PHYSICS

BOOKS - D MUKHERJEE PHYSICS (HINGLISH)

ELECTRIC CURRENT IN CONDUCTORS

Others

1. The carrier density (number of free electrons per m^3) in metallic conductoirs is of the order of

A. 10^{10}

B. 10^{-16}

C. 10^{22}

D. 10^{28}

Answer: D

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2. When a current flows in a conductor, the order of magnitude of drift velocity of electrons through it is :

A. $1cm/s$

B. $10m/s$

C. $10^4 m/s$

D. $10^8 m/s$

Answer: A

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3. The resistance of a metallic conductor increases with temperature due to.

A. chagne in carrier density

B. change in the dimensions of the conductor

C. increase in the number of collisioins among the carries

D. increase in the rate of collision between the carries and the vibratioin atoms of the conductor

Answer: D

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4. 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 that of germanium decrreases

D. copper decreases and that of germanium increases

Answer: D

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5. A straight conductor of uniform cross-section carries a current I. Let $s =$ specific charge of an electron. The momentum of all the free electrons per unit length of the conductor, due to their drift velocity only, is

A. Is

B. I/s

C. $\sqrt{I/s}$

D. $(I/s)^2$

Answer: B

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6. Current flows through a metallic conductor whose area of cross-section increases in the direction of the current. If we move in this direction.

A. the current will change

B. the carrier density will change

C. the drift velocity will increase

D. the drift velocity will decrease

Answer: D

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7. A conducting ring of radius R has charge Q distributed unevenly over it. If it rotates with an angular velocity ω, the equivalent current will be

A. zero

B. $Q\omega$

C. $Q\frac{\omega}{2\pi}$

D. $Q\frac{\omega}{2\pi R}$

Answer: C::D

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8. 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.

A. 2

B. 4

C. 8

D. indeterminate unles the length of the third edge is specified

Answer: B

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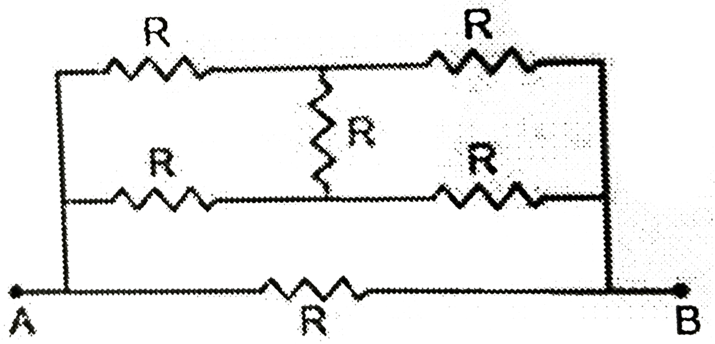
9. In the network shown below, the equivalent resistance between A and B is

Physics MCQ



A. $R/2$

B. R

C. $2R$

D. $4R$

Answer: A

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10. A and B are two points on a uniform ring of resistance R the $\angle ASCB = \theta$, whre C is the centre of the sign. The equivalent reisrtance between A and b

