R_0}{2}$

D. $\frac{R_0}{\sqrt{3}}$

Answer: D

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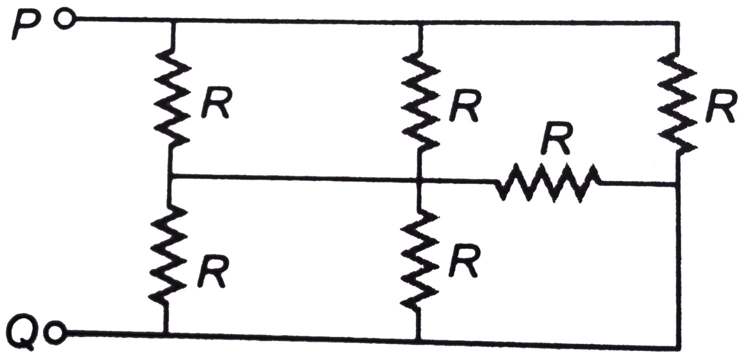
36. In the circuit shown in figure $R = 55\Omega$ the equivalent resistance between the point P and Q is



A. 30Ω

B. 35Ω

C. 55Ω

D. 25Ω

Answer: D

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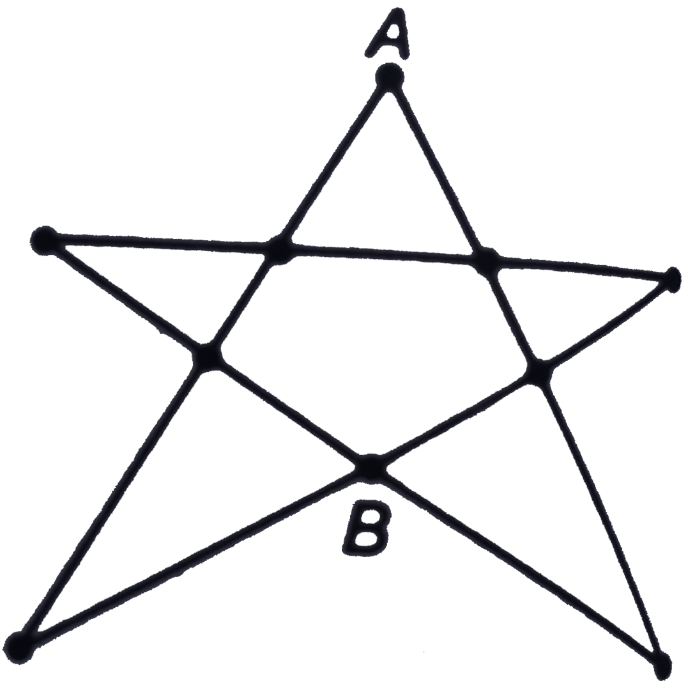
37. The resistance of all the wires between any two adjacent dots is R.

Then, equivalent resistance between $A$and B as shown in figure is



A. $(7/3)R$

B. $(7/6)R$

C. $(14/8)R$

D. none of these

Answer: B

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38. A uniform wire of resistance 4Ω is bent into circle of radius r. As specimen of the same wire is connected along the dimeter of the circle. What is the equivalent resistance across the ends of this wire?

A. $\frac{4}{(4+\pi)}\Omega$

B. $\frac{3}{(3+\pi)}\Omega$

C. $\frac{2}{(2+\pi)\Omega}$

D. $\frac{1}{(1+\pi)}\Omega$

Answer: A

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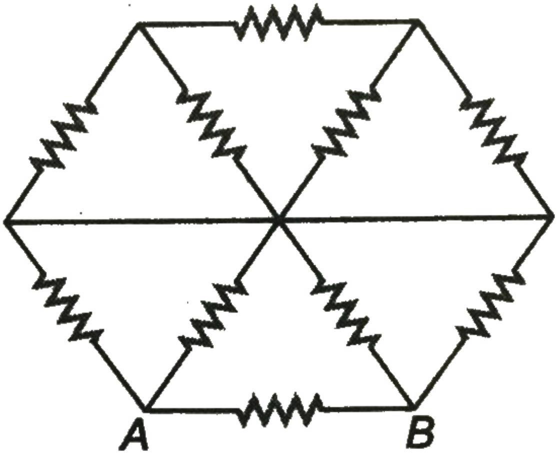
39. In the network shown in figure, each resistance is R. The equvalent resistance between points A and B is



A. $\frac{20}{11}R$

B. $\frac{19}{11}R$

C. $\frac{8}{15}R$

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

Answer: D

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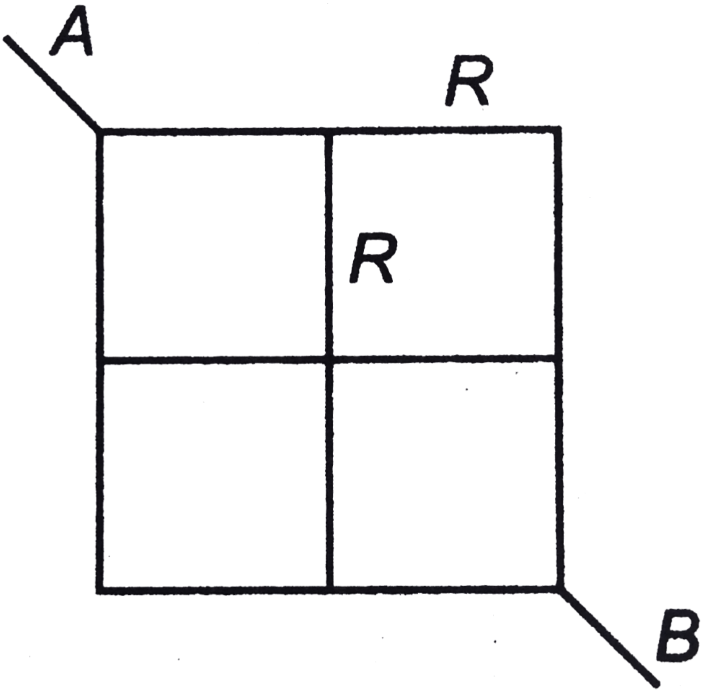
40. The equivalent resistance between the points A and B is (R is the resistance of each side of smaller square)



A. R

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

C. $2R$

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

Answer: B

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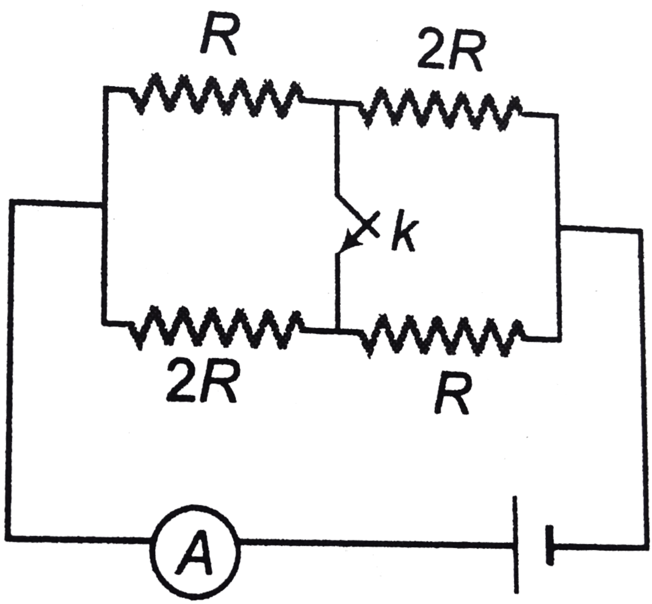
OBJECTIVE_TYPE

1. The potential difference between points A and B in the circuit shown in figure will be



A. $1V$

B. $2V$

C. $-3V$

D. none of these

Answer: D

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Level 1 Subjective

1. When a steady current passes through a cylindrical conductor, is there an electric field inside the conductor?

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2. Determine True or False. Electrons in a conductor have no motion in the absence of a potential difference across it.

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3. In the Bohr model of hydrogen atom, the electron is pictured to rotate in a circular orbit of radius $5 \times 10^{-11} m$, at a speed 2.2×10^{6} m/ s. What is the current associated with electron motion?

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4. A $120V$ house circuit has the following light bulbs switched on : $40W$, $60W$ and $75W$. Find the equivalent resistance of these bulbs.

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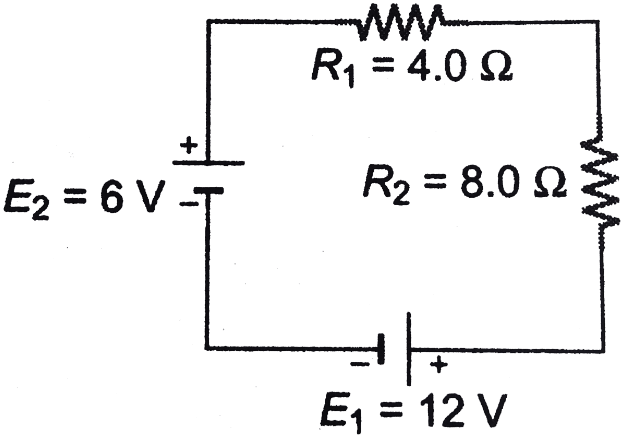
5. Assume that the batteries in figure have negligible internal resistance. Find



a. the current in the circuit,

(b) the power dissipated in each resistor and

(c) the power of each battery, stating whether energy is supplied by or absorbed by it

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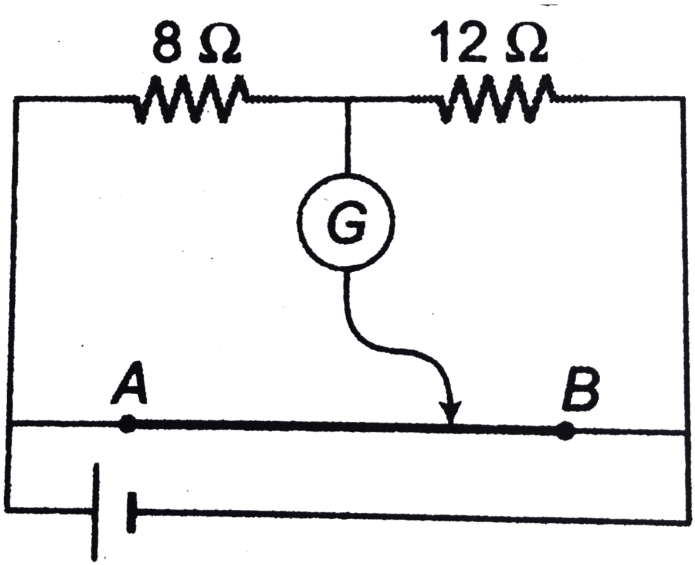
6. The potentiometer wire AB shown in figure is $40 cm$ long. Where the free end of the galvanometer should be connected on AB so that the

galvanometer may show zero deflection?



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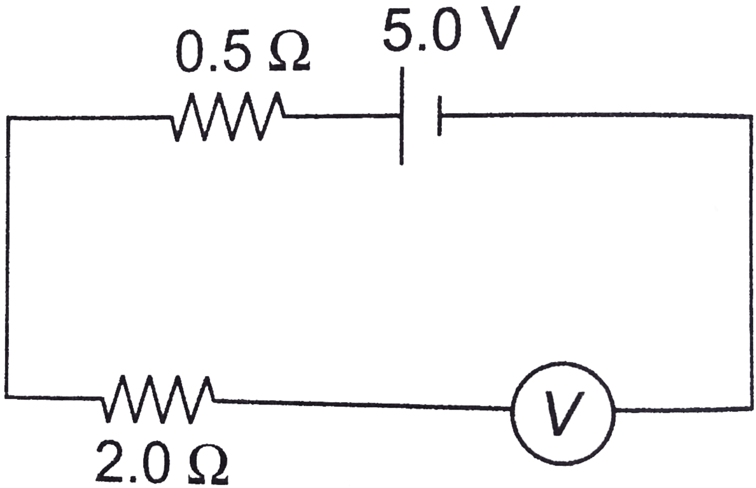
7. An ideal voltmeter V is connected to a 2.0Ω resistor and a battery with emf $5.0V$ and internal resistance 0.5Ω as shown in figure

(a) What is the current in the 2.0Ω resistor?

(b) What is the terminal voltage of the battery?

(c) What is the reading of the voltmeter?



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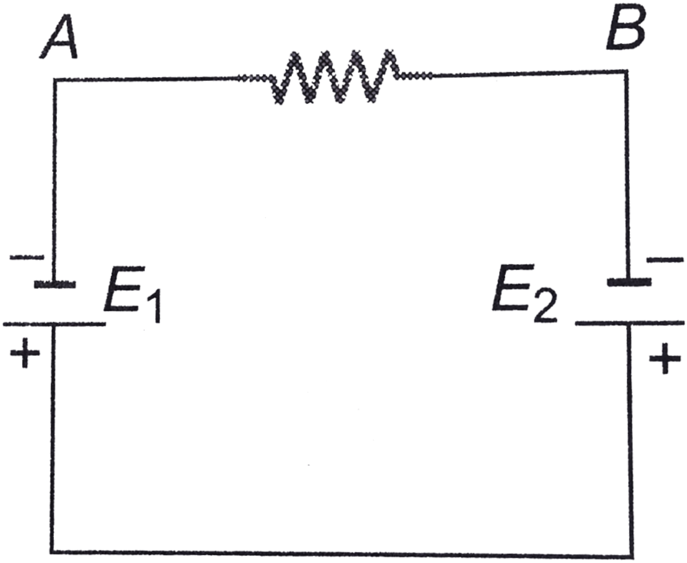

8.

In Figure $E_1 = 12V$ and $E_2 = 8V$

(a) What is the direction of the current in the resistor?

(b) Which battery is doing positive work?

(c) Which point, A or B, is at the higher potential?

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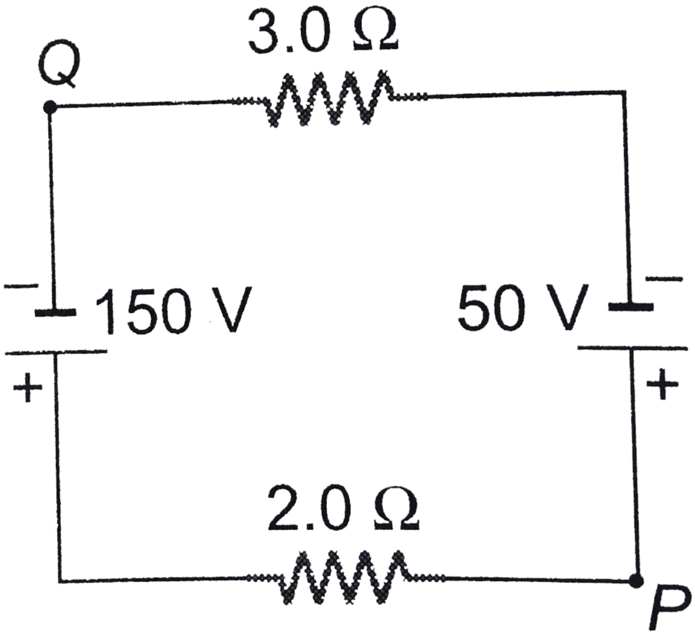
9. In Figure if the potential at Point P is $100V$, what is the potential at point Q?



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10. Copper has one conduction electron per atom. Its density is $8.89g/cm^3$ and its atomic mass. $63.54g/mol$. If a copper wire of diameter $1.0mm$ carries a current of $2.0A$, what is the drift speed of the electrons in the wire?

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11. An aluminium wire carrying a current has diameter $0.84mm$. The electric field in the wire $0.49V/m$. What is

(a) the current carried by the wire?

(b) the potential difference between two points in the wire $12.0m$ apart?

(c) the resistance of a $12.0m$ length of this wire?

Specific resistance of aluminium is $2.75 \times 10^{-8} \Omega - m$.

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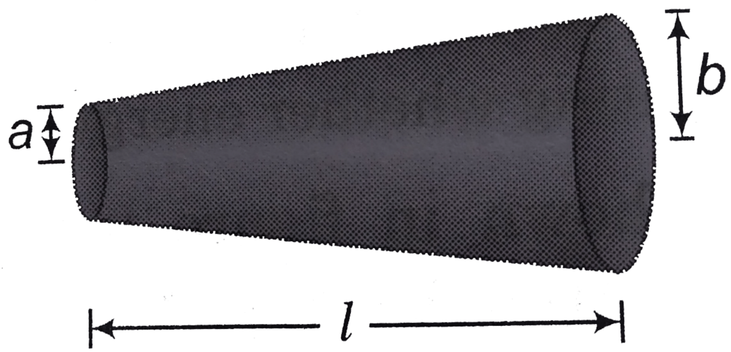
12. A conductor of length l has a non-uniform cross-section. The radius of cross-section varies linearly from a to b. The resistivity of the material is ρ. Find the resistance of the conductc across its ends.



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13. If a battery of emf E and internal resistance r is connected across a load of resistance R. Shot that the rate at which energy is dissipated in R is maximum when $R = r$ and this maximur power is $P = E^2 / 4r$.

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14. Two identical batteries each of emf $E = 2$volt and internal resistance $r = 1$ ohm are available t. produce heat in an external resistance by passing a current through it. What is the maximum power that can be developed across an external resistance R using these batteries?

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15. Two coils connected in series have resistance of $600K\Omega$ and 300Ω at $20^\circ C$ and temperature coefficient of0.001 and $0.004(.^\circ C)^{-1}$ respectively. Find resistance of the combination at a temperature of $50^\circ C$. What is the effective temperature coefficient of combination?

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16. An aluminium wire $7.5m$ long is connected in parallel with a copper wire $6m$ long. When a current of $5A$ is passed through the combination, it is found that the current in the aluminium wire is $3A$. The diameter of the aluminium wire is $1mm$. Determine the diameter of the copper wire. Resistivity of copper is $0.017\mu\Omega - m$ and that of the aluminium is $0.028\mu\Omega - m$.

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17. The potential difference between two points in a wire $75.0cm$ apart is $0.938V$, when the current density is $4.40 \times 10^7 A/m^2$. What is

(a) the magnitude of E in the wire?

(b) the resistivity of the material of which the wire is made?

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18. A rectangular block of metal of resistivity p has dimensions $d \times 2d \times 3d$. A potential difference V is applied between two opposite faces of the block.

(a) To which two faces of the block should the potential difference V be applied to give the maximum current density? What is the maximum current density?

(b) To which two faces of the block should the potential difference V be applied to give the maximum current? What is this maximum current?

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19. An electrical conductor designed to carry large currents has a circular cross-section $2.50mm$ in diameter and is $14.0m$ long. The resistance between its ends is 0.104Ω .

(a) What is the resistivity of the material?

(b) If the electric field magnitude in the conductor is $1.28V/m$, what is the total current?

(c) If the material has $8.5x10^{28}$ free electrons per cubic metre, find the average drift speed under the conditions of part (b).

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20. The resistance of a copper wire and an iron at $20^{\circ} C$ are 4.1Ω and 3.9Ω respectively. Neglecting any thermal expansion, find the temperature at which resistane of both are equal.

$\alpha_{Cu} = 4.0 \times 10^{-3} K^{-1}$ an $\alpha_{Fe} = 5.0 \times 10^{-3} K^{-1}$

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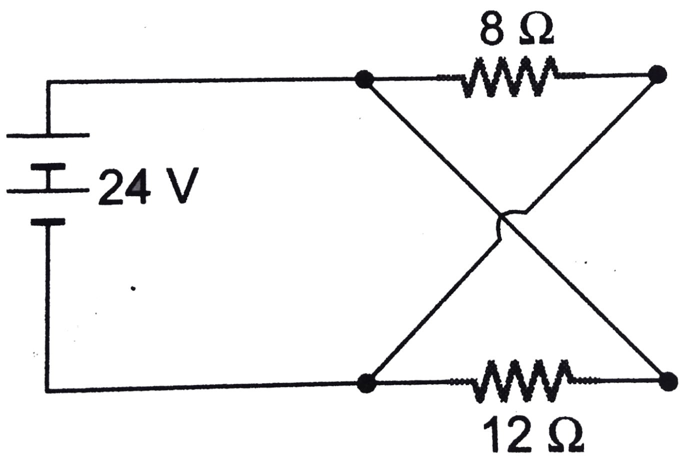
21. Find the current supplied by the battery in the circuit shown in figure.



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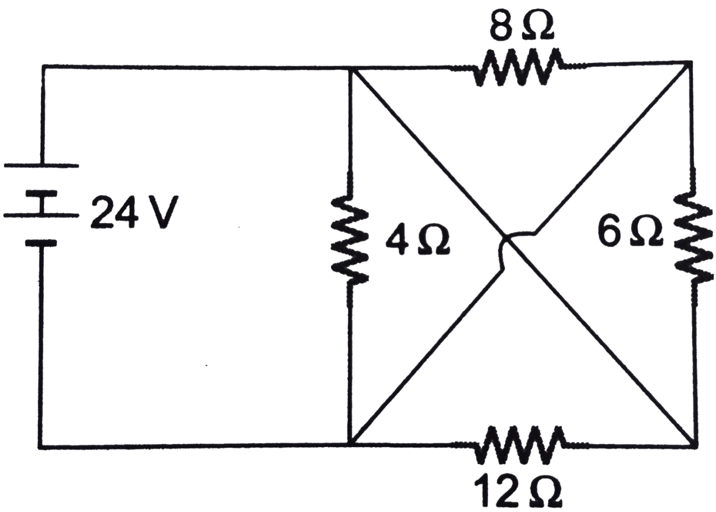
22. Calculate battery current and equivalent resistance of the network shown in figure.



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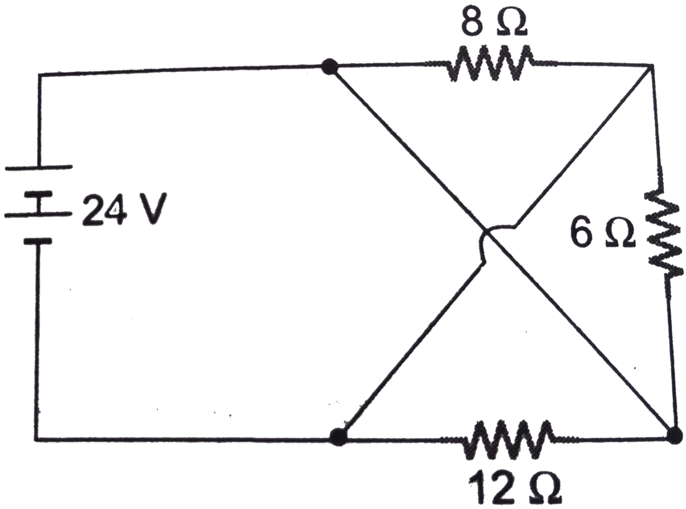
23. Compute total circuit resistance and battery current as shown in figure.



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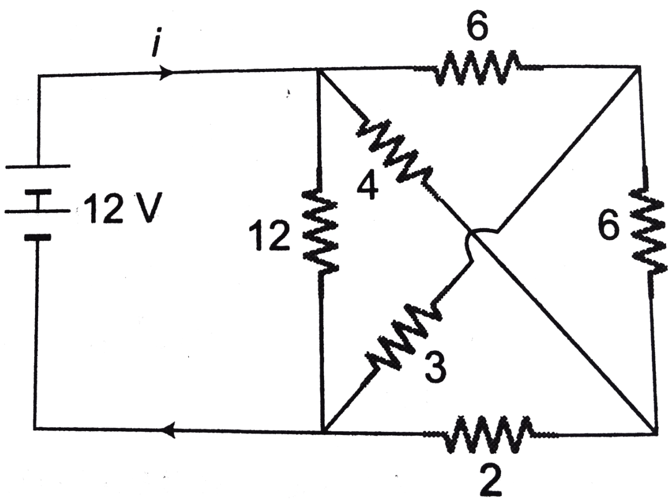
24. Compute the value of battery current in shown in figure. All resistance are in ohm.



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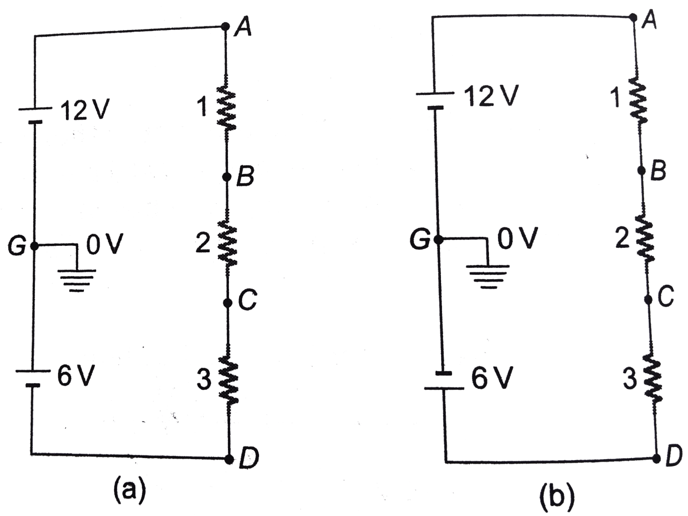
25. Calculate the potentials of points A, B, C and D as shown in Fig. a. What would be the new potential values if connections of $6V$ battery are reversed as shown in fig b. All resistance are on ohm.



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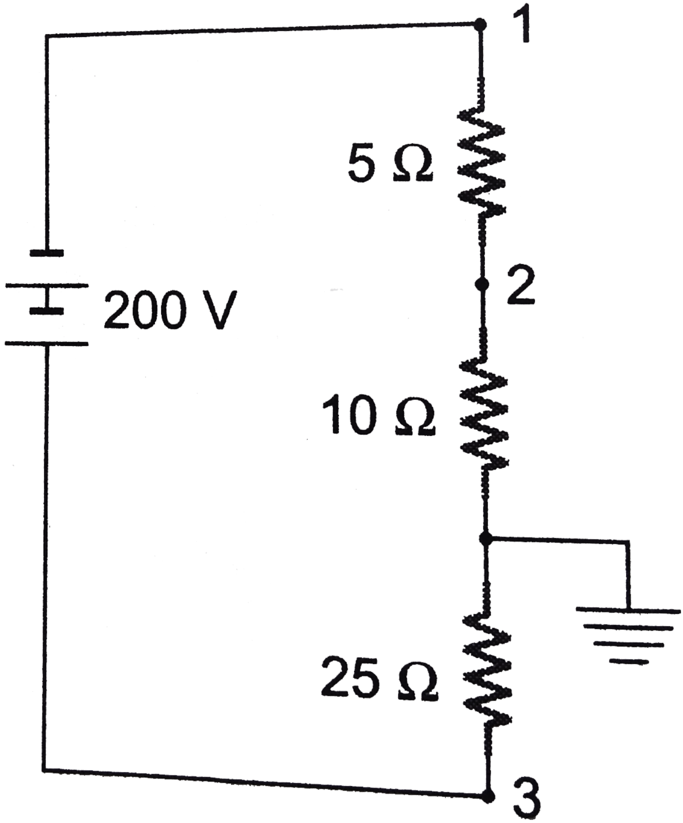
26. Give the magnitude and polarity of the following voltages in the circuit of figure:



i. V_1 ii. V_2 iii. V_3 iv. V_{3-2}

v. V_{1-2}

V_{1-3}

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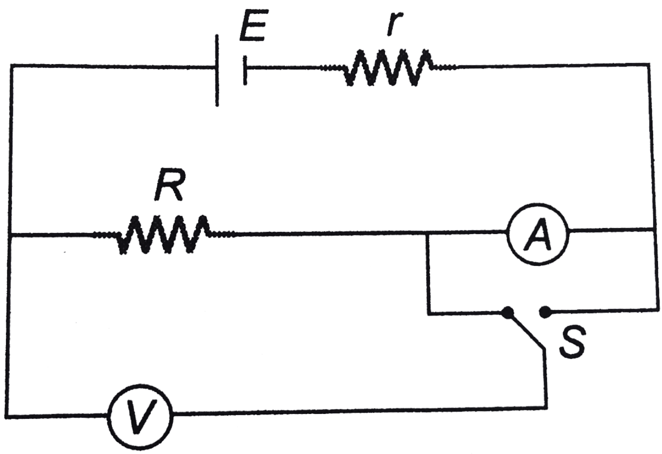
27. The emf E and the internal resistance r of the battery shown in figure are $4.3V$ and 1.0Ω respectively. The external resistance R is 50Ω. The resistances of the ammeter and voltmeter are 2.0Ω and 200Ω respectively.

(a) Find the readings of the two meters.

(b) The switch is thrown to the other side. What will be the readings of the two meters now?



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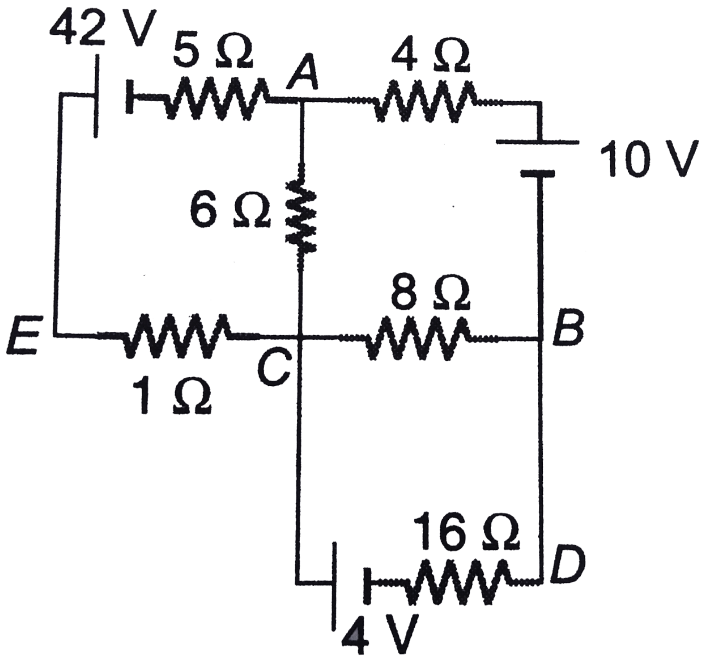
28. Find the current in each branch of the cirucit shown in figure



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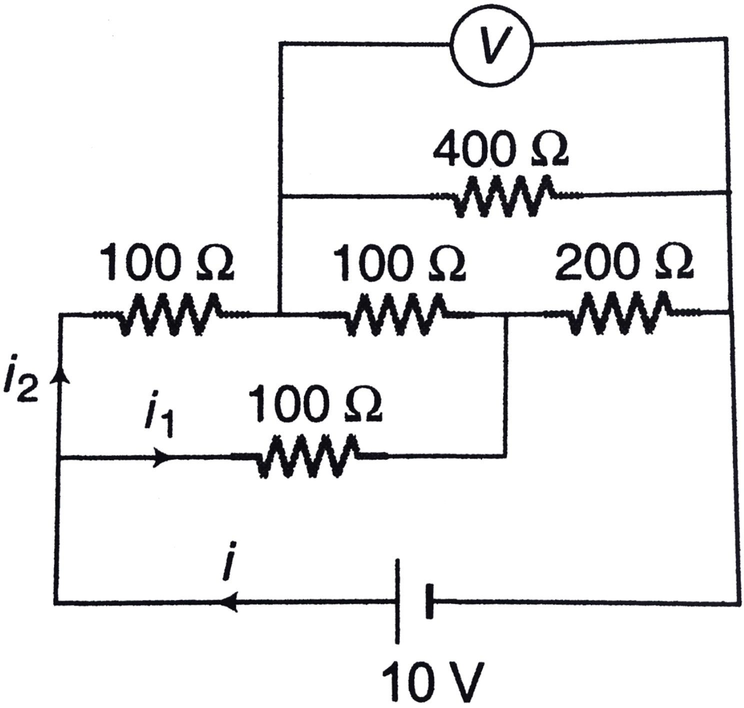
29. An electrical circuit is shown in figure. Calculate the potential difference across the resistor of 400Ω as will be measured by the voltmeter Vof resistance 400Ω either by applying Kirchhoff's rules or otherwise.



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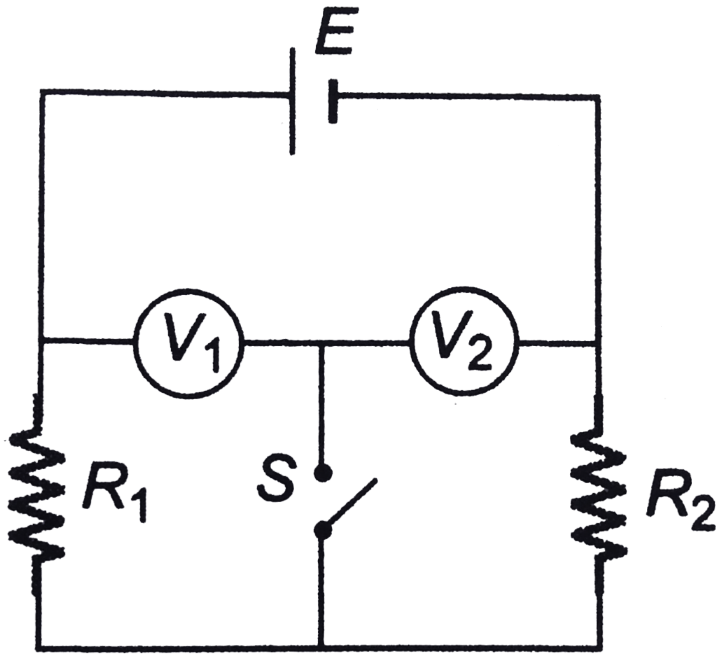
30. In the circuit shownin figure V_1 and V_2 are two voltmeter of resistances 3000Ω and 2000Ω respectively. In additions $R_1 = 2000\Omega$, $R_2 = 3000\omega$ and $E = 200V$ then

a. Fid the reading of voltmeters V_1 and V_2 when

i. switch S is open

ii. Switch S is closed

b. Current through S, when it is closed (Disregard the resistance of battery)



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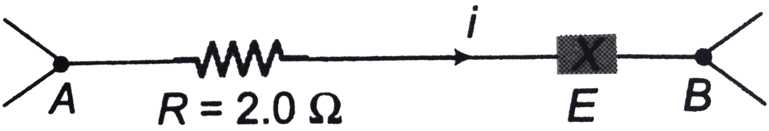
31. In figure circuit section AB absorbs energy at the rate of $5.0W$ when a current$i = 1.0A$ passes through it in the indicated direction.

(a) What is the potential difference between points A and B?

(b) Emf device X does not have internal resistance. What is its emf?

(c) What is its polarity (the orientation of its positive and negative terminals)?



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32. The potential difference across the terminals of a battery is $8.4V$ when there is a current of $1.50A$ in the battery from the negative to the positive terminal. When the current is $3.50Air$, the reverse direction, the potential difference becomes $9.4V$.

(a) What is the internal resistance of the battery?

(b) What is the emf of the battery?

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33. A battery of emf $2.0V$ and internal resistance 0.10Ω is being charged with a current of $5.0A$. Find the potential difference between the terminals of the battery?

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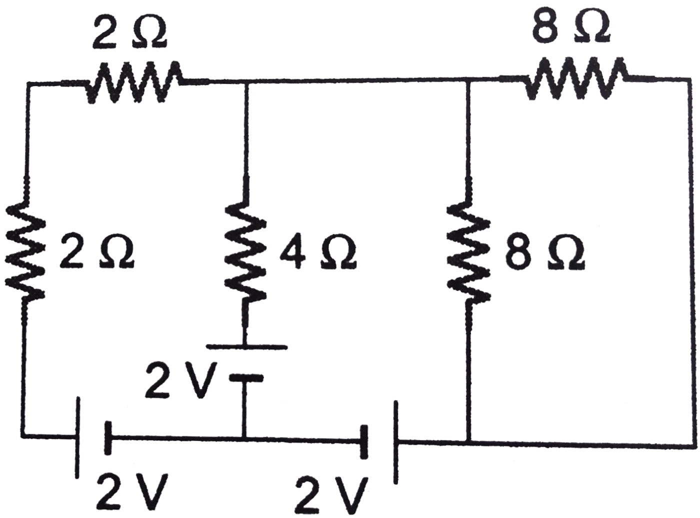
34. Find the currents in different resistors shown in figure



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35. A resistance box, a battery and a galvanometer of resistance G ohm are connected in series. the galvanometer is shunted by resistance of S ohm, find the change in resistance in the be required to maintain the current from the battery unchanged.

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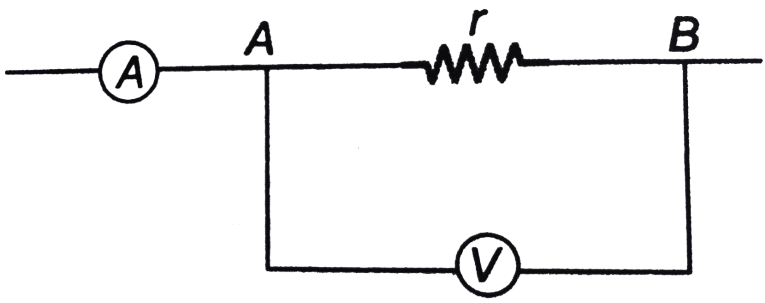
36. Determine the resistance r if an ammeter shows a current of $I = 5A$ and a voltmeter $100V$. The internal resistance of the voltmeter is $R = 2,500\Omega$



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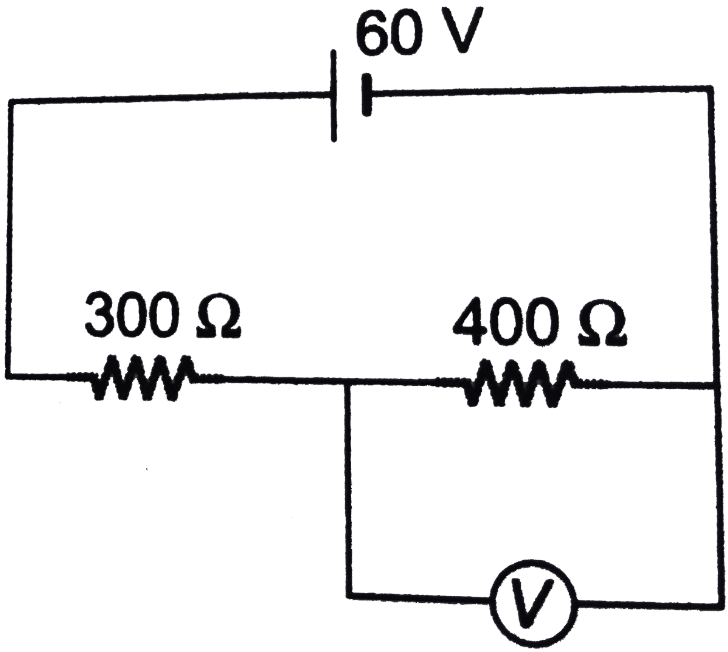
37. In the circuit, a voltmeter reads $30V$ when it is connected across 400 Ω resistance. Calculate what the same voltmeter will read when it is connected across the 300Ω resistance?



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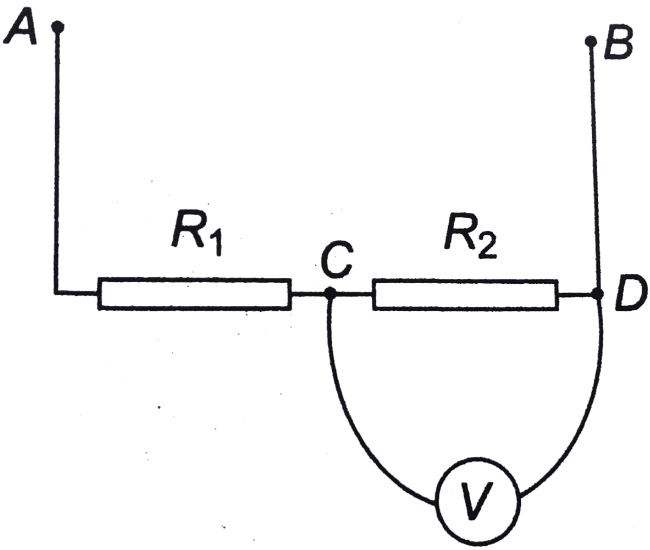
38. Resistance $R_1$and R_2, each 60Ω, are connected in series. The points A and B is $120V$. Find the reading of voltmeter connected resistance

$r = 120\Omega$



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39. A moving coil galvanometer of resistance 20Ω gives a full scale deflection when a current of $1mA$ is passed through it. It is to be converted into an ammeter reading $20A$ on full scale. But the shunt of 0.005Ω only is available. What resistance should be connected in series with the galvanometer coil?

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40. A cell of emf $3.4V$ and internal resistance 3Ω is connected to an ammeter having resistance 2Ω and to an external resistance of 100Ω. When a voltmeter is connected across the 100Ω resistance, the ammeter reading is $0.04A$. Find the voltage reading by the voltmeter and its resistance. Had the voltmeter been an ideal one what would have been its reading?

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41. (a) A voltmeter with resistance R_v is connected across the terminals of a battery of emf E and internal resistance r. Find the potential difference measured by the voltmeter.

(b) If$E = 7.50V$ and $r = 0.45\Omega$, find the minimum value of the voltmeter resistance R_v so that the voltmeter reading is within 1.0% of the emf of the battery. (c) Explain why your answer in part (b) represents a minimum value.

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42. An ammeter with resistance R_A is connected in series with a resistor R, a battery of emf c and internal resistance r. The current measured by the ammeter is I_A. Find the current through the circuit if the ammeter is removed so that the battery and the resistor form a complete circuit. Express your answer in terms of I_A, r, R_A and R. Show that more "ideal" the ammeter, the smaller the difference between this current and the current I_A. ltbr. (b) If $R = 3.80\Omega, \varepsilon = 7.50V$ and $r = 0.45\Omega$, find the maximum value of the ammeter resistance R_A so that I_A is within $99\,\%$ of the current in the circuit when the ammeter is absent. (c) Explain why your answer in part (b) represents a maximum value.

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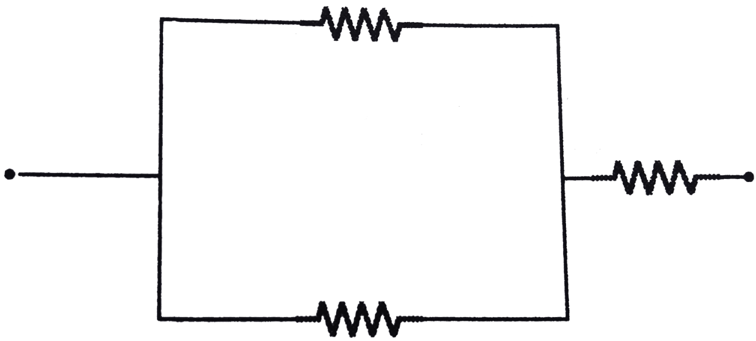
43. Each of three resistors in figure has a resistance of 2.4Ω and can dissipate a maximum of 36 W without becoming excessively heated. What is the maximum power the circuit can dissipate?



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44. A storage battery with emf $2.6V$ loaded with external resistance produces a current $1A$. In this case, the potential difference between the terminals of the storage battery equals $2V$. Find the thermal power generated in the battery and the net power supplied by the battery for external circuit.

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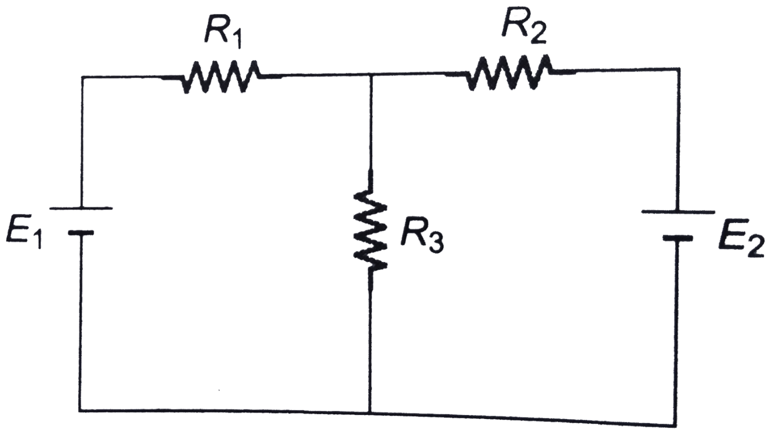
45. In the circuit shown in figure $E_1 = 7V$, $E_2 = 1V$, $R_1 = 2\Omega$, $R_2 = 2\Omega$ and $R_3 = 3\Omega$ respectively. Find the power supplied by the two batteries.



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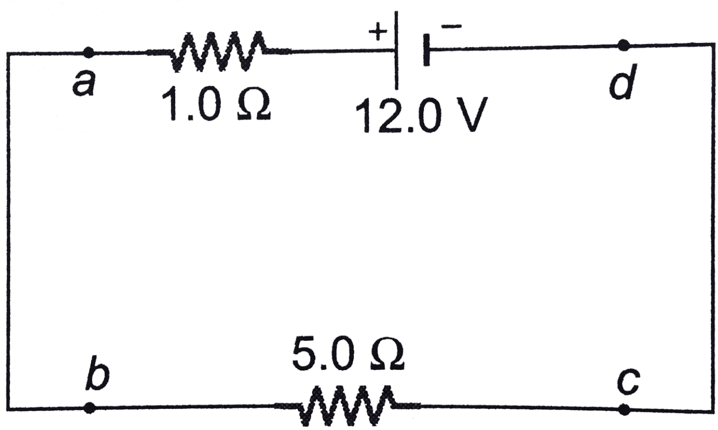
46. In the circuit shown in figure find



a) the rate of conversion of internal (chemical) energy to electrical energy within the battery

(b) the rate of dissipation of electrical energy in the battery

(c) the rate of dissipation of electrical energy in the external resistor.