A. $\frac{R}{4\pi^2}(2\pi - \theta)\theta$

B. $R\left(I - \frac{\theta}{2\pi}\right)$

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

D. $R\frac{2\pi - \theta}{4\pi}$

Answer: A

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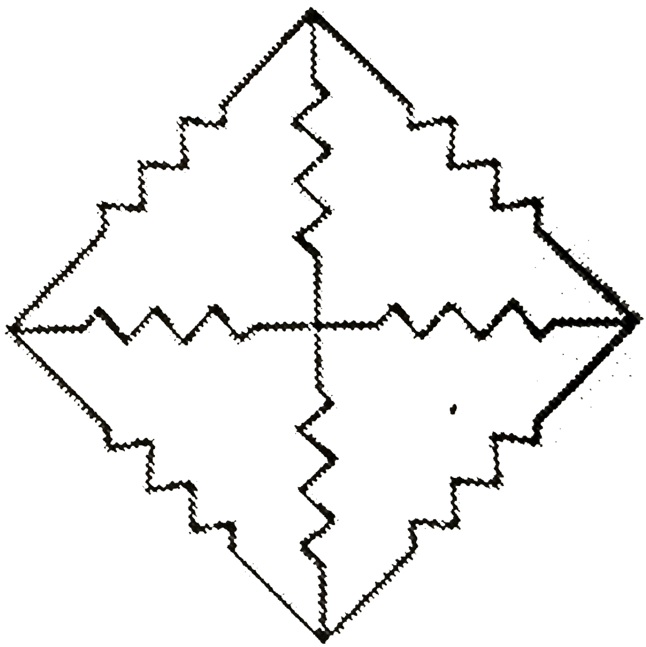

11.

In the network shown, each resistance is equal to R. The equivalent resistance between diagonally opposite corners is

A. R

B. $R/3$

C. $2R/3$

D. $4R/3$

Answer: C::D

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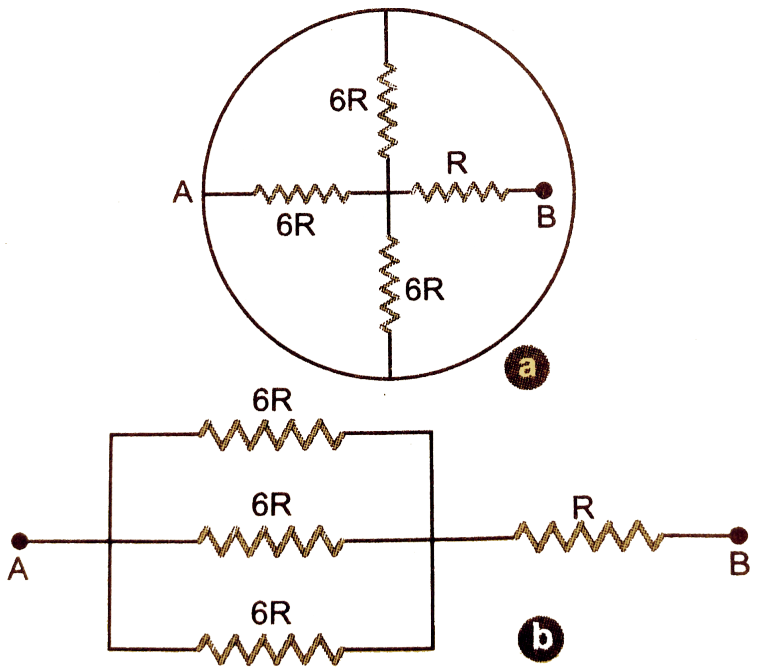
12. In the network shown in figure, the ring has zero resistance. Find the resistance between A and B.



A. $2R$

B. $4R$

C. $7R$

D. $10R$

Answer: A

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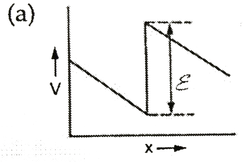
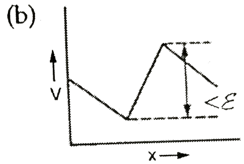
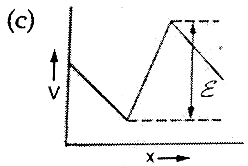
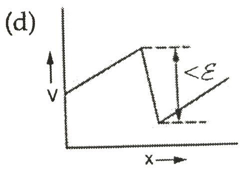
13. The two ends of a uniform conductor are joined to a cell of e.m.f. E and some internal resistance. Starting from the midpoint P of the conductor, we move in the direction of current and return to P. The potential V at every point on the path is plotted against the distance covered (x). which of the following graphs best represent the resulting curve ?

A. 

B. 

C. 

D. 