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47. Three resistors having resistances of $1.60\Omega, 2.40\Omega$ and 4.80Ω are connected in parallel to a $28.0V$ battery that has negligible internal resistance. Find

(a) the equivalent resistance of the combination.

(b) the current in each resistor.

(c) the total current through the battery.

(d) the voltage across each resistor.

(e) the power dissipated in each resistor.

(f) which resistor dissipates the maximum power the one with the greatest resistance or the least resistance? Explain why this should be.

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48. The power of resistor is the maximum power the resistor can safely dissipate without too rise in temperature. The power rating of a $15k\Omega$ resistor is $5.0W$. What is the maximum allowable potential difference across the terminals of the resistor?

(b) A $9.0k\Omega$ resistor is to be connected across a $120V$ potential difference. What power rating is required?

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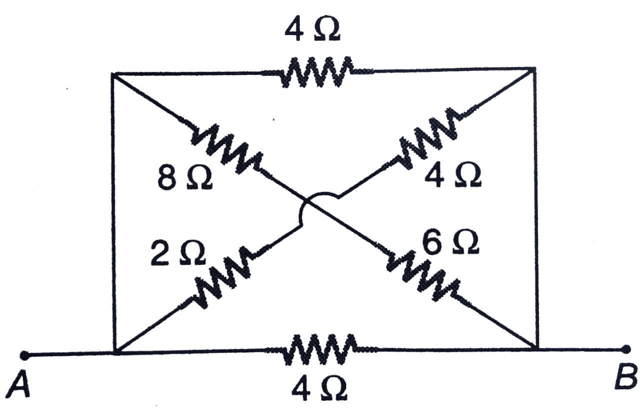
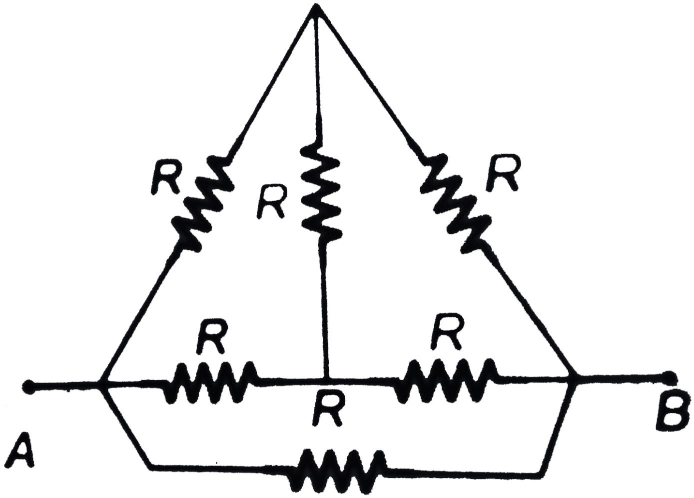
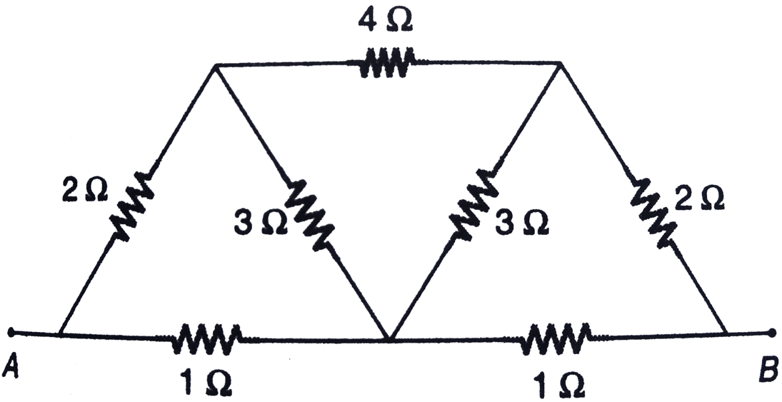
49. Find the equivalent resistance between points A and B in the following circuits?

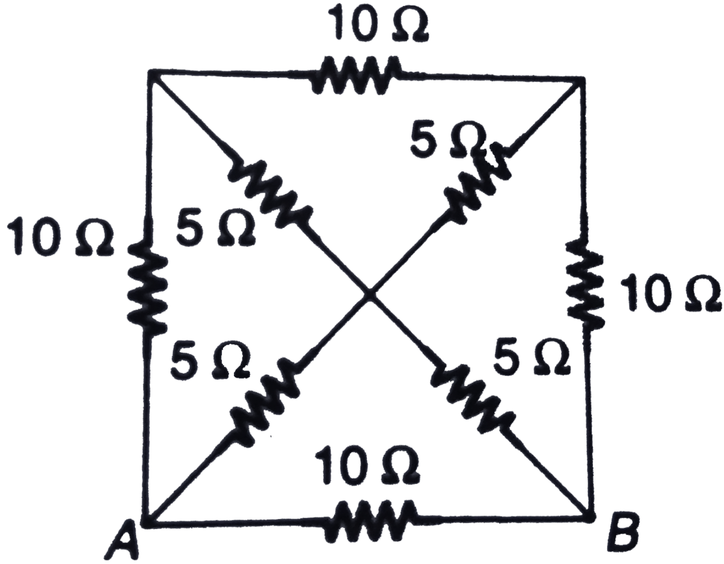


(a)

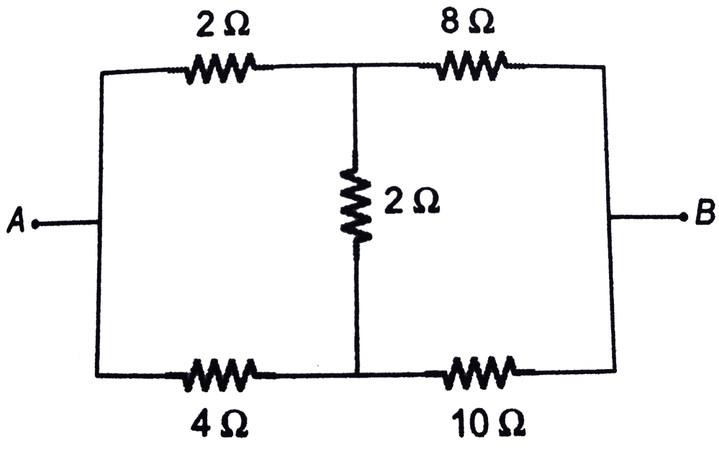


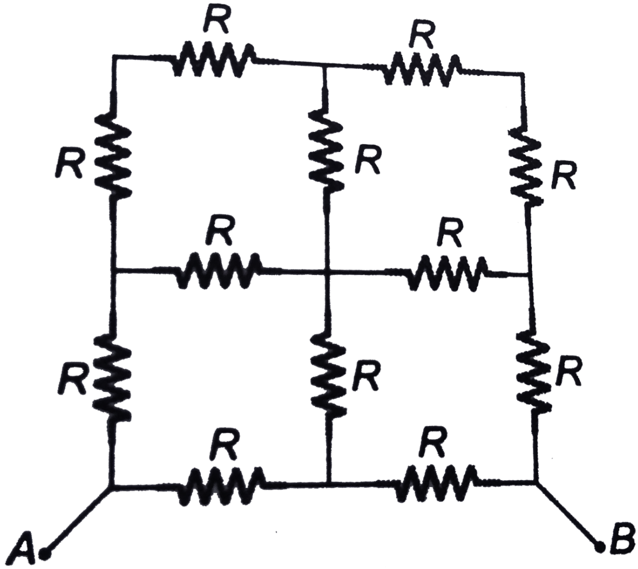


(c)

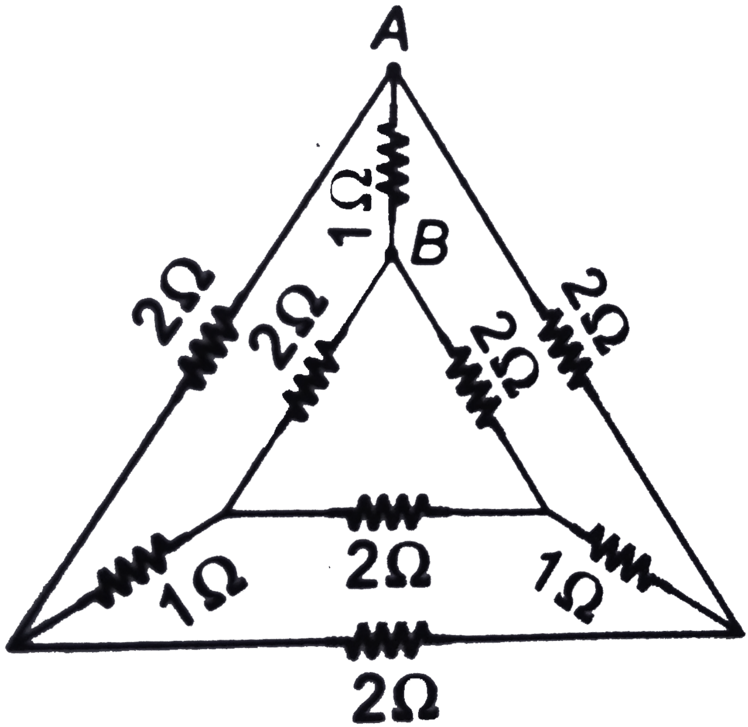


(d)





(f)



(g)

A. 31/42

B. 42/31

C. 23/25

D. 17/24

Answer: A

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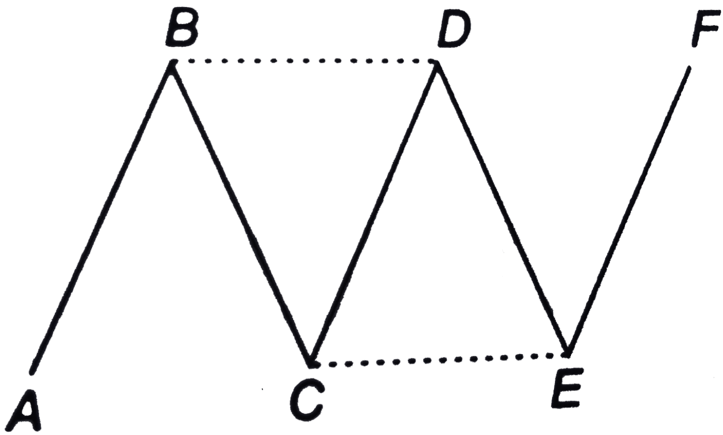
50. What will be the change in the resistance of a circuit between A and F consisting of five identical conductors, if two similar conductors are added as shown by the dashed line in figure?



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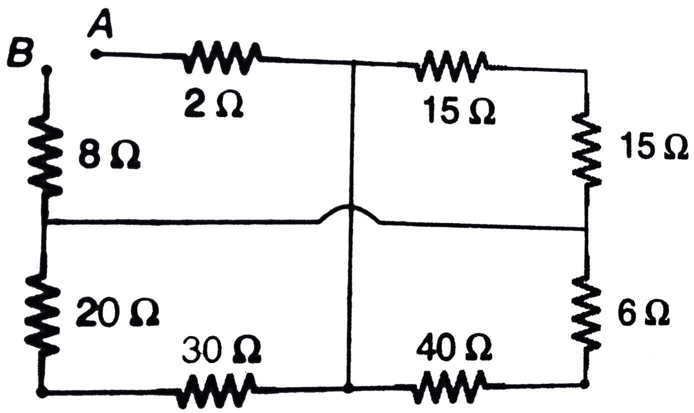
51. Find R_{AB} in the circuit shown in figure.



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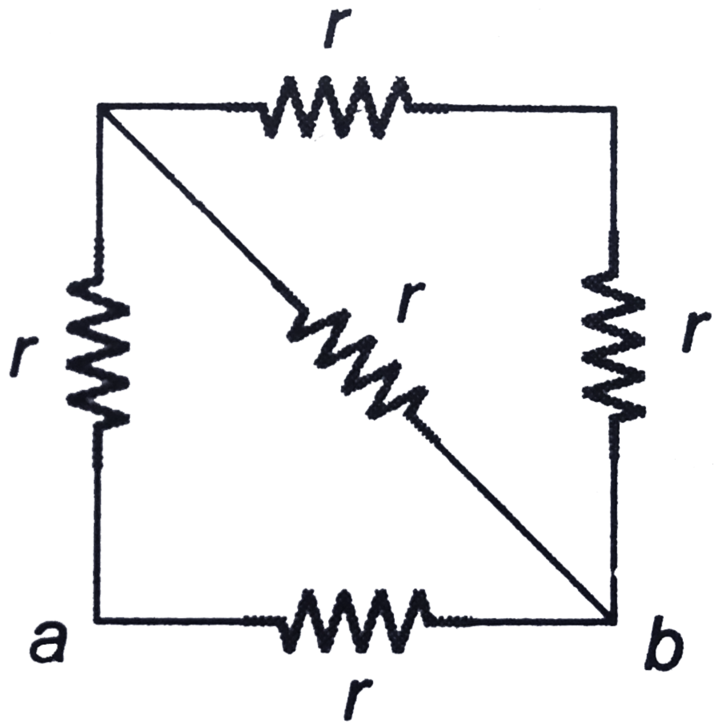
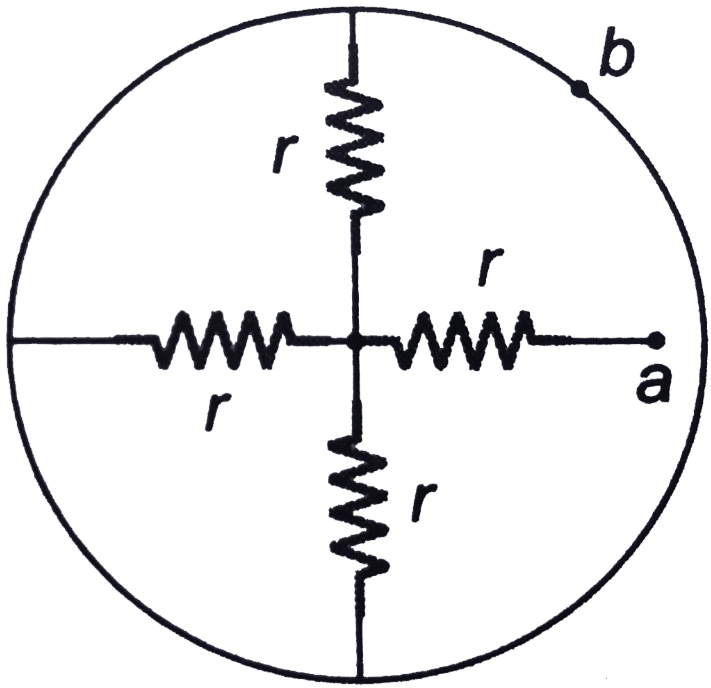
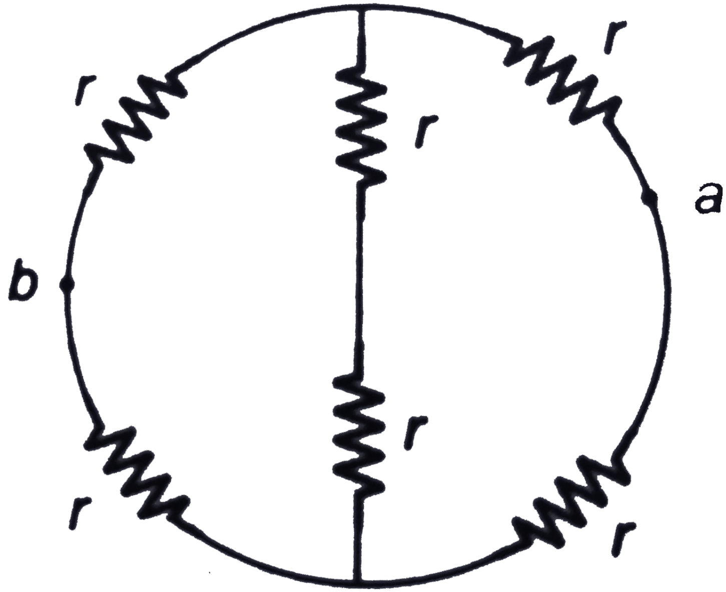
52. Find the equivalent resistance of the networks shown in figure between the points a and b.



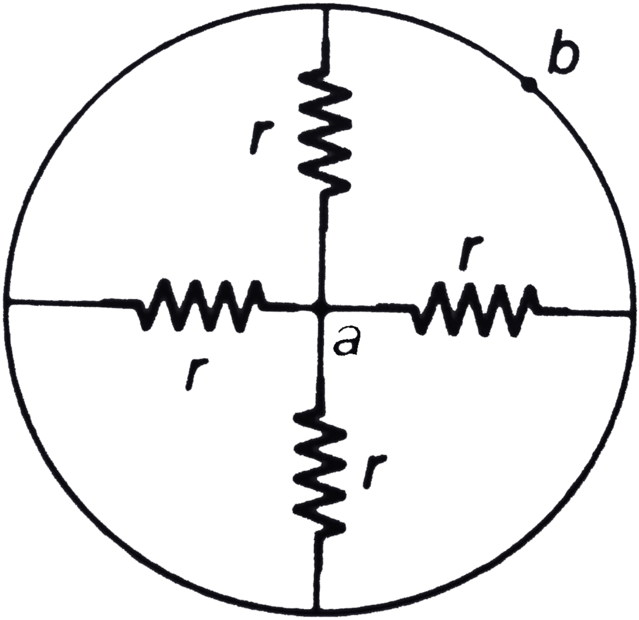
(a)



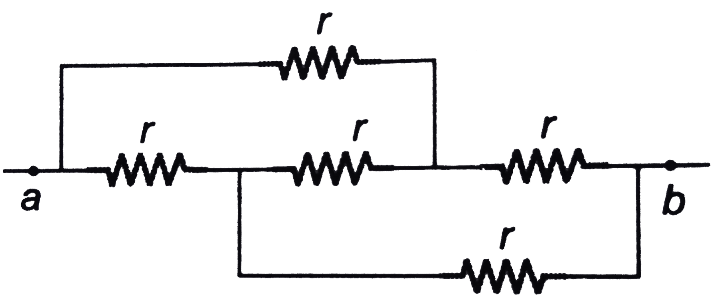
(b)



(c)



(d)



(e)

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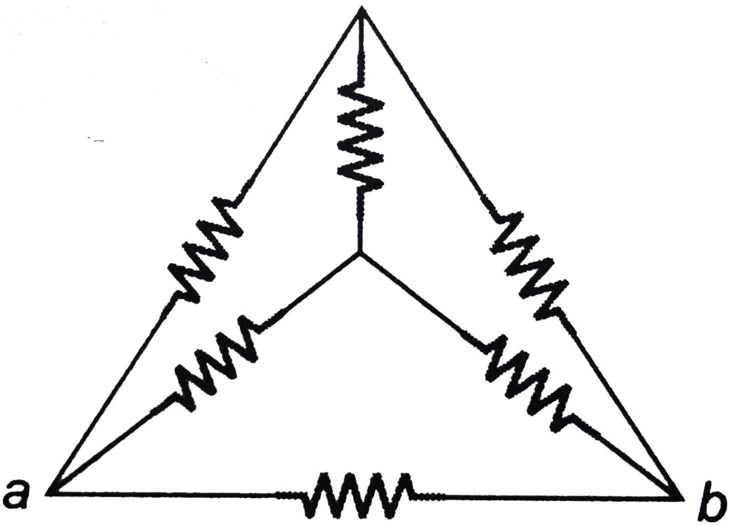
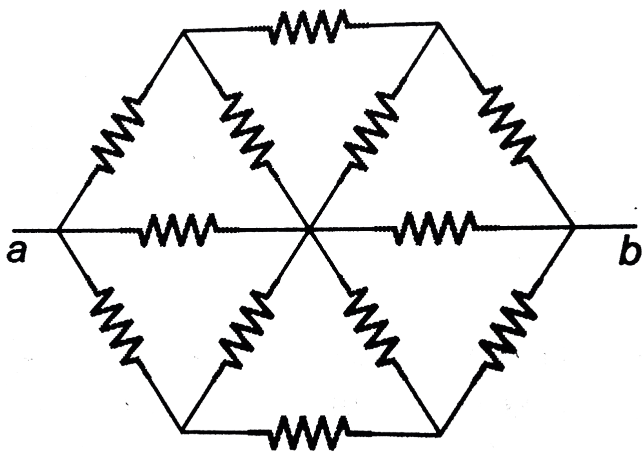
53. Find the equivalent resistance of the circuits shown in figure between the points a and b. Each resistor has a resistance r.



(a)



(b)

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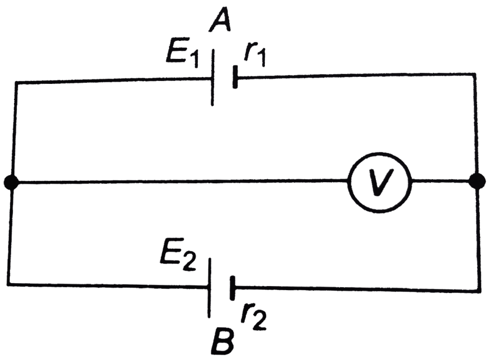
Level 2 Single Correct

1. Two cells A and B of emf $1.3V$ and $1.5V$ respectively are arranged as shown in figure. The voltmeter reads $1.45V$. The voltmeter is assumed to be ideal. Then



A. $r_1 = 2r_2$

B. $r_1 = 3r_2$

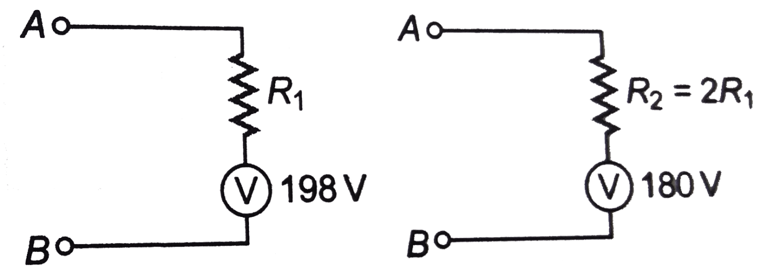
C. $r_2 = 2r_1$

D. $r_2 = 3r_1$

Answer: B

Watch Video Solution

2. A voltmeter connected in series with a resistance R_1 to a circuit indicates a voltage $V_1 = 198V$. When a series resistor $R_2 = 2R_1$ is used, the voltmeter indicates as voltage $V_2 = 180V$. If the resistance of the voltmeter is $R_V = 900\Omega$, then the applied voltage (in volt) across A and B is



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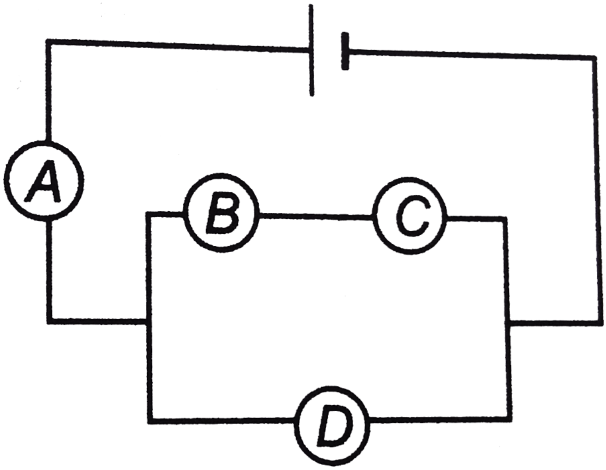
3. All bulbs in the circuit shown in figure are identical. Which bulb glows most brightly?



A. B

B. A

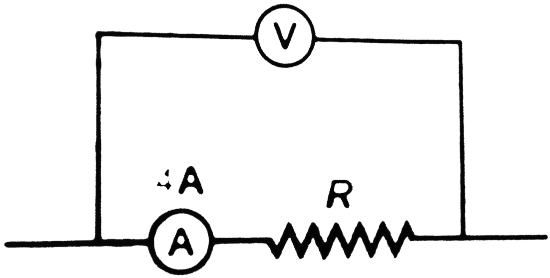
C. D

D. C

Answer: B

Watch Video Solution

4. A students connects an ammeter A and a voltmeter V to measure a resistancer as shown in figure. If the voltmeter reads $20V$ and the ammeter reads $4A$, then R is



A. equal to 5Ω

B. greater than 5Ω

C. less than 5Ω

D. greater or less than 5Ω depending upon the direction of current

Answer: C

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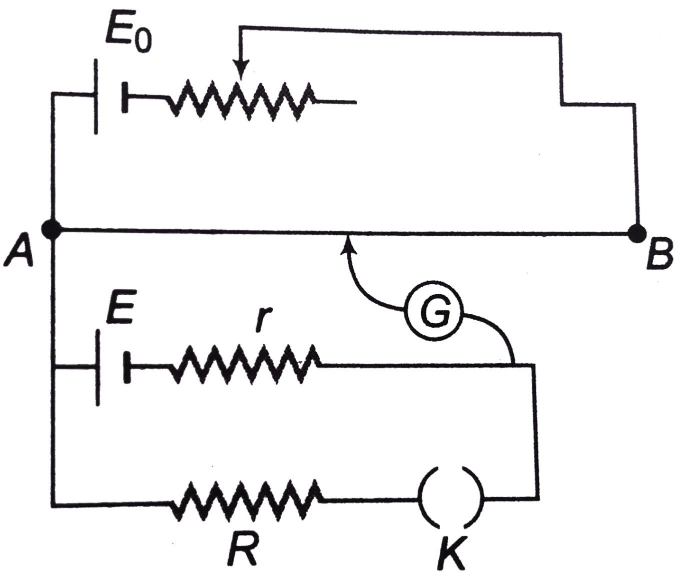
5. The given figure represents an arrangement of potentiometer for the calculation of internal resistance (r) of the unknown battery (E). The balance length is $70.0cm$ with the key opened and $60.0cm$ with the key closed. R is 132.40Ω. The internal resistance (r) of the uknown cell will be



A. 22.1Ω

B. 113.5Ω

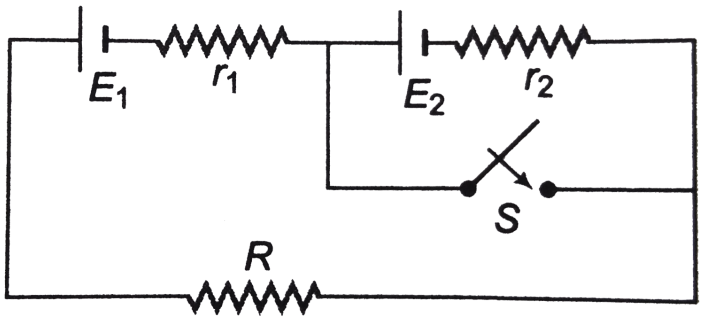
C. 154.5Ω

D. 10Ω

Answer: A

Watch Video Solution

6. Switch S is closed at time $t = 0$. Which one of the following statements is correct?



A. Current in the resistance R increases if $E_1 r_2 < E_r(R + r_1)$

B. Current in the resistance R increases if $E_1 r_2 > E_2(R + r_1)$

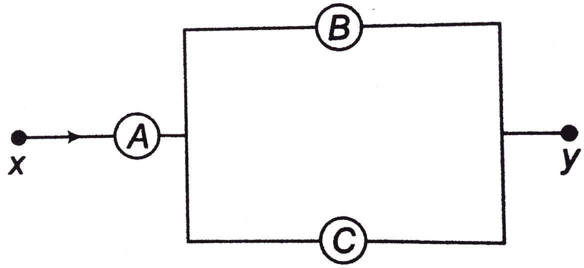
C. Current in the resistance R decreases if $E_1 r_2 > E_2(R + r_1)$

D. Current in the resistance R decreases if $E_1 r_2 = E_2(R + r_1)$

Answer: B

Watch Video Solution

7. A, B and C are voltmeters of resistances R, $1.5R$ and $3R$ respectively. When some potential difference is applied between x and y the voltmeter readings are V_A, V_B and V_C,` then



A. $V_A = V_B = V_C$

B. $V_A \neq V_B = V_C$

C. $V_A = V_B \equiv V_C$

D. $V_A + V_B = V_C$

Answer: A

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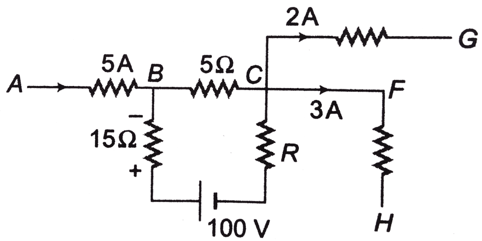
8. In the circuit shown the voltage drop across the 15Ω resistor is $30V$ having the polarity as indicated. The ratio of potential difference across 5Ω and resistance R is



A. $2/7$

B. 0.4

C. $5/7$

D. 1

Answer: D

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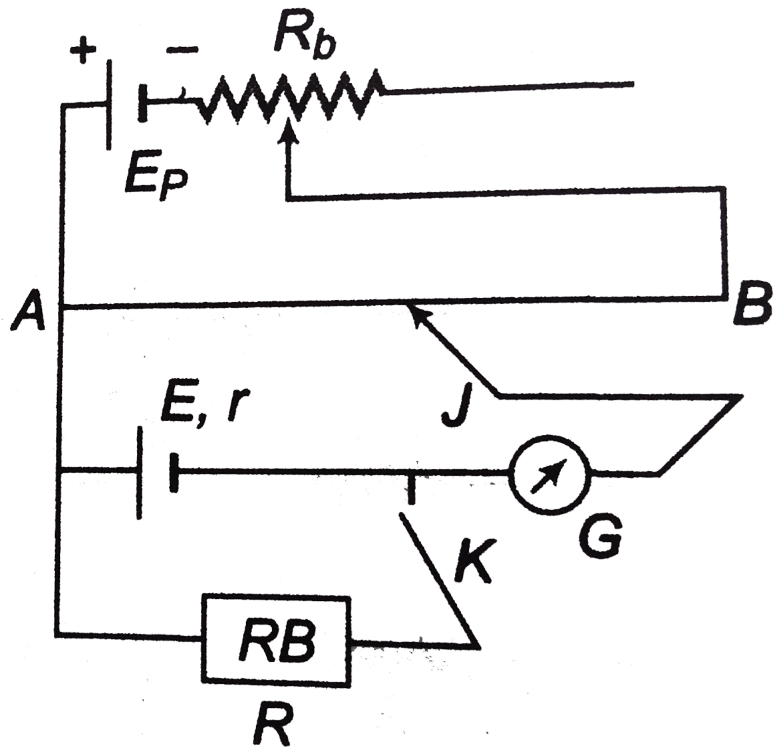
9. In an experiment on the measurement of internal resistance of as cell by using a potentionmeter, when the key K is kept open then balancing length is obtained at y metre. When the key K is closed and some resistance R is inserted in the resistance box, then the balancing length is found to be x metre. Then the internal resistance is



A. $\frac{(x-y)}{y} R$

B. $\frac{(y-x)}{x} R$

C. $\frac{(y-x)}{y}R$

D. $\frac{(x-y)}{x}R$

Answer: B

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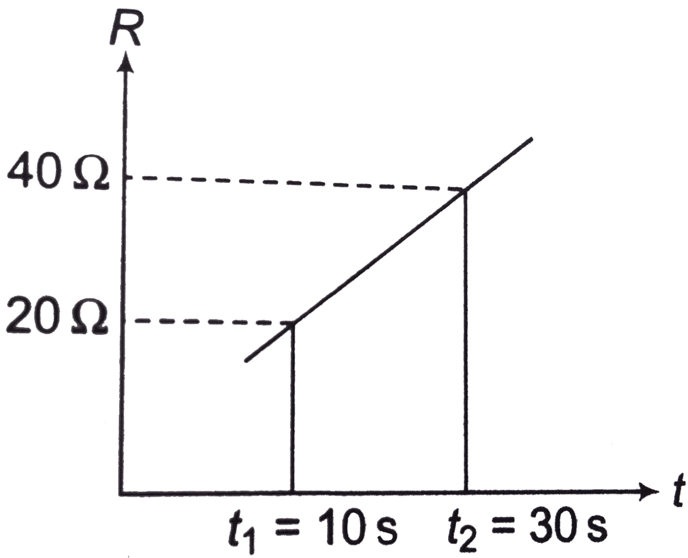
10. A source of emf $E=10V$ and having negligible internal resistance is connected to a variable resistance. The resistance varies as shown in figure. The total charge that has passed through the resistor R during the time interval from t_1 or t_2 is



A. $40 \log_4$

B. $30 \log_e 3$

C. $20 \log_e 2$

D. $10 \log_e 2$

Answer: D

Watch Video Solution

11. In order to increase the resistance of a given wire of unknown of uniform cross section to four times its value, a fraction of its length is stretched uniformly till the full length of the wire becoes $\frac{3}{2}$ times the original length. What is the value of this fraction?

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

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

C. $\frac{1}{16}$

D. $\frac{1}{6}$

Answer: B

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12. In a meter bridge, null point is $20cm$, when the known resistance R is shunted by 10Ω resistance, null point is found to be shifted by 10 cm. Find the unknown resistance X.

A. $10cm$

B. $20cm$

C. $30cm$

D. $40cm$

Answer: B

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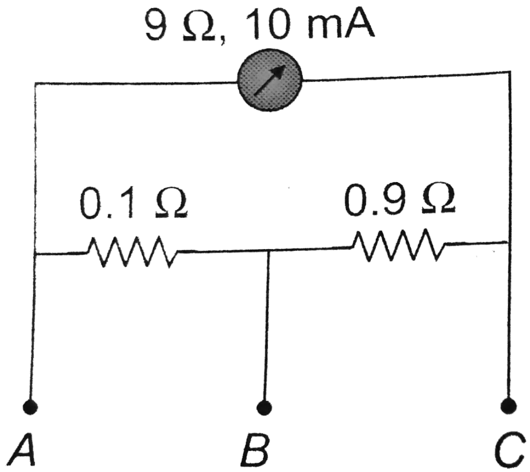
13. A milliammeter of range $10 mA$ and resistance 9Ω is joined in a circuit as shown. The meter gives full-scale deflection for curretn I when A and B are used as its terminals, i.e., current enters at A and leaves at B (C is left isolated). The value if I is



A. $100 mA$

B. $900 mA$

C. $1 A$

D. $1.1 A$

Answer: C

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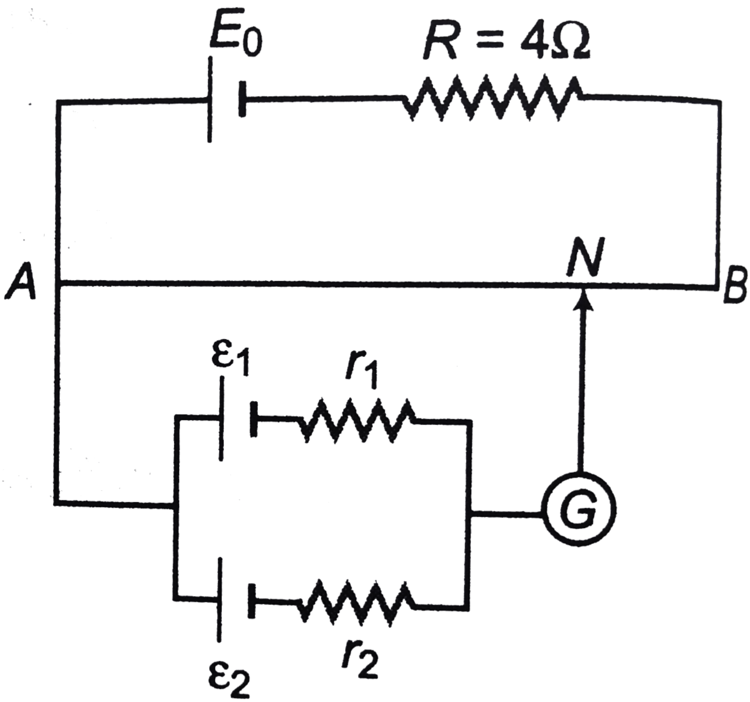
14. A battery of emf $E_0 = 12V$ is connected across a $4m$ long uniform wire having resistance $4\Omega/m$. The cell of small emfs $\varepsilon_1 = 2V$ and $\varepsilon_2 = 4V$ having internal resistance 2Ω and 6Ω respectivley are connected as shown in the figure. If galvanometer shows no diflection at the point N the distance of points N from the point A is equal to



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

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

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

D. none of these

Answer: D

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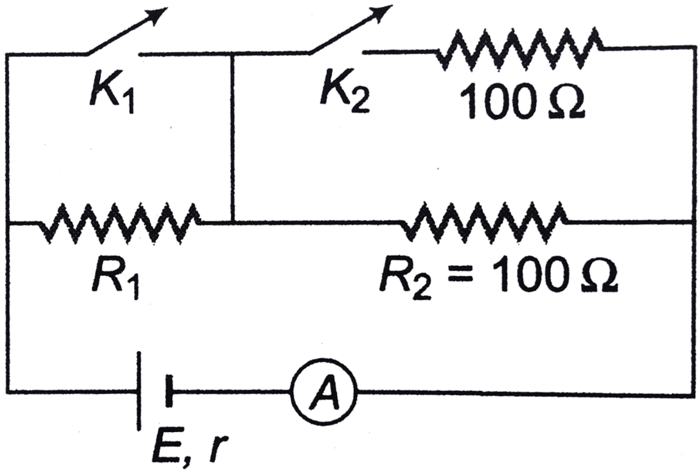
15. In the circuit shown, keys K_1 and K_2 both are closed the ammeter reads I_0. But when $K_1$is open and K_2 is closed, the ammeter reads $I_0/2$. Assuming that ammeter resistance is much less than R_2, the values of r

and R_1 is Omega are



A. 25,50

B. 25,100

C. 0,100

D. 0,50

Answer: D

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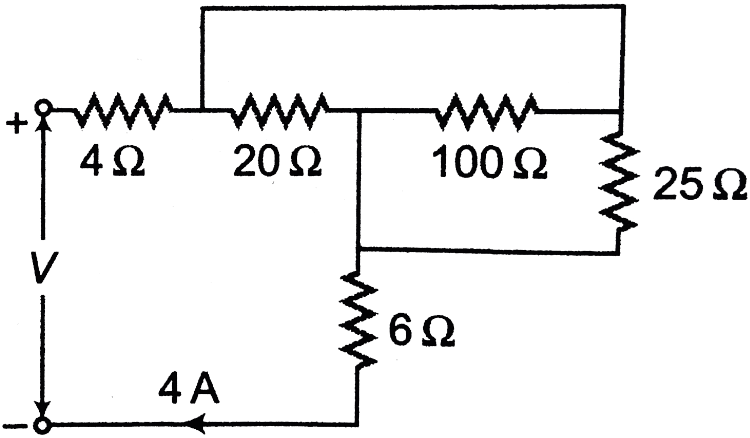
16. In the circuit shown in figure , V must be



A. $50V$

B. $80V$

C. $100V$

D. $1290V$

Answer: B

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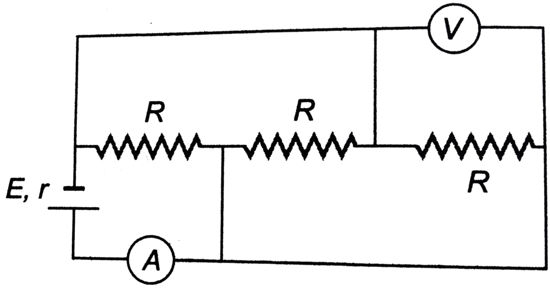
17. In the circuit shown in figure ammeter and voltmeter are ideal. If $E = 4V, R = 9\Omega$ and $r = 1\Omega$ then readings of ammeter and voltmeter are



A. $1A, 3V$

B. $2A, 3V$

C. $3A, 4V$

D. $4A, 4V$

Answer: A

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18. A moving coil galvnometer is converted into an ammeter reading up to $0.03A$ by connecting a shunt of resistance $\frac{r}{4}$. What is the maximum current which can be sent through this galvanometer if no shunt is used (here r=resistance of galvanometer)

A. $0.004A$

B. $0.005A$

C. $0.006A$

D. $0.008A$

Answer: C

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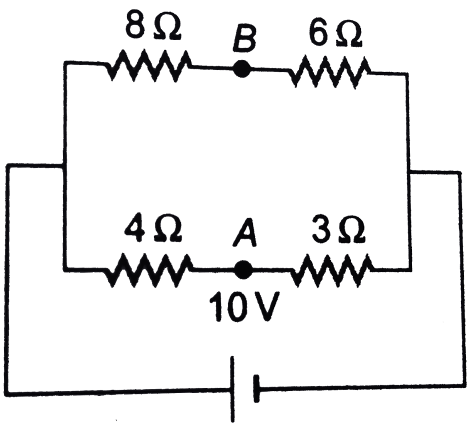
19. The potential difference between points A and B is



A. $\frac{20}{7}V$

B. $\frac{40}{7}V$

C. $\frac{10}{7}V$

D. zero

Answer: D

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20. Two wires A and B made of same material and having their lengths in the ratio $6:1$ are connected in series The potential difference across the wire $3V$ and $2V$ respectively. If r_A and r_B are the radii of A and B respectively, then $\frac{r_B}{r_A}$ is

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

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

C. 1

D. 2

Answer: B

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

A. 4450Ω

B. 5050Ω

C. 5550Ω

D. 6050Ω

Answer: A

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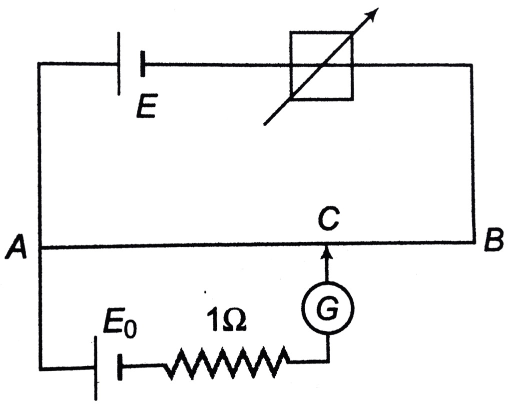
22. Figure shows a potentiometer arrangement with $R_{AB} = 10\Omega$ and rheostat of variable resistance d. For $x = 0$ null deflection point is found at $20cm$ from A. For unknown value of x null deflection point was at $30cm$ from A, then the value of x is



A. 10Ω

B. 5Ω

C. 2Ω

D. 1Ω

Answer: B

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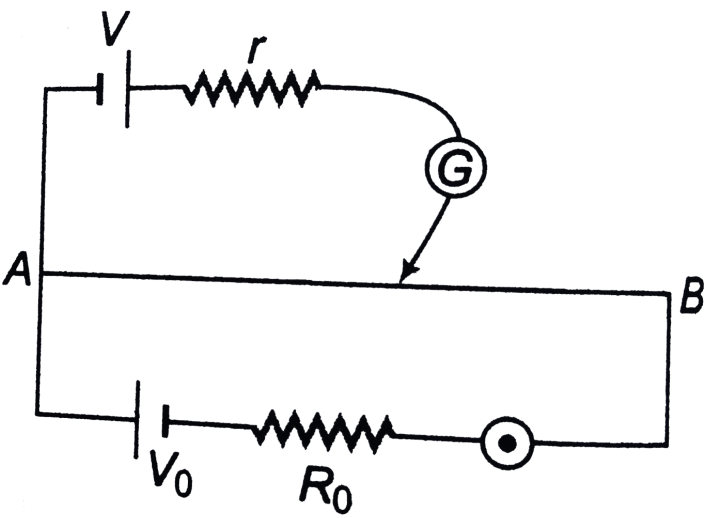
23. In the given potentiometer arrangemeter the null point



A. can be obtained for any value of V

B. can be obtained only if $V < V_0$

C. can be obtained only if $V > V_0$

D. can never be obtained

Answer: D

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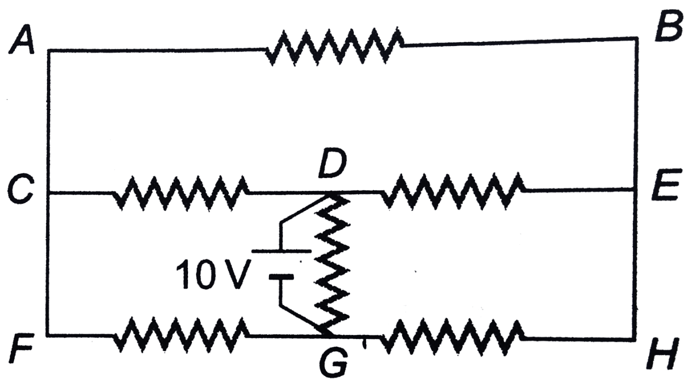
24. All resistance shown in the circuit are 2Ω each. The current in the resistance between D and E is



A. $5A$

B. $2.5A$

C. $1A$

D. $7.5A$

Answer: B

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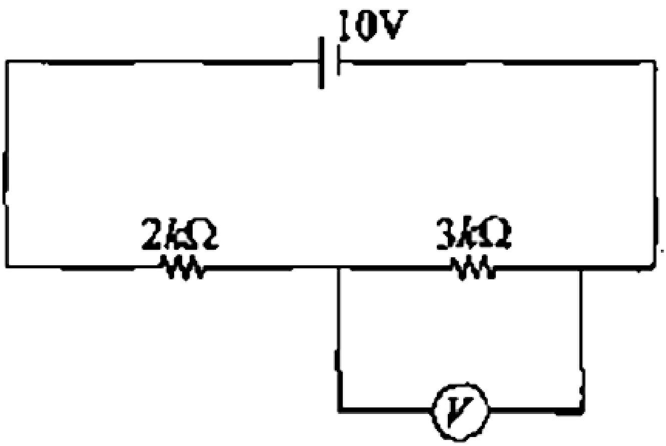
25. Iri the circuit shown in figure-3.334, the resistance of voltmeter is$6k\Omega$.

The voltmeter reading will be :



A. $6V$

B. $5V$

C. $4V$

D. $3V$

Answer: B

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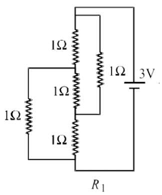
26. Figure shows three resistor configurations R_1, R_2 and R_3 connected to 3V battery. If the power dissipated by the configuration R_1, R_2 and R_3 is P_1, P_2 and P_3, respectively. Then -



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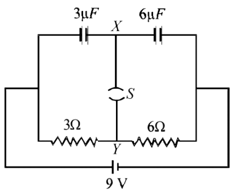

,

A. $1:1:1$

B. $4:4:1$

C. $4:1:1$

D. $1:4:4$

Answer: D

Watch Video Solution

Level 2 More Than One Correct

1. Two heaters designed for the same voltage V have different power ratings. When connected individually across as source of voltage$V$, they produce H amount of heat each in time t_1 and t_2 respectively. When used together acros the same source, they produce H amount of heat in time t

A. if they are in series $t = t_1 + t_2$

B. if they are in series $t = 2(t_1 + t_2)$

C. if they are in parallel $t = \dfrac{t_1 t_2}{(t_1 + t_2)}$

D. if they are in parallel $t = \dfrac{t_1 t_2}{2(t_1 + t_2)}$

Answer: A::C

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2. Two cells of emf $E_1 = 6V$ and $E_2 = 5$ are joined in parallel with same polarity on same side without any external load. If their internal resistance are $r_1 = 2\Omega$ and $r_2 = 3\Omega$ respectively, then

A. terminal potentiasl difference across any cell is less than $5V$

B. terminal potential differences any cell is $5.6V$

C. current through the cells is $0.2A$

D. current through the cells is zero if $E_1 = E_2$

Answer: B::C::D

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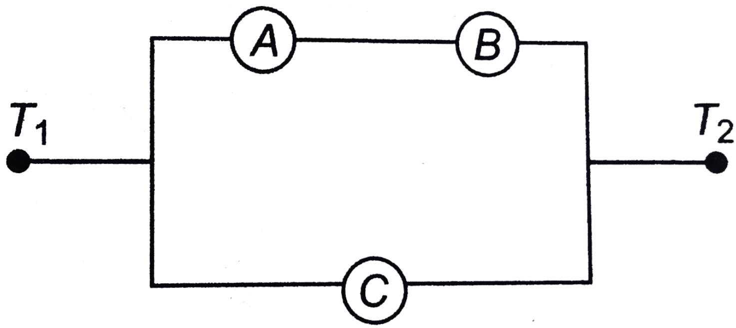
3. Three ammeters $A, B,$ and C of resistances R_A, R_b and R_C respectively are joined as shown. When some potential difference is appllied across the terminals T_1 and T_2 their readings are I_A, I_B and I_C

respectively Then,



A. $I_A = I_B$

B. $I_A R_A + I_B R_B = I_C R_C$

C. $\dfrac{I_A}{I_C} = \dfrac{R_C}{R_A}$

D. $\dfrac{I_B}{I_C} = \dfrac{R_C}{R_A + R_B}$

Answer: A::B::D

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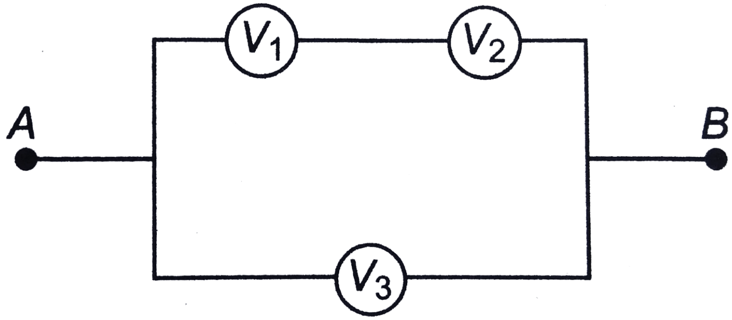
4. Three voltmeters all having different resistance, are joined as shown. When some potential difference is applied acros A and B, their readings are V_1, V_2 and V_3. Then



A. $V_1 = V_2$

B. $V_1 \neq V_2$

C. $V_1 + V_2 = V_3$

D. $V_1 + V_2 > V_3$

Answer: B::C::D

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5. Two conductors made of the same material have lengths L and $2L$ but have equal resistance. The two are connected in series in a circuit which current is flowing. Which of the following is/are correct?

A. The potential difference across the two conductors is the same

B. the drift speed is larger inte conductor of lengthL

C. The electric field in the first conductor is twice that in the second

D. the electric field in the second conductor is twice that in the first

Answer: A::B::C

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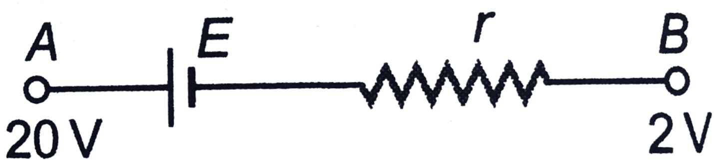
6. In the figure shown, find the incorrect statement



A. current will flow from A to B

B. current may flow A to B

C. current may flow from B to A

D. the direction of current will depend on E

Answer: B::C::D

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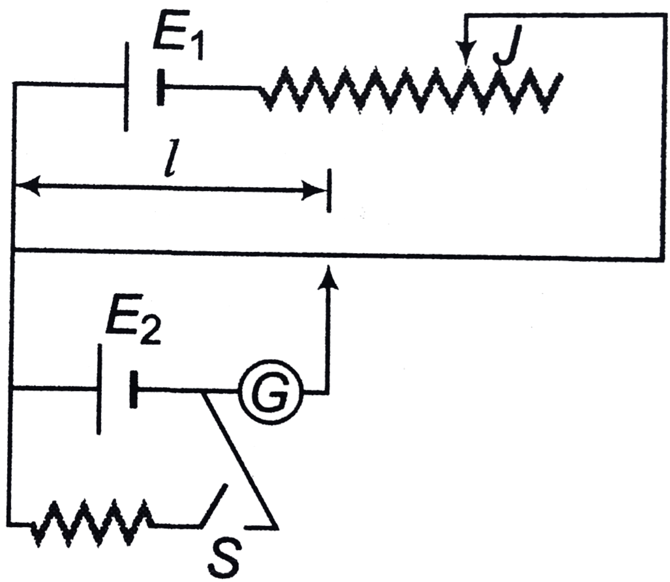
7. In the poteniometer experiement shown in figure, the null point length is l. Choose the correct options given below



A. If jockey J is shifted towards right l will increse

B. if value of E_1 is increased l is decreased

C. if valued of E_2 is incresed I in increased

D. if switched S is closed I will decrease

Answer: A::B::C::D

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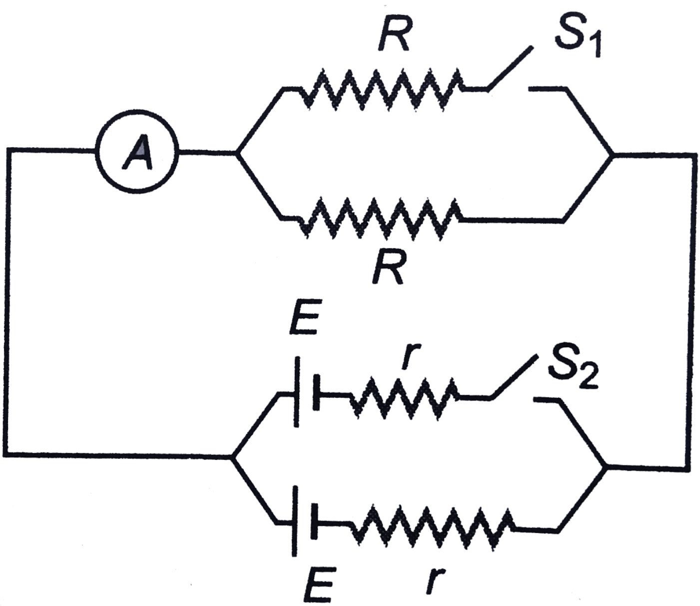
8. In the circuit shown in figure, reading of ammeter will



A. shows no deflection if S_1 is closed

B. decrease if S_2 is closed

C. increase if S_2 is closed

D. decrease if S_2 is closed

Answer: C

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9. In the circuit shown in figure it is given that $V_b - V_a = 2$ volt. Choose the correct options

A. current in the wiere of 6 A

B. direction of current is from a to b

C. $V_a - V_c = 12$ volt

D. $V_C - V_a = 12\text{volt}$

Answer: A::D

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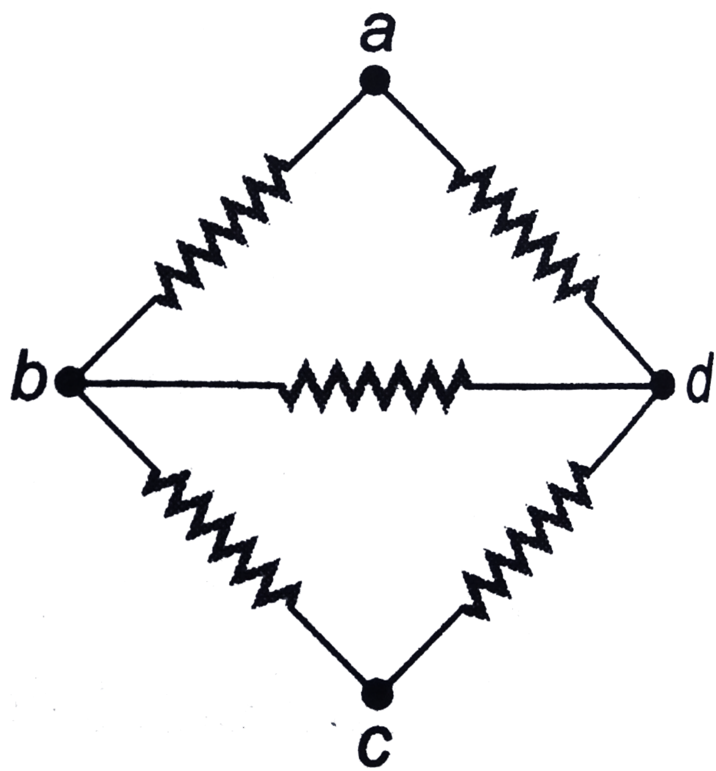
10. Each resistance of the network shown in figure is r. Net resistance between



A. a and b is $\frac{7}{3}r$

B. a and c is$r$

C. b and d is$r$

D. b and d is $\frac{r}{2}$

Answer: B::D

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Level 2 Comprehension Example Type

1. The length of a potentiometer wire is $600cm$ and it carries a current of $40mA$. For a cell of emf $2V$ and internal resistance 10Ω, the null point is found to be at $500cm$. On connecting a voltmeter across the cell, the balancing length is decreased by $10cm$

The voltmeter reading will be

A. $1.96V$

B. $1.8V$

C. $1.64V$

D. $0.96V$

Answer: A

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2. The length of a potentiometer wire is 600 cm and it carries a current of $40mA$. For a cell of emf $2V$ and internal resistance 10Ω, the null point is found to be at $500cm$. On connecting a voltmeter acros the cell, the balancing length is decreased by $10cm$

The resistance of the voltmeter is

A. 500Ω

B. 290Ω

C. 490Ω

D. 20Ω

Answer: C

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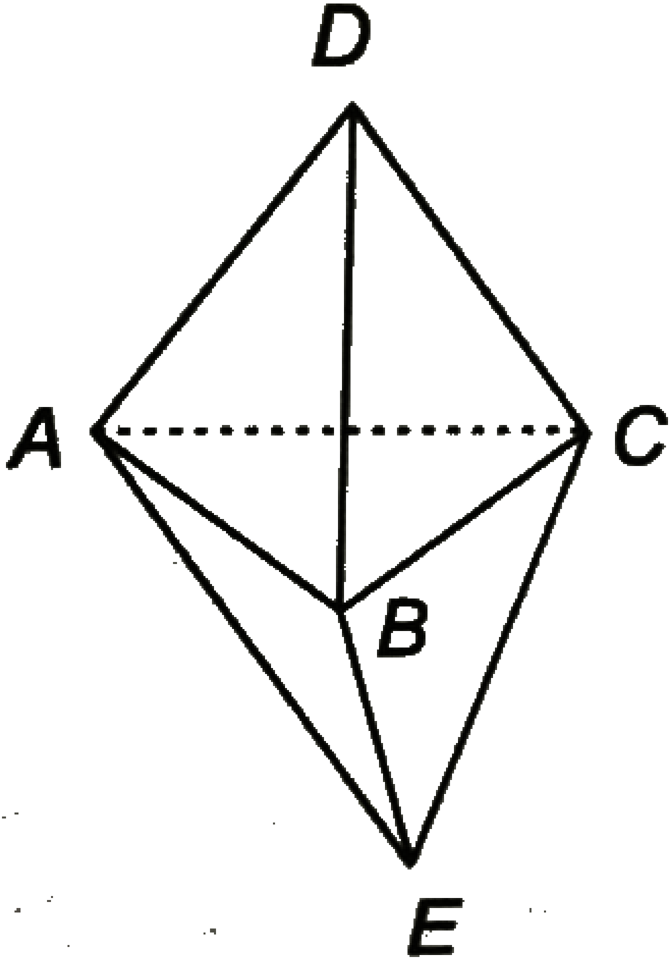
Level 2 Subjective

1. Find the equivalent resistance of the triangular bipyramid between the points.



a. A and C , b. D and E`

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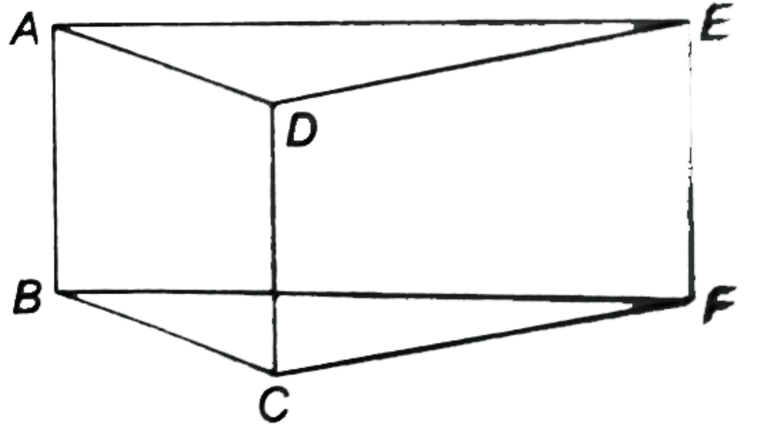
2. Nine wires each of resistance are connected to make a prism as shown in figure. Find the equivalent resistance of the arrangement across

a. AD b. AB



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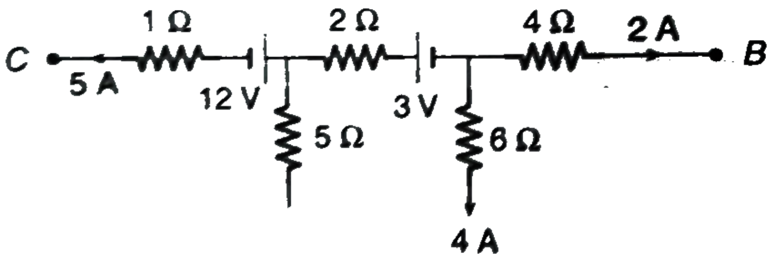
3. The figure shows part of certain circuit, find,



a. power dissipated in 5Ω resistance,

b.Potential difference $V_C - V_B$

c.Which battery is being charged?

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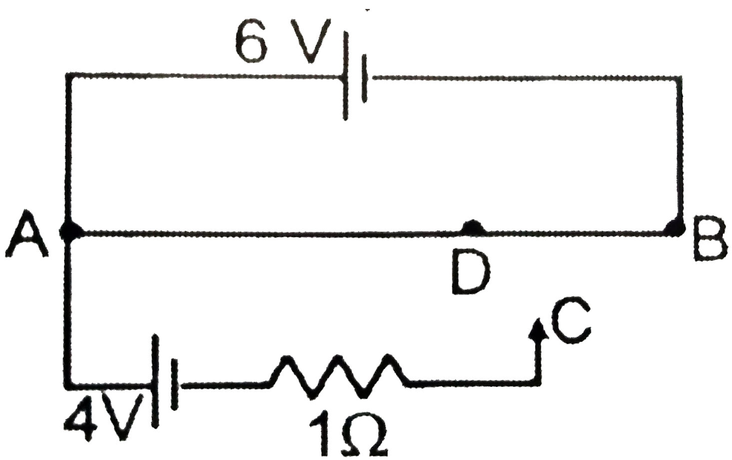
4. A 6 volt battery of negligible internal resistance is connected across a uniform wire AB of length $100cm$. The positive terminal of another battery of emf 4V and internal resistance 1Ω is joind to the point A as shown in figure. Take the potential at B to be zero. (a) What are the potentials at the points A and C ? (b) At which D of the wire AB, the potential is equal to the potential at C. (c) If the point C and D are connected by a wire. What will be the current through is ? (d) Id the 4V batteryt is replaced by 7.5 V battery, what whould be the answers of parts (a) and (b) ?



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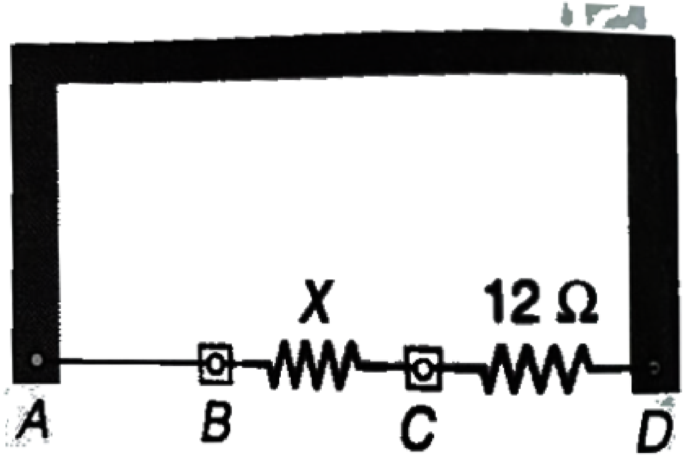
5. A thin uniform wire AB of length $1m$, an unknown resistance X and a resistance of 12Ω are connected by thick conducting strips, as shown in the figure. A battery and a galvanometer (with a sliding jockey connected to it) are also available. Connections are to be made to measure the unknown resistance X. Using the principle of Wheatstone bridge answer the following questions :

(a) Are there positive and negative terminals on the galvanometer?

(b) Copy the figure in your answer book and show the battery and the galvanometer (with jockey connect at appropriate points.

(c) After appropriate connections are made, it is found that no deflection takes place in th, from galvanometer when the sliding jockey touches the wire at a distance of $60cm$ from A. Obtain value of the resistance X.



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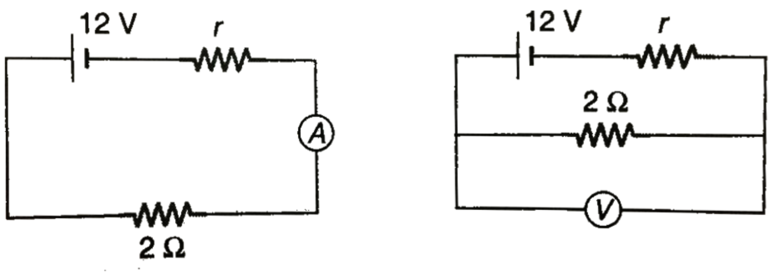
6. A galvanometer (coil resistance 99Ω.) is converted into an ammeter using a shunt of 1Ω and connected as shown in figure (a). The ammeter reads $3A$. The same galvanometer is convened into a voltmeter by connecting a resistance of 101Ω in series. This voltmeter is connected at, shown in figure (b). Its reading is found to be $\frac{4}{5}$ of the full scale reading. Find :

(a) internal resistance r of the cell

(b) range of the ammeter and voltmeter

(c) full scale deflection current of the galvanometer.



(a) (b)

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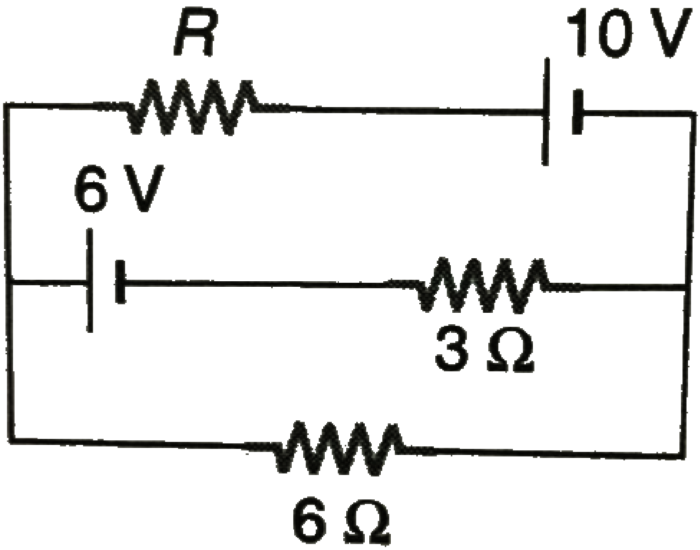
7. In a circuit shown in figure if the internal resistances of the sources are negligible then at what value of resistance R will the thermal power generated in it will be the maximum. What is the value of maximum power?



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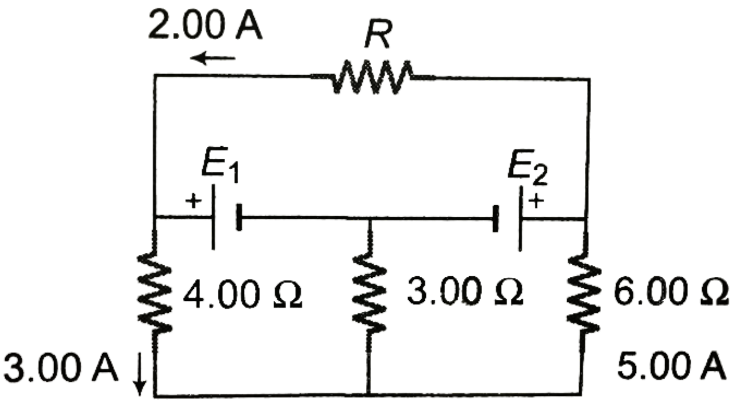
8. In the circuit shown in figure find:



(a). the current in the 3.00Ω resistor,

(b) the unknown emfs E_1 and E_2 and

(c) the resistance R.

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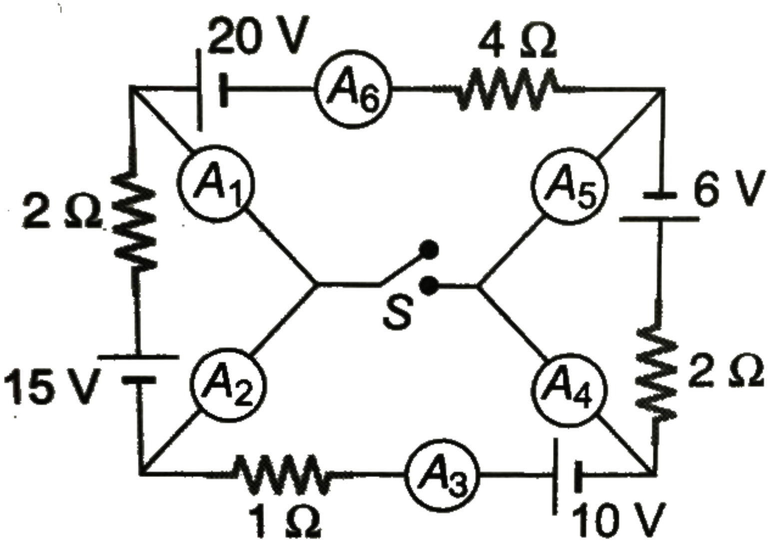
9. In the circuit shown all the ammeters are ideal.



(a), If the switch S is open, find the reading of all ammeters and the potential difference across the switch.

(b) If the switch S is closed, find the current through all ammeters and the switch also.

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10. 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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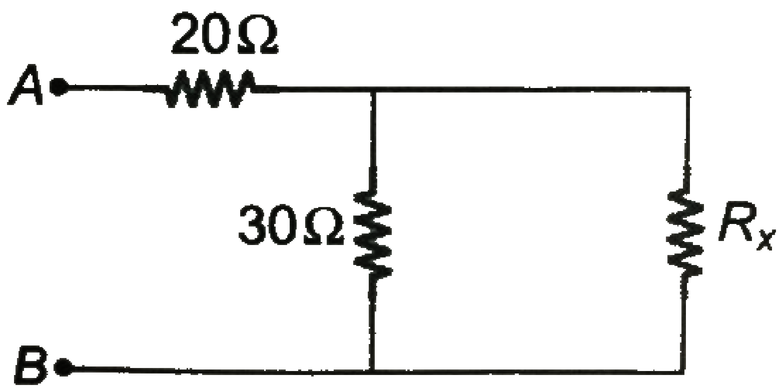
11. A circuit shown in the figure has resistances 20Ω and 30Ω. At what value of resistance R_x will the thermal power generated in it be practically independent of small variations of that resistance? The voltage between points A and B is supposed to be constant in this case.



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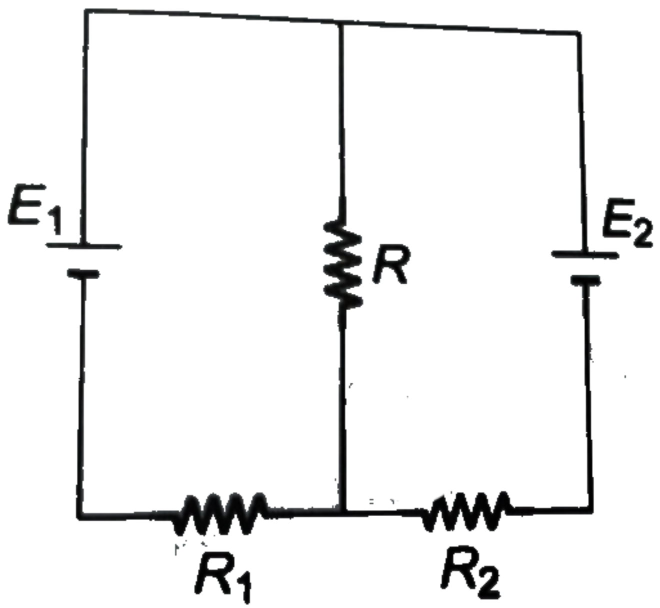
12. In the circuit shown in figure, the emfs of batteries are E_1, and E_2 which have internal resistances R_1, and R_2. At what value of the resistance R will the thermal power generated in it be the highest? What it is?



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13. A conductor has a temperature independent resistance R and a total heat capacity C. At the moment $t = 0$ it is connected to a DC voltage V. Find the times dependence of the conductors temperature t assuming the thermal power dissipated into surrounding space to vary as $q = k(T - T_0)$ where k is a constant T_0 is the surrounding temperature (equal to conductor's temperature at the initial moment).

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Example

1. How many electrons pass through a bulb in 1 min, if the current is 400 mA $\left(e = 1.6 \times 10^{-19} C\right)$?

A. 15×10^{-19}

B. 15×10^{19}

C. 1.5×10^{19}

D. 1.5×10^{-19}

Answer: B

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2. 10^{20} electrons, each having a charge of 1.6×10^{-19} C, pass from a point A towards another point B in 0.1 s. What is the current in ampere ? What is its direction ?

A. 160 A from B to A

B. 160 A from A to B

C. 16 A from B to A

D. 16 A from A to B

Answer: A

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3. A wire carries a current of $2.0A$. What is charge that has flowed through is cross section in $1.0s$? How many electrons does his correspond to?

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4. If an elctron revolves in a circle of radius $\pi/2$ cm with uniform speed $6 \times 10^5 m/s$. Find the electric currect. (Take, $\pi^2 = 10$)

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5. (a) The amount of charge passed in time t through a cross-section of wire is

$q = \alpha t - \beta t^2$

where α and β are constant.

(i) Find current in terms of time t.

(ii) Sketch i versus t graph.

(b) The current through a wire depends on time as

$i = 4 + 3t + 2t^2$

Find the charge crossed through a section of wire in 6 sec.

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6. The current in a wire varies with time according to the relation

$i = (3.0A) + (2.0A/s)t$

a. How many coulomns of charge pass a cross section of the wire in the time internal between $t = 0$ and $t = 4.0s$?

b. What constant current would transport the same charge in the same time interval?

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7. An electron beam has an aperture of $2mm^2$. A total of 7×10^{16} electrons flow through any perpendicular cross-section per second. Calculate the current density in the electron beam.

A. $2.4 \times 10^3 A/m^3$

B. $3.9 \times 10^3 A/m^3$

C. $5.6 \times 10^3 A/m^3$

D. None of these

Answer: C

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8. Find the current flowing through a copper wire of length 0.2m, area of cross-section $1mm^2$, when connected to a battery of 4 V. Given that electron mobility $= 4.5 \times 10^{-6} m^2 V^{-1} s^{-1}$ and charge on electron $= 1.6 \times 10^{-19} C$. The number density of electron in copper is $8.5 \times 10^{28} m^{-3}$.

A. 4.22 Amp

B. 1.22 Amp

C. 9.8 Amp

D. 3.12 Amp

Answer: B

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9. An aluminium wire of diameter 0.24 cm is connected in series to a copper wire of diameter 0.16 cm. The wires carry an electric current of 10 ampere. Find (i) current-density in the aluminium wire (ii) drift velocity of electrons in the copper wire. Given : Number of electrons per cubic metre volume of copper $= 8.4 \times 10^{28}$.

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10. What is the drift velocity of electrons in a silver wire of length 2 m, having cross-sectional area $6.14 \times 10^{-6} m^2$ and carrying a current of 5A. Given, atomic weight of silver = 108, density of silver $= 9.5 \times 10^3 kg/m^3$, charge of electron $= 1.6 \times 10^{-9} C$, Avogadro's number $= 6.023 \times 10^{26}$ per kg atom?

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11. The resistance of a wire is R ohm. What will be its new resistance if it is stretched to n times its original length ?

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12. Resistance of a conductor of length l and area of cross-section A is R. If its length is doubled and area of cross-section is halved, then find its new resistance.

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13. All the edges of a block with parallel faces are unequal. Its longest edge is twice its shortest edge. The ratio of the maximum to minimum resistance between parallel faces is.

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14. Calculate the electric field in a copper wire of cross-sectional area $2.0mm^2$ carrying a current of 1A .The resistivity of copper $= 1.7 \times 10^{-8}(\Omega)m.$

A. E=8.5mV/m

B. E=2.5mV/m.

C. E=3.5mV/m.

D. E=5.5mV/m.

Answer: A

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15. A copper wire has a resistance of 10Ω and an area of cross-section $1mm^2$. A poetential difference of 10 V exists across the wire. Calculate the drift speed of electrons if the number of electrons per cubic metre in copper is 8×10^{28} electrons.

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16. A current of 1.0 ampere is flowing through a copper wire of length 0.1 metre and cross-section $1.0 \times 10^{-6} m^2$. (i) If the specific resistance of copper be $1.7 \times 10^{-8} \Omega m$, calculate the potential difference across the ends of the wire. (ii) Determine current density in the wire. (iii) If there be one free electron per atom in copper, then determine the drift velocity of electrons. Given : density of copper $= 8.9 \times 10^3 kgm^{-3}$, atomic weight $= 63.5$, $N = 6.02 \times 10^{26}$ per kg-atom.

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17. Find the relaxation time for free electrons in copper, if the density of mobile electrons in copper, if the density of mobile electrons is $8.4 \times 10^{28} m^{-3}$. The resistivity of copper at room temperature is $1.7 \times 10^{-8} \Omega m$.

Given : mass of electron $= 9.11 \times 10^{-31} kg$ and charge on electron $= 1.6 \times 10^{-19} C$.

A. 2.49×10^{-14} second

B. 1.9×10^{-8} second

C. 2.49×10^{14} second

D. none

Answer: A

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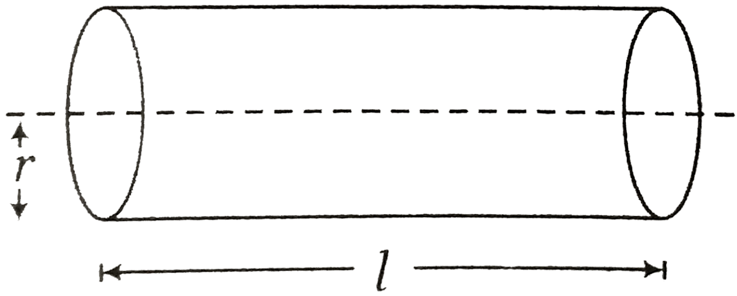
18. A wire has a resistance R. Find new resistance,

(i) if radius of cross-section of a cylindrical wire is doubled, then find ratio of initial to final resistance.

(ii) if length of wire is increased by 10%, then find the percentage increase in its resistance.

(iii) if length of wire is increased by 20%, then find the percentage increase in its resistance.



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19. The resistance of a thin silver wire is 1.0Ω at $20^\circ C$. The wire is placed in a liquid bath and its resistance rises to 1.2Ω. What is the temperature of the bath? α for silver is $3.8 \times 10^{03} / (.^\circ C)$

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20. Resistance of platinum wire in a platinum resistance thermometer at melting ice, boiling water and at a hot bath are $6\Omega, 6.5\Omega$ and 6.2Ω, respectively. Find temperature of hot bath.

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21. The temperature coefficient of resistance of a wire is $0.00145^{\circ}C^{-1}$. At $100^{\circ}C$ its resistance is 2Ω. At what temperature the resistance of the wire be 3Ω?

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22. How will you repersent a resistance of $3700\Omega \pm 10\%$ by colour code?

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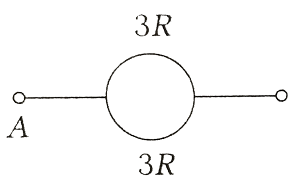
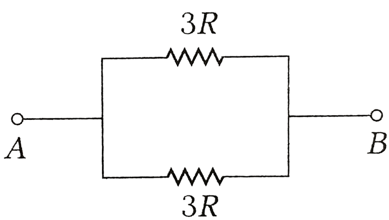
23. A wire of resistance 6R is bent in the form of a circle. What is the effective resistance between the ends of the diameter?





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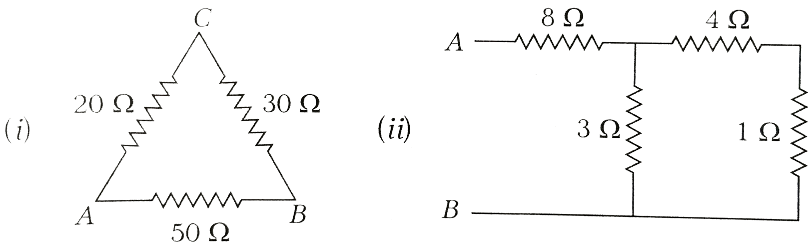
24. Find the equivalent resistance between A and B in the following cases



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25. A letter A consists of a uniform wire of resistance 1 ohm per cm. The sides of the letter are each 20 cm long and the cross-piece in the middle is 10 cm long while the apex angle is 60°. Find the resistance of the letter between the two ends of the legs.

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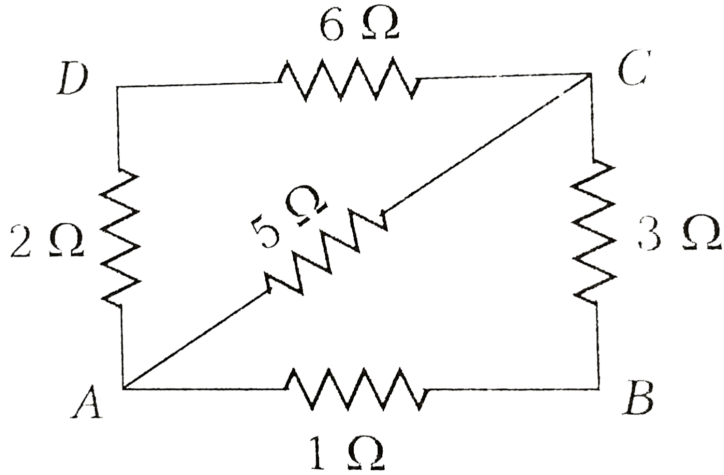
26. Find in the given network of resistors, the equivalent resistance between the points A and B, between A and D.



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27. Find the effective resistance between points A and B for the network shown in the figure below.

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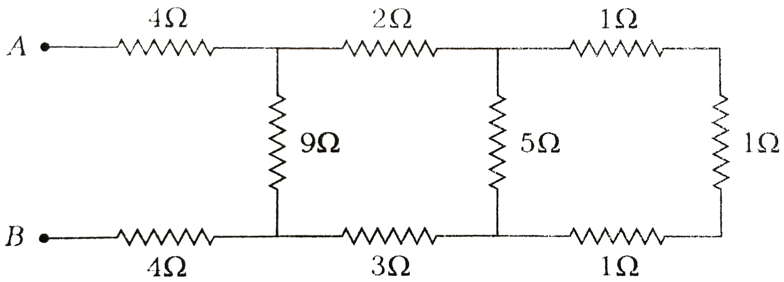
28. Find the equivalent resistance between A and B in the following case



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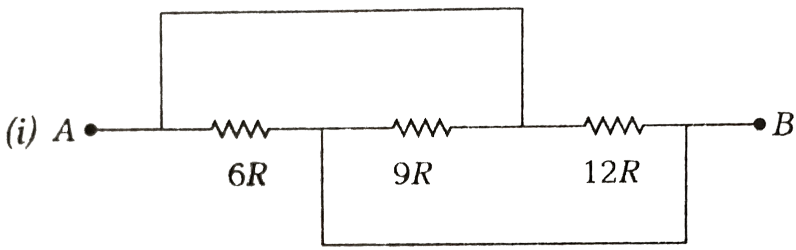
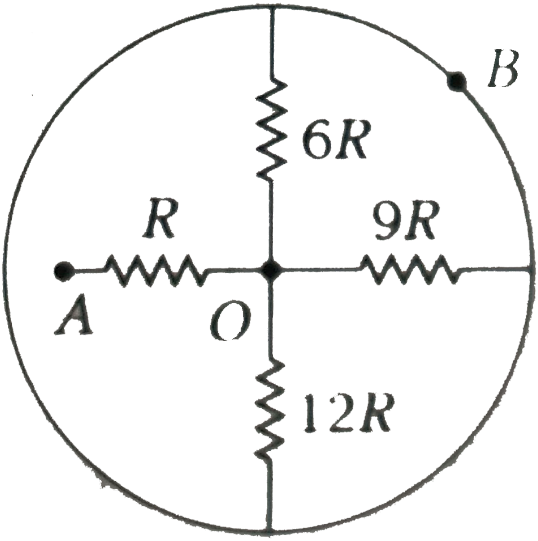
29. Find the equivalent resistance between A and B.



(iii)



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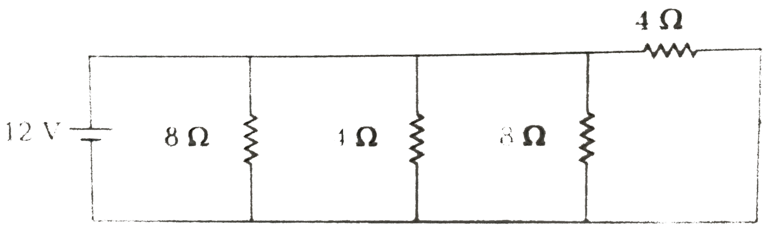
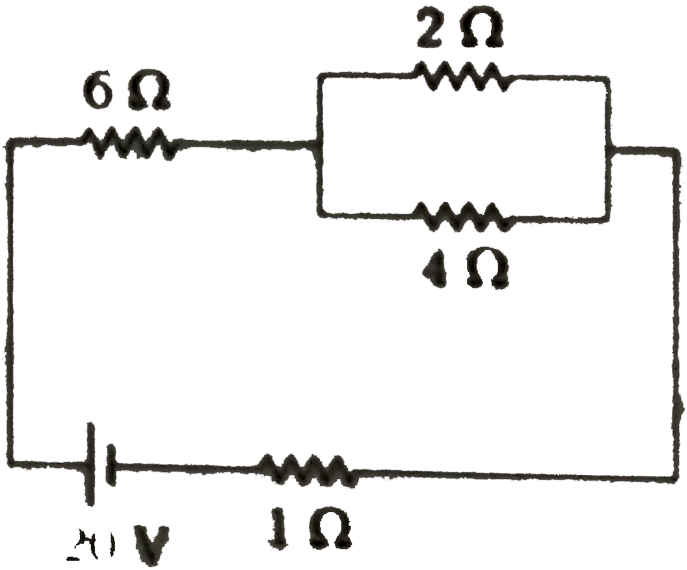
30. Determine the current supplied by the battery in the circuit as shown



(ii) Find currents in resistance 2Ω and 4Ω.



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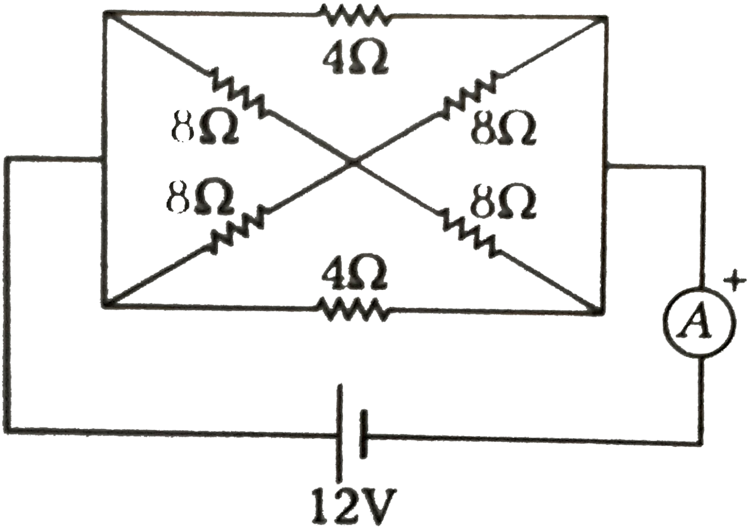
31. Calculate the current shown by the ammeter A in the circuit shown in figure.



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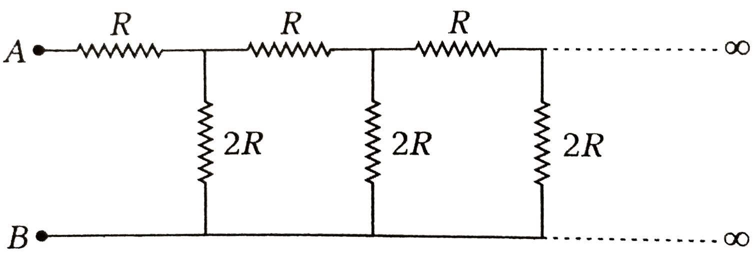
32. Find the equivalent resistance between A and B.



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33. The reading on a high resistance voltmeter when a cell is connected across it is 3 V. When the terminals of the cell are also connected to a resistance of 4 Ω, then the voltmeter reading drops to 1.2 V. Find the internal resistance of the cell.

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34. A battery of emf 2 V and internal resistance r is connected in series with a resistor of 10Ω through an ammeter of resistance 2Ω. The ammeter reads 50 mA. Draw the circuit diagram and calculate the value of r.

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35. A voltmeter of resistance 994Ω is connected across a cell of emf 1 V and internal resistance 6Ω. Find the potential difference across the voltmeter, that across the terminals of the cell and percantage error in the reading of the voltmeter.

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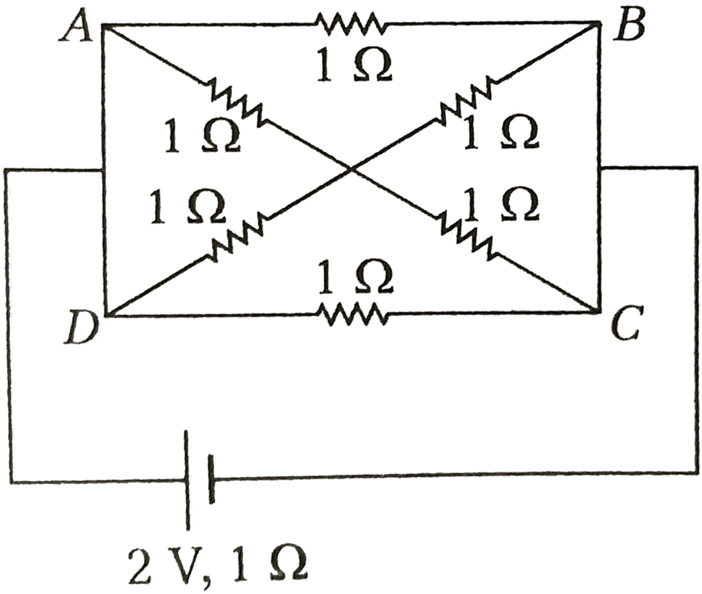
36. Find the current drawn from a cell of emf 2 V and internal resistance 2Ω connected to the network given below.