Answer: B

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14. The emf of a cell is ε and its internal resistance is r. its terminals are connected to a resistance R. The potential difference between the terminals is $1.6V$ for $R = 4\Omega$, and $1.8V$ for $R = 9\Omega$. Then,

A. $\varepsilon = 1V, r = 1\Omega$

B. $\varepsilon = 2V, r = 1\Omega$

C. $\varepsilon = 2V, r = 2\Omega$

D. $\varepsilon = 2.5V, r = 0.5\Omega$

Answer: B

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15. N identical cells are connected to form a battery. When the terminals of the battery are joined directly (short - circuited), current I flows in the circuit. To obtain the maximum value of I,

A. all the cells should be joined in sereis

B. all the cells should be joined in parallel

C. two rows of $N/2$ cells each should be joined in parallel

D. $\sqrt{N}$ rows of $\sqrt{N}$ cells each should be joined in parallel, given that $\sqrt{N}$ is an integer

Answer: B

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16. N identical cells, each emf E and internal resistance r are joined in series. Out of N cells, n cells are wrongly connected i.e., their terminals are connected in reverse of the required for series connection $\left(n < \frac{N}{2}\right)$. Let E_0 be the emf of resulting battery and r_0 be its internal resistance. Then

A. $\varepsilon_0 = (N - n)\varepsilon, r_0 = (N - n)r$

B. $\varepsilon = (N - 2n)\varepsilon, r_0 = (N - 2n)r$

C. $\varepsilon_0 = (N - 2n)\varepsilon, r_0 = Nr$

D. $\varepsilon = (N - n)\varepsilon, r_0 = Nr$

Answer: C::D

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17. n identical cells, each of emf E and internal resistance r, are joined in series to form a closed circuit. Find the potential difference across any one cell.

A. zero

B. ε

C. $\frac{\varepsilon}{n}$

D. $\frac{n-1}{n}\varepsilon$

Answer: A

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18. n identical cells, each of emf ε and internal resistance r, are joined in series to from a closed circuit. One cell a is joined with reversed polarity. The potential difference across each cell, except A, is

A. $\frac{2\varepsilon}{n}$

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

C. $\frac{n-2}{n}\varepsilon$

D. $\frac{2n}{n-2}\varepsilon$

Answer: A

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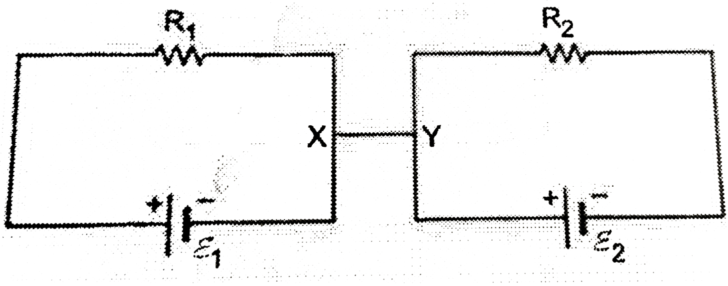
19. 

In the circuit shown above, the conductor XY is of negligible resisance. Then

A. current will flow through XY if $\varepsilon_1 \neq \varepsilon_2$

B. current will flow through XY if $\frac{\varepsilon_1}{R_1} \neq \frac{\varepsilon_2}{R_2}$

C. current will flow through XY if $\frac{\varepsilon_1 + \varepsilon_2}{R_1 \_ + R_2} \neq \frac{|\varepsilon_1 - \varepsilon_2|}{R_1 - R_2}$