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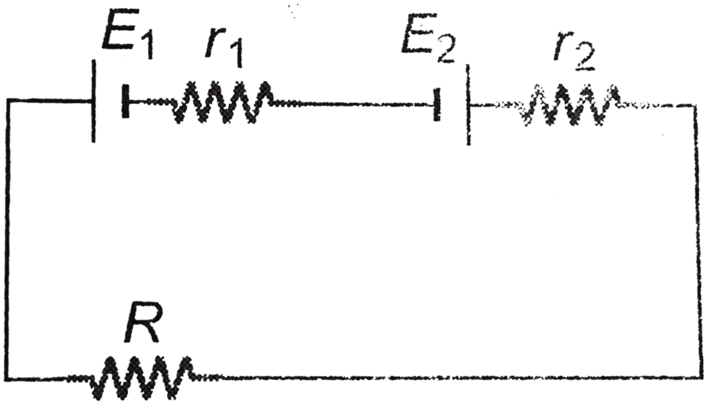
37. In the circuit shown in figure



$E_1 = 10V, E_2 = 4V, r_1 = r_2 = 1\Omega$ and $R = 2\Omega$.

Find the potential difference across battery 1 and battery 2.

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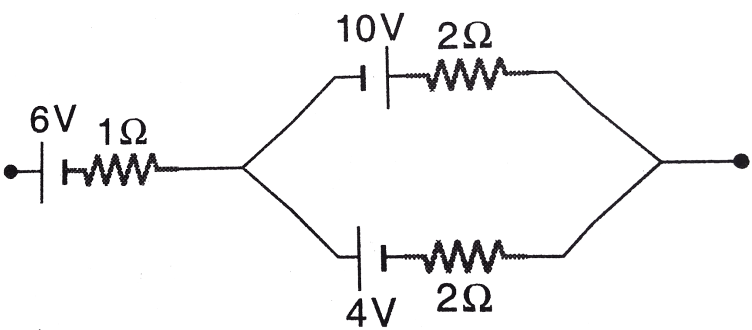
38. Find the emf and internal resistance of a single battery which is equivalent to a combination of three batteries as show in figure.



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39. Two identical cells of emf 1.5 V each joined in paralllel provide supply to an external circuit consisting of two resistances of 7Ω each joined in parallel. A very high resistance voltmeter reads the terminal voltage of cells to be 1.4 V. Calculate the internal resistance of each cell.

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40. Find the minimum number of cell required to produce an electron current of $1.5A$ through a resistance of 30Ω .Given that the emf internal resistance of each cell are $1.5V$ and 1.0Ω respectively

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41. 36 cells each of internal resistance 0.5Ω and emf 1.5 V each are used to send current through an external circuit of 2Ω resistance. Find the best mode of grouping them and the current through the external circuit.

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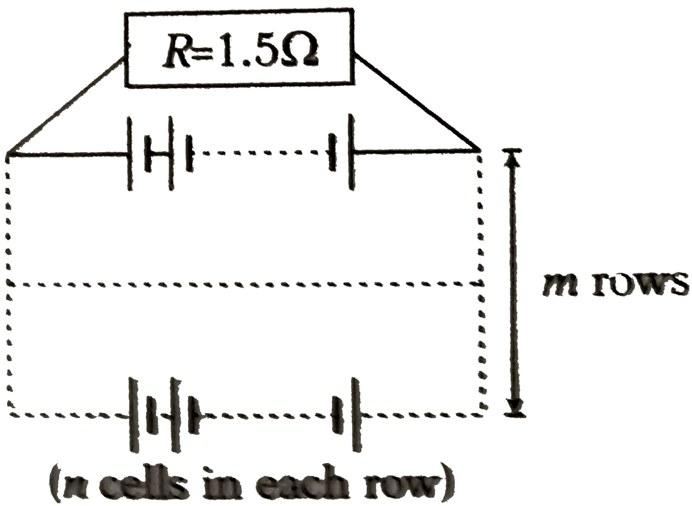
42. 12 cells, each of emf 1.5 V and internal resistance of 0.5Ω, are arranged in m rows each containing n cells connected in series, as shown. Calculate the values of n and m for which this combination would send maximum current through an external resistance of 1.5Ω.



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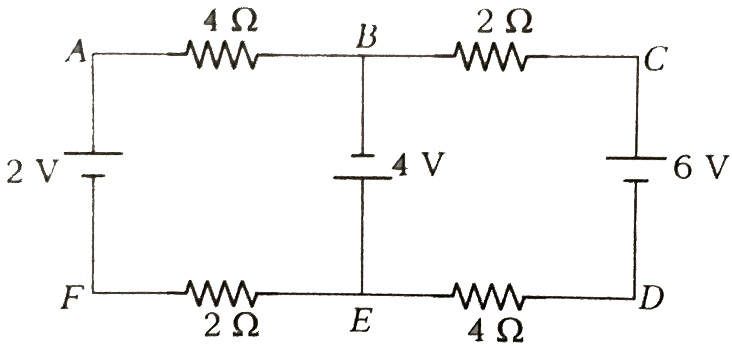
43. Find currents in different branches of the electric circuit shown in figure.



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44. In example above, find the potential difference between points F and C.

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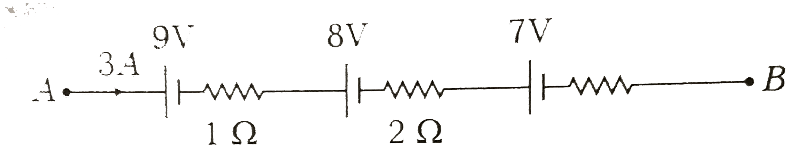
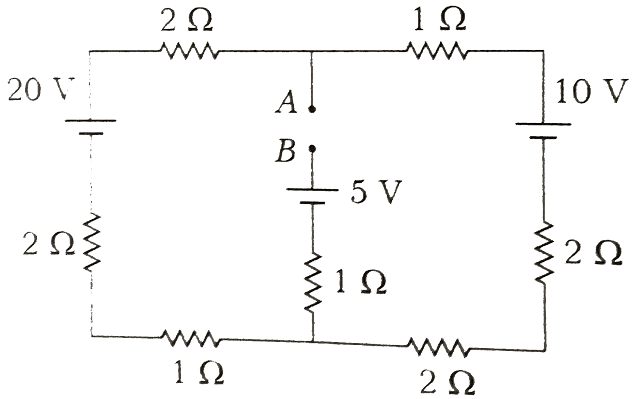
45. (i) Find the potential difference between A and B.





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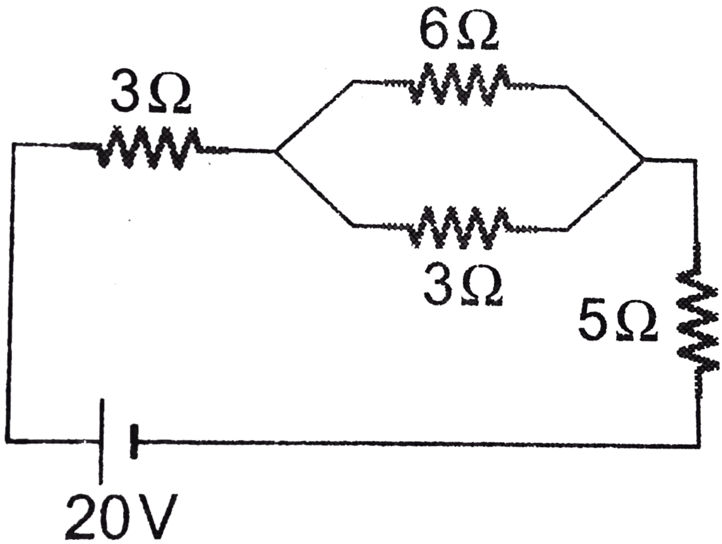
46. In the circuit shown in figure find the heat developed across each resistance in $2s$.



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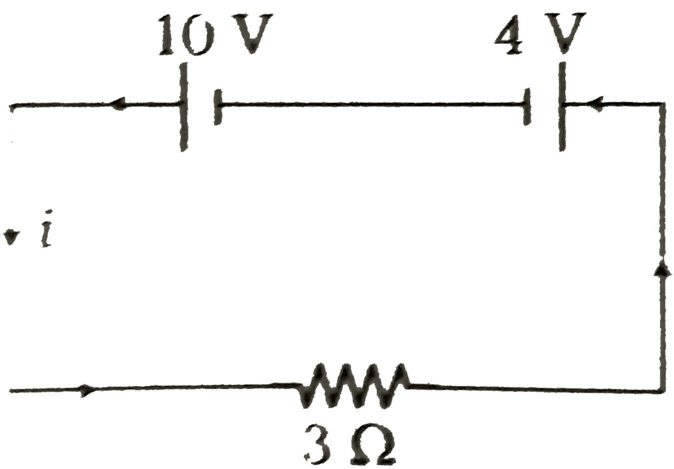
47. In the circuit shown in the following figure, find



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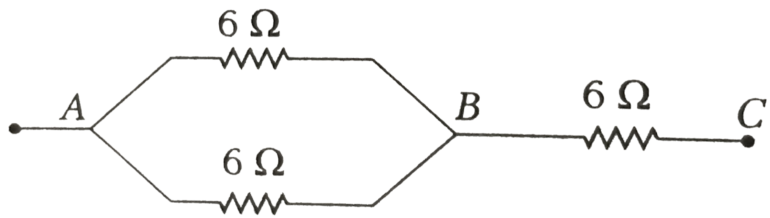
48. In the following figures, each of the three resistances, the rating of 24 W and resistance of 6Ω. Find the maximum power rating of the circuit.



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49. Two bulbs having rating of 60 W, 220 V and 100 W, 220 V are joined (i) in series, (ii) in parallel. Which of the two will glow brighter in each case?

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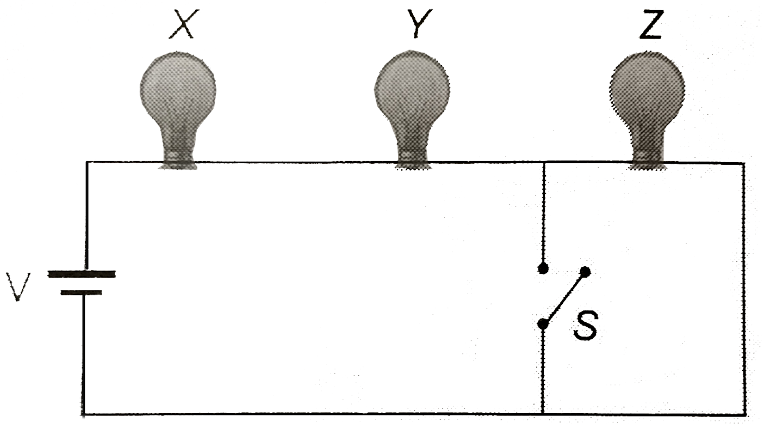
50. A series circuit consists of three bulbs connected to a battery as shown. When switch S is closed, what happens to (a) Power consumed in bulb X and Y (b) Power consumed in bulb Z (c) the current in the circuit

(d) the voltage drop across three bulbs and (e) the power consumed in circuit?



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51. What shunt resistance is required to make the $1.00 mA$, 20Ω Galvanometer into an ammeter with a range of 0 to $50.0 A$?

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52. How can we make a galvanometer with $G = 20\Omega$ and $i_g = 1.0 mA$ into a voltmeter with a maximum range of $10 V$?

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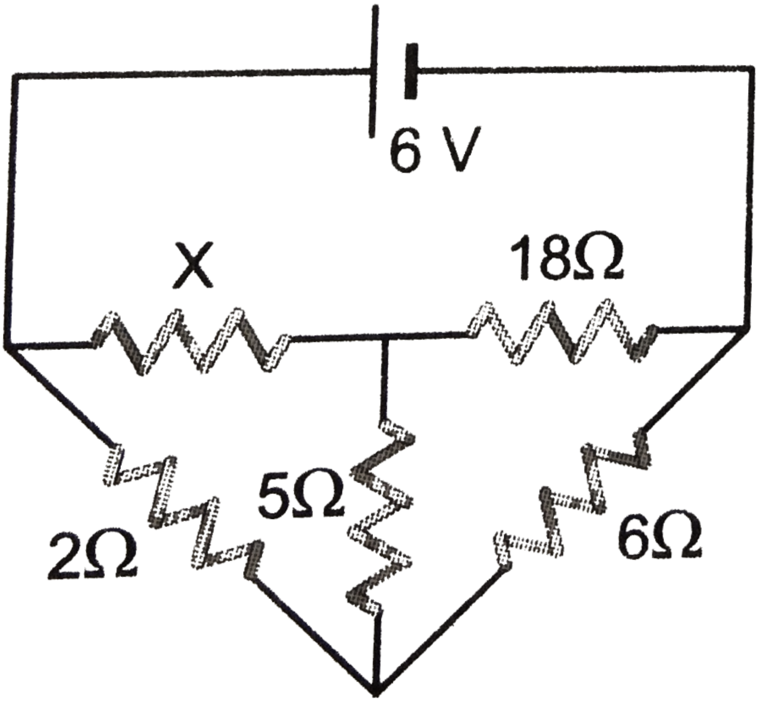
53. Find out the magnitude of resistance X in the circuit shown in figure, When no current flows through the 5Ω resistance



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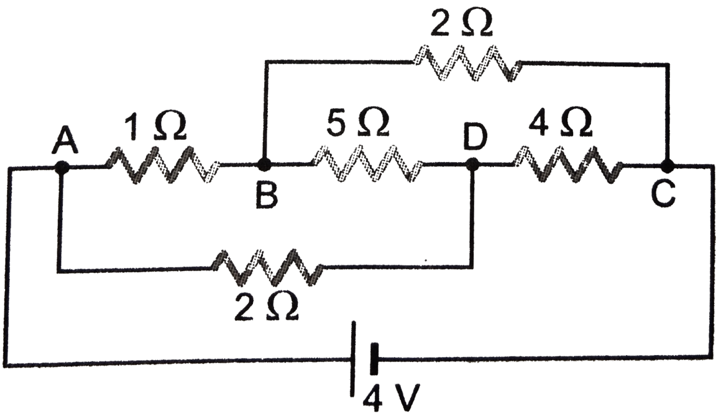
54. Calculate the current the current drawn from the battery by the network of resistors shown in figure.



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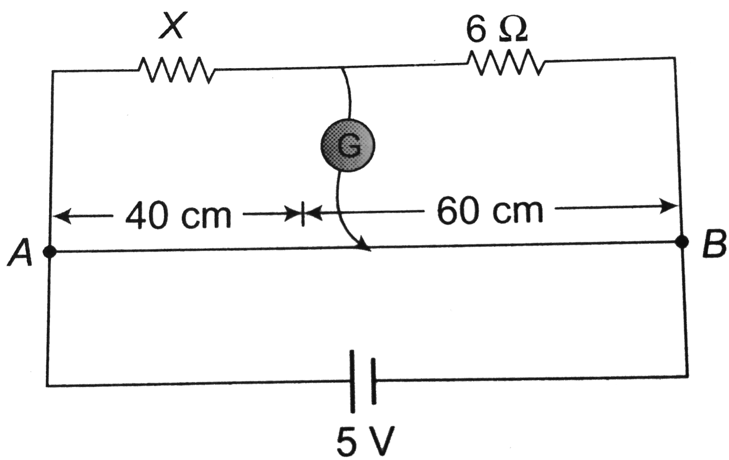
55. In the circuit shown, a meter bridge is in its balanced state. The meter bridge wire has a resistance $.1 ohm / cm$. The value of unknown resistance X and the current drawn from the battery of negligible resistance is



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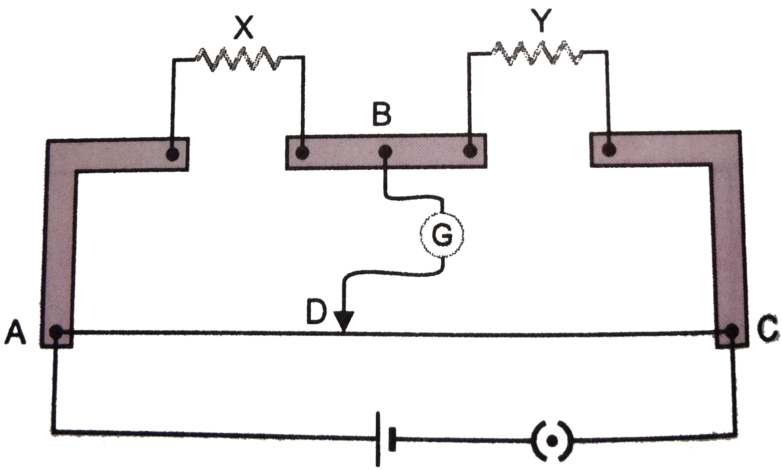
56. The figure



Shows the experimental set up of a meter bridge. The null point is found to be 60 cm away from the end A with X and Y in positions as shown. When a resistance of 15Ω is connected in series with Y, the null points is found to shift by 10 cm towards the end A of the wire. Find the position of the null point if resistance of 30Ω were connected in parallel with Y.

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57. A potentiometer wire is 10 m long and has a resistance of 18Ω. It is connected to a battery of emf 5 V and internal resistance 2Ω. Calculate the potential gradient along the wire.

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

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

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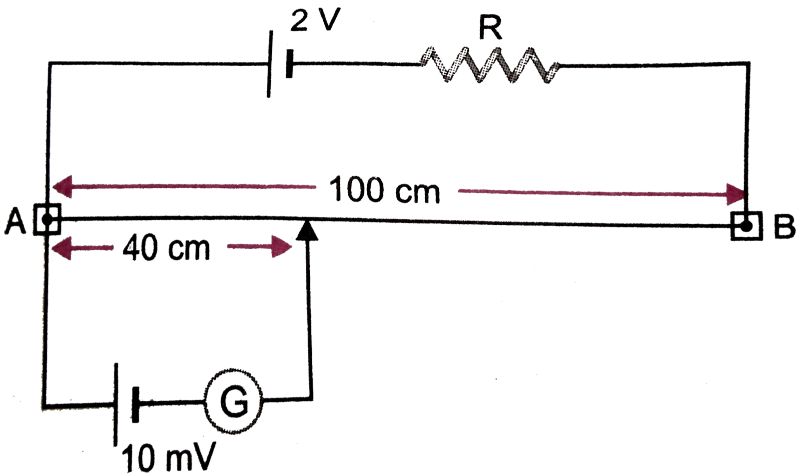
60. A potentiometer wire of length $100cm$ having a resistance of 10Ω is connected in series with a resistance R and a cell of emf $2V$ of negligible internal resistance. A source of emf



of $10mV$ is balanced against a length of $40cm$ of the potentiometer wire. What is the value of resistance R ?

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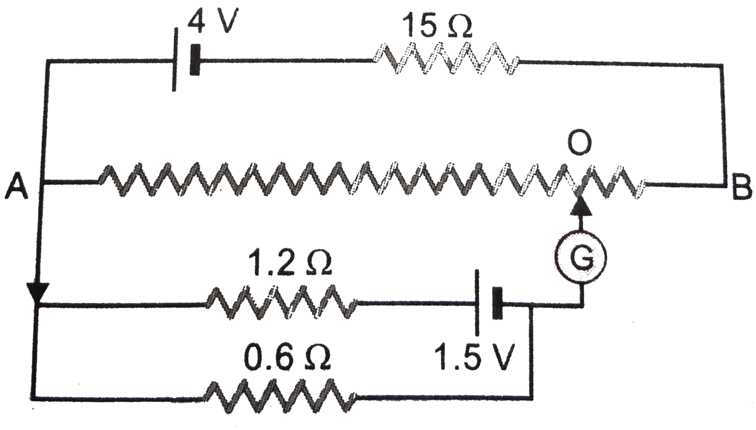
61. AB is 1 meter long uniform wire of 10Ω resistance. Other data are shown in the diagram. Calculate (i) potential gradient along AB (ii) length AO when galvanometer shown deflection



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Check point

1. The current flowing through wire depends on time as, $1 = 3t^2 + 2t + 5$

The charge flowing through the cross - section of the wire in time $t = 0$

to $t = 2$ second is

A. 22 C

B. 20 C

C. 18 C

D. 5 C

Answer: A

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2. The charge of an electron is $1.6 \times 10^{19} C$. How many electrons strike the screen of a cathode ray tube each second when the beam current is 16 mA

A. 10^{17}

B. 10^{19}

C. 10^{-19}

D. 10^{-17}

Answer: A

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3. A conductor carries a current of $0.2A$. Find the amount of charge that will pass through the cross-section of the conductor in $30s$. How many electrons will flow in this time interval if the charge on one electron is $1.6 \times 10^{-19} C$?

A. $0. .375 \times 10^{19}$

B. 375×10^{19}

C. 3.75×10^{19}

D. 37.5×10^{19}

Answer: C

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4. In a closed circuit, the current / (in ampere) at an instant of time t (in second) is given by I = $4 - 0.08t$. The number of electrons flowing in 50 s through the cross-section of the conductor is

A. 1.25×10^{19}

B. 6.25×10^{20}

C. 5.25×10^{19}

D. 2.25×10^{20}

Answer: B

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

A. $v_d \propto E$

B. $v_d \propto \frac{1}{E}$

C. $v_d = \text{constant}$

D. $v_d \propto E^2$

Answer: A

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

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

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

C. v

D. $4v$

Answer: C

Watch Video Solution

7. A metallic resistor is connected across a battery.If the number of collisions if the free electrons with the lattice is somehow decreased in the resistor (for example,by cooling it),the current will

A. increase

B. decrease

C. remain constant

D. become zero

Answer: B

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8. When current flows through a conductor, then the order of drift velocity of electrons will be

A. $10^{10} cm s^{-1}$

B. $10^{-2} cm s^{-1}$

C. $10^{4} cm s^{-1}$

D. $10^{-1} cm s^{-1}$

Answer: B

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9. The drift velocity does not depend upon

A. cross-section of the wire

B. length of the wire

C. number of the free electrons

D. magnitude of the current

Answer: B

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10. The number density of conduction electrons in a copper conductor is $8.5 \times 10^{28} m^{-3}$. How long does an electron take to drift from one end of a wire 3.0 m long to its other end ? The area of cross-section of the wire is $2.0 \times 10^{-6} m^2$ and it is carrying a current of 3.0 A.

A. $2.73 \times 10^4 s$

B. $4.73 \times 10^4 s$

C. $5 \times 10^4 s$

D. $6 \times 10^8 s$

Answer: A

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11. Calculate the amount of charge flowing in 2 minutes in a wire of resistance 10Ω when a potential difference of 20 V is applied between its ends

A. 120 C

B. 240 C

C. 20 C

D. 4 C

Answer: B

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

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

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

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

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

Answer: A

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13. The following four wires are made of the same material. Which of these will have the largest extension when the same tension is applied?

A. Length = 50 cm, diameter = 0.5 mm

B. Length = 100 cm, diameter = 1 mm

C. Length = 200 cm, diameter = 2 mm

D. Length = 300 cm, diameter = 3 mm

Answer: A

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14. Carbon resistors, used in electronic circuits are marked for their value of resistance and tolerance by a colour code. A given resistor has colour scheme brown, red, green and gold. Its value in ohm is

A. $52 \times 10^6 \pm 10\,\%$

B. $24 \times 10^5 \pm 5\,\%$

C. $12 \times 10^4 \pm 10\,\%$

D. $12 \times 10^5 \pm 5\,\%$

Answer: D

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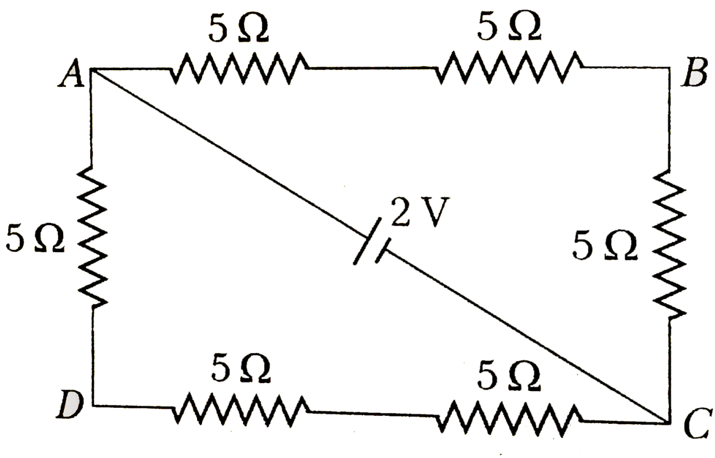
15. The potential difference between points A and B of the following figure is



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

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

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

D. $2V$

Answer: C

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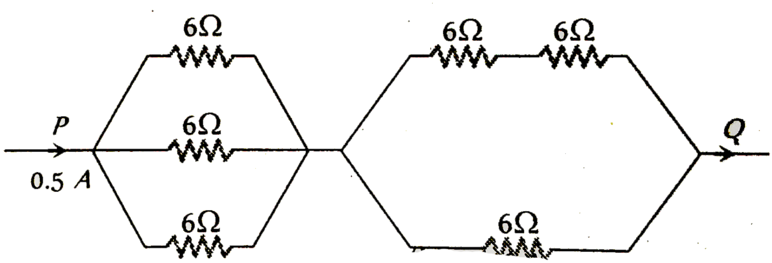
16. Resistances of 6 ohm each are connected in the manner shown in adjoining figure. With the current 0.5 ampere as shown in figure, the potential difference $V_P - V_Q$ is



A. $3.6V$

B. $6.0V$

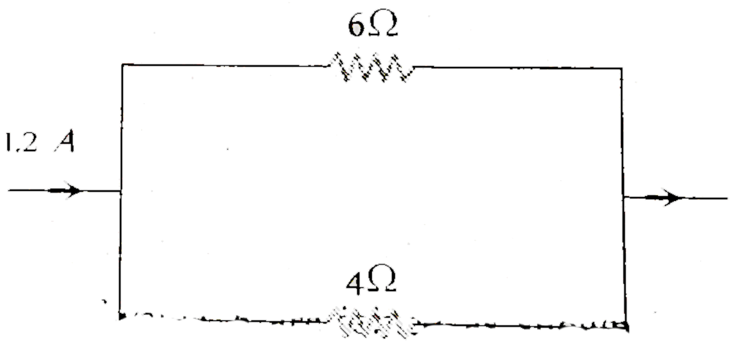
C. $3.0V$

D. $7.2V$

Answer: C

Watch Video Solution

17. In the figure given below, the current passing through 6Ω resistor is



A. $0.40A$

B. $0.48A$

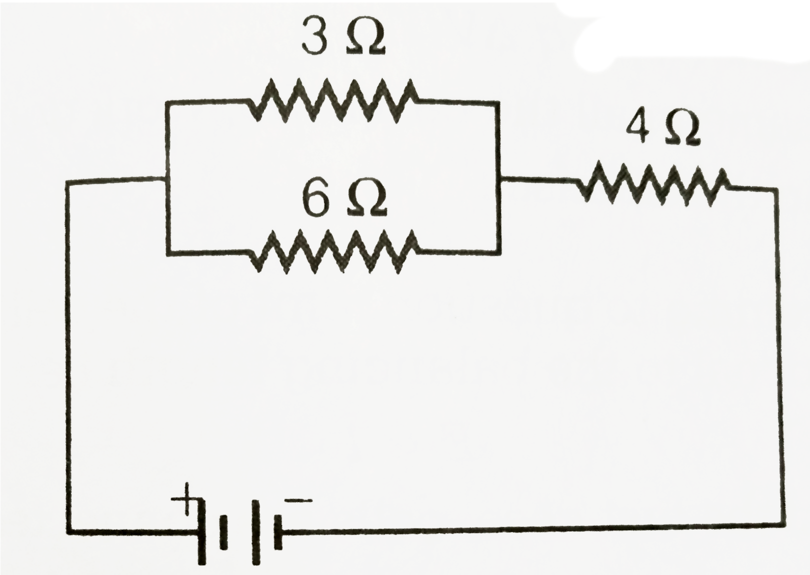
C. $0.72A$

D. $0.80A$

Answer: B

Watch Video Solution

18. Current through 3Ω resistor is 0.8A, then potential drop through 4Ω resistor is



A. $9.6V$

B. $2.6V$

C. $4.8V$

D. $1.2V$

Answer: C

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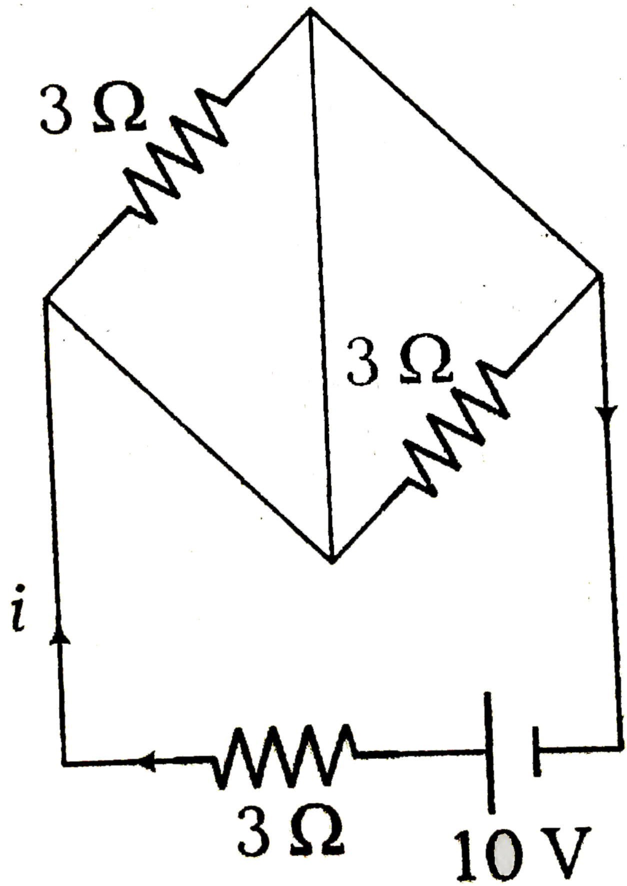
19. Current I as shown in the circuit will be



A. $10A$

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

C. zero

D. infinite

Answer: B

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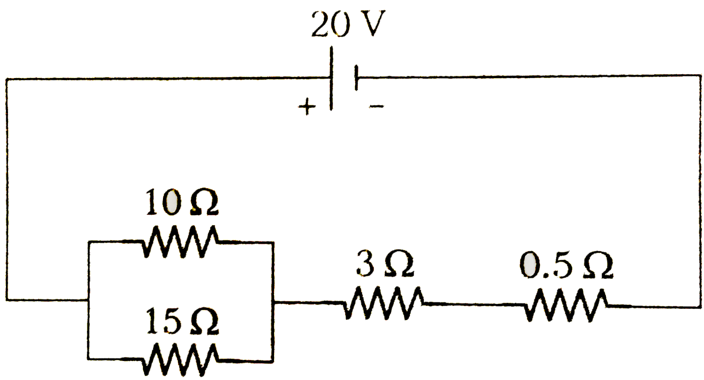
20. In the circuit, the current flowing through 10Ω resistance is



A. $12A$

B. $1.2A$

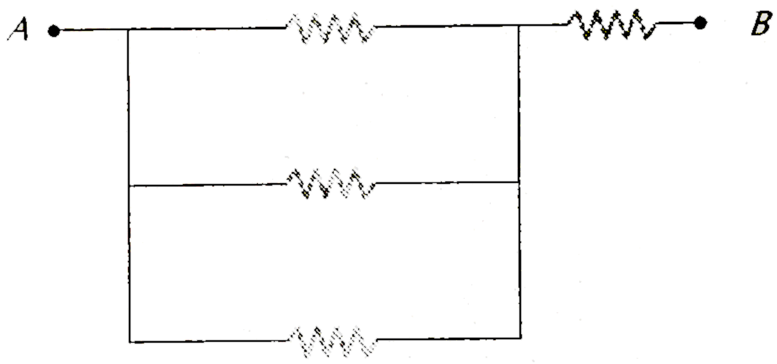
C. $0.8A$

D. $0.4A$

Answer: B

Watch Video Solution

21. If all the resistors shown have the value 2 ohm each, the equivalent resistance over AB is



A. 2 ohm

B. 4 ohm

C. $1\frac{2}{3}ohm$

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

Answer: D

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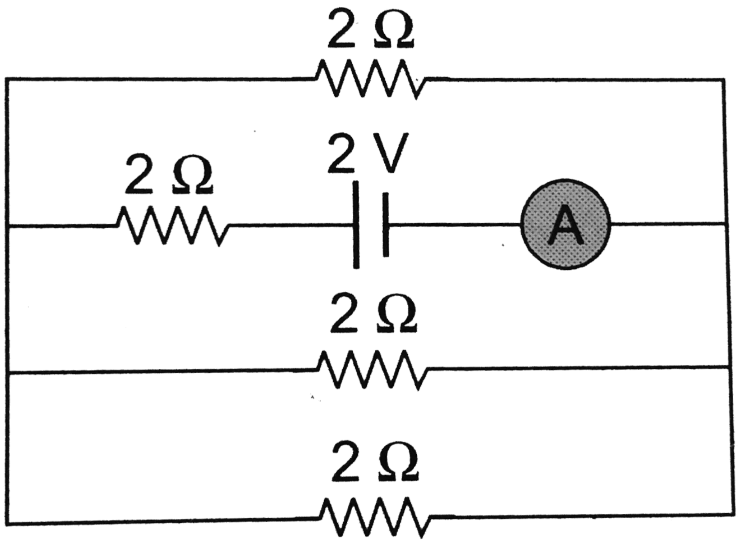
22. The reading of the ammeter as per figure shown is



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

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

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

D. $2A$

Answer: B

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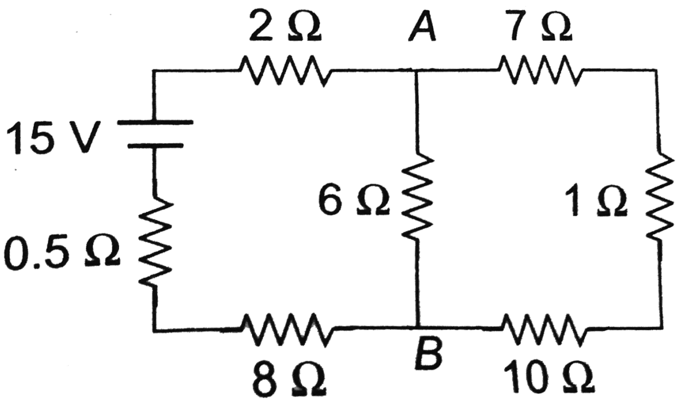
23. The current from the battery in circuit diagram shown is



A. $1A$

B. $2A$

C. $1.5A$

D. $3A$

Answer: A

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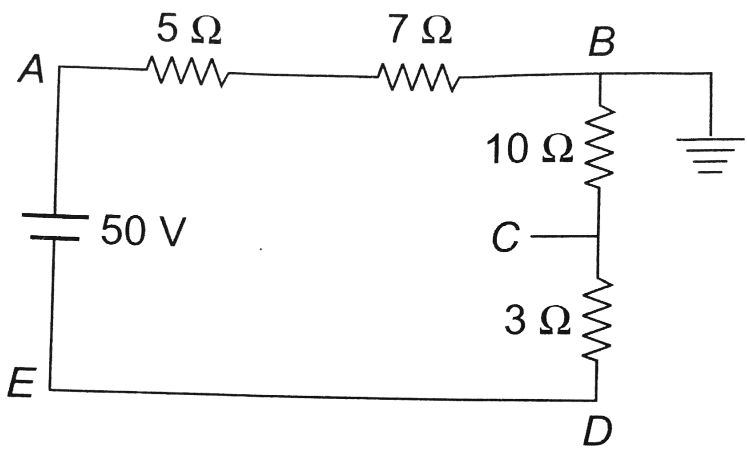
24. In the circuit shown, the point B is earthed. The potential at the point $'A'$ is



A. 14 V

B. 24 V

C. 26 V

D. 50 V

Answer: B

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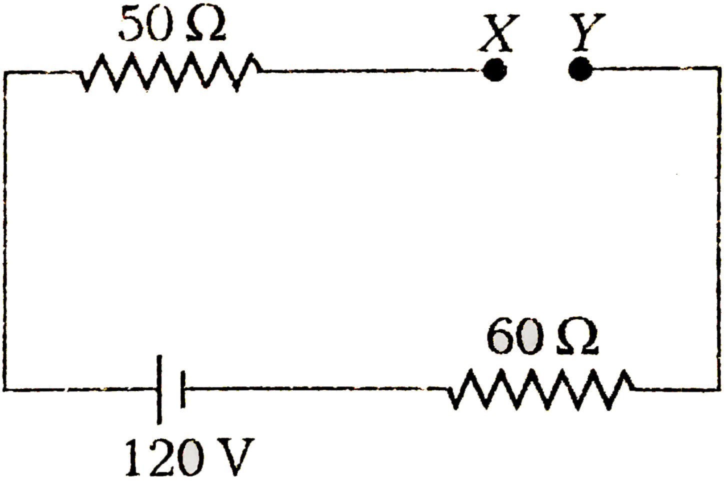
25. In the circuit shown, potential difference between X and Y will be



A. zero

B. 20 V

C. 60 V

D. 120 V

Answer: D

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26. A current of 2.0 ampere passes through a cell of e.m.f. 1.5 volts having internal resistance of 0.15 ohm. The potential difference measured, in volts, across both the ends of the cell will be

A. 1.35

B. 1.50

C. 1.00

D. 1.20

Answer: D

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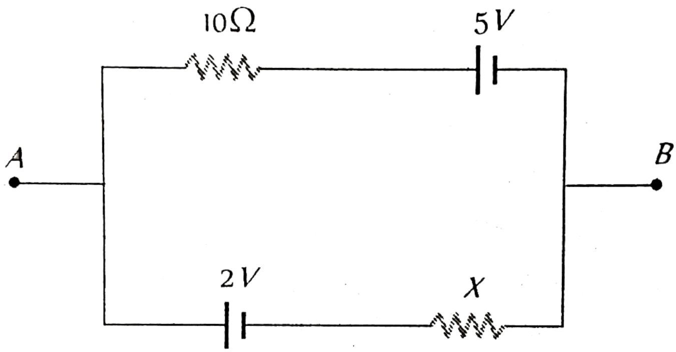
27. If $V_{AB} = 4V$ in the given fig are, then resistance χ will be



A. 5Ω

B. 10Ω

C. 15Ω

D. 20Ω

Answer: D

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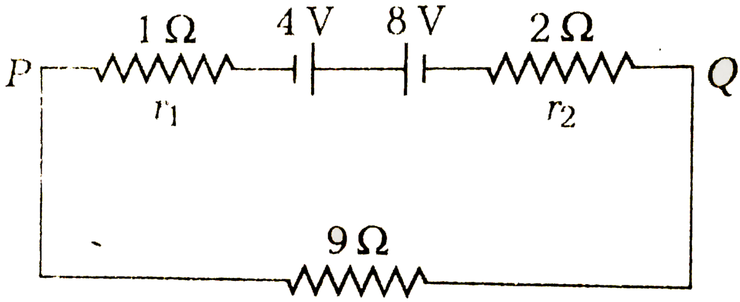
28. Two batteries of emf 4 V and 8 V with internal resistances 1Ω and 2Ω are connected in a circuit with a resistance of 9Ω as shown in figure. The current and potential difference between the points P and Q are



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

B. $\frac{1}{6}$ A and 4 V

C. $\frac{1}{9}$ A and 9 V

D. $\frac{1}{2}$ A and 12 V

Answer: A

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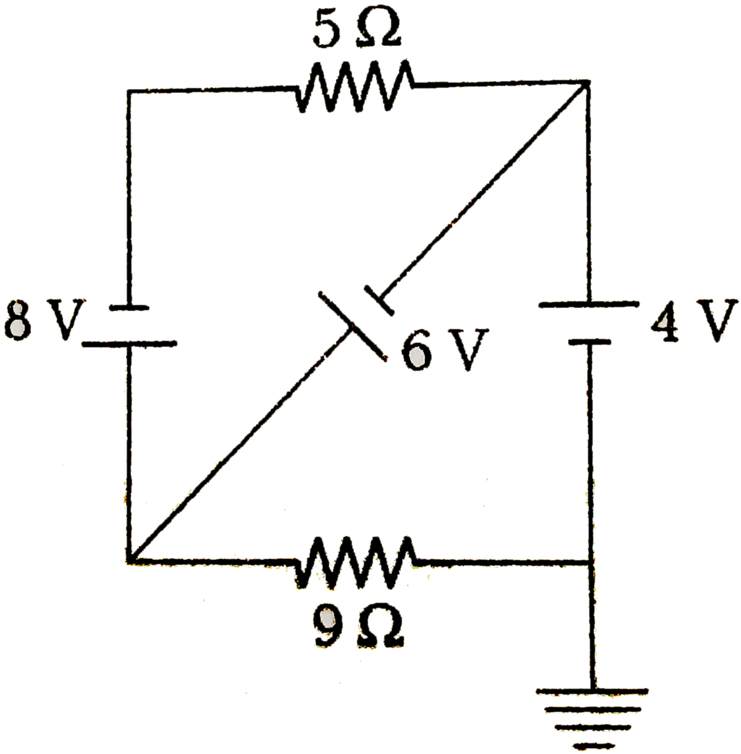
29. The current through the 5Ω resistor is



A. $10A$

B. $1A$

C. $2.5A$

D. $0.4A$

Answer: D

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30. Two cells , each of $emf E$ and internal resistance r, are connected in parallel across a resistor R. The power delivered to the resistor is maximum if R is equal to

A. R = r/2

B. R = r

C. R = 2r

D. R = 0

Answer: A

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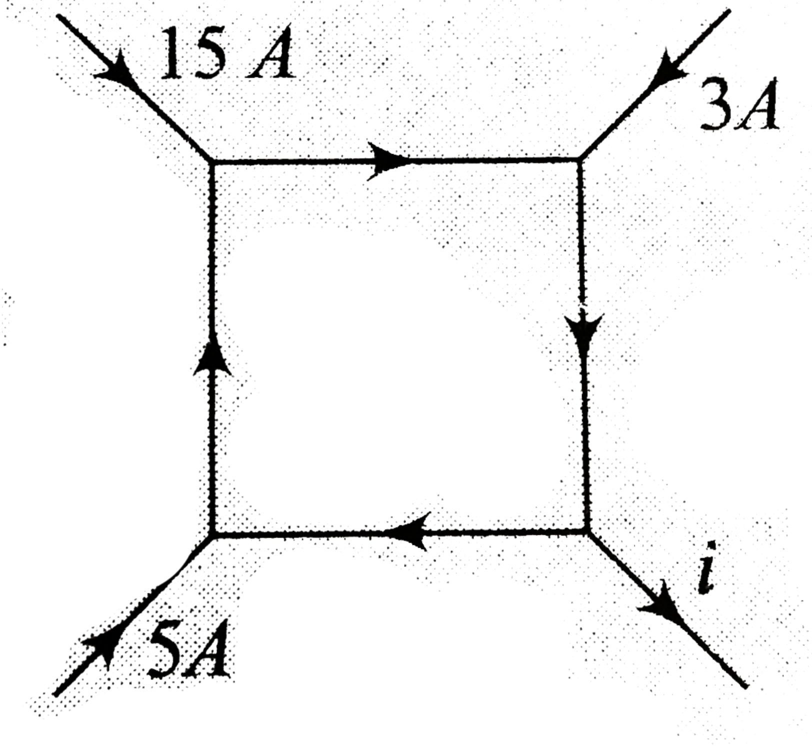
31. Shown is a network of currents. The magnitude of the current is also shown there. Find the current i.



A. $3A$

B. $13A$

C. $23A$

D. $-3A$

Answer: C

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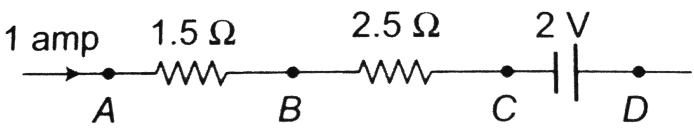
32. In the circuit element given here, if the potential at point $B = V_B = 0$, then the potentials of A and D are given as



A. $V_A = -1.5V, V_D = +2V$

B. $V_A = -1.5V, V_D = +0.5V$

C. $V_A = +1.5V, V_D = +0.5V$

D. $V_A = +1.5V, V_D = -0.5V$

Answer: D

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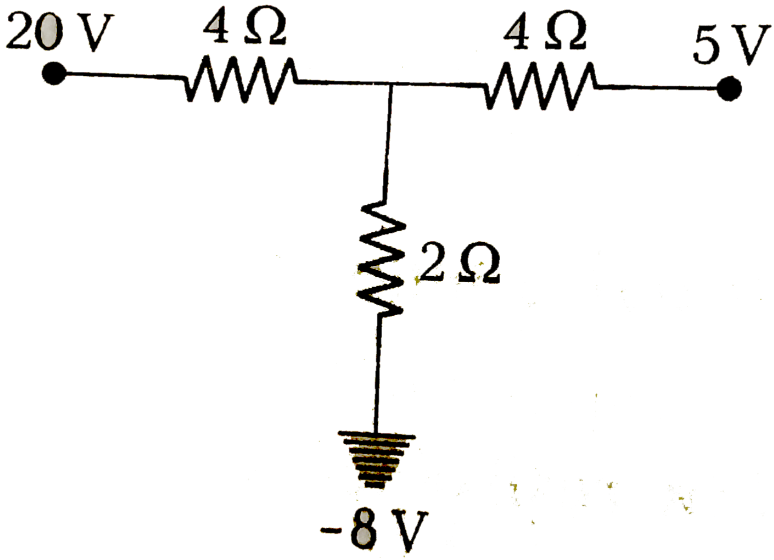
33. Three resistances are connected to form a T-shape as shown in the figure. Then, the current in the 4Ω resistor is



A. $0.93A$

B. $4.5A$

C. $2.5A$

D. $1.57A$

Answer: B

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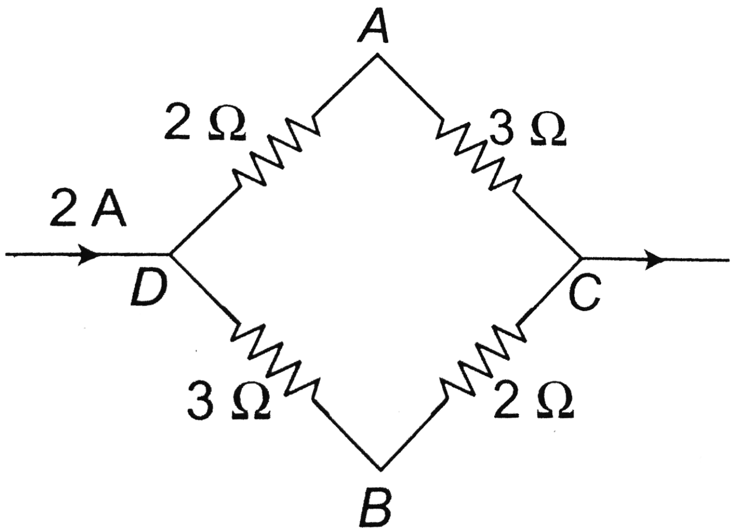
34. A current of $2A$ flows in a system of conductor as shown. The potential difference $(V_A - V_B)$



A. $+4V$

B. $+2V$

C. $+1V$

D. $-1V$

Answer: C

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35. How much work is required to carry a $6\mu C$ charge from the negative terminal to the positive terminal of a 9 V battery?