D. no current will flow through XY

Answer: D

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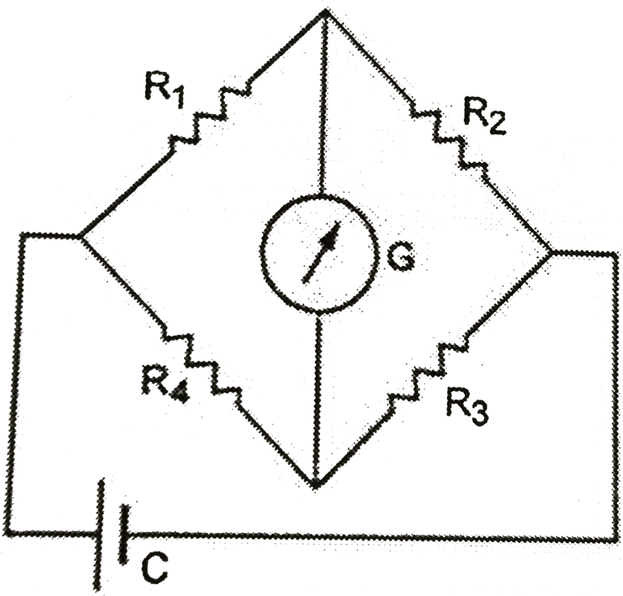
20.



The Wheatstone bridge shown in the above figure is balanced. If the positions of the cell C and the galvanometer G are now interchanged, G will show zero deflection

A. in all cases

B. only if all the resistances are qual

C. only if $R_1 = R_3$ and $R_2 = R_4$

D. only if $R_1 / R_3 = R_2 / R_4$

Answer: A

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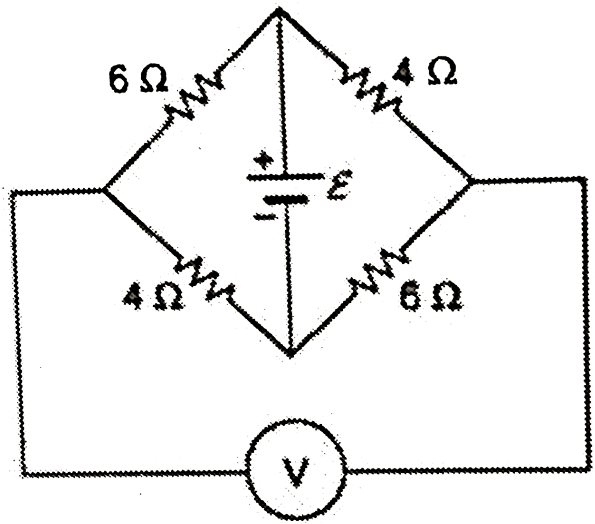
21.



In the circuti shown above the the voltmeter is of large resistance. The emf of the cell is ε. The reading of the voltmeter is

A. zero

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

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

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

Answer: C::D

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22. A Galvanometer of range $10mA$ has a coli of resistance 1Ω. To use it as an ammeter of range $1A$, the required shunt must have a resistance of

A. $\frac{1}{101}\Omega$

B. $\frac{1}{100}\Omega$

C. $\frac{1}{99}\Omega$

D. $\frac{1}{9}\Omega$

Answer: C::D

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23. A milliammeter of range of $10mA$ gives full-scale deflection for a current of $100mA$, when a shunt of 0.1Ω is connected in parallel to it. The coil of the milliammeter has a resistance of.

A. 0.9Ω

B. 1Ω

C. 1.1Ω

D. 0.11Ω

Answer: A

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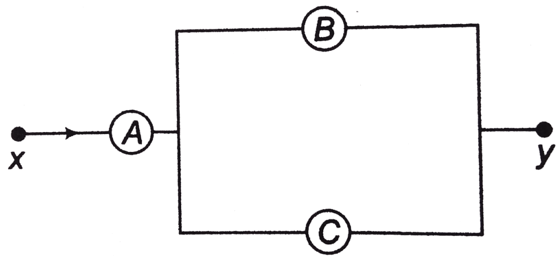
24. A, B and C are voltmeters of resistances R, $1.5R$ and $3R$ respectively. When some potential difference is applied between x and y the voltmeter readings are V_A, V_B and V_C,` then



A. $V_A = V_B = V_C$

B. $V_A \neq V_B = V_C$

C. $V_A = V_B \neq V_C$

D. $V_B \neq V_A = V_C$

Answer: A

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25. 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 A and V will decrease

C. A will decrease, V will increase

D. A will increase, V will decrease

Answer: D

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26. In a moving -coil instrument, the coil is is suspended in a radial magnetilc field instead of a uniform magnetic field. This is done to

A. increase the sensitivity of the instrument

B. increase the accuracy of the instrument

C. make the instrument compact and portable

D. make its deflection proportional to the current through it

Answer: D

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27. Acell of internal resistance r drives a current through an external resistance R. The power delivered by the cell to the external resistance is maximum when

A. $R = r$

B. $R > \;> r$

C. $R < \;< r$

D. $R = 2r$

Answer: A

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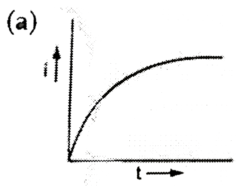
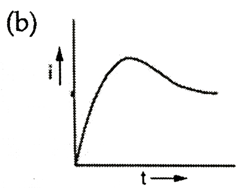
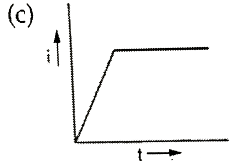
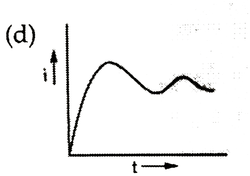
28. When an electric heater is switched on, the current flowing through it (i) is plotted against time (t). Taking into account the variation of resistance with temperature, which of the following best represents the resulting curve

A. 

B. 

C. 

D. 

Answer: B

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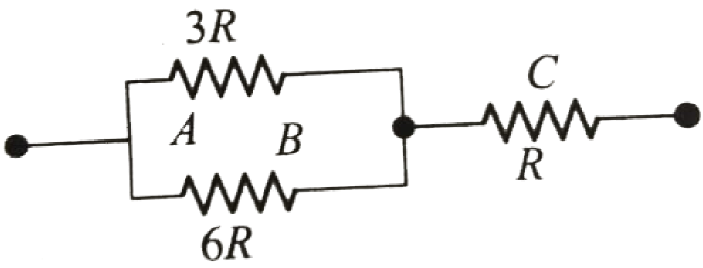
29. Figure 7.37 shows a network of three resistances. When some potential difference is applied across the network , thermal powers dissipated by A, B and C are in the ratio



A. $2:3:4$

B. $2:4:3$

C. $4:2:3$

D. $3:2:4$

Answer: C::D

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30. An electric bulb is designed to draw P_0 power at V_0 voltage. If the voltage is V, it drawas power. Then

A. $P = \frac{V_0}{V} P_0$

B. $P = \frac{V}{V_0} P_0$

C. $P = \left(\frac{V}{V_0}\right)^2 P_0$

D. $P = \left(\frac{V_0}{V}\right)^2 P_0$

Answer: C::D

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31. An electric bulb rated for 500 watts at 100 volts is used in a circuit having a 200 volts supply. The resistance R that must be put in series with the bulb, so that the bulb delivers 500 watt is ....ohm.

A. 10Ω

B. 20Ω

C. 50Ω

D. $100\Omega s$

Answer: B

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32. Two electric bulbs A and B are designed for the same voltage. Their power ratings are P_A and P_B respectively with $P_A > P_B$. If they are joined in series across V voltage supply

A. A will draw more power than B

B. B will draw more power than A

C. the ratio of powers drawn by them will depend on V

D. A and B will draw the same power

Answer: B

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33. n identical light bulbs, each designed to draw P power from a certain voltage supply, are joined in series across that supply. The total power which they will draw is

A. nP

B. P

C. P/n

D. P/n^2

Answer: C::D

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34. When a $500 - W$ electric and a $500 - W$ heater operate at their rates voltages, the filament of the bulb reaches a much higher temperature than the filament of the heater.