A. $54 \times 10^{-3} J$

B. $54 \times 10^{-6} J$

C. $54 \times 10^{-9} J$

D. $54 \times 10^{-12} J$

Answer: B

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36. two resistors R and 2R are connected in series in an electric circuit. The thermal energy developed in R and 2R are in the ratio

A. $1:2$

B. $2:1$

C. $1:4$

D. $4:1$

Answer: A

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37. The resistor of resistance ' R ' is connected to 25 V supply and heat produced in it is 25 J / sec. The value of R is

A. 225Ω

B. 1Ω

C. 25Ω

D. 50Ω

Answer: C

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38. In India electricity is supplied for domestic use at $220V$. It is supplied at $110V$ in USA. If the resistance of a $60W$ bulb for use in India is R, the resistance of a $60W$ bulb for use in USA will be

A. R/4

B. R/2

C. R

D. 2R

Answer: A

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39. If R_1 and R_2 are respectively the filament resistances of a 200 watt bulb and 100 watt bulb designed to operate on the same voltage, then

A. R_1 is two times R_2

B. R_2 is two times R_1

C. R_2 is four times R_1

D. R_1 four times R_2

Answer: B

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40. Two electric bulbs have tungsten filament of same length. If one of them gives $60W$ and the other $100W$, then

A. 100 W bulb has thicker filament

B. 60 W bulb has thicker filament

C. Both filaments are of same thickness

D. it is not possible to get different wattage unless the lengths are different

Answer: A

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41. A resistor of resistance R is connected to an ideal battery. If the value of R is decreased,the power dissipated in the resistor will

A. increase

B. decrease

C. remain unchanged

D. None of these

Answer: B

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42. How many calories of heat will be approximately developed in a $210W$ electric bulb in 5 min ?

A. 800000 cal

B. 63000 cal

C. 1050 cal

D. 15000 cal

Answer: D

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43. If in the circuit shown in Fig.7.55, power dissipation is $150W$, then find the value of $R(\text{in}\Omega)$.

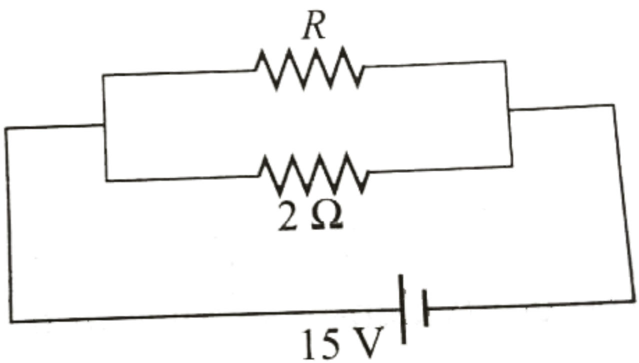

Fig. 7.55

A. 2Ω

B. 6Ω

C. 5Ω

D. 4Ω

Answer: B

Watch Video Solution

44. A wire when connected to $220V$ mains supply power dissipation P_1. Now the wire is cut into two equal pieces which are connected in parallel to the same apply power dissipation in this case is P_2 then $P_1 : P_2$ is

A. 1

B. 4

C. 2

D. 3

Answer: B

Watch Video Solution

45. Two electric bulbs one, if 200 V-40 W and other 200 V-100 W are connected in series to a 200 V line, then the potential drop across

A. the two bulbs is the same

B. Both the bulbs is 200 V

C. 40 W bulb is greater than the potential drop across 100 W bulb

D. 100 W bulb is greater than the potential drop across 40 W bulb

Answer: C

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46. One kilowatt hour is equal to

A. $36 \times 10^5 J$

B. $36 \times 10^3 J$

C. $10^3 J$

D. $10^5 J$

Answer: A

Watch Video Solution

47. 3 identical bulbs are connected in series and these together dissipate a power P . If now the bulbs are connected in parallel, then the power dissipated will be

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

B. $3P$

C. $9P$

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

Answer: C

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48. Two bulbs are working in parallel order. Bulb A is brighter than bulb B . If R_A and R_B are their resistance respectively then

A. $R_A = R_B$

B. $R_B > R_A$

C. $R_A > R_B$

D. None of these

Answer: B

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49. Electric bulb $50W - 100V$ glowing at full power are to be used in parallel with battery $120V$, 10Ω. Maximum number of bulbs that can be connected so that they glow in full power is

A. 2

B. 8

C. 4

D. 6

Answer: C

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50. Some electric bulbs are connected in series across a 220 V supply in a room. If one bulb is fused then remaining bulbs are connected again in series across the same supply. The illumination in the room will

A. increase

B. decrease

C. remain the same

D. not continuous

Answer: A

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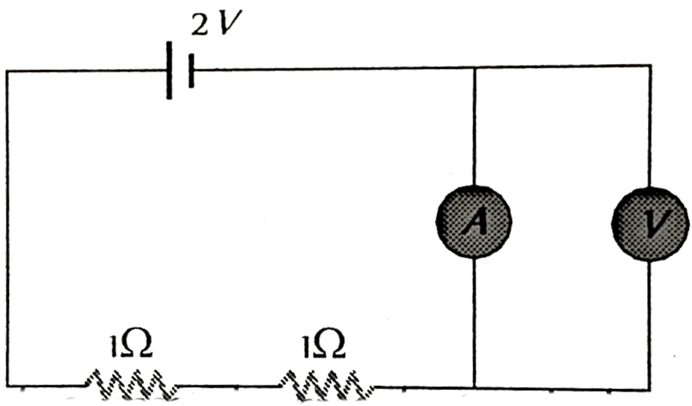
51. In the circuit shown, A and V are ideal ammeter and voltmeter respectively. Reading of the voltmeter will be



A. $2V$

B. $1V$

C. $0.5V$

D. Zero

Answer: D

Watch Video Solution

52. The net resistance of a volmeter should be large to ensure that

A. it does not get overheated

B. it does not draw emmissive current

C. it can measure large potential difference

D. it does not appreciably change the potential difference to be measured.

Answer: D

Watch Video Solution

53. Two galvanometers A and B require 3 mA and 6 mA respectively, to produce the same deflection of 10 divisions. Then,

A. A is more sensitive than B

B. B is more sensitive than A

C. A and B are equally sensitive

D. sensitiveness of B is twice that of A

Answer: A

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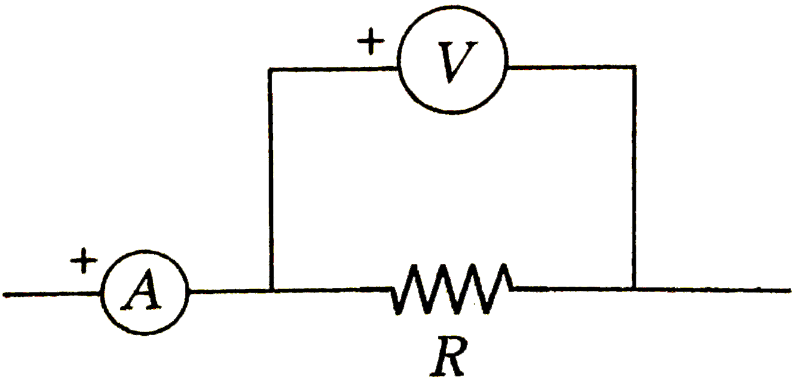
54. An ammeter A, a voltmeter V and a resistance R are connected as shown in the figure. If the voltmeter reading is $1.6V$ and the ammeter reading is 0.4A, then R is



A. equal to 4Ω

B. greater than 4Ω

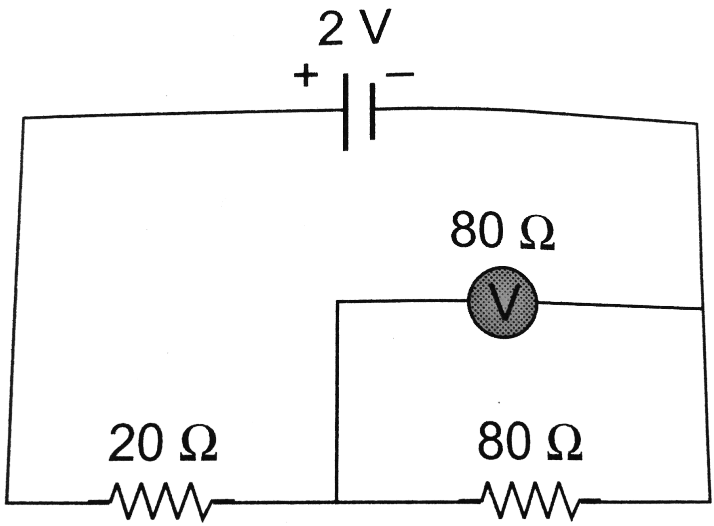
C. less than 4Ω

D. $between 3Omega \text{ and } 4Omega$`

Answer: B

Watch Video Solution

55. In the adjoining circuit, the e.m.f. of the cell is 2 volt and the internal resistance is negligible. The resistance of the voltmeter is $80 ohm$. The reading of the voltmeter will be



A. $0.80 V$

B. $1.60 V$

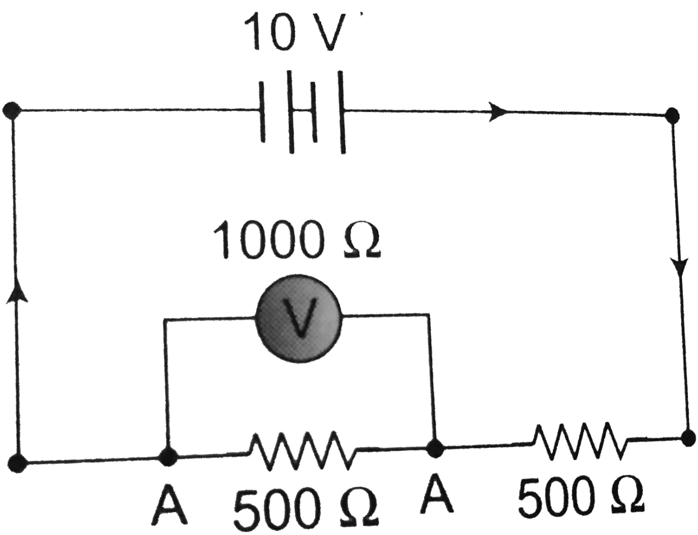
C. $1.33V$

D. $2.00V$

Answer: C

Watch Video Solution

56. What is the reading of voltmeter in the following figure ?



A. $3V$

B. $2V$

C. $5V$

D. $4V$

Answer: D

Watch Video Solution

57. A galvanometer of resistance 25Ω gives full scale deflection for a current of 10 milliampere , is to be changed into a voltmeter of range 100 V by connecting a resistance of ‘ R ’ in series with galvanometer. The value of resistance R in Ω is

A. 10000

B. 975

C. 10025

D. 9975

Answer: D

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Watch Video Solution

58. An ammeter and a voltmeter are joined in sereis to a cell. Their readings are A and V respectively. If a resistance is now joinding parallel with the voltmeter. Then

A. Both A and V will decrease

B. Both A and V will increase

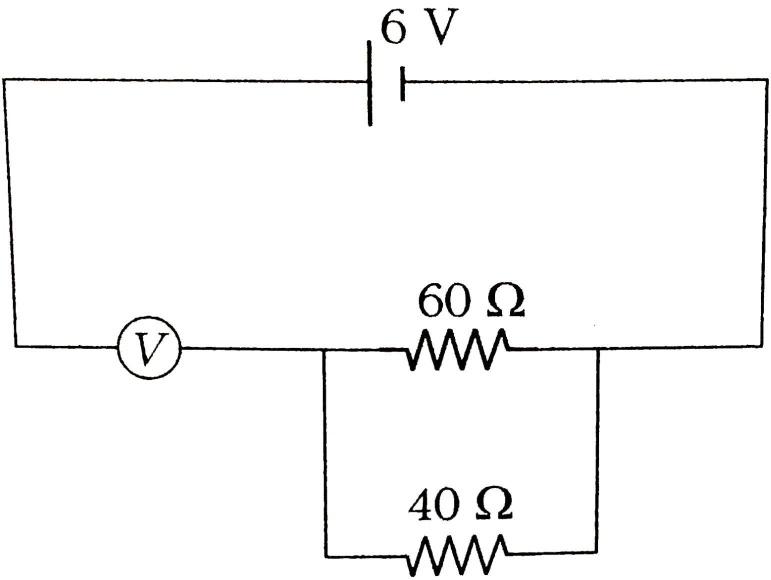
C. A will decrease, V will increase

D. A will increase, V will decrease

Answer: D

Watch Video Solution

59. In the circuit shown in the figure, the voltmeter reading is



A. $2.4V$

B. $3.4V$

C. $4.0V$

D. $6.0V$

Answer: D

Watch Video Solution

60. The shunt required for 10% of main current to be sent through the moving coil galvanometer of resistance 99Ω will be-

A. 9.9Ω

B. 10Ω

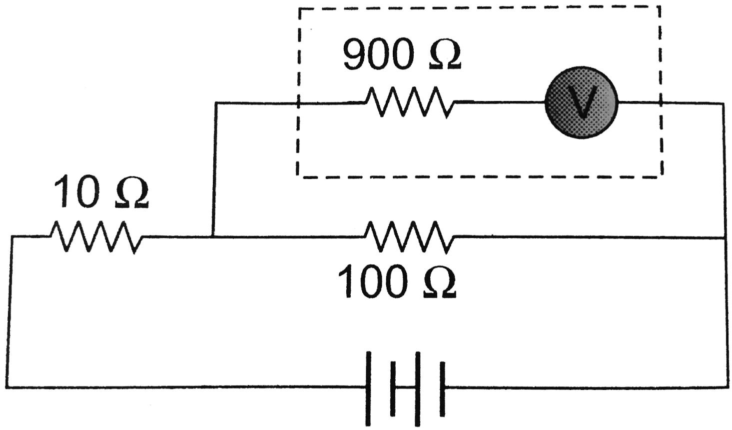
C. 11Ω

D. 9Ω

Answer: C

Watch Video Solution

61. The potential difference across the 100Ω resistance in the following circuit is measured by a voltmeter of 900Ω resistance. The percentage error made in reading the potential difference is



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

B. 0.1

C. 1.0

D. 10.0

Answer: B

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62. A microammeter has as resistance of 100Ω and full scale range of $50\mu A$. It can be used a voltmeter or as ahigher range ammeter provided a resistance is added to it. Pick the correct range and resistance combinations

50 V range with $10k\Omega$ resistance in series

b.$10V$ range with $200k\Omega$ resistance in series

c. 5mA rangw with 1Ω resistance in parallel

$10mA$ range with 1Ω resistance in parallel

A. 50 V range with 10 $k\Omega$ resistance in series

B. 10 V range with 200 $k\Omega$ resistance in series

C. 10 mA range with 1Ω resistance in parallel

D. None of the above

Answer: B

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63. Show that the percentage error in the measurement of resistance by a metre bridge is minimum when the null point is near about the centre of the wire.

A. 20 cm

B. 50 cm

C. 80 cm

D. 100 cm

Answer: C

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64. A resistance of 1980Ω is connected in series with a voltmeter, after which the scale division becomes 100 times larger. Find the resistance of voltmeter.

A. 10Ω

B. 20Ω

C. 30Ω

D. 40Ω

Answer: B

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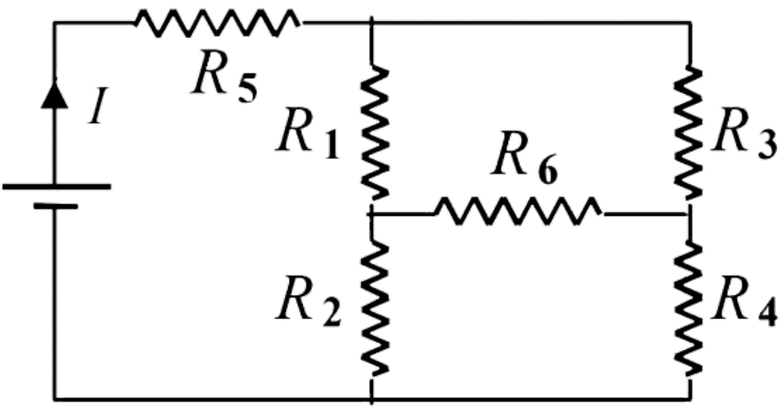
65. In the given circuit, it is observed that the current I is independent of the value of the resistance R_6. Then the resistance values must satisfy



.

A. $R_1 R_2 R_3 = R_3 R_4 R_5$

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

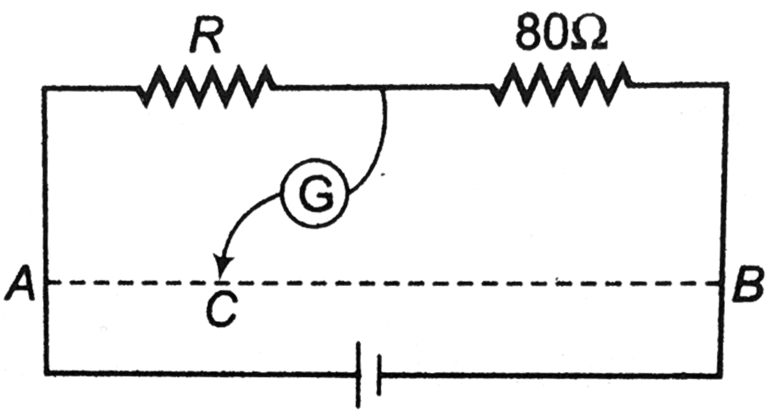
C. $R_1 R_4 = R_2 R_3$

D. $R_1 R_3 = R_2 R_4 = R_5 R_6$

Answer: C

Watch Video Solution

66. AB is a wire of uniform resistance. The galvanometer G shows no deflection when the length $AC = 20 cm$ and $CB = 80 cm$. The resistance R is equal to.



A. 320Ω

B. 8Ω

C. 20Ω

D. 40Ω

Answer: C

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67. A potentiometer is used for the compaisem of e.m.f. of two cells E_1 and E_2. For cell E_1 the no deflection point os obtained at $20cm$ and for E_2 the no deflection point is obtained at $30cm$. The ratio of their e.m.f.'s will be

A. $2/3$

B. $3/2$

C. 1

D. 2

Answer: A

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68. In a potentiometer experiment, the galvanometer shows no deflection when a cell is connected across $60cm$ of the potentiometer wire. If the cell is shunted by a resistance of 6Ω, the balance is obtained across $50cm$ of the wire. The internal resistance of the cell is

A. 0.5Ω

B. 0.6Ω

C. 1.2Ω

D. 1.5Ω

Answer: C

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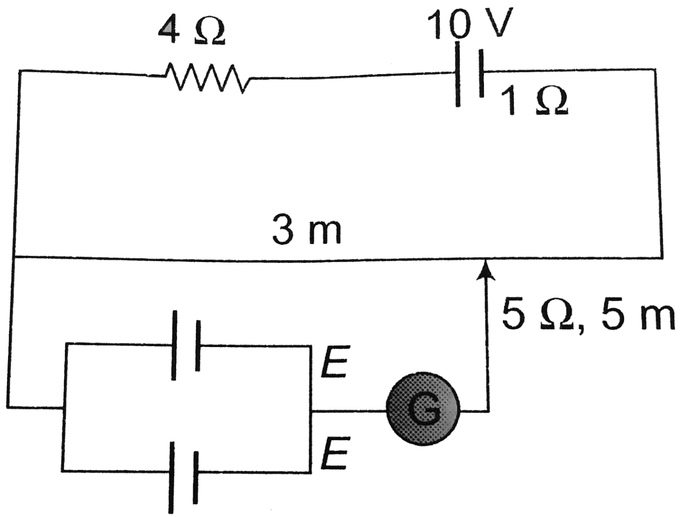
69. A resistance of 4Ω and a wire of length 5 meters and resistance 5Ω are joined in series and connected to a cell of e.m.f. $10V$ and internal resistance 1Ω. A parallel combination of two identical cells is balanced across $300cm$ of wire. The e.m.f. E of each cell is



A. $1.5V$

B. $3.0V$

C. $0.67V$

D. $1.33V$

Answer: B

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

A. 4.9Ω

B. 7.9Ω

C. 5.9Ω

D. 6.9Ω

Answer: A

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Taking it together

1. What is terminal potential differnce of a cell? Can its value be greater than the emf of a cell? Explian.

A. being discharged

B. open circuit

C. being charged

D. being either changed or discharged

Answer: C

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2. Identify the material commonly used for making coil of a resistacne box.

A. Molybdenum

B. Manganese

C. Manganin

D. Magnesium

Answer: C

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3. Which of the following is a vector quantity?

A. Current density

B. Current

C. Wattless current

D. Power

Answer: A

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

A. $E \propto J$

B. $E \propto J^2$

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

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

Answer: A

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5. Consider the following two statements:

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

(B)Kirchhoff's loop law follows from conservative nature of electirc field .

A. Both A and B are wrong

B. A is correct but B is wrong

C. A is wrong but B is correct

D. Both A and B are correct

Answer: D

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

A. potentiometer is more sensitive than voltmeter

B. the resistance of potentiometer is less than volumeter

C. potentiometer is cheaper than voltmeter

D. potentiometer does not take current from the circuit

Answer: D

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7. What is immeterial for an electric fuse wire ?

A. Its specific resistance

B. Its radius

C. Its length

D. Current flowing through it

Answer: C

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8. Conductivity increases in the order of

A. Al, Ag, Cu

B. Al, Cu, Ag

C. Cu, Al, Ag

D. Ag, Cu, Al

Answer: B

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9. By mistake, a voltmeter is connected in series and an ammeter is connected in parallel, with a resistance in an electrical circuit. What will happen to the instruments?

A. Both ammeter and voltmeter will be damaged

B. Neither the ammeter nor the voltmeter will be damaged

C. Only the ammeter will be damaged

D. Only the voltmeter will be damaged

Answer: C

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10. If E is the emf of a cell of internal resistance r and external resistance R, then potential difference across R is given as

A. $V = E/(R+r)$

B. $V = E$

C. $V = E/(1 + r/R)$

D. $V = E/(1 + R/r)$

Answer: C

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11. the nonideal batteries are connected in series. Consider the following statements :

(A)The equivalent emf is larger than either of the two emfs.

(B) the equivalent internal resistances is smaller than either of the two internal resistances.

A. Each of A and B is correct

B. A is correct but B is wrong

C. B is correct but A is wrong

D. Each of A and B is wrong

Answer: B

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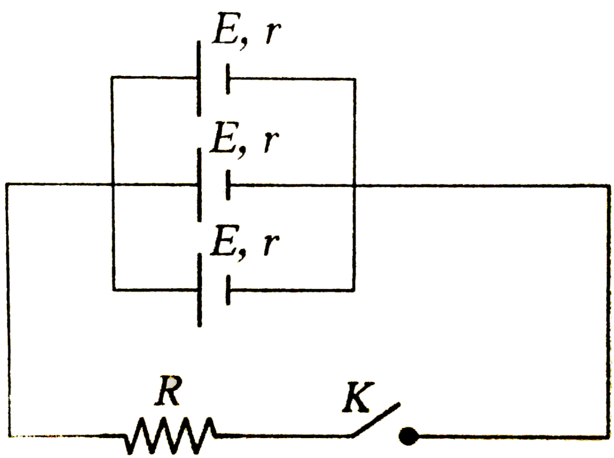
12. When n cells are joined in parallel combination as shown, the strength of the current i is given by



A. $\dfrac{nE}{R+nr}$

B. $\dfrac{E}{R+(r/n)}$

C. $\dfrac{E}{r+Rn}$

D. None of these

Answer: B

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13. A student has 10 resistors of resistance ' r '. The minimum resistance made by him from given resistors is

A. 10r

B. $\frac{r}{10}$

C. $\frac{r}{100}$

D. $\frac{r}{5}$

Answer: B

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14. A wire has resistance 12Ω. It is bent in the form of a circle. The effective resistance between two points across a diameter is.

A. 12Ω

B. 6Ω

C. 3Ω

D. 24Ω

Answer: B

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15. A stready current i is flowing through a conductor of uniform cross-section. Any segment of the conductor has

A. zero charge

B. only positive charge

C. only negative charge

D. charge proportional to current i

Answer: A

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16. There are n cells, each of emf E and internal resistance r, connected in series with an external resistance R. One of the cells is wrongly connected, so that it sends current in the opposite direction. The current flowing in the circuit is

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

B. $\dfrac{(n-1)E}{nr+R}$

C. $\dfrac{(n-2)E}{nr+R}$

D. $\dfrac{(n-2)E}{(n-2)r+R}$

Answer: C

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17. The maximum power dissipated in an external resistance R, when connected to a cell of emf E and internal resistance r, will be

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

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

C. $\frac{E^2}{3r}$

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

Answer: D

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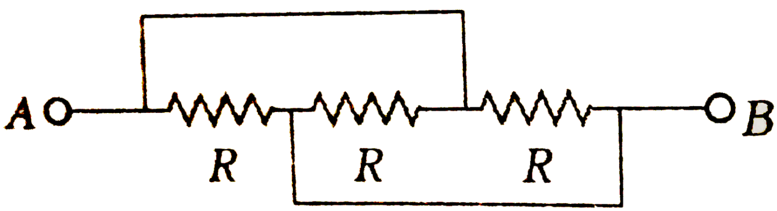
18. The resistance across A and B in the figure below will be



A. 3R

B. R

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

D. None of these

Answer: C

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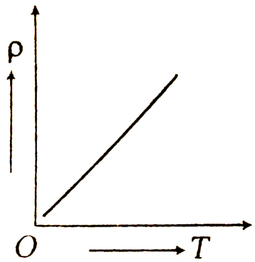
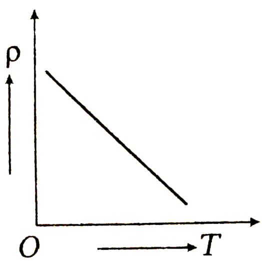
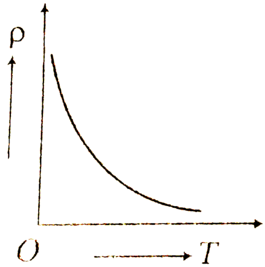
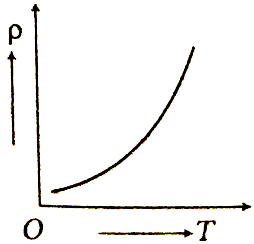
19. The temperature (T) dependence of resistivity (rho) of a semiconductor is represented by :

A. 

B. 

C. 

D. 

Answer: C

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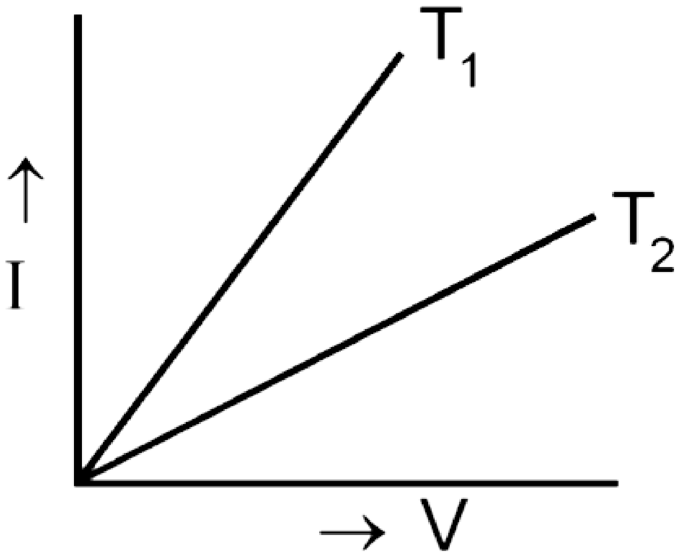
20. The current (I) and voltage (V) graphs for a given metallic wire at two different temperature (T_1) and (T_2) are shown in fig. It is concluded that



A. $T_1 > T_2$

B. $T_1 < T_2$

C. $T_1 = T_2$

D. $T_1 > 2T_2$

Answer: B

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21. 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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22. An ammeter and a voltmeter of resistance R connected in seires to an electric cell of negligible internal resistance. Their readings are A and V respecitvely. If another resistance R is connected in parallel with the voltmeter

A. Both A and V will increase

B. Both A and V will decreases

C. A will decrease and V will increase

D. A will increase and V will decrease

Answer: C

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23. The resistance of a wire is 10Ω. Its length is increased by 10% by stretching. The new resistance will now be

A. 12Ω

B. 1.2Ω

C. 13Ω

D. 11Ω

Answer: A

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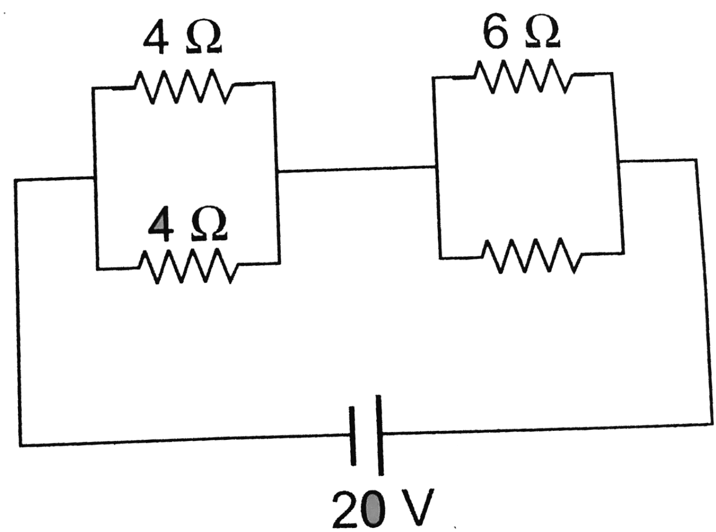
24. Four resistances are connected in a circuit in the given figure. The electric cirrent flowing through $4 ohm$ and $6 ohm$ resistance is respectively



A. 2 A and 4 A

B. 1 A and 2 A

C. 1 A and 1 A

D. 2 A and 2 A

Answer: D

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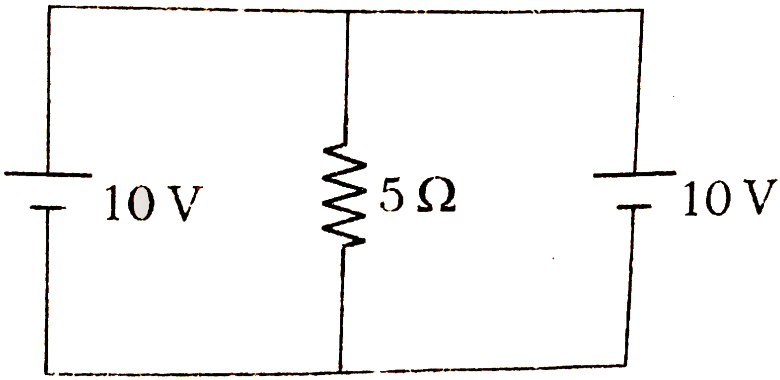
25. Current through the 5Ω resistor is



A. 2A

B. 4A

C. zero

D. 1A

Answer: A

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26. A cell which has an emf 1.5 V is connection series with an external resistance of 10Ω. If the potential difference across the cell is 1.25 V, then the internal resistance of the cell is $(\text{in}\Omega)$

A. 2

B. 0.25

C. 1.5

D. 0.3

Answer: A

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27. 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. 8Ω

B. 1Ω

C. 2Ω

D. 5Ω

Answer: B

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28. A wire of resistance R is divided in 10 equal parts. These parts are connected in parallel, the equivalent resistance of such connection will be

A. $0.01R$

B. $0.1R$

C. 10R

D. 100R

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29. Three resistors each of 2 ohm are connected together in a triangular shape. The resistance between any two vertices will be

A. $4/3\Omega$

B. $3/4\Omega$

C. 3Ω

D. 6Ω

Answer: A

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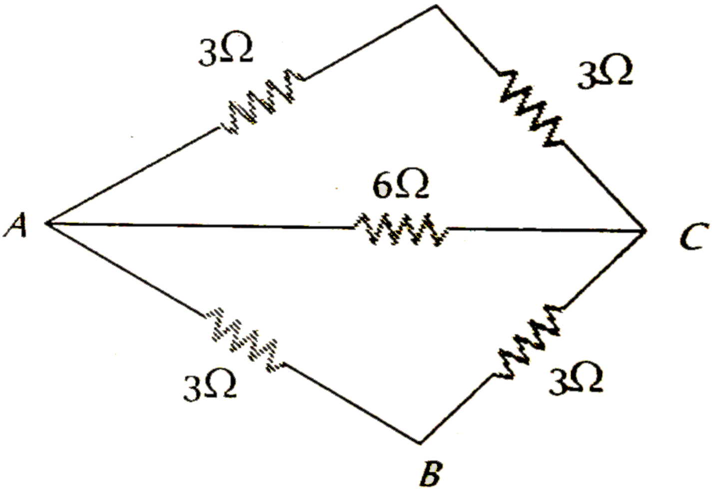
30. The effective resistance between the points A and B in the figure is



A. 5Ω

B. 2Ω

C. 3Ω

D. 4Ω

Answer: B

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31. Two resistances are joined in parallel whose resultant is $6/8ohm$. One of the resistance wire is broken and the effective resistance becomes 2Ω . Then the resistance in ohm of the wire that got broken was

A. $3/5$

B. 2

C. $6/5$

D. 3

Answer: C

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32. A wire of resistanc e9Ω is broken in two parts. The length ratio being $1:2$. The two pieces are connected in parallel. The net resistance will be

A. 2Ω

B. 3Ω

C. 4Ω

D. 6Ω

Answer: A

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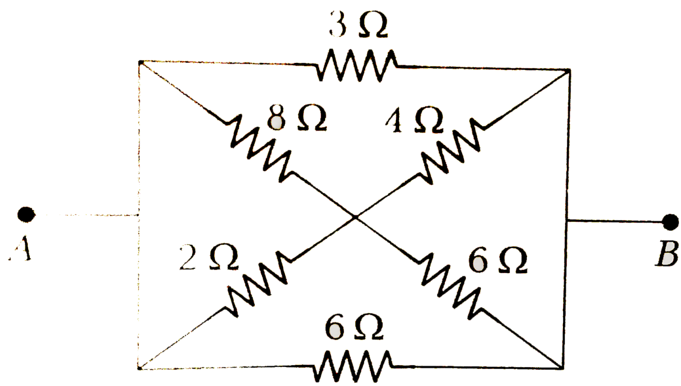
33. In the network shown, the equivalent resistance between A and B is



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

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

C. $\frac{24}{17}\Omega$

D. $\frac{17}{24}\Omega$

Answer: A

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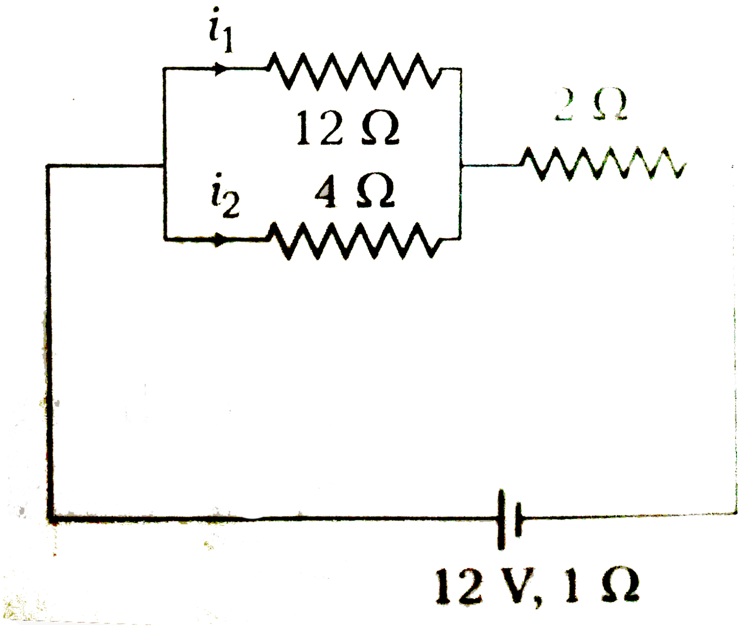
34. In the circuit shown, the currents i_1 and i_2 are



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

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

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

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

Answer: B

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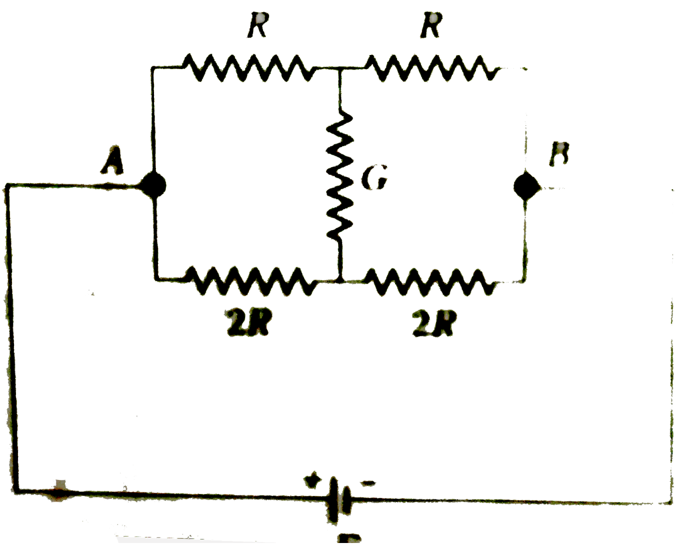
35. Consider the following statements regarding the network shown in the figure.



The eqivalent resistance of the network between points A and B is independent of value of G.

The equivalent resistance of the network between points A and B is $4/3R$

.

The current through G is zero.

Which of the above statements(s) is/are true?

A. (1) alone

B. (2) alone

C. Both (2) and (3)

D. (1), (2) and (3)

Answer: D

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36. To send 10% of the main current through a moving coil galvanometer of resistance 99ω, the shunt required is –

A. 9Ω

B. 11Ω

C. 10Ω

D. 9.9Ω

Answer: B

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37. A 1250 W heater operates at $115V$. What is the resistance of the heating coil?

A. 1.6Ω

B. 13.5Ω

C. 1250Ω

D. 10.6Ω

Answer: D

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38. The resistance of a wire at $20^{\circ} C$ is 20Ω and at $500^{\circ} C$ is 60Ω. At which temperature its resistance will be 25Ω?

A. $50^{\circ} C$

B. $60^{\circ} C$

C. $70^{\circ} C$

D. $80^{\circ} C$

Answer: D

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

A. $5 \times 10^{-2} m s^{-1}$

B. $0.5 m s^{-1}$

C. $5 \times 10^{-3} ms^{-1}$

D. $5 \times 10^{-6} ms^{-1}$

Answer: C

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40. At room temperature copper has free electron density of $8.4 \times 10^{28} per m^3$. The copper conductor has a cross-section of $10^{-6} m^2$ and carries a current of 5.4 A. What is the electron drift velocity in copper?

A. $4 ms^{-1}$

B. $0.4 ms^{-1}$

C. $4 cms^{-1}$

D. $0.4 mms^{-1}$

Answer: D

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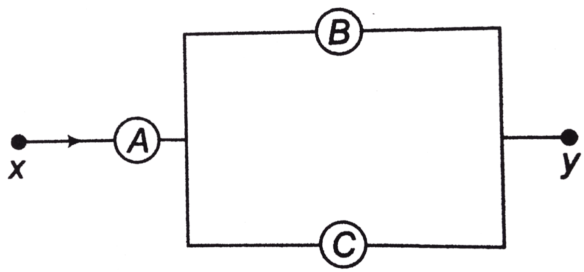
41. A, B and C are voltmeters of resistances $R, 1.5R$ and $3R$ respectively. When some potential difference is applied between x and y the voltmeter readings are V_A, V_B and V_C,` then



A. $V_1 = V_2 = V_3$

B. $V_1 < V_2 = V_3$

C. $V_1 > V_2 > V_3$

D. $V_1 > V_2 = V_3$

Answer: A

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42. 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 $1 \text{ cm} \times (1/2)$ cm faces

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

C. maximum when the battery is connected across $1 = \text{cm} \times (1/2)$ cm faces

D. same irrepective of the three faces

Answer: A

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43. 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 8V

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 resistances and not voltages

Answer: B

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44. 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. $3.2 \times 10^{-2} V / m$

D. $1 V / m$

Answer: A

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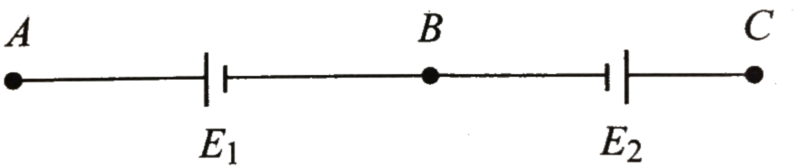
45. Two cells of emfs E_1 and $(E_2 (E_1 > E_2)$ are connected as shows in Fig. 6.45.



When a potentiometer is connected between A and B, the balancing length of the potentiometer wire is $300 cm$. On connecting the same potentiometer between A and C, the balancing length is $100 cm$. The ratio E_1 / E_2 is

A. $3 : 1$

B. $1:3$

C. $2:3$

D. $3:2$

Answer: D

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46. A voltmeter of resistance 998Ω is connected across a cell of emf 2 V and internal resistance 2Ω. Find the p.d. across the voltmeter, that across the terminals of the cell and percentage error in the reading of the voltmeter.

A. $1.99V$

B. $3.5V$

C. 5 V

D. 6 V

Answer: A

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47. A wire of 50 cm long, $1mm^2$ in cross-section carries a current of 4 A, when connected to a 2 V battery, the resistivity of wire is

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

B. $5 \times 10^{-7} \Omega - m$

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

D. $1 \times 10^{-6} \Omega - m$

Answer: D

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48. 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. 2Ω

B. 3Ω

C. 6Ω

D. 1Ω

Answer: B

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

A. $0.05Vm^{-1}$

B. $0.5Vm^{-1}$

C. $0.01Vm^{-1}$

D. $0.1 Vm^{-1}$

Answer: C

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50. The electron with change $\left(q = 1.6 \times 10^{-19} C\right)$ moves in an orbit of radius 5×10^{-11}m with a speed of $2.2 \times 10^{6} ms^{-1}$, around an atom. The equivalent current is

A. $1.12 \times 10^{-6} A$

B. $1.12 \times 10^{-3} A$

C. $1.12 \times 10^{-9} A$

D. $1.12 A$

Answer: B

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51. Two resistance wires on joining in parallel the resultant resistance is ohms $\frac{6}{5}$ ohms. One of the wire breaks, the effective resistance is 2 ohms . The resistance of the broken wire is

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

B. 2Ω

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

D. 3Ω

Answer: D

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52. A potentiometer having the potential gradient of $2mV/cm$ is used to measure the difference of potential across a resistance of $10ohm$. If a length of $50cm$ of the potentiometer wire is required to get null point, the current passing through the 10Ω resistor is (in mA)

A. 1

B. 2

C. 5

D. 10

Answer: D

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53. The n rows each containinig m cells in series are joined parallel. Maximum current is taken from this combination across jan external resistance of 3Ω resistance. If the total number of cells used are 24 and internal resistance of each cell is 0.5Ω then

A. m = 8, n = 3

B. m = 6, n = 4

C. m = 12, n = 2

D. m = 2, n = 12

Answer: C

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54. A $100V$ voltmeter of internal resistance $20k\Omega$ in series with a high resistance R is connected to a $110V$ line. The voltmeter reads $5V$, the value of R is

A. $210k\Omega$

B. $315k\Omega$

C. $420k\Omega$

D. $440k\Omega$

Answer: C

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55. A cell supplies a current i_1 trhough a resistnace R_1 and a current i_2 through a resistance R_2. The internal resistance of this cell is

A. $R_2 - R_1$

B. $\dfrac{i_1 R_2 - i_2 R_1}{i_1 - i_2}$

C. $\dfrac{i_2 R_2 - i_1 R_1}{i_1 - i_2}$

D. $\left(\dfrac{i_1 + i_2}{i_1 - i_2}\right)\sqrt{R_1 R_2}$

Answer: C

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56. Out of five resistance of $R\Omega$ each 3 are connected in parallel and are joined to the rest 2 in series. Find the resultant resistance.