The most important reason for this that

A. their resistances are not equal

B. they are made of different materials

C. their dimensions are very different

D. they radiate different powers at different temperatures

Answer: C::D

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

A. $4:1$

B. $2:1$

C. $\sqrt{2}:1$

D. $1:2$

Answer: B

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36. 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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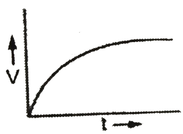
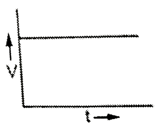
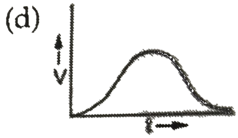
37. An ideal cell is connected to a capacitor through a voltmeter. The reading V of the voltmeter is plotted agains time. Which of the following best represents the resulting curve?

A. (a) 

B. (b) 

C. (c) 

D. 

Answer: B

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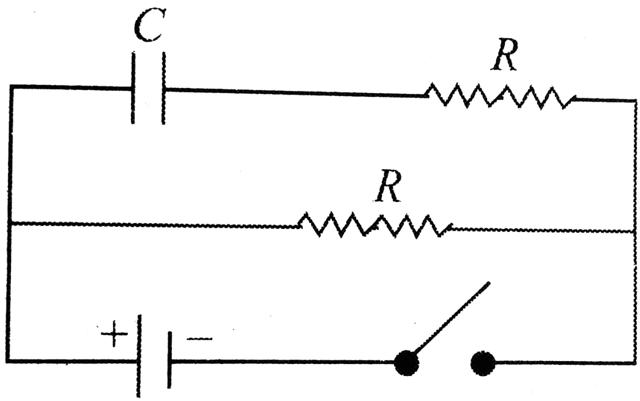
38. In the circuit shown in fig. when the switch is closed, the capacitor charges with a time constant



A. RC

B. $2RC$

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

D. $RCIn2$

Answer: A

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39. A capacitor is charged and then made to discharged through a resistance. The time constant is τ. In what time will the potential difference across the capacitor decreases by $10\,\%$?

A. $\tau In(0.1)$

B. $\tau In(0.9)$

C. $\tau In(10/9)$

D. $\tau In(11/10)$

Answer: C

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40. A capacitor charges from a cell through a resistance. The time constant is τ. In what time will the capacitor collect 10% of the final charge?

A. $\tau In(0.1)$

B. $\tau In(0.9)$

C. $\tau In(10/9)$

D. $\tau In(11/10)$

Answer: C

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41. A capacitor of capacitance C has charge Q. it is connected to an identical capacitor through a resistance. The heat produced in the resistance is

A. $\frac{Q^2}{2C}$

B. $\frac{Q^2}{4C}$

C. $\frac{Q^2}{8C}$

D. dependent on the value of the resistance

Answer: B

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42. The charge on a capacitor decrease η time in time t, when it discharging through a circuit with a time constant τ

A. $t = \eta\tau$

B. $t = \tau In\eta$

C. $t = \tau(In\eta - 1)$

D. $t = \tau In\left(1 - \frac{1}{\eta}\right)$

Answer: B

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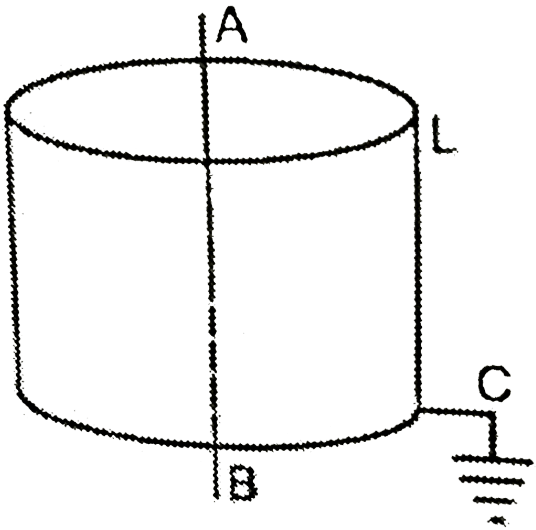

43.