A. $(3/7)R\Omega$

B. $(7/3)R\Omega$

C. $(7/8)R\Omega$

D. $(8/7)R\Omega$

Answer: B

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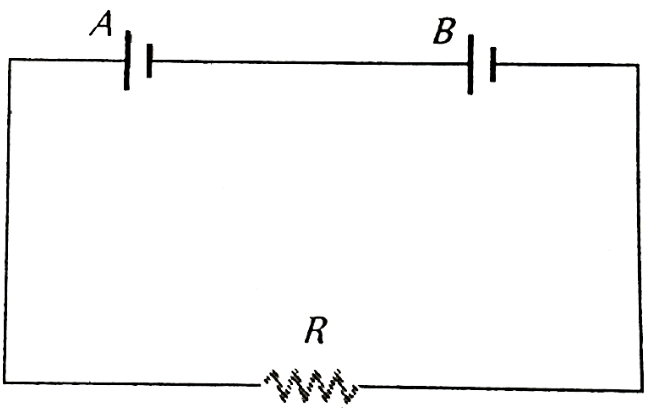
57. Two batteries A and B each of e.m.f. 2 V are connected in series to an external resistance R = 1 ohm . If the internal resistance of battery A is 1.9 ohms and that of B is 0.9 ohm , what is the potential difference between the terminals of battery A



A. 2 V

B. 3.8 V

C. zero

D. 4.8 V

Answer: C

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58. For a cell of e.m.f. 2 V , a balance is obtained for 50 cm of the potentiometer wire. If the cell is shunted by a 2Ω resistor and the balance is obtained across 40 cm of the wire, then the internal resistance of the cell is

A. 0.25Ω

B. 0.50Ω

C. 0.80Ω

D. 1.00Ω

Answer: B

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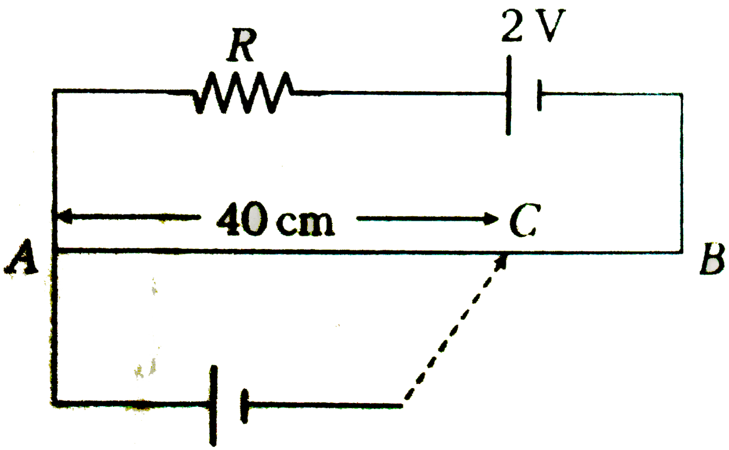
59. AB is a potentiometer wire of length 100 cm and its resistance is 10Ω. It is connected in series with a resistance R = 40 Ω and a battery of emf 2 V and negligible internal resistance. If a source of unknown emf E is balanced by 40 cm length of the potentiometer wire, the value of E is



A. $0.8V$

B. $1.6V$

C. $0.08V$

D. $0.16V$

Answer: D

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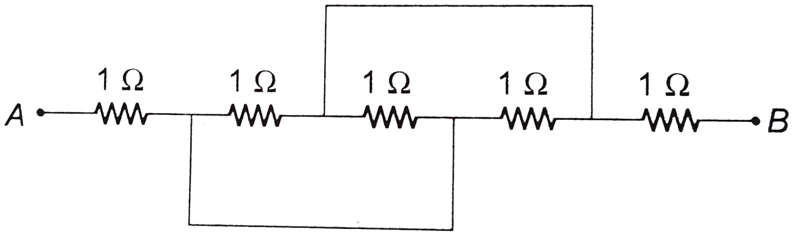
60. Equivalent resistance between the points A and B (in Ω)



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

B. $\frac{5}{4}$

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

D. $\frac{7}{2}$

Answer: C

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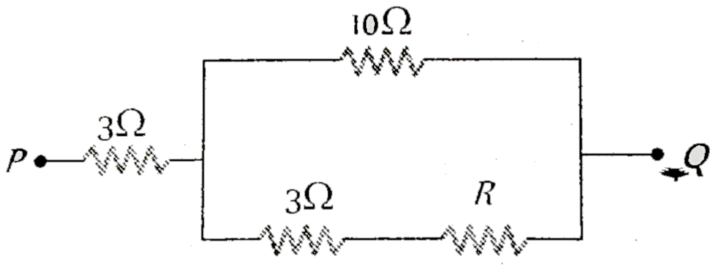
61. In the circuit shown here, what is the value of the unknown resistor R so that the total resistance of the circuit between points P and Q is also equal to R



A. 3Ω

B. $\sqrt{39}\Omega$

C. $\sqrt{69}\Omega$

D. 10Ω

Answer: C

Watch Video Solution

62. Two wire of the same meta have same length, but their cross-sections are in the rati $3:1$. They are joined in series. The resistance of thicker wire is 10Ω . The total resistance of the combination will be

A. 40Ω

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

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

D. 100Ω

Answer: A

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63. The masses of the three wires of copper are in the ratio $5:3:1$ and their lengths are in the ratio $1:3:5$. The ratio of their electrical resistances is

A. $5:3:1$

B. $\sqrt{125} : 15 : 1$

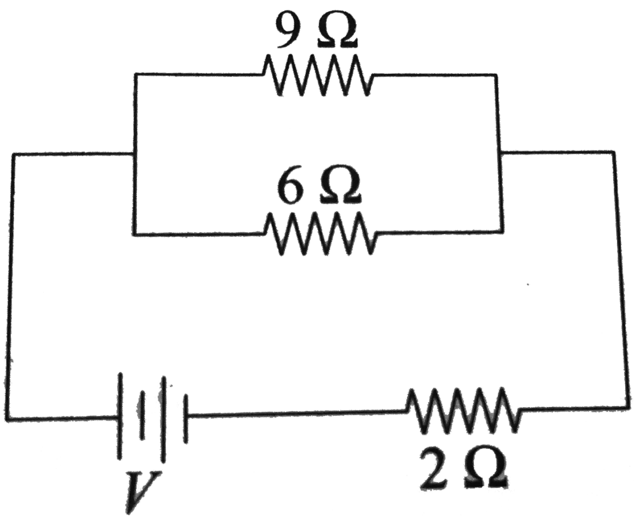
C. $1 : 15 : 125$

D. $1 : 3 : 5$

Answer: C

Watch Video Solution

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



A. 8 V

B. 10 V

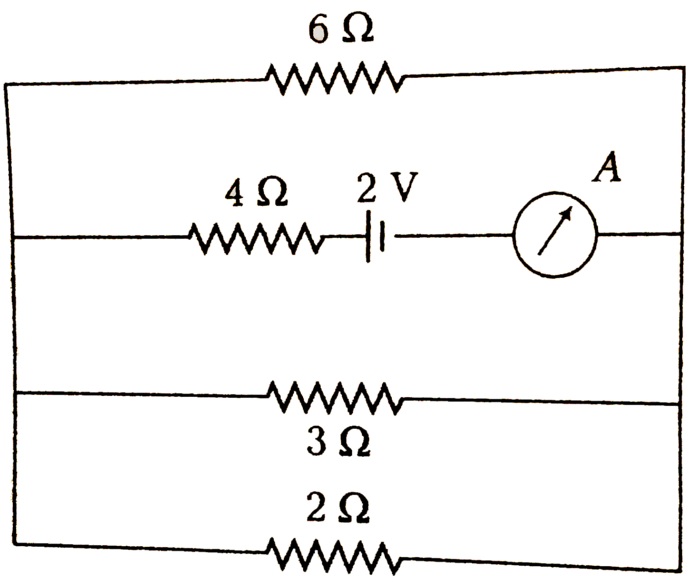
C. 2 V

D. 4 V

Answer: B

Watch Video Solution

65. The reading of the ammeter in the following figure will be



A. 0.8 A

B. 0.6 A

C. 0.4 A

D. 0.2 A

Answer: C

Watch Video Solution

66. A wire of length 100 cm is connected to a cell of emf 2 V and negligible internal resistance. The resistance of the wire is 3Ω. The additional resistance required to produce a potential drop of 1 milli volt per cm is

A. 60Ω

B. 47Ω

C. 57Ω

D. 35Ω

Answer: C

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67. Two uniform wires A and B are of the same total metal and have equal masses. The radius of wire A is twice that of wire B. The total resistance of A and B when connected in parallel is

A. 4Ω when the resistance of wire A is 4.25Ω

B. 5Ω when the resistnace of wire A is 4Ω

C. 4Ω when the resistance of wire B is 4.25Ω

D. 5Ω when the resistance of wire B is 4Ω

Answer: A

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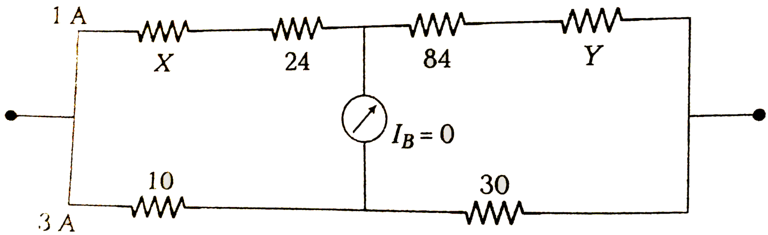
68. In the given circuit, the resistances are given in ohm. The current through the 10Ω resistance is 3 A while that through the resistance X is 1 A. No current passes through the galavanometer. The values of the unknown resistances X and Y are respectively (in ohm)



A. 14 and 54

B. 12 and 6

C. 6 and 12

D. 6 and 6

Answer: D

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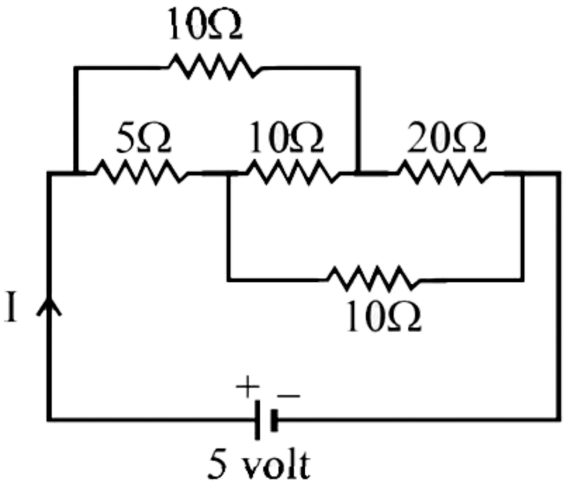
69. The current I drawn from the 5 volt source will be



A. $0.33A$

B. $0.5A$

C. 0.67A

D. $0.17A$

Answer: B

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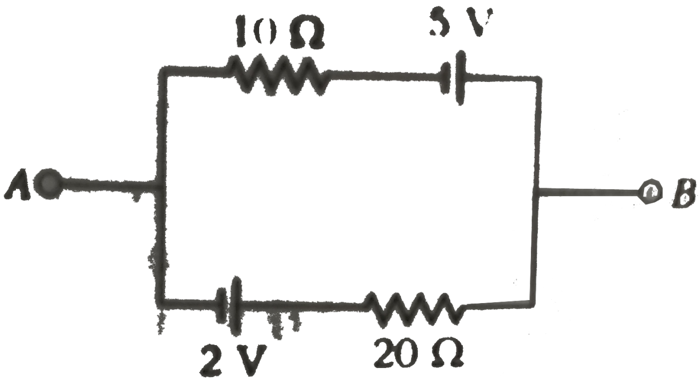
70. The current in the given circuit is



A. $0.3A$

B. $0.4A$

C. $0.1A$

D. $0.2A$

Answer: C

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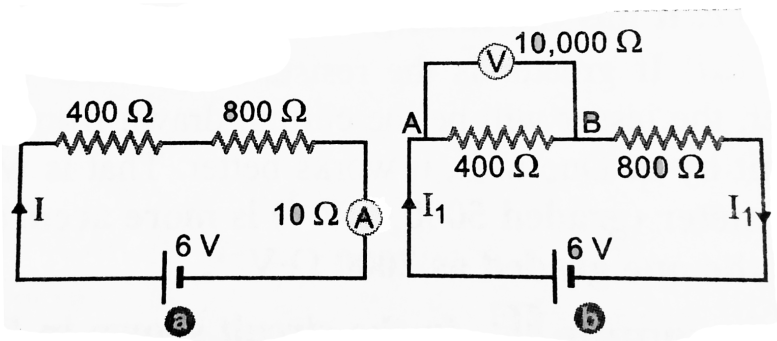
71. Two resistors 400Ω and 800Ω are connected in series with a $6V$ battery. It is desired to measure the current in the circuit. An ammeter of 10Ω resistance is used for this purpose figure. What will be the reading in the ammeter? Similarly, if a voltmeter of $10,000\Omega$ resistance is used to measure the potential difference across the 400Ω resistor, what will be the reading in the voltmeter?



A. 2 V

B. 1.95 V

C. 3.8 V

D. 4 V

Answer: B

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72. A battery of emf E has an internal resistance r. A variable resistacne R is connected to the terminals of the battery. A current i is drawn from the battery. V is the terminal potential difference. If R alone is gradually reduced to zero, which of the following best describes i and V?

A. i approaches zero, V approaches E

B. i approaches $\frac{E}{r}$, V approaches zero

C. i approaches $\frac{E}{r}$, V approaches E

D. i approaches infinity, $\frac{E}{r}$, V approaches E

Answer: B

Watch Video Solution

73. Two resistances are connected in the two gaps of a meter bridge. The balance point is $20cm$ from the zero end. When a resistance 15Ω is connected in series with the smaller of two resistance, the null point+ shifts to $40cm$. The smaller of the two resistance has the value.

A. 3

B. 6

C. 9

D. 12

Answer: C

Watch Video Solution

74. A battery of four cells in series, each having an emf of 1.14 V and an internal resistance of 2Ω is to be used to charge a small 2 V accumulator of negligible internal resistance. What is the charging current?

A. $0.1A$

B. $0.2A$

C. $0.3A$

D. $0.45A$

Answer: D

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75. The length of a wire of a potentiometer is 100 cm, and the e.m.f. of its standard cell is E volt. It is employed to measure the e.m.f. of a battery whose internal resistance is 0.5Ω. If the balance point is obtained at I = 30 cm from the positive end, the e.m.f. of the battery is .

where i is the current in the potentiometer wire.

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

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

C. $\frac{30(E-0.5i)}{100}$, where i is the current in the potentiometer wire

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

Answer: D

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76. When a resistance of 100Ω is connected in series with a galvanometer of resistance R, then its range is V. To double its range, a resistance of 1000Ω is connected in series. Find the value of R.

A. 700Ω

B. 800Ω

C. 900Ω

D. 100Ω

Answer: C

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77. 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. $\sqrt{r_1 r_2}$

B. $r_1 + r_2$

C. $r_1 - r_2$

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

Answer: C

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

A. $4:1$

B. $1:1$

C. $1:2$

D. $1:4$

Answer: D

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79. Two bulbs consume same energy when operated at $200V$ and $300V$, respectively . When these bulbs are connected in series across a dc source of $500V$, then

A. ratio of potential differences across them is $3/2$

B. ratio of potential differences across them is $9/4$

C. ratio of powers consumed across them is $4/9$

D. ratio of powers consumed across them is $2/3$

Answer: C

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80. A factory is served by a 220 V supply line. In a circuit protected by a fuse marked 10 A, the maximum number of 100 W lamps in parallel that can be turned on, is

A. 11

B. 22

C. 33

D. 66

Answer: B

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81. Two bulbs 60 W and 100 W designed for voltage 220 V are connected in series across 220 V source. The net power dissipated is

A. 37.5 W

B. 75W

C. 80W

D. 40 W

Answer: A

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82. A tap supplies water at $22^\circ C$, a man takes 1 L of water per min at $37^\circ C$ from the geyser. The power of geyser is

A. 525 W

B. 1050 W

C. 1775 W

D. 2100 W

Answer: B

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83. The mean free path of electrons in a metal is $4 \times 10^{-8} m$ The electric field which can give on an average $2eV$ energy to an electron in the metal will be in the units V/m

A. 8×10^{7}

B. 5×10^{-11}

C. 8×10^{-11}

D. 5×10^{7}

Answer: D

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84. You are given two resistances R_1 and R_2. By using them singly, in series and in parallel, you can obtain four resistances of 1.5Ω, 2Ω, 6Ω and 8Ω. The value of R_1 and R_2 are

A. 1Ω, 7Ω

B. 1.5Ω, 6.5Ω

C. 3Ω, 5Ω

D. 2Ω, 6Ω

Answer: D

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85. A potentiometer having the potential gradient of $2mV / cm$ is used to measure the difference of potential across a resistance of $10ohm$. If a length of $50cm$ of the potentiometer wire is required to get null point, the current passing through the $10ohm$ resistor is (in mA)

A. 1

B. 2

C. 5

D. 10

Answer: D

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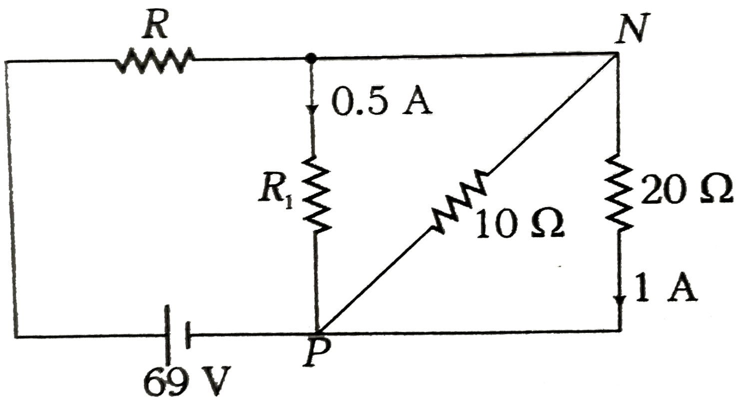
86. In the circuit shown in the figure,



A. The current through NP is 0.5 A

B. The value of $R_1 = 40\Omega$

C. The value of R =14Ω

D. sThe potential difference across R = 49 V

Answer: B::C::D

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

A. 4450 Ω

B. 5050 Ω

C. 5550 Ω

D. 6050 Ω

Answer: A

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88. When a galvanometer is shunted by resistance S, then its current capacity increases n times. If the same galvanometer is shunted by another resistance S', then its current capcity will increase by n' is given by

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

B. $\dfrac{S(n-1)+S'}{S'}$

C. $\dfrac{n+S}{S'}$

D. $\dfrac{S(n-1)-S'}{S'}$

Answer: B

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89. The tungsten filaments of two electric bulbs are of the same length. If one of them gives 25 W power and the other 60 W power, then

A. Both the filaments are of same thickness

B. 25 W bulb has thicker filament

C. 60 W bulb has thicker filament

D. Both the filaments have same cross-sectional area

Answer: C

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90. 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

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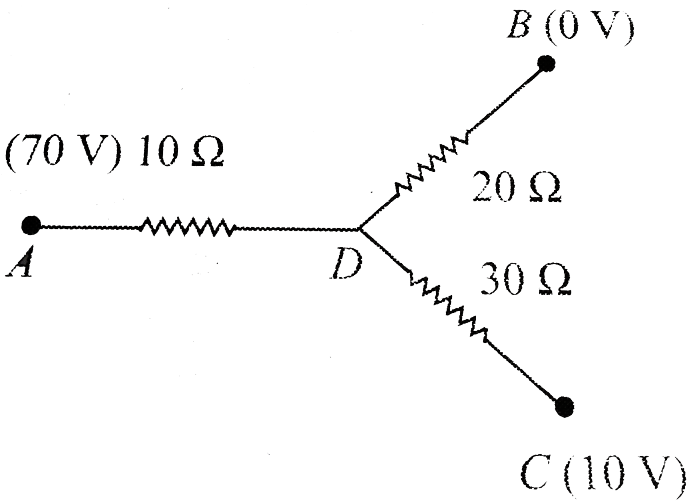
91. In the network shown in fig. , points A, B, and C are at potentials of 70 V, 0, and 10V, respectively.



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

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

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

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

Answer: C

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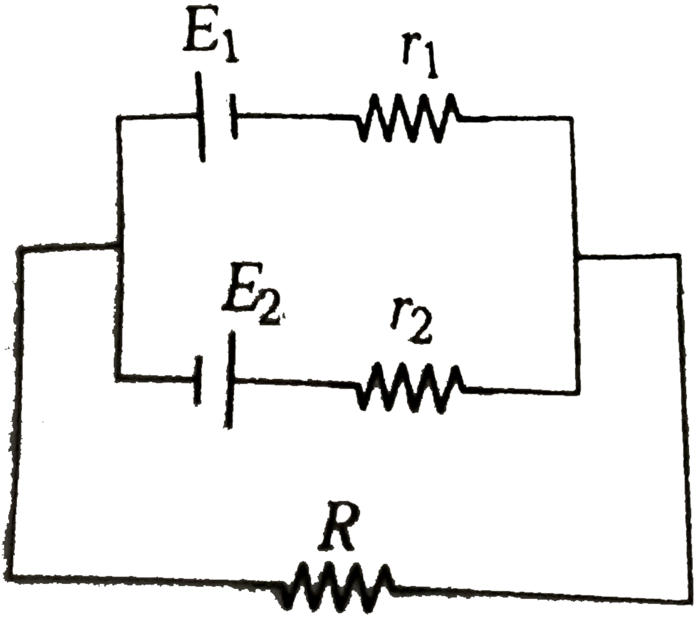
92. The current in the resistance R will be zero if



A. $E_1 r_1 = E_2 r_2$

B. $\frac{E_1}{r_1} = \frac{E_2}{r_2}$

C. $(E_1 + E_2) r_1 = E_1 r_1$

D. $(E_1 - E_2) r_1 = E_2 r_1$

Answer: B

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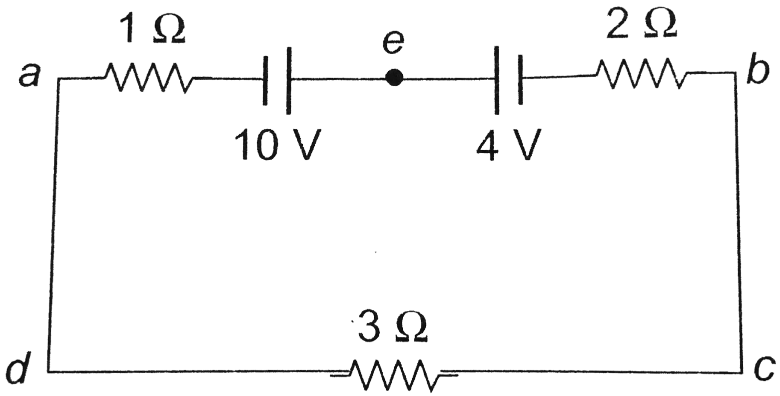
93. The magnitude and direction of the current in the circuit shown will be



A. $\frac{7}{3}A$ from a to e

B. $\frac{7}{3}A$ from b to e

C. 1A from b to e

D. 1A from a to e

Answer: D

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94. 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 given segment of wire which push them just the right way by repulsion

D. the charges ahead

Answer: B

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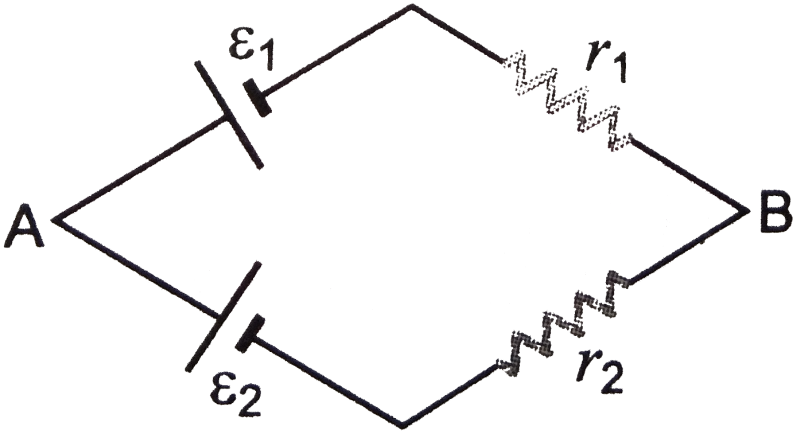
95. Two batteries of emf ε_1 and $\varepsilon_2 (\varepsilon_2 > \varepsilon_1$ and internal resistances r_1 and r_2 respectively are connected in parallel as shown in Fig. 2 (EP).1.



A. Two equivalent emf ε_{eq} of the cells is between ε_1 and $\varepsilon_2, i.e., \varepsilon_1 < \varepsilon_{eq} < \varepsilon_2$

B. The equivalent emf ε_{eq} is smaller then ε_1

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

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

Answer: A

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96. A resistance R is to be measured using a meter bridge. Student chooses the standard 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 l_1 more accurately

B. He should change S to 1000Ω and repeat the experiment

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

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

Answer: C

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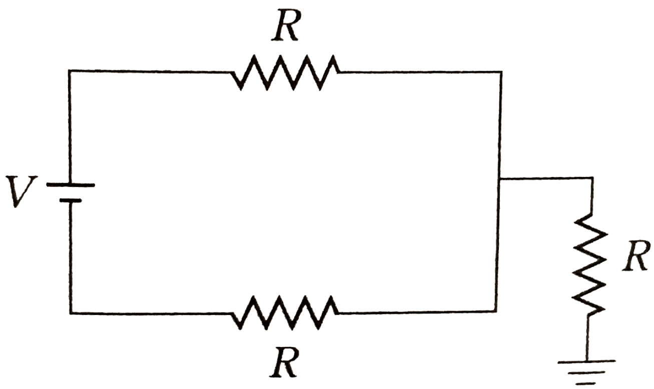
97. The current drawn from the battery shown in the figure is ltBrgt



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

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

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

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

Answer: B

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98. Two nonideal batteries are connected in parallel. Consider the following statements:

(A)The equivalent emf is smaller than either of the two emfs.

(B) The equivalent internal resistance is smaller than either of the two internal resistances.

A. Both A and B are correct

B. A is correct but B is wrong

C. B is correct but A is wrong

D. Both A and B are correct

Answer: C

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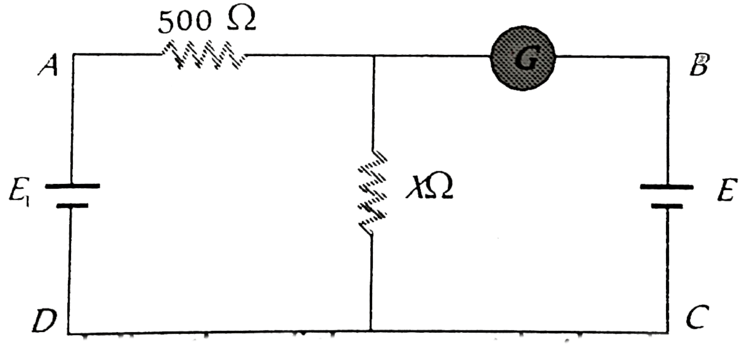
99. In the adjoining circuit, the battery E_1 has an e.m.f me of 12 volt and zero internal resistance while the battery E has an e.m.f me of 2volt . If the galvanometer G reads zero, then the value of the resistance X in ohm is



A. 250

B. 100

C. 50

D. 200

Answer: B

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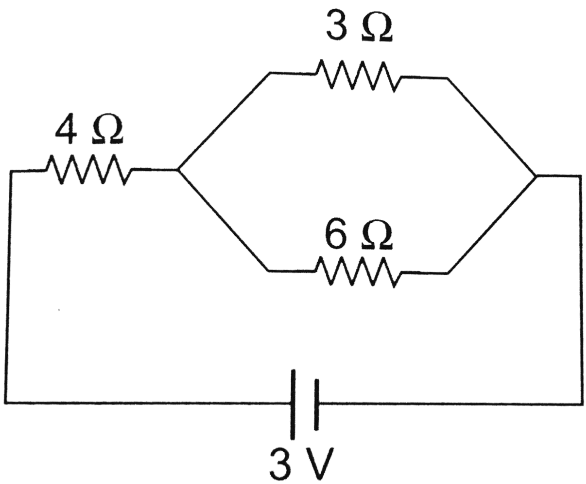
100. The potential drop across the 3Ω resistor is



A. 1 V

B. $1.5V$

C. 2 V

D. 3 V

Answer: A

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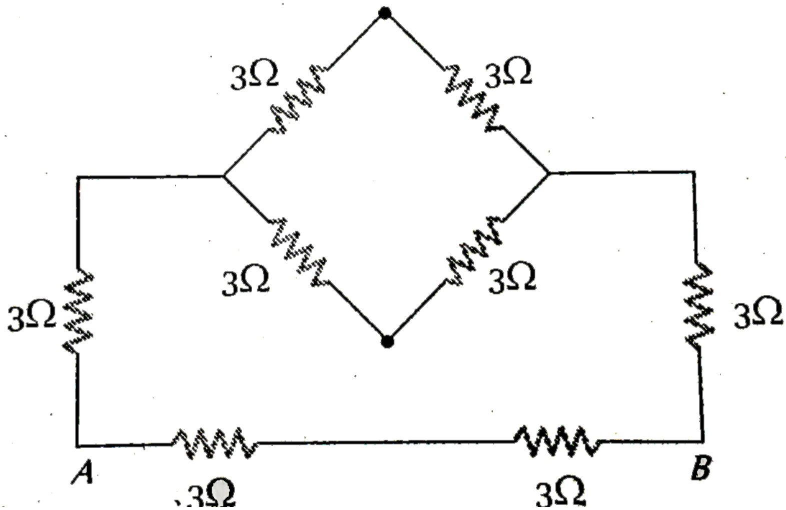
101. Equivalent resistance between A and B will be



A. 2Ω

B. 18Ω

C. 6Ω

D. 3.6Ω

Answer: D

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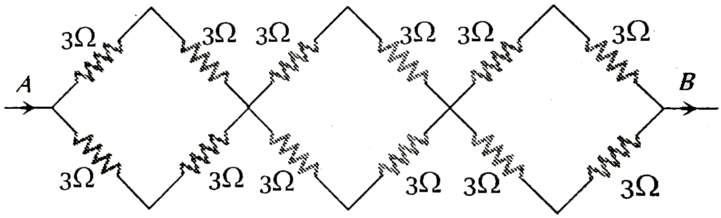
102. In the network of resistors shown in the adjoining figure, the equivalent resistance between A and B is



A. 54 Ω

B. 18 Ω

C. 36 Ω

D. 9 Ω

Answer: D

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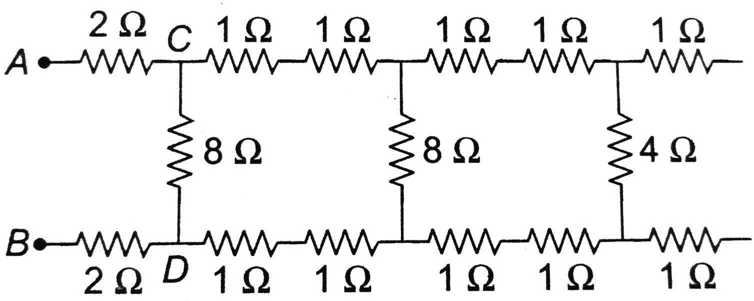
103. In the figure shown, the total resistance between A and B is



A. 12 Ω

B. 4 Ω

C. 6 Ω

D. 8 Ω

Answer: D

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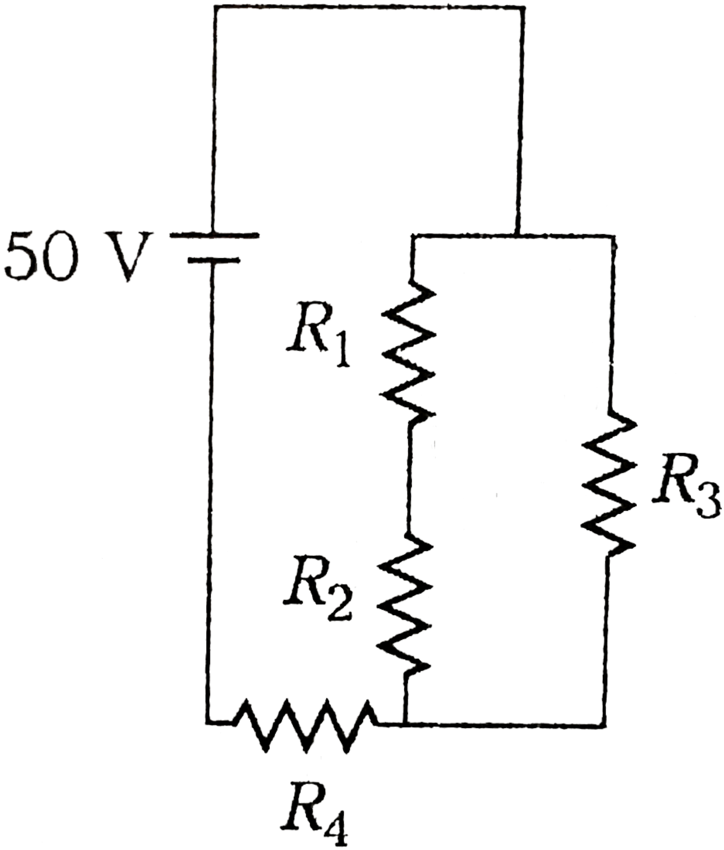
104. The potential difference in volt across the resistance R_3 in the circuit shown in figure, is $(R_1 = 15\Omega, R_2 = 15\Omega, R_3 = 30\Omega, R_4 = 35\Omega)$



A. 5

B. 7.5

C. 15

D. 12.5

Answer: C

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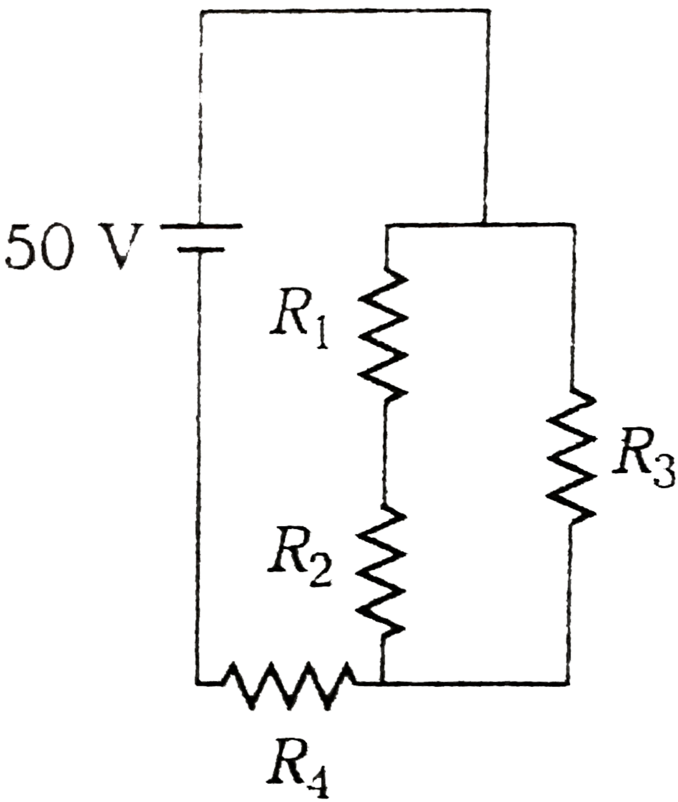
105. In the given circuit, the voltmeter records 5 V. The resistance of the voltmeter in Ω is



A. 200

B. 100

C. 10

D. 50

Answer: B

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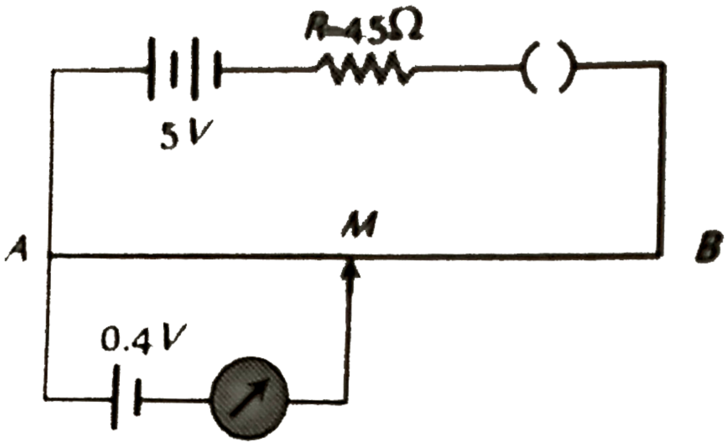
106. In given figure, the potentiometer wire AB has a resistance of 5Ω and length 10 m . The balancing length AM for the emf of 0.4 V is



A. 0.4m

B. 4 m

C. 0.8 m

D. 8 m

Answer: D

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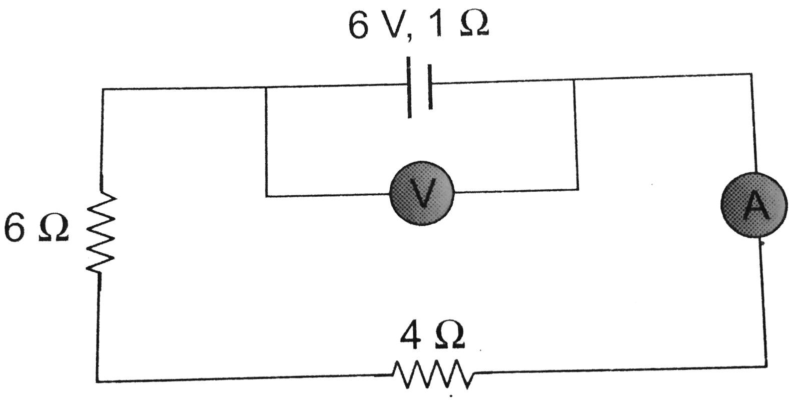
107. In the circuit shown here, the readings of the ammeter and voltmeter are



A. 6 A, 60 V

B. 0.6 A, 6 V

C. 6 A, 6 V

D. 6/11 A, 6/11 V

Answer: D

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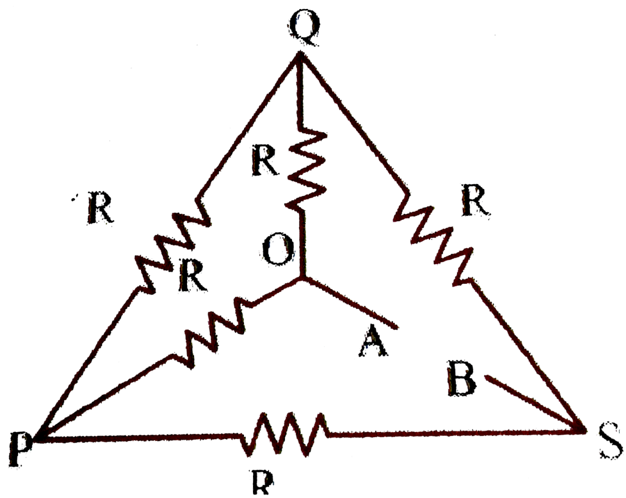
108. If each of the resistance in the network in figure R,

the equivalent resistance between terminals A and B is



A. R

B. 5R

C. 3R

D. 6R

Answer: A

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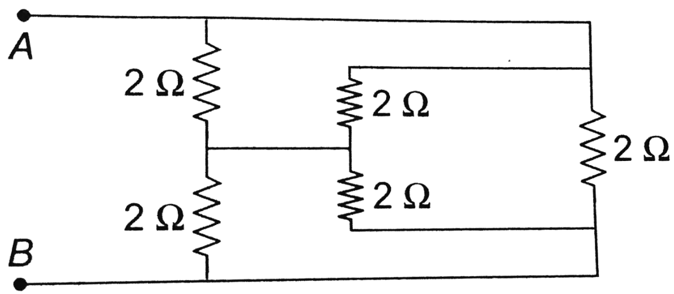
109. Find the equivalent resistance across AB :



A. 1Ω

B. 2Ω

C. 3Ω

D. 4Ω

Answer: A

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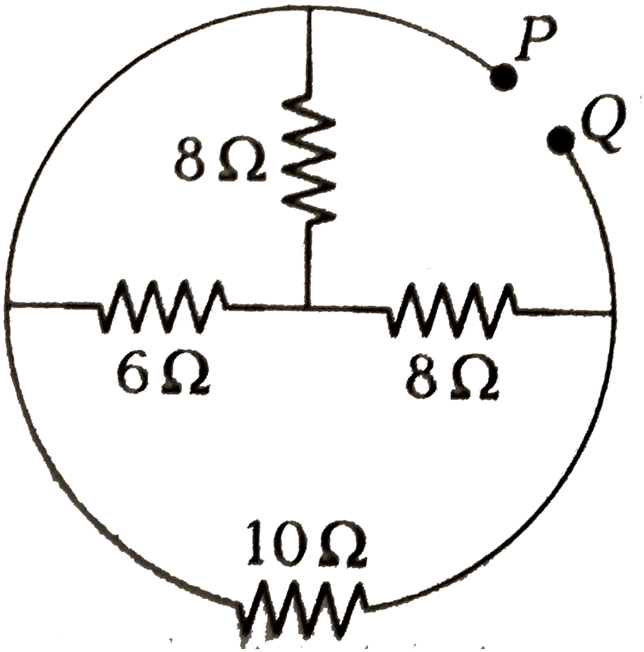
110. The equivalent resistance between P and Q in the figure is approximately



A. 6Ω

B. 5.333Ω

C. 7.5Ω

D. 20Ω

Answer: B

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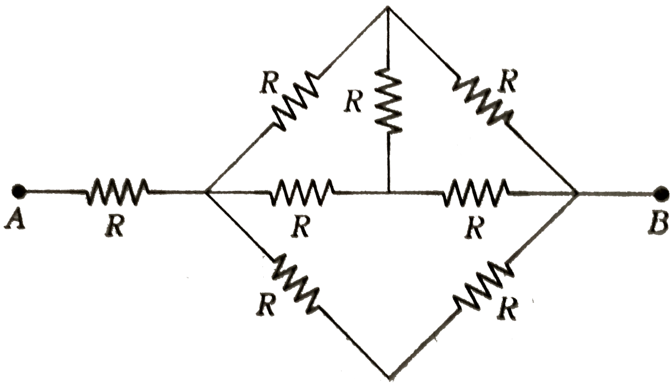
111. In the given network of resistances, the effective resistance between A and B is



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

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

C. 5R

D. 8R

Answer: A

Watch Video Solution

112. A source of e.m.f. $E = 15V$ and having negligible internal resistance is connected to a variable resistance so that the current in the circuit increases with time as $i = 1.2t + 3$. Then, the total charge that will flow in first five second will be

A. 10 C

B. 20 C

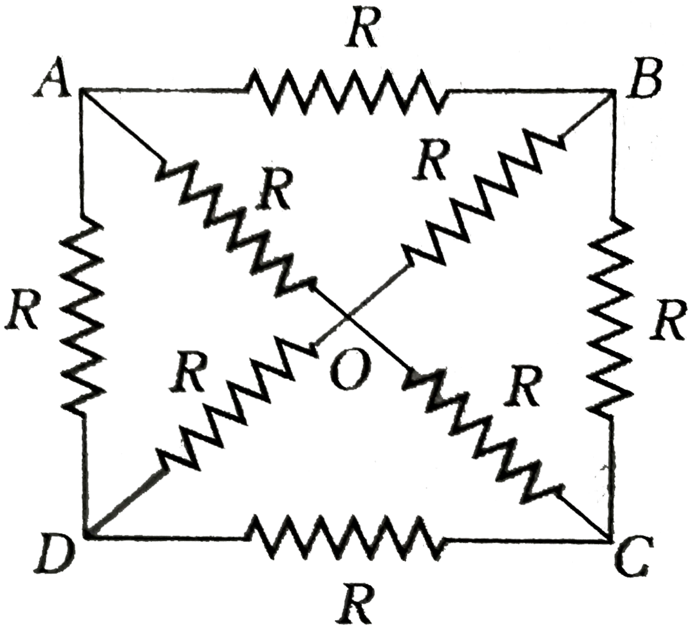
C. 30 C

D. 40 C

Answer: C

Watch Video Solution

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



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

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

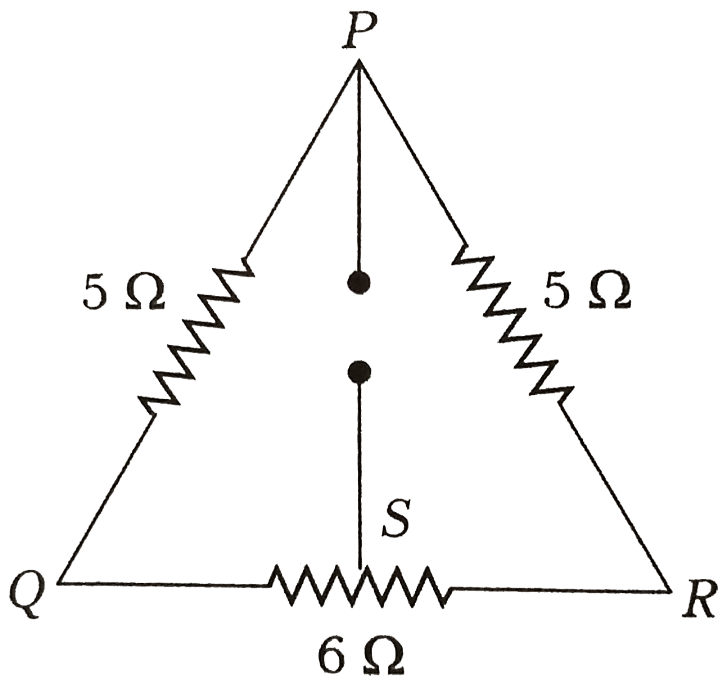
C. 2R

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

Answer: A

Watch Video Solution

114. Three resistances 5Ω, 5Ω and 6Ω are connected as shown in figure. If the point S divides the resistance 6Ω into two equal halves, the resistance between points P and S is



A. 11 Ω

B. 8 Ω

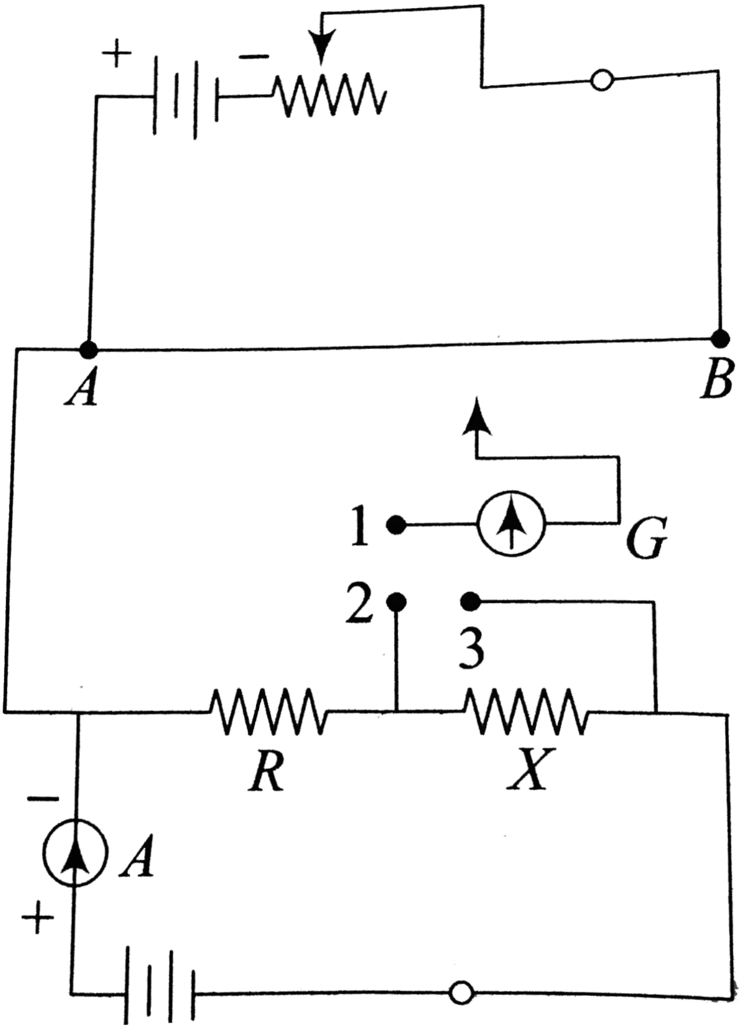
C. 6 Ω

D. 4 Ω

Answer: D

Watch Video Solution

115. A potentiometer circuit is setup as shown. The potential gradient across the potentiometer wire is $k\text{volt}/cm$ and the ammeter present in the circuit reads. $1.0A$ When two-way key is switched off. The balance point, when the key between the terminals (i) 1 and 2 (ii) 1 and 3, is plugged in, are found to be at lengths l_2cm and l_2cm respectively. The magnitudes, of the resistors R and X, in ohm, are then, equal, respectively, to



A. $k(l_2 - l_1) \text{and} k l_2$

B. $k l_1 \text{and} k(l_2 - l_1)$

C. $k(l_2 - l_1) \text{and} k l_2$

D. $kl_1 \text{and} kl_2$

Answer: B

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116. An electric immersion heater of $1.08kW$ is immersed in water. After it has reaches a temperature of $100^\circ C$, how much time will be required to produce $100g$ of steam?

A. $50s$

B. $420s$

C. $105s$

D. $210s$

Answer: D

Watch Video Solution

117. A moving coil galvanometer is converted into an ammeter reads upto $0.03A$ by connecting a shunt of resistance $4r$ across it and ammeter reads up $0.06A$, when a shunt of resistance r is used. What is the maximum current which can be sent through this galvanometer if no shunt is used ?

A. $0.01A$

B. $0.02A$

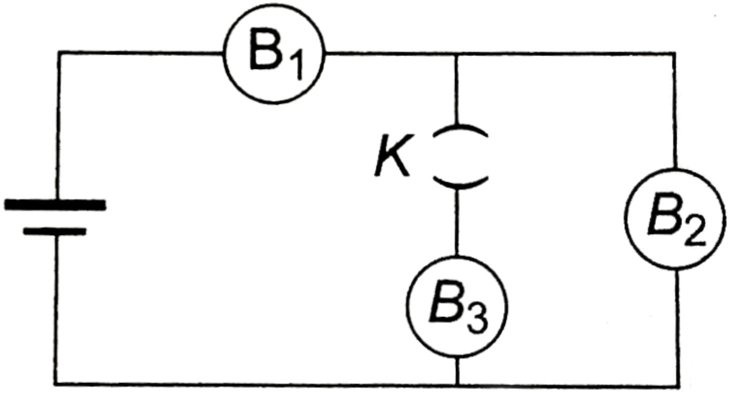
C. $0.03A$

D. $0.04A$

Answer: B

Watch Video Solution

118. B_1, B_2 and B_3 are the three identical bulbs connected to a battery of steady emf with key K closed. What happens to the brightness of the bulbs B_1 and B_2 when the key is opened?



A. Brightness of the bulb B_1 increases and that of B_2 decreases

B. Brightness of the bulbs B_1 and B_2 increases

C. Brightness of the bulb B_1 decreases and B_2 increases

D. Brightness of the bulbs B_1 and B_2 decreases

Answer: C

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119. The scale of a galvanometer of resistance $100 ohms$ contains 25 divisions. It gives a defelction of one division on passing a current of 4×10^{-4} amperes. The resistance in ohms to be added to it, so that it may become a voltmeter of range 2.5 volts is

A. 150

B. 170

C. 110

D. 220

Answer: A

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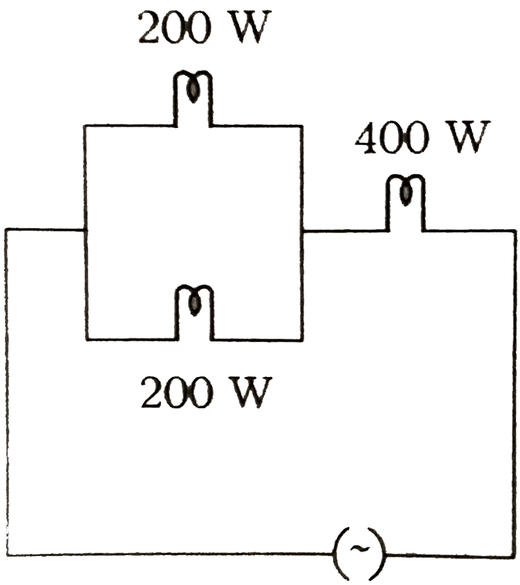
120. Three electric bulbs of 200 W, 200 W and 400 W are connected as shown in figure. The resultant power of the combination is



A. 800 W

B. 400 W

C. 200 W

D. 600 W

Answer: A

Watch Video Solution

121. Two electric bulbs rated 50 W and 100 W are glowing at full powr, when used in parallel with a battery of emf 120 V and internal resistance 10 Ω. The maximum number of bulbs that can be connected in the circuit when glowing at full power, is

A. 6

B. 4

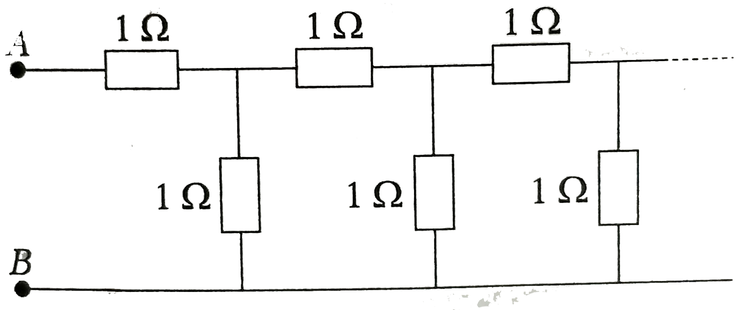
C. 2

D. 8

Answer: B

View Text Solution

122. The equivalent resistance between point A and B of an infinite network of resistance, each of 1Ω, connected as shown, is



A. infinite

B. 2Ω

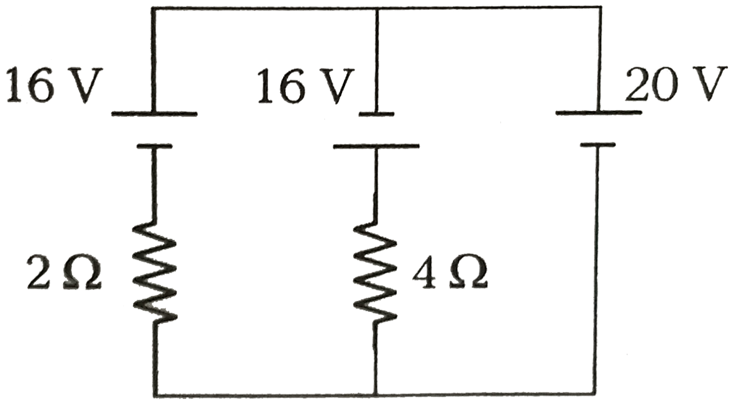
C. $\frac{1+\sqrt{5}}{2}\Omega$

D. zero

Answer: C

Watch Video Solution

123. In the given figure, the current through the 20 V battery is



A. $11A$

B. $12A$

C. $7A$

D. $14A$

Answer: A

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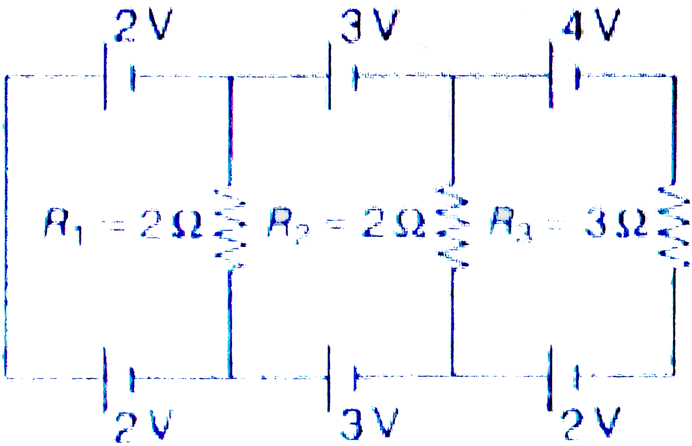
124. the current in resistance R_3 in the given circuit is $\frac{2}{x}A$. Find the value of x.



A. $1A$

B. $2/3A$

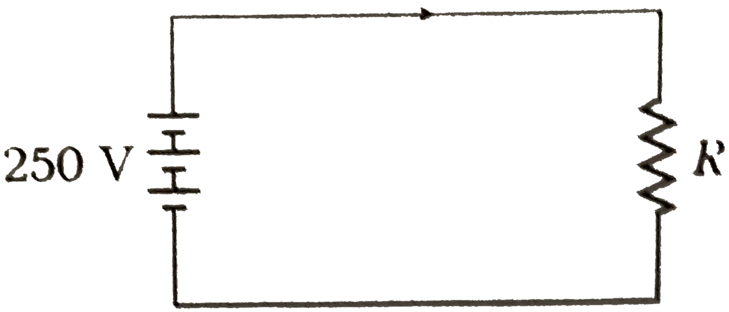
C. $0.25A$

D. $0.50A$

Answer: B

Watch Video Solution

125. In the circuit shown in figure, the resistance R has a value that depends on the current. Specifically R is 20 Ω when i is zero and the amount of increase in resistance is numerically equal to one-half of the current. What is the value of current I in circuit?



A. 15 A

B. $10A$

C. 20 A

D. $5A$

Answer: B

Watch Video Solution

126. The charge flowing in a conductor varies with times as $Q = at - bt^2$. Then, the current

A. reaches a maximum and then decreases

B. falls to zero after $t = \dfrac{a}{2b}$

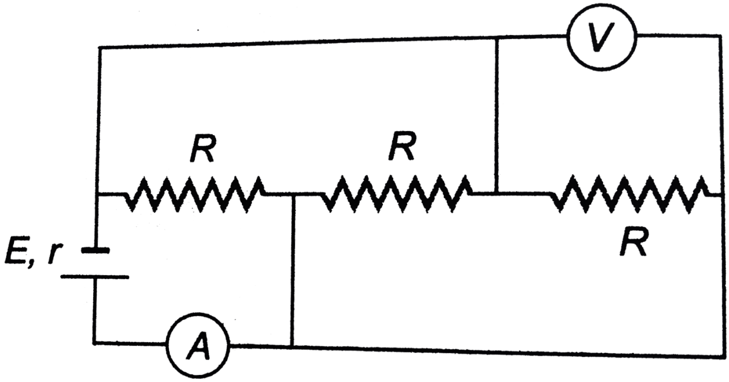
C. changes at a rate of $(-2b)$

D. Both (b) and (c)

Answer: B

Watch Video Solution

127. In the circuit shown in figure ammeter and voltmeter are ideal. If $E = 4V$, $R = 9\Omega$ and $r = 1\Omega$, then readings of ammeter and voltmeter are



A. 1 A, 3 V

B. 2 A, 3 V

C. 3 A, 4 V

D. 4 A, 4 V

Answer: A

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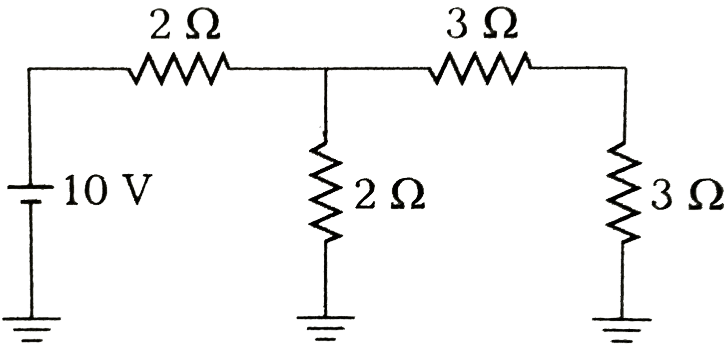
128. In the circuit shown, the current in 3Ω resistance is



A. $1A$

B. $\frac{1}{7}A$

C. $\frac{5}{7}A$

D. $\frac{15}{7}A$

Answer: C

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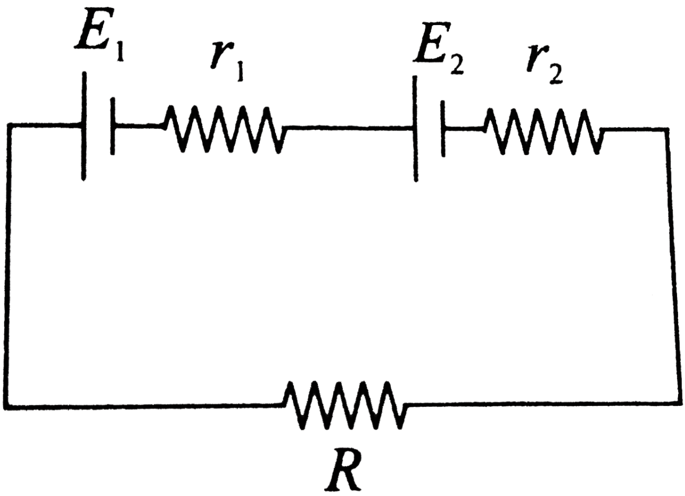
129. Under what condition, the current passing through the resistance R can be increased by short - circuiting the battery of emf E_2 The internal resistances of the two batteries are r_1 and r_2, respectively.



A. $E_2 r_1 > E_1(R + r_2)$

B. $E_1 r_2 < E_2(R + r_1)$

C. $E_2 r_2 < E_1(R + r_2)$

D. $E_1 r_2 > E_2(R + r_1)$

Answer: D

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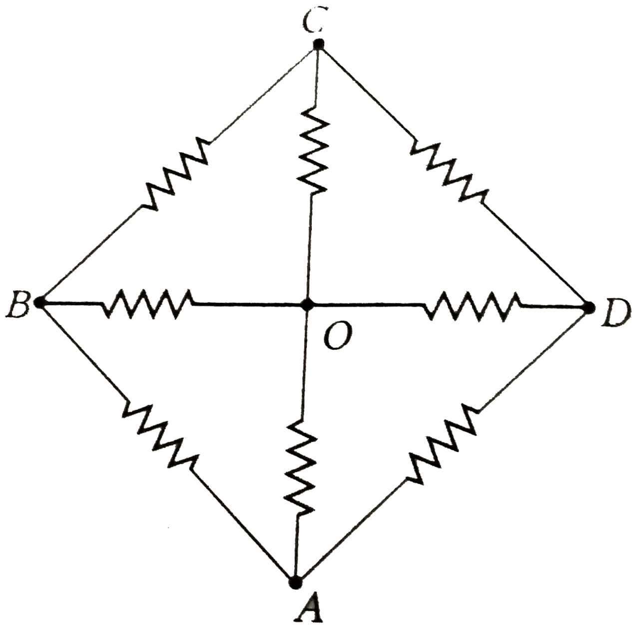
130. In the arrangement shown, the magnitude of each resistance is 1Ω.

The equivalent resistance between O and A is given by



A. $\frac{14}{13}\Omega$

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

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

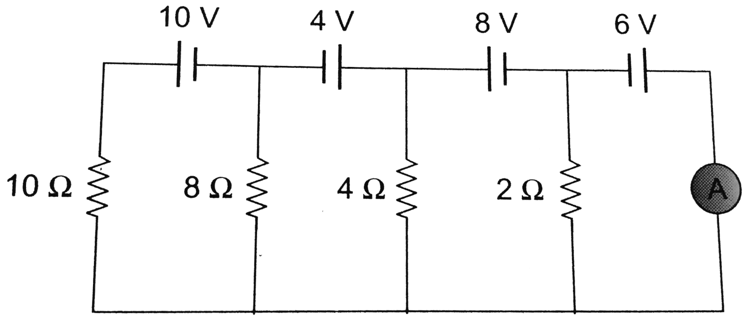
D. $\frac{5}{6}\Omega$

Answer: B

View Text Solution

131. Fing the reading of the ideal ammeter connected in the given circuit.

Assume that the cells have negligible internal resistance.



A. $0.8A$

B. $0.25A$

C. $1.95A$

D. $1.0A$

Answer: C

Watch Video Solution

132. A moving coil galvanometer has 150 equal divisions. Its current sensitivity is 10-divisions per milliampere and voltage sensitivity is 2 divisions per millivolt. In order that each division reads 1 volt, the resistance in ohms needed to be connected in series with the coil will be -

A. 99995

B. 9995

C. 10^3

D. 10^5

Answer: B

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133. It takes 16 min to boil some water in an electric kettle. Due to some defect it becomes necessary to remove 10% turns of the heating coil of the kettle . After repairs , how much time will it take to boil the same mass of water ?

A. 17.7 min

B. 14.4 min

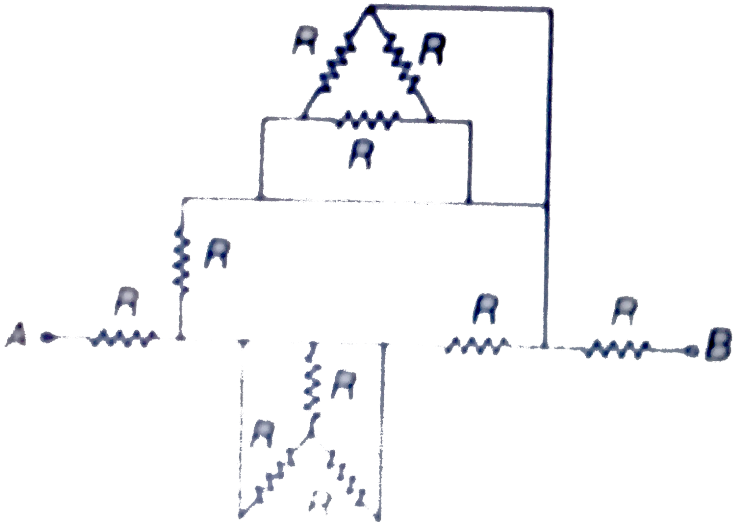
C. 20.9 min

D. 13.9 min

Answer: B

Watch Video Solution

134. Equivalent resistance between points A and B is $0.5xR$. Find value of x.



A. 3R

B. 4R

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

D. $\frac{7R}{2}$

Answer: C

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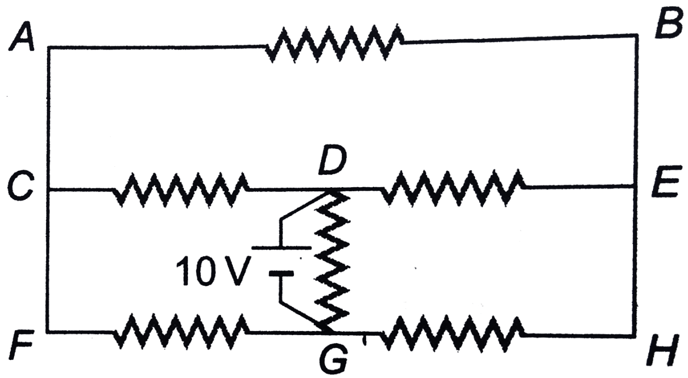
135. All resistance shown in the circuit are 2Ω each. The current in the resistance between D and E is



A. $5A$

B. $2.5A$

C. $1A$

D. $7.5A$

Answer: B

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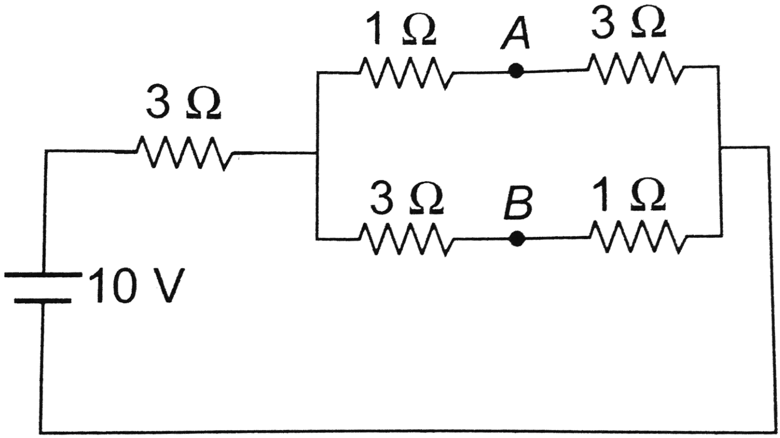
136. A battery of e.m.f. $10V$ is connected to resistance as shown in figure.

The potential difference $V_A - V_B$ between the point A and B is



A. $-2V$

B. 2V

C. 5V

D. $\frac{20}{11}V$

Answer: B

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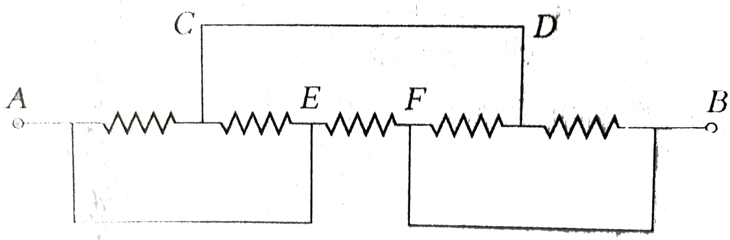
137. If $V_A - V_B = V_0$ and the value of each resistance is R, then



I. net resistance between AB is $\frac{R}{2}$

II. Net resistance between AB is $\frac{3R}{5}$

III. Current through CD is $\frac{V_0}{R}$

IV. current through EF is $\frac{2V_0}{3R}$

Which of the option/options are correct?

A. I and II

B. I and III

C. Only I

D. All of these

Answer: B

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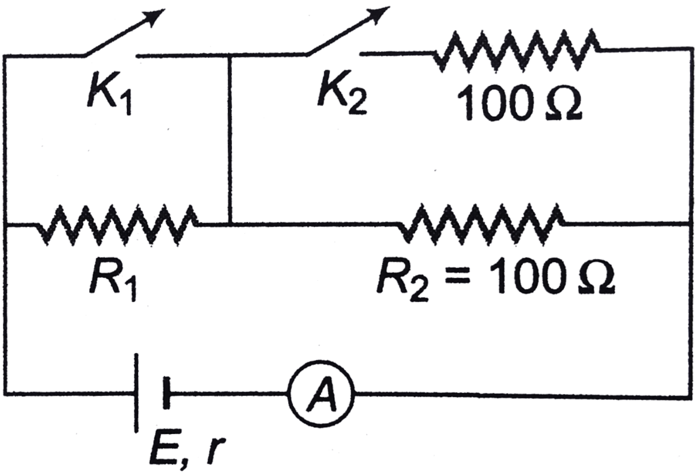
138. In the circuit shown, keys K_1 and K_2 both are closed the ammeter reads I_0. But when $K_1$is open and K_2 is closed, the ammeter reads $I_0/2$. Assuming that ammeter resistance is much less than R_2, the values of r and R_1 is Omega are



A. 100,50

B. 50100

C. 0,100

D. 0,50

Answer: D

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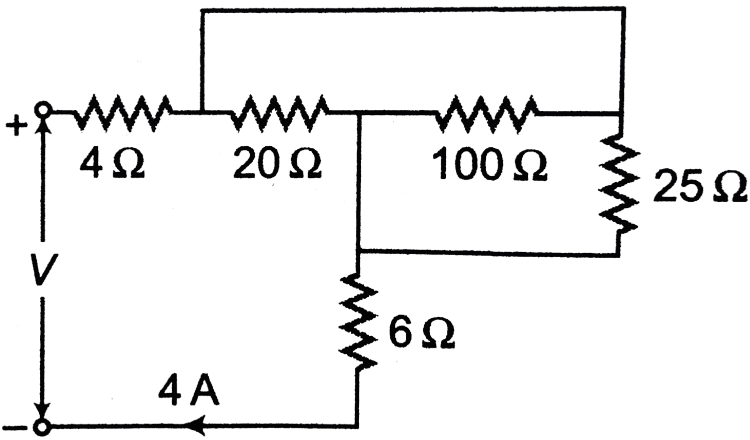
139. In the circuit shown in figure , V must be



A. 50 V

B. 80 V

C. 100 V

D. 1290 V

Answer: B

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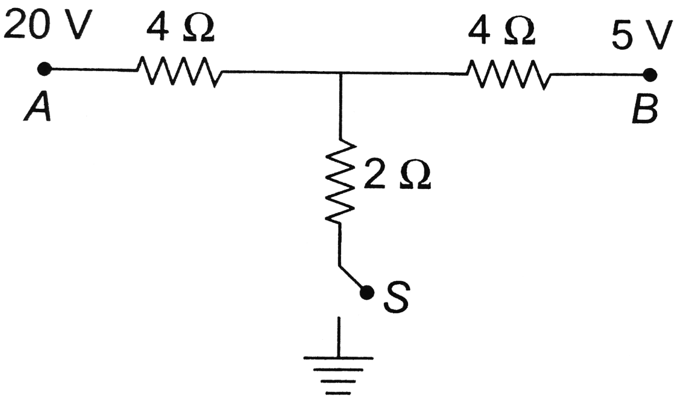
140. As the switch S is closed in the circuit shown in figure, current passed through it is.



A. $4.5A$

B. $6.0A$

C. $3.0A$

D. zero

Answer: A

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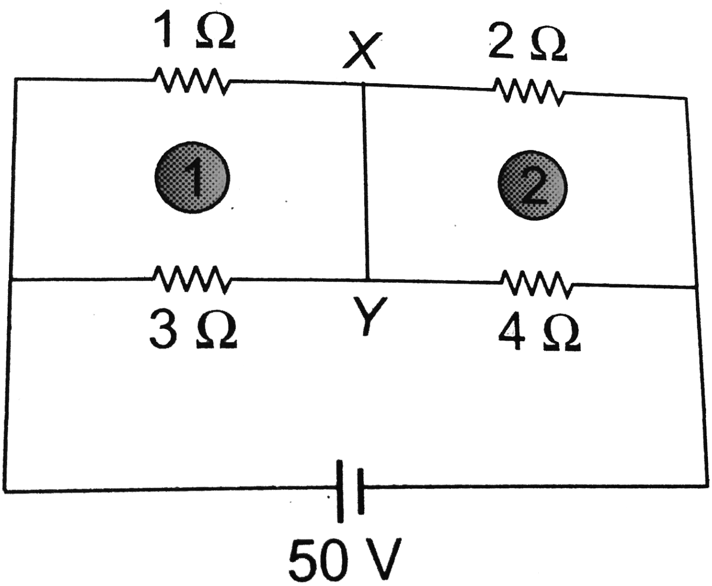
141. Current through XY of circuit shown is



A. 1A

B. 4A

C. 2A

D. 3A

Answer: C

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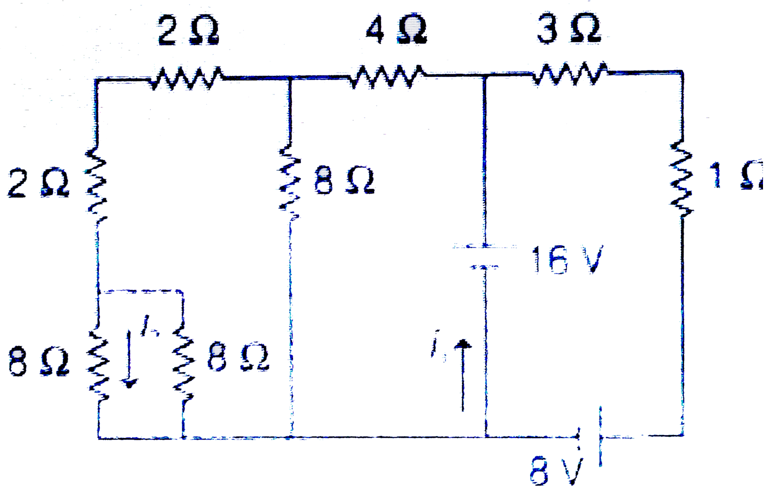
142. In the circuit shown in figure ,find the ratio of currents i_1 / i_2.



A. 2

B. 8

C. 0.5

D. 4

Answer: B

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B. Assertion and reason

1. Assertion : V = iR is Ohm's law.

Reason : V - I graph is always a straight line passing through origin.

A. If both Assertion and Reason are true and Reason is the correct explanation of Assertion.

B. If both Assertion and Reason are true and Reason is not correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If Assertion is false but Reason is true.

Answer: C

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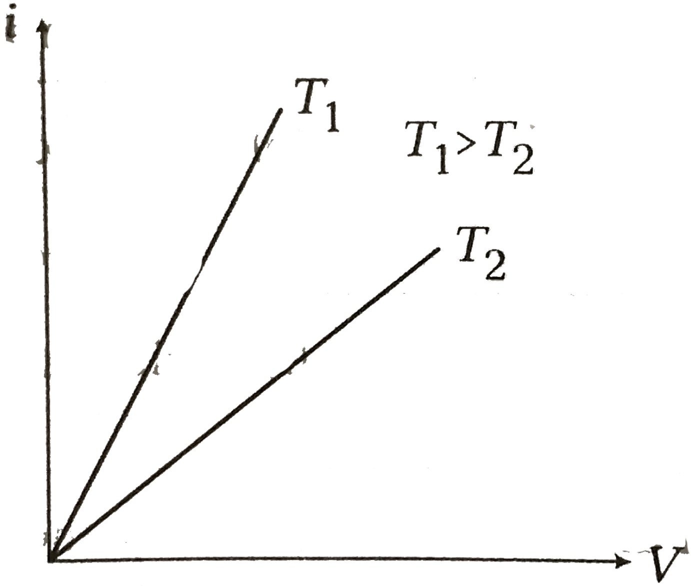
2. Assertion : Current versus potential difference (i-V) graph for a conductor at two different temperatures T_1 and T_2 is shown in figure. Hence $T_1 > T_2$.



Reason : Resistance of a conductor increases with rise in temperature.

A. If both Assertion and Reason are true and Reason is the correct explanation of Assertion.

B. If both Assertion and Reason are true and Reason is not correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If Assertion is false but Reason is true.

Answer: D

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3. Assertion : If a current flows through a wire of non-uniform cross-section, potential difference per unit length of wire is same throughout the length of wire.

Reason : Current through the wire is same at all cross-sections.

A. If both Assertion and Reason are true and Reason is the correct explanation of Assertion.

B. If both Assertion and Reason are true and Reason is not correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If Assertion is false but Reason is true.

Answer: D

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4. Assertion : In our houses when we start switching on different light buttons, main current goes on increasing.

Reason : Different connections in houses are in parallel. When we start switching on different light buttons, then net resistance of the circuit decreases. Therefore, main current increases.

A. If both Assertion and Reason are true and Reason is the correct explanation of Assertion.

B. If both Assertion and Reason are true and Reason is not correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If Assertion is false but Reason is true.

Answer: A

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5. Assertion : If a current is flowing through a conducting wire of non-uniform cross-section, drift speed and resistance both will increase at a section where cross-sectional area is less.

Reason : Current density at such sections is more where cross-sectional area is less.

A. If both Assertion and Reason are true and Reason is the correct explanation of Assertion.

B. If both Assertion and Reason are true and Reason is not correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If Assertion is false but Reason is true.

Answer: B

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6. Assertion : Kilovol-ampere (kVA) and kilowatt-hour have the same dimensions.

Reason : Both are the units of energy.

A. If both Assertion and Reason are true and Reason is the correct explanation of Assertion.

B. If both Assertion and Reason are true and Reason is not correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If both Assertion and Reason are false.

Answer: D

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7. Assertion : If by mistake, a voltmeter is connected in series, then circuit will burn.

Reason : Current will drastically decrease in the circuit.

A. If both Assertion and Reason are true and Reason is the correct explanation of Assertion.

B. If both Assertion and Reason are true and Reason is not correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If Assertion is false but Reason is true.

Answer: D

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8. Assertion : Resistance of an ammeter is less than the resistance of a milliammeter.

Reason : Value of shunt required in case of ammeter is more than a milliammeter.

A. If both Assertion and Reason are true and Reason is the correct explanation of Assertion.

B. If both Assertion and Reason are true and Reason is not correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If Assertion is false but Reason is true.

Answer: B

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9. Assertion : A resistance wire is broken into four pices and all are connected in parallel. Then, net resistance becomes 1/16 times.

Reason : In parallel net resistance is less than the smallest value of individual resistance.

A. If both Assertion and Reason are true and Reason is the correct explanation of Assertion.

B. If both Assertion and Reason are true and Reason is not correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If Assertion is false but Reason is true.

Answer: B

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10. Assertion : Potential difference across the terminals of a battery is always less than the emf of the battery.

Reason : During discharging of a battery potential differnce across to terminals of a battery is

$V = E - ir$

$\therefore V < E$

A. If both Assertion and Reason are true and Reason is the correct explanation of Assertion.

B. If both Assertion and Reason are true and Reason is not correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If Assertion is false but Reason is true.

Answer: D

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11. Assertion : Inside a conductor, electrons have no motion in the absence of some potential difference across it.

Reason : In the absence of potential difference no electrostatic force will act on the electrons inside the conductor.

A. If both Assertion and Reason are true and Reason is the correct explanation of Assertion.

B. If both Assertion and Reason are true and Reason is not correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If both Assertion and Reason are false.

Answer: D

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12. Assertion : Current between two points in an electrical always flows from higher potential to lower potential.

Reason : During charging of a battery current inside the battery flows negative terminal to positive terminal.

A. If both Assertion and Reason are true and Reason is the correct explanation of Assertion.

B. If both Assertion and Reason are true and Reason is not correct explanation of Assertion.

C. If both Assertion and Reason are false.

D. If Assertion is true but Reason is false.

Answer: D

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13. Assertion : In case of potentiometer experiment, if emfs of known and unknown both batteries are increased two times, then null point length will remain unchanged.

Reason : Null point length does not depend on emf of either of the two batteries.

A. If both Assertion and Reason are true and Reason is the correct explanation of Assertion.

B. If both Assertion and Reason are true and Reason is not correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If Assertion is false but Reason is true.

Answer: C

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14. Assertion : In potentiometer experiment, null point cannot be obtained if emf of unknown battery is more than the emf of known battery.

Reason : By increasing the emf of known battery, null point length increases.

A. If both Assertion and Reason are true and Reason is the correct explanation of Assertion.

B. If both Assertion and Reason are true and Reason is not correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If Assertion is false but Reason is true.

Answer: C

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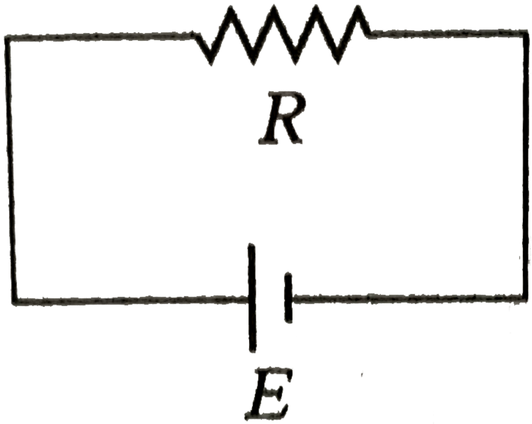
15. Assertion : In the circuit shown in figure, battery is ideal. If a resistance R_0 is cannected in parallel with R, then power across R will increase.



Reason : Current drawn from the battery will increase.

A. If both Assertion and Reason are true and Reason is the correct explanation of Assertion.

B. If both Assertion and Reason are true and Reason is not correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If Assertion is false but Reason is true.

Answer: D

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16. Assertion : Two 60 W bulbs are first connected in series and then in parallel with same battery. Total power produced in second case will become four times. Rated voltage is same for two bulbs.

Reason : In series total power produced will be 30 W and in parallel 120 W.

A. If both Assertion and Reason are true and Reason is the correct explanation of Assertion.

B. If both Assertion and Reason are true and Reason is not correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If Assertion is false but Reason is true.

Answer: A

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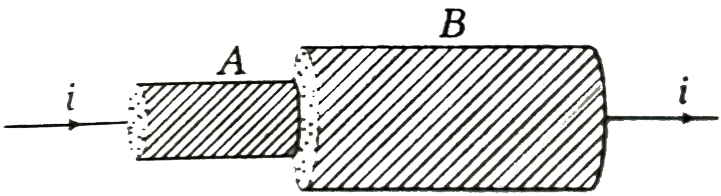
17. Assertion : Two resistance wires shown in figure are of same material. They have equal length. More heat is generated in wire A.



Reason : In series $H \propto R$ and resistance of wire A is more.

A. If both Assertion and Reason are true and Reason is the correct explanation of Assertion.

B. If both Assertion and Reason are true and Reason is not correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If Assertion is false but Reason is true.

Answer: A

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18. Assertion : Two identical bulbs when connected across a battery, produce a total power P. When they are connected across the same battery in series total power consumed will be $\frac{P}{4}$.

Reason : In parallel, $P = P_1 + P_2$ and in series $P = \frac{P_1 P_2}{P_1 + P_2}$

A. If both Assertion and Reason are true and Reason is the correct explanation of Assertion.

B. If both Assertion and Reason are true and Reason is not correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If Assertion is false but Reason is true.

Answer: A

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Match the columns

1. Rated power of a bulb at V voltage is P. Now, same voltage V is applied in all conditions mentioned in Column I. Match this Column I with Column II in which actual total power consumed is given.

	Column I		Column II
A.	Two bulbs are connected in parallel.	(p)	P
B.	Two bulbs are connected in series.	(q)	$2P$
C.	Two bulbs are connected in parallel and one bulb in series with this combination.	(r)	$\frac{P}{2}$
D.	A group of two-two bulbs in parallel are mutually connected in series.	(s)	None

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2. In the part of circuit shown in figure, match the following two columns for V_{AB}

	Column I		Column II
A.	If $i = 5$ A	(p)	$V_{AB} = 0$ V
B.	If $i = -5$ A	(q)	$V_{AB} = 10$ V
C.	If $i = 0$	(r)	$V_{AB} = 20$ V
D.	If points A and B are connected by a conducting wire	(s)	$V_{AB} = -10$ V

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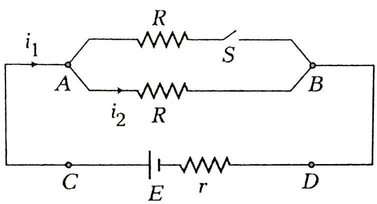
3. In the circuit diagram shown in figure match the following two columns when switch S is closed.



	Column I		Column II
A.	Current (i_1)	(p)	will increase
B.	Current (i_2)	(q)	will decrease
C.	Potential difference across A and B	(r)	will remain same
D.	Potential difference across C and D	(s)	may increase or decrease. It will depend on value of r

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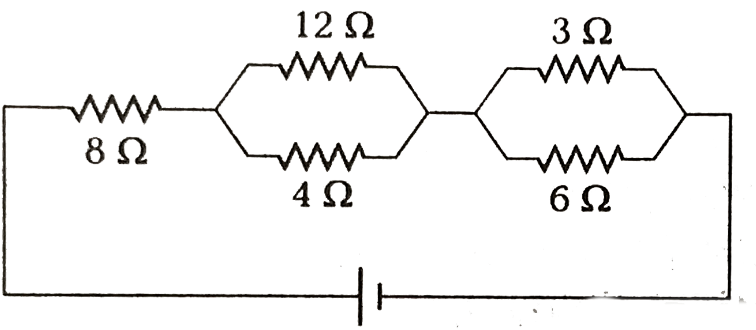
4. In the circuit diagram shown in figure, potential difference across 3Ω resistance is 20 V. Then, match the following two columns.



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Medical entrances gallery

1. A potentiometer wire is $100 cm$ 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. $5:4$

B. $3:4$

C. $3:2$

D. $5:1$

Answer: C

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2. The charge flowing through a resistance R varies with time $tasQ = at - bt^2$. The total heat produced in R is

A. $\frac{a^3R}{3b}$

B. $\frac{a^3R}{2b}$

C. $\frac{a^3R}{b}$

D. $\dfrac{a^3 R}{6b}$

Answer: D

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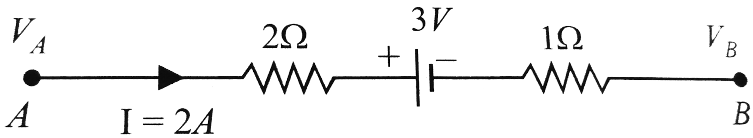
3. The potential difference $(V_A - V_B)$ between the point A and B in the given figure is



A. $-3V$

B. $+3V$

C. $+6V$

D. $+9V$

Answer: D

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4. A filament bulb $(500W, 100V)$ is to be used in a $230V$ main supply. When a resistance R is connected in series, it works perfectly and the bulb consumers $500W$. The value of R is

A. 230Ω

B. 46Ω

C. 26Ω

D. 13Ω

Answer: C

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5. 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. 32Ω

B. 40Ω

C. 44Ω

D. 48Ω

Answer: A

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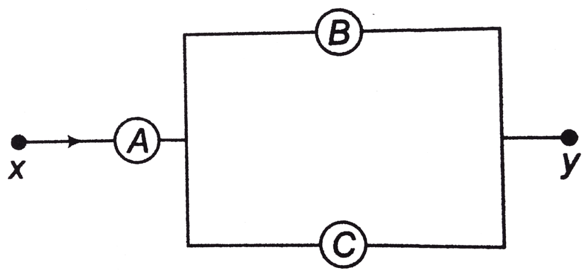
6. A, B and C are voltmeters of resistances R, $1.5R$ and $3R$ respectively. When some potential difference is applied between x and y the voltmeter readings are V_A, V_B and V_C,` then



A. $V_A = V_B = V_C$

B. $V_A \neq V_B = V_C$

C. $V_A = V_B \neq V_C$

D. $V_A \neq V_B \neq V_C$

Answer: A

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7. A cross a metallic conductor of non-uniform cross-section, a constant potential difference is applied. The quantity which remain (s) constant along the conductor is

A. current density

B. current

C. drift velocity

D. electric field

Answer: B

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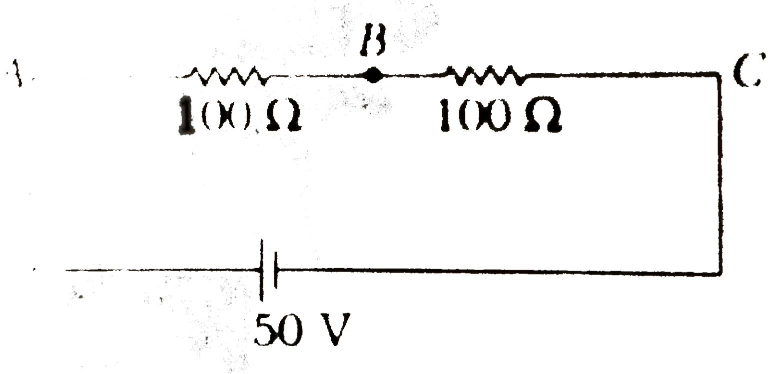
8. Consider the diagram shown below.



A Voltmeter of resistance 150Ω is connected across A and B. The potential drop across B and C measured by voltmeter is

A. 29

B. 27 V

C. 31 V

D. 30 V

Answer: C

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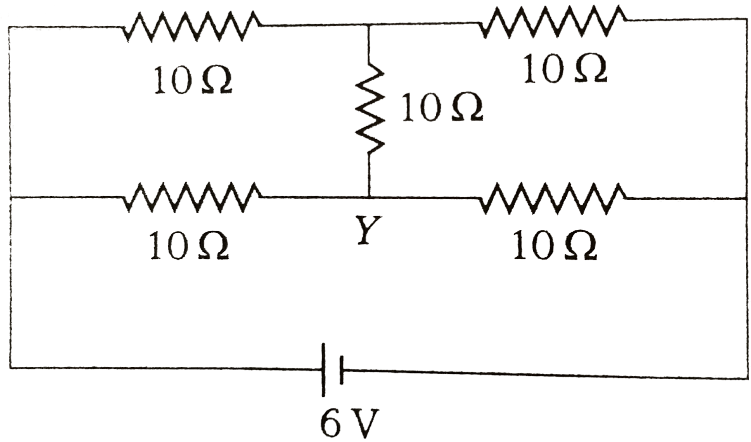
9. Each resistor shown in the figure has a resistance of 10Ω and the battery has the emf 6 V. What will be the current supplied by the battery ?



A. $0.6A$

B. $1.2A$

C. $1.8A$

D. $0.3A$

Answer: A

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10. A 1Ω resistance in series with an ammeter is balanced by 25 cm of potentiometer by 50 cm. The ammeter shows a reding of $1.5A$. Then, the error in ammeter reading is

A. $0.03A$

B. 3A

C. $1.3A$

D. $0.3A$

Answer: A

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11. The range of voltmeter is 10 V and its internal resistance is 50Ω. To convert it to voltmeter of range 15 V, how much resistance is to be added ?

A. Add 25Ω resistor in parallel

B. Add 25Ω resistor in series

C. Add 125Ω resistor in parallel

D. Add 125Ω resistor in series

Answer: B

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12. Identify the wrong statement.

A. Charge is a vector quantity

B. Current is a scalar quantity

C. Charge can be quantity

D. Charge is additive in nature

Answer: A

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13. When the rate of flow of charge through a metallic condoctor of non-uniform cross-section is uniform, then the quantity that remains constant along the conductor is

A. current density

B. electric field

C. electric potential

D. current

Answer: D

Watch Video Solution

14. The resistance of a carbon resistor of colour code Red-Red Green Silver is (in $k\Omega$)

A. $2200 \pm 5\%$

B. $2200 \pm 10\%$

C. $220 \pm 10\,\%$

D. $220 \pm 5\,\%$

Answer: B

View Text Solution

15. The slope of the graph showing the variation of potential difference V on X-axis and current Y-axis gives conductor

A. resistance

B. resistivity

C. reciprocal of resistance

D. conductivity

Answer: C

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

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

B. $\rho_1 + \rho_2$

C. $\dfrac{\rho_1 \rho_2}{\rho_1 + \rho_2}$

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

Answer: A

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17. A galvanometer of resistance 50Ω is connected to a battery of 8 V along with a resistance of 3950Ω in series. A full scale deflection of 30 divisions is obtained in the galvanometer. In order to reduce this deflection to 15 divisions, the resistance in series should be .... Ω.

A. 1950

B. 7900

C. 2000

D. 7950

Answer: D

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18. Choose the correct statement.

A. Kirchhoff's first law of electricity is based on conservation of change while the second while the second law is based on conservation of energy

B. Kirchhoff's first law of electricity is based on conservation of energy while the second law is based on conservation of charge

C. Kirchhoff's both laws are based on conservation of charge

D. Kirchhoff's both laws are based on conservation of energy

Answer: A

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19. A metal plate weighting 750g is to be electroplated wiwth 0.05% of its weight of silver. If a current of 0.8A is used. Find the time needed for depositing the required weight of silver. $\text{E.C.E. of silver is} 11.18 \times 10^{-7} kgC^{-1}$.

A. 5 min 32 s

B. 6 min 37 s

C. 4 min 16 s

D. 6 min 10 s

Answer: B

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20. A DC ammeter has resistance 0.1Ω and its current ranges $0 - 100A$. If the range is to be extended to $0 - 500$, then the following shunt resistance will be required

A. 0.010Ω

B. 0.011Ω

C. 0.025Ω

D. 0.25Ω

Answer: C

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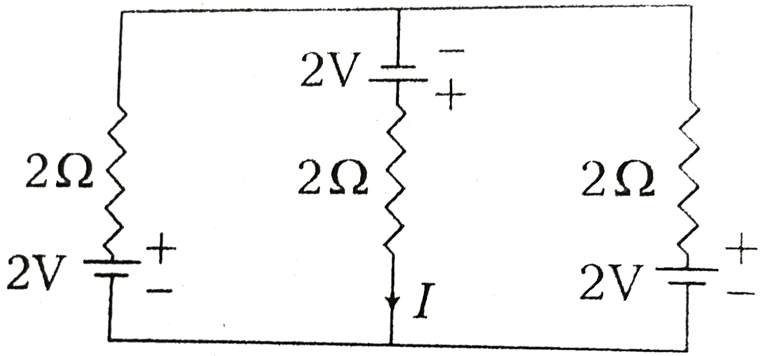
21. The current I shown in the circuit is



A. $1.33A$

B. zero

C. $2A$

D. $1A$

Answer: A

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22. A metal wire of circular cross-section has a resistance R_1. The wire is now stretched without breaking, so that its length is doubled and the density is assumed to remain the same. If the resistance of the wire now becomes R_2, then $R_2 : R_1$ is

A. $1 : 1$

B. $1 : 2$

C. $4 : 1$

D. $1 : 4$

Answer: C

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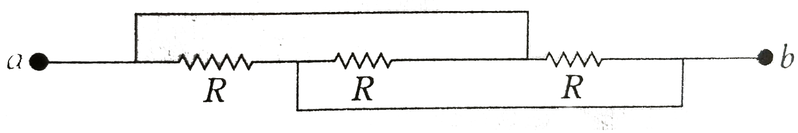
23. Consider the combination of resistor,



The equivalent resistance between a and b is

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

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

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

D. $3R$

Answer: C

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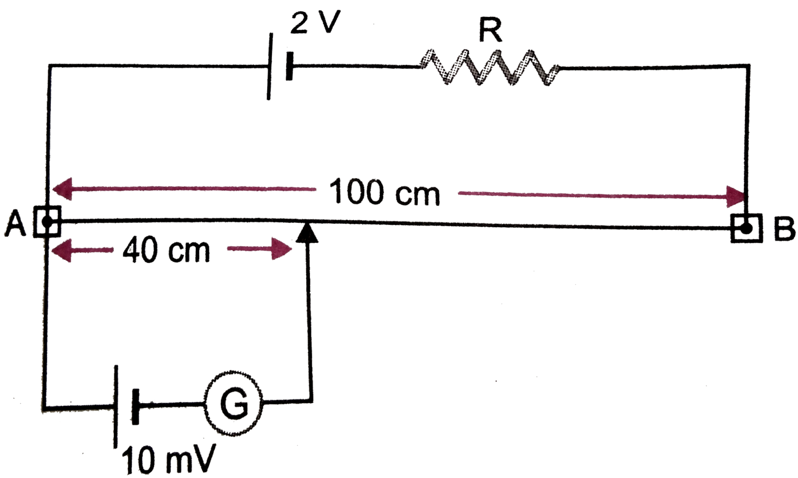
24. A potentiometer wire of length $100cm$ having a resistance of 10Ω is connected in series with a resistance R and a cell of emf $2V$ of negligible internal resistance. A source of emf



of $10mV$ is balanced against a length of $40cm$ of the potentiometer wire. What is the value of resistance R ?

A. 760Ω

B. 640Ω

C. 790Ω

D. 840Ω

Answer: C

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25. Three resistances 2Ω, 3Ω and 4Ω are connected in parallel. The ratio of currents passing through them when a potential difference is applied across its ends will be

A. $5:4:3$

B. $6:3:2$

C. $4:3:2$

D. $6:4:3$

Answer: D

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

A. 2E and 4r

B. 4E and 4r

C. 2E and 2r

D. 4E and 2r

Answer: A

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27. In the circuit shown alongside, the ammeter and the voltmeter redings are 3A and 6A, respectively. Then, the value of the resistance R is

A. $< 2\Omega$

B. 2Ω

C. $> 2\Omega$

D. $gr2\Omega$

Answer: B

View Text Solution

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

A. $500^\circ C$

B. $300^{\circ} C$

C. $200^{\circ} C$

D. $400^{\circ} C$

Answer: B

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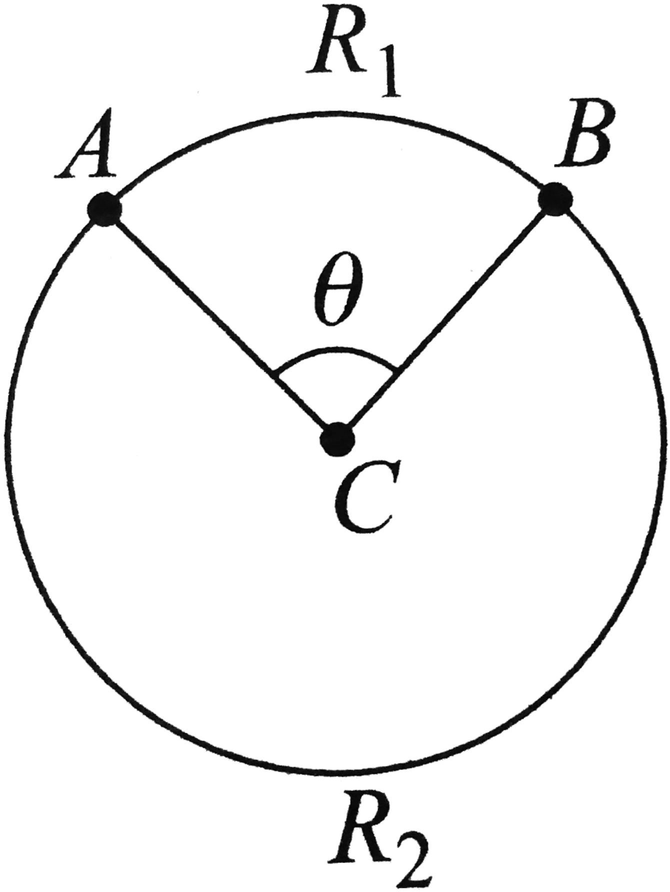
29. In a uniform ring of resistance R there are two points A and B such that $\angle ACB = \theta$, where C is the centre of the ring. The equivalent resistance between A and B is



A. $\dfrac{R(2\pi-\theta)}{4\pi}$

B. $\dfrac{R\theta}{2\pi}$

C. $R\left(1-\dfrac{\theta}{2\pi}\right)$

D. $\dfrac{R}{4\pi^2}(2\pi-\theta)\theta$

Answer: D

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30. The dimensions of mobility of charge carriers are

A. $\left[M^{-2}T^{2}A\right]$

B. $\left[M^{-1}T^{2}A\right]$

C. $M^{-2}T^{3}A]$

D. $\left[M^{-1}T^{3}A\right]$

Answer: B

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31. The temperature coefficient of resistance of an alloy used for making resistor is

A. small and positive

B. small and negative

C. large and positive

D. large and negative

Answer: A

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32. A wire of resistance 4Ω is stretched to twice its original length. In the process of stretching, its area of cross-section gets halved. Now, the resistance of the wire is

A. 8Ω

B. 16Ω

C. 1Ω

D. 4Ω

Answer: B

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33. A carbon film resistor has cololur code green, black, violet, gold. The value of the resistor is

A. $50 M\Omega$

B. $500 M\Omega$

C. $500 \pm 5\% M\Omega$

D. $500 \pm 10\% M\Omega$

Answer: C

View Text Solution

34. A uniform wire of resistance 9Ω is joined end-to-end to from a circule. Then, the resistance of the circular wire between any two diametrically points is

A. 6Ω

B. 3Ω

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

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

Answer: C

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35. The equivalent resistance of two resistor connected in series is 6Ω and their equivalent resistance is $\frac{4}{3}\Omega$. What are the values of resistances ?

A. $4\Omega, 6\Omega$

B. $8\Omega, 1\Omega$

C. $4\Omega, 2\Omega$

D. 6Ω, 2Ω

Answer: C

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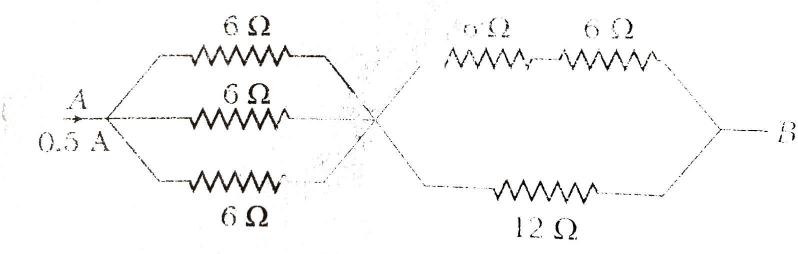
36. Six resistance are connected as shown in figure. If total current flowing is $0.5A$, then the potrential difference $V_A - V_B$ is



A. 8 V

B. 6 V

C. 2 V

D. 4 V

Answer: D

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37. Four cells, each of emf E and internal resistance r, are connected in series across an external resistance reverse. Then, the current in the external circuit is

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

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

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

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

Answer: A

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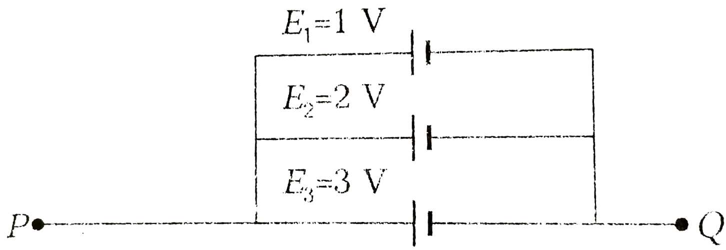
38. A circuit consists of three batteries of emf $E_1 = 1V$, $E_2 = 2V$ and $E_3 = 3V$ and internal resistance 1Ω, 2Ω and 1Ω respectively which are connected in parallel as shown in figure. The potential difference between points P and Q is



A. $1.0V$

B. $2.0V$

C. $2.2V$

D. $3.0V$

Answer: B

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

A. $4A$

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

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

D. $1A$

Answer: D

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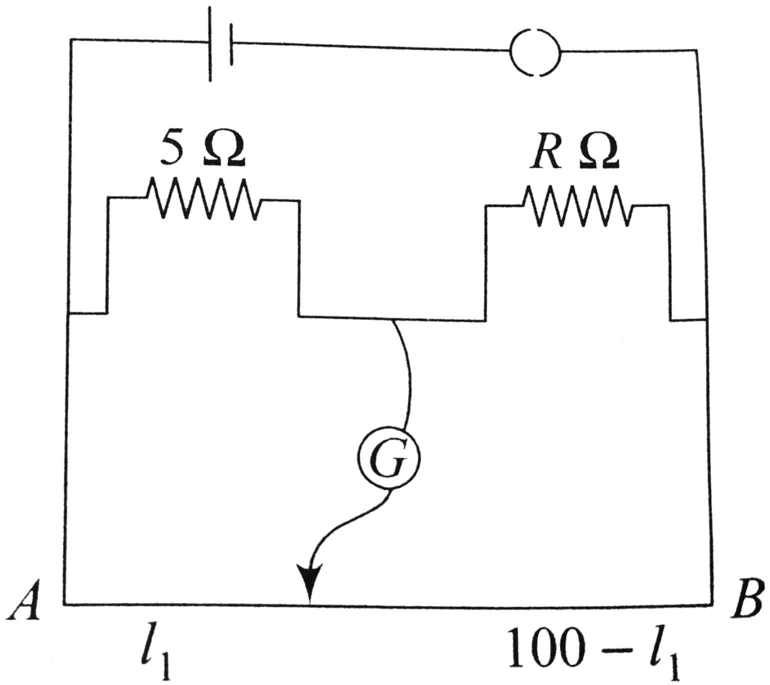
40. The resistance in the two arms of the meter bridge are 5Ω and $R\Omega$, respectively. When the resistance R is shunted with an equal resistance, the new balance point is $1.6l_1$.

The resistance R is



A. 10Ω

B. 15Ω

C. 20Ω

D. 25Ω

Answer: B

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41. 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. 9.5Ω

C. 0.5Ω

D. 0.75Ω

Answer: C

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42. In a ammeter 0.2% of main current passes through the galvanometer. If resistance of galvanometer is G, the resistance of ammeter will be

A. $\frac{1}{499}G$

B. $\frac{499}{500}G$

C. $\frac{1}{500}G$

D. $\frac{500}{499}G$

Answer: A

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

A. $\frac{R(s_1+s_2)}{s_1s_2}$

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

C. $\dfrac{R s_1 s_2}{(s_1 + s_2)}$

D. $\dfrac{(s_1 + s_2)}{R s_1 s_2}$

Answer: A

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44. An electron in potentiometer experiences a force $2.4 \times 10^{-19} N$. The length of potentiometer wire is 6m. The emf of the battery connected across the wire is (electronic charge $= 1.6 \times 10^{-19} C$)

A. 6 V

B. 9 V

C. 12 V

D. 15 V

Answer: B

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45. A galvanometer having internal resistance 10Ω required 0.01 A for a full scale deflection. To convert this galvanometer to a voltmeter of full scale deflection at 120 V, we need to connect a resistance of

A. $11990\ \Omega$ in series

B. 11990Ω in parallel

C. 12010Ω in series

D. 12010Ω in parallel

Answer: A

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46. In potentiometer experiment, a cell of emf $1.25V$ gives balancing length of 30 cm. If the cell is replaced by another cell, then balancing length is found to be 40 cm. What is the emf of second cell ?

A. $\cong 1.5V$

B. $\cong 1.67V$

C. $\cong 1.47V$

D. $\cong 1.37V$

Answer: B

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

A. it does not draw current from external circuit

B. it draws a heavy current from external circuit

C. it has a wire of high resistance

D. it has a low resistance

Answer: A

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

A. 1Ω

B. 0.5Ω

C. 4Ω

D. 2Ω

Answer: D

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49. A galvanometer has a coil of resistance 100Ω and gives a full-scale deflection for $30mA$ current. If it is to work as a voltmeter of $30V$ range, the resistance required to be added will be

A. 500Ω

B. 900Ω

C. 1000Ω

D. 1800Ω

Answer: B

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50. In an electroplating experiment, mg of silver is deposited when 4 A of current flows for 2 min. The amount of silver (in g) deposited by 6 A of current for 40 s will be

A. 4m

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

C. 2m

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

Answer: B

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

A. 2Ω

B. 4Ω

C. 8Ω

D. 16Ω

Answer: D

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

A. 0.2Ω

B. 0.5Ω

C. 0.8Ω

D. 1.0Ω

Answer: B

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53. The resistance of the four arms P, Q, R and S in a Wheatstone's bridge are $10ohm30ohm$ and $90ohm$ rerspectively. The e.m.f. and internal resistance of the cell are $7vo <$ and $5ohm$ respectively. If the galvanometer resistance is $50ohm$, the current drawn for the cell will be

A. $1.0A$

B. $0.2A$

C. $0.1A$

D. $2.0A$

Answer: B

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54. An electron revolves in a circule at the rate of 10^{19} rounds per second. The rquivlent current is $\left(e = 1.6 \times 10^{-19} C\right)$

A. $1.0A$

B. $1.6A$

C. $2.0A$

D. $2.6A$

Answer: B

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55. A silver wire of radius $0.1cm$ carries a current of 2A. If the charge density in silver is $5.86 \times 10^{28} m^{-3}$, then the drif velocity is

A. $0.2 \times 10^{-3} ms^{-1}$

B. $0.4 \times 10^{-4} ms^{-1}$

C. $0.68 \times 10^{-4} ms^{-1}$

D. $7 \times 10^{-4} ms^{-1}$

Answer: C

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56. A 1m long wire of diameter $0.31mm$ has a resistance of 4.2Ω. If it is replaced by another wire of same material of length $1.5m$ and diameter $0.155mm$, then the resistance of wire is

A. 25.2Ω

B. 0.6Ω

C. 26.7Ω

D. 0.8Ω

Answer: A

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57. 24 cells of emf $1.5V$ each having internal resistance of 1Ω are connected to an external resistance of 1.5Ω. To get maximum current,

A. all cells are connected in series combination

B. all cells are connected in parallel combination

C. 4 cells in each row are connected in series and 6 such rows are connected in parallel

D. 6 cells in each row are connected in series and 4 such rows are connected in parallel

Answer: D

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58. The temperature coefficient of resistance of the material of a wire is $0.00125^{\circ}C^{-1}$. Its resistance at $27^{\circ}C$ is 1Ω. At what temperature will its resistance be 2Ω ?

A. 1154 K

B. 1100 K

C. 1400 K

D. 1127 K

Answer: B

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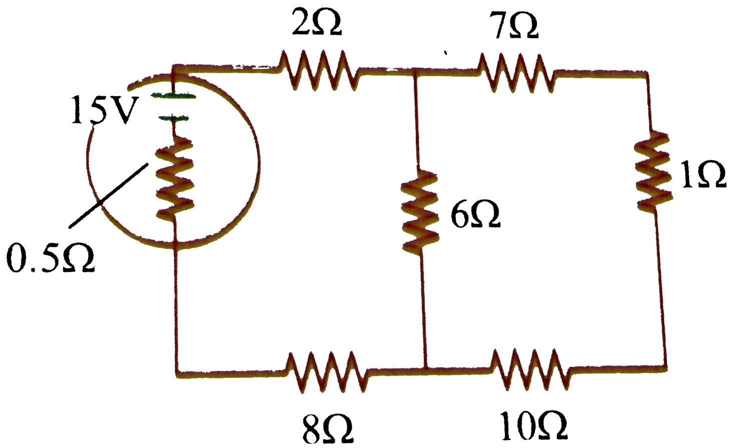
59.



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. $3A$

B. $2A$

C. $5A$

D. $1A$

Answer: D

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60. 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. 4

B. 8

C. 6

D. 2

Answer: B

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61. Three conductors draw respectively currents of 1 A, 2 A and 4 A when connected in turn across a battery. If they are connected in series across the same battery, the current drawn will be

A. $\frac{2}{7}A$

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

C. $\frac{4}{7}A$

D. $\frac{5}{7}A$

Answer: A

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

A. $1:3:5$

B. $5:3:1$

C. $1:15:125$

D. $125:15:1$

Answer: D

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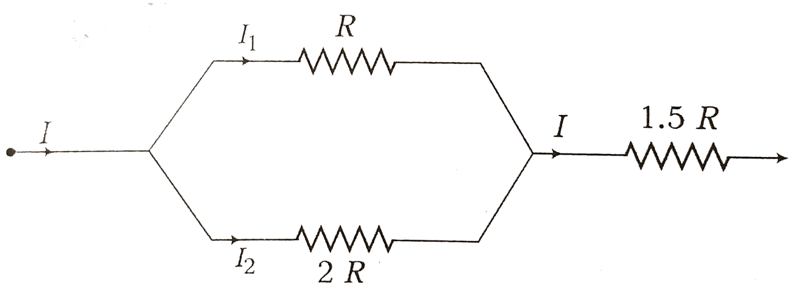
63. In the circuit diagram,heat produces in R, 2R and $1.5R$ are in the ratio of



A. $4:2:3$

B. $8:4:27$

C. $2:4:3$

D. $27:8:4$

Answer: B

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64. Which one of the following electrical meter has the smallest resistance ?

A. Ammeter

B. Milliammeter

C. Galvanometer

D. Voltmeter

Answer: A

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65. Two wires of the same materical having equal area of cross-section have L and 2L. Their respective resistances are in the ratio

A. $2:1$

B. $1:1$

C. $1:2$

D. $1:3$

Answer: C

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66. Two bulbs 60 W and 100 W designed for voltage 220 V are connected in series across 220 V source. The net power dissipated is

A. 80 W

B. 160 W

C. $37.5W$

D. 60 W

Answer: C

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67. The drift speed of electrons in copper wire of diameter and length l is v . If the potential difference across the wire is doubled, then the new drift speed becomes

A. v

B. $2v$

C. $3v$

D. $v/2$

Answer: B

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68. A potentiometer wire of length 10 m and resistance 10Ω per meter is connected in serice with a resistance box and a 2 volt battery. If a potential difference of 100 mV is balanced across the whole length of potentiometer wire, then then the resistance introduce introduced in the resistance box will be

A. 1900Ω

B. 900Ω

C. 190Ω

D. 90Ω

Answer: C

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69. If a wire is stretched to four times its length, then the specific resistance of the wire will

A. become 4 times

B. become 1/4 times

C. become 16 times

D. remain the same

Answer: D

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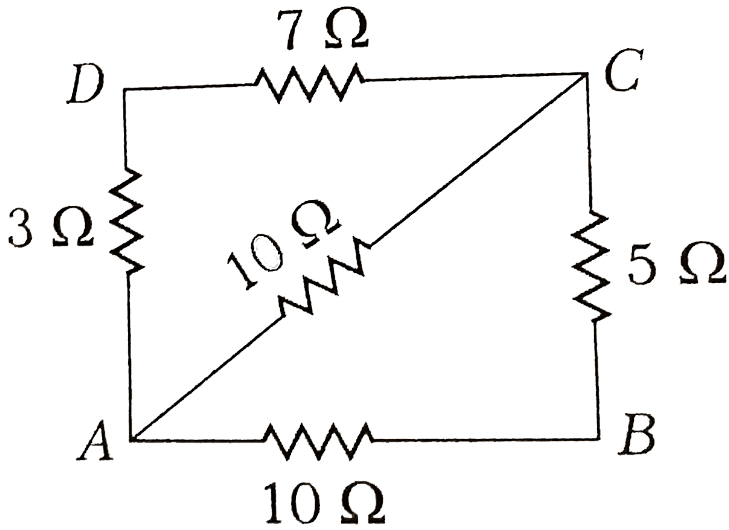
70. For the circuit shown in figure given below, the equivalent resistance points A and B is



A. 10Ω

B. 5Ω

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

D. 2Ω

Answer: C

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71. Two resistors of 6Ω and 9Ω are connected in series to a 120 V source. The power consumed by the 6Ω resistor is

A. 384 W

B. 616 W

C. 1500 W

D. 1800 W

Answer: A

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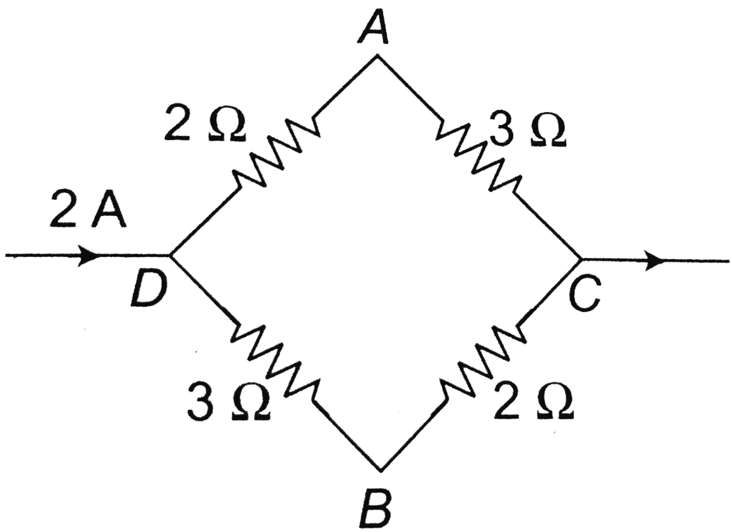
72. A current of $2A$ flows in a system of conductor as shown. The potential difference $(V_A - V_B)$



A. $+1V$

B. $-1V$

C. $+2V$

D. $-2V$

Answer: A

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

A. $r = \sqrt{R_1 + R_2}$

B. $r = \sqrt{R_1 \times R_2}$

C. $r = \dfrac{R_1 + R_2}{2}$

D. $r = \dfrac{1}{R_2} + \dfrac{1}{R_2}$

Answer: B

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74. When a current of (2.5 ± 0.5) ampere flows through a wire, it develops a potential difference of (20 ± 1) volt, the resistance of the wire is

A. $(8 \pm 2)\Omega$

B. $(8 \pm 1.6)\Omega$

C. $(8 \pm 1.5)\Omega$

D. $(8 \pm 3)\Omega$

Answer: A

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75. To draw the maximum current from a combination of cells, how should be the cells be grounded ?

A. Parallel

B. Series

C. Depends upon the relative values of internal and external resistance

D. Mixed grouping

Answer: C

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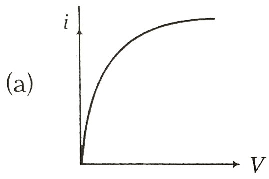
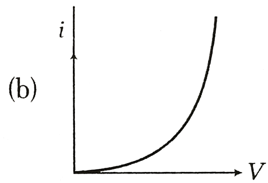
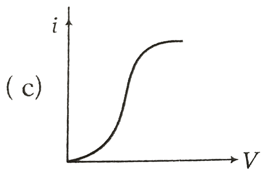
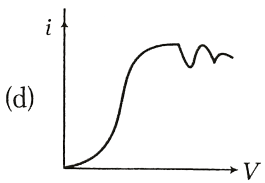
76. The variation between V-I has shown by graph for heating filament

A. 

B. 

C. 

D. 

Answer: A

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77. Two bulbs when connected in parallel to a source take 60 W each, the power consumed, when they are connected in series with the same source is

A. 15 W

B. 30 W

C. 60 W

D. 120 W

Answer: B

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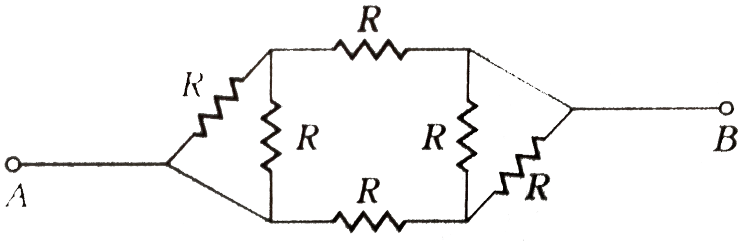
78. The equivalent resistance resistance between A and B of network shown in figure is



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

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

C. 6 R

D. 2 R

Answer: A

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79. A galvanometer having resistance of 50Ω requires a current of $100\Omega A$ to given full scale deflection. How much resistance is required to convert it into an ammeter of range of 10 A ?

A. $5 \times 10^{-3}\Omega$ in series

B. $5 \times 10^{-4}\Omega$ in parallel

C. $10^{5}\Omega$ in series

D. $10^{5}\Omega$ in parallel

Answer: B

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80. Two cells when connected in series are balanced on $8m$ on a potentiometer. If cells are connected with polarities of one the cellis reversed, they balance on $2m$. The ratio of e.m.f.'s of the two cellsis

A. $3:4$

B. $4:3$

C. $3:5$

D. $5:3$

Answer: D

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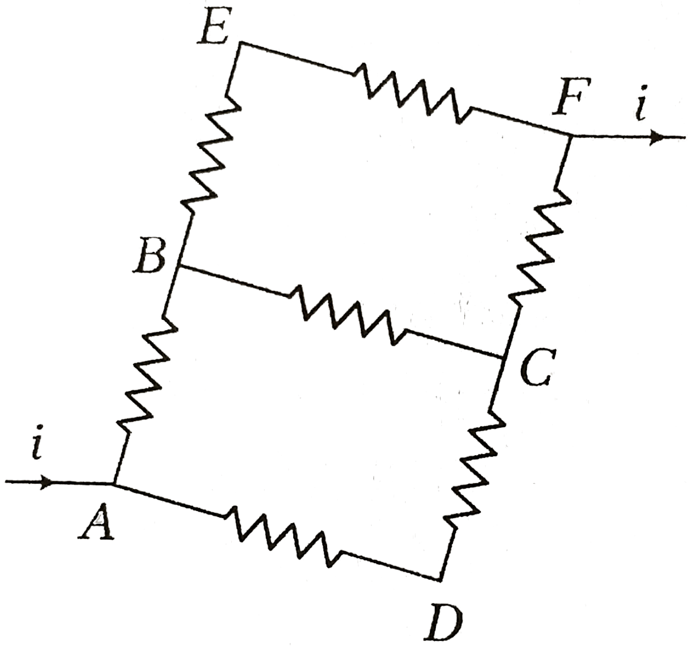
81. In the given circuit diagram if each resistance is of 10Ω, then the current in arm AD will be



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

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

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

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

Answer: B

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

A. $4v$

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

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

D. v

Answer: D

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83. A wire has a resistance of 12 ohm . It is bent in the form of equilateral triangle. The effective resistance between any two corners of the triangle is

A. 6Ω

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

C. 9Ω

D. 12Ω

Answer: B

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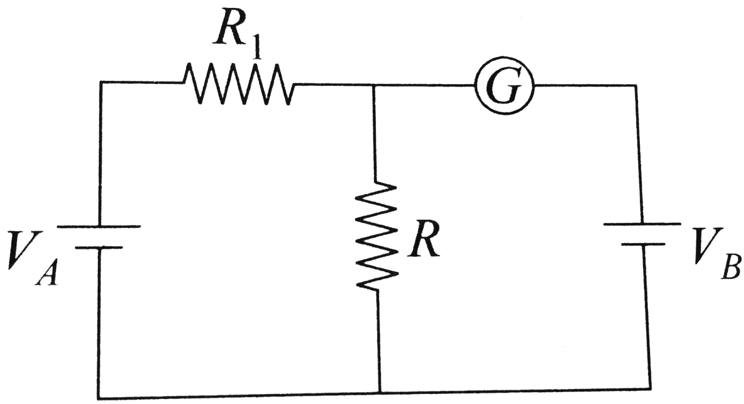
84. In the circuit shown the cells A and B have negligible resistance. For $V_A = 12V$, $R_1 = 500\Omega$ and $R = 100\Omega$, the galvanometer (G) shows no deflection. The value of V_B is



A. 4 V

B. 2 V

C. 12 V

D. 6 V

Answer: B

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85. A milli voltmeter of 25 milli volt range is to be converted into an ammeter of 25 ampere range. The value (in ohm) of necessary shunt will be

A. 0.001

B. 0.01

C. 1

D. 0.05

Answer: A

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

A. 20%

B. 2.5%

C. 5%

D. 10%

Answer: C

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87. 6Ω and 12Ω resistors are connected in parallel. This combination is connected in series with 10 V battery and 6Ω resistor. What is the potential differnce between the terminals of the 12Ω resistor ?

A. 4 V

B. 16 V

C. 2

D. 8 V

Answer: A

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88. A voltmeter of range 2 V and resistance 300Ω cannot be converted into ammeter of range

A. $1A$

B. $1mA$

C. $100mA$

D. $10mA$

Answer: B

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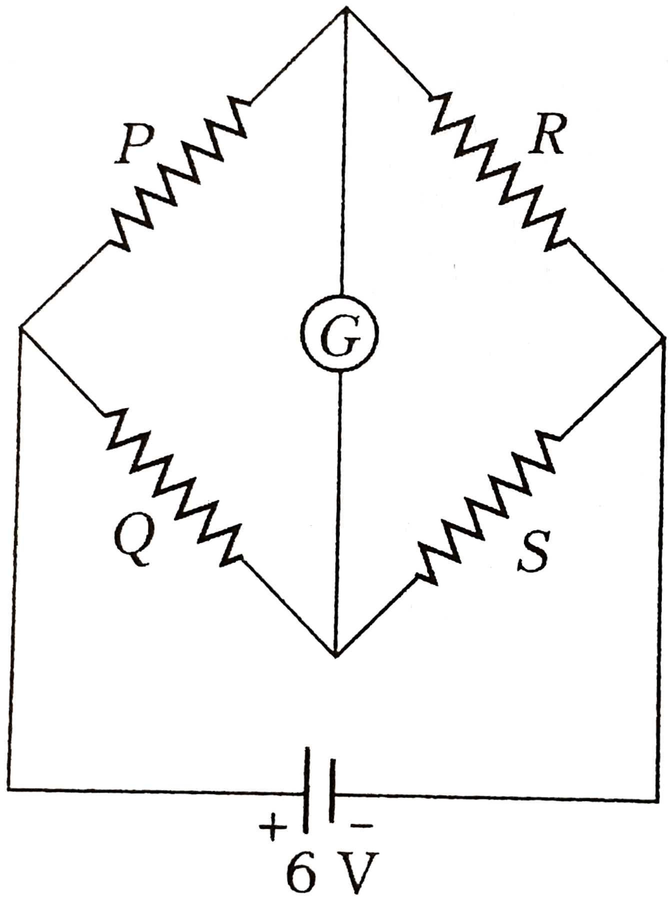
89. In the Wheatstone network given, $P = 10\Omega, Q = 20\Omega, R = 15\Omega, S = 30\Omega,$ the current passing through the battery (of negligible internal resistance)



A. $0.36A$

B. zero

C. $0.18A$

D. $0.72A$

Answer: A

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90. A current of 5 ampere is passing through a metallic wire of cross-sectional area $4 \times 10^{-6} m^2$. If the density of the charge-carriers in the wire is $5 \times 10^{26} m^{-3}$, find the drift speed of the electrons.

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

B. $1.56 \times 10^{-2} ms^{-1}$

C. $1.56 \times 10^{-3} ms^{-1}$

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

Answer: B

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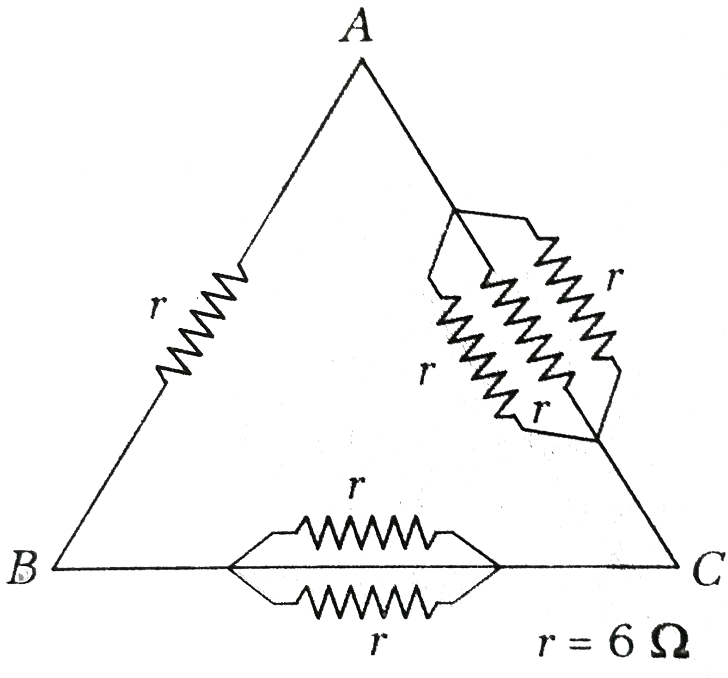
91. Six resistance each of value $r = 5\Omega$ are connected between points A, B and C as shown in figure. If R_1, R_2 and R_3 are the net resistance between A and B, between B and C and between A and C respectively, then $R_1 : R_2 : R_3$ will be equal to



A. $6 : 3 : 2$

B. $1 : 2 : 3$

C. $5 : 4 : 3$

D. $4 : 3 : 2$

Answer: C

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92. Charge passing through a conductor of cross-section area $A = 0.3m^2$ is given by $q = 3t^2 + 5t + 2 \in coluomb, wheretis \sec ond. W\hat{i}sthevalueofdr \quad \text{if} \quad tvel$

n=2xx10^(25)//m^(3)`)

A. $0.77 \times 10^{-5} m/s$

B. $1.77 \times 10^{-5} m/s$

C. $2.08 \times 10^{-5} m/s$

D. $0.57 \times 10^{5} m/s$

Answer: B

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93. Charge passing through a conductor of cross-section area $A = 0.3m^2$ is given by $q = 3t^2 + 5t + 2$ in coluomb, where t is second. What is the value of drift velocity at $t = 2s$? (Given, $n = 2 \times 10^{25} / m^3$)

A. $0.77 \times 10^{-5} \frac{m}{s}$

B. $1.77 \times 10^{-5} \frac{m}{s}$

C. $2.08 \times 10^{-5} \frac{m}{s}$

D. $0.57 \times 10^{5} \frac{m}{s}$

Answer: B

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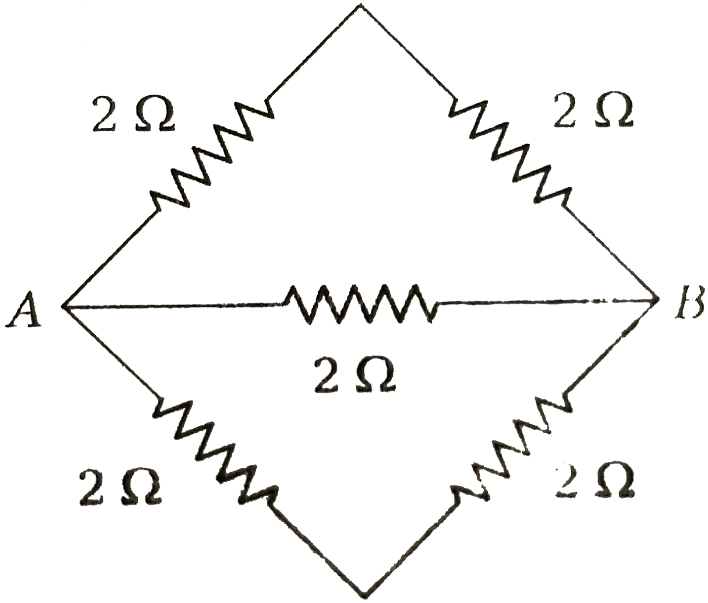
94. In the circuit shown, the potential difference between x and y will be



A. zero

B. 120 V

C. 60 V

D. 20 V

Answer: B

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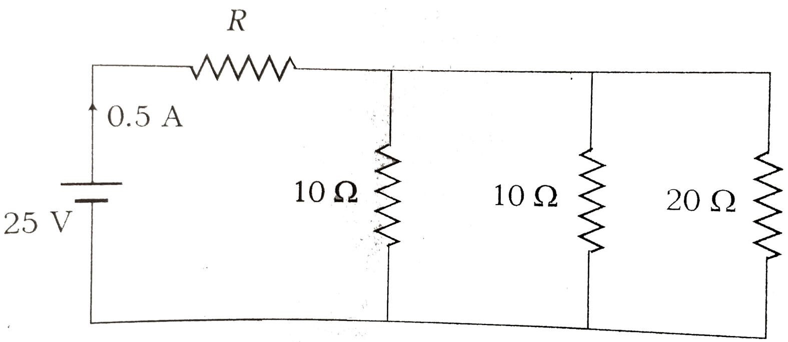
95. For the circuit shown in figure,



A. resistance $R = 46\Omega$

B. current through 20Ω resistance is $0.1A$

C. potential difference across the middle resistance is 2 V

D. All of the above are true

Answer: D

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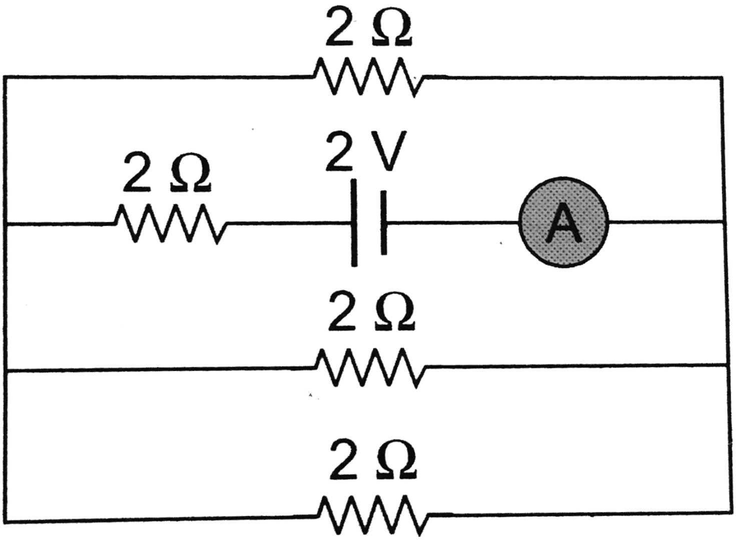
96. The reading of the ammeter as per figure shown is



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

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

C. $\frac{1}{8}A$

D. $2A$

Answer: B

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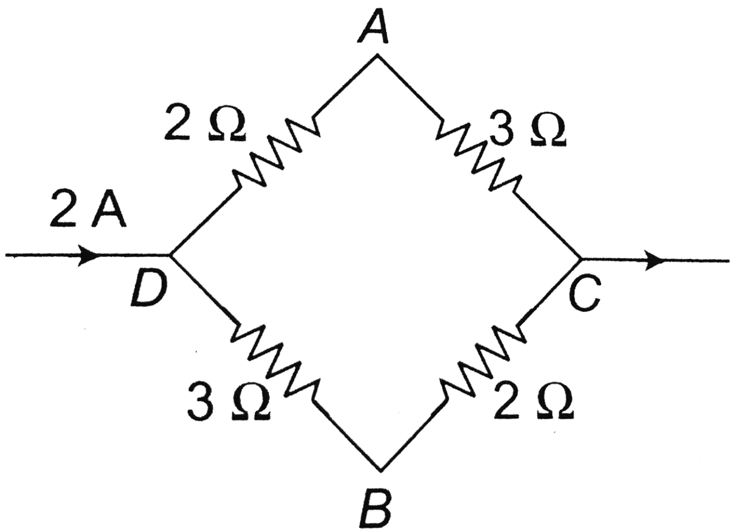
97. A current of $2A$ flows in a system of conductor as shown. The potential difference $(V_A - V_B)$



A. $-1V$

B. $+1V$

C. $-2V$

D. $+2V$

Answer: D

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