A straight conductor AB lies along the axis of a hollow metal cylinder L, which is connected to earth through a conductor C.A quantity of charge will flow through C

A. if a current begins to flow through AB

B. if the current through AB is reversed

C. if AB is removed, and a beam of electrons flows in its place

D. if AB is removed, and a beam of protons flows in its place

Answer: C::D

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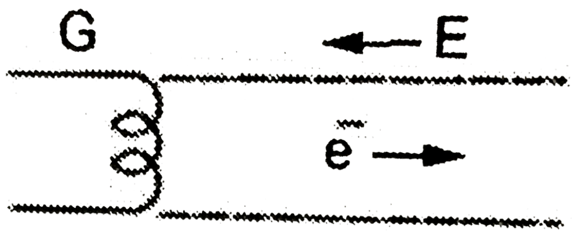
44. 

A beam of electorn emitted from the electron gun G is accelerated by an electic field E. The area of cross-section of the beam remains constant. A the beam moves away from G

A. the speed of the electrons increases

B. the current constituted by the beam increases

C. the number of electrons per unit volume in the beam increases

D. the number of electrons per unit volume in the beam decreases

Answer: A::D

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45. The charge flowing in a conductor varies with times as $Q = at - bt^2$. Then, the current

A. decreases linearly with time

B. reaces a maximum and then decreases

C. falls to zero after a time period $t = \frac{a}{2b}$

D. change at a rate $-2b$

Answer: A::C::D

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46. The charge flowing in a conductor varies time as,

$q = at - \frac{1}{2}bt^2 + \frac{1}{6}ct^3$

Where a,b,c are positive constants. Then, find (i) the initial current (ii) the time after which the value of current reaches a maximum value (iii) the maximum or minimum value of current.

A. has an initial value $i = a$

B. reaches a minimum value after a time period $t = b/c$

C. reaches a maximum value after a time period $t = b/c$

D. has either a maximum or a minimum value $i = a - \frac{b^2}{2c}$

Answer: A::B::D

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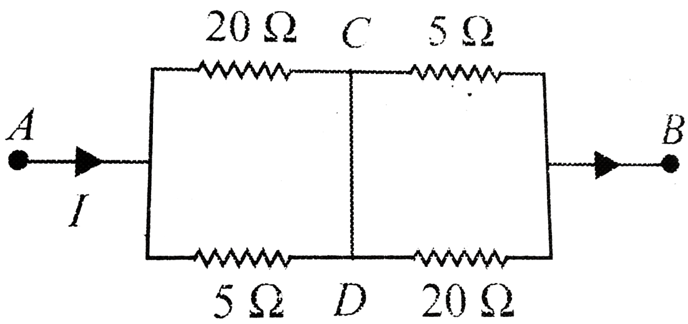
47. When some potential differece is maintained between A and B, current I enters the network at A and leaves at B



A. The equivalent resistance between A and B is 8Ω

B. C and D are at the same potential.

C. No current flows between C and D

D. Current $3I/5$ flows from D to C

Answer: A::B::D

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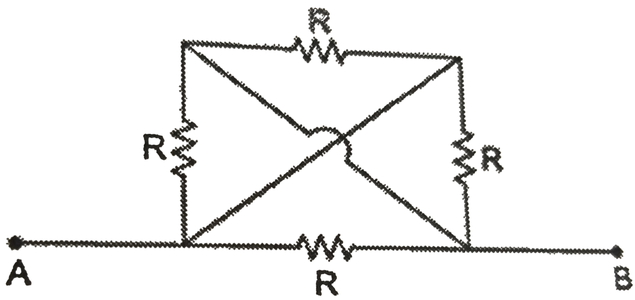

48.

In the circuit shown above, each of the four conductors is of resistance R. The potentail difference between A and B is V. The current flowing between A and B is

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

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

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

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

Answer: D

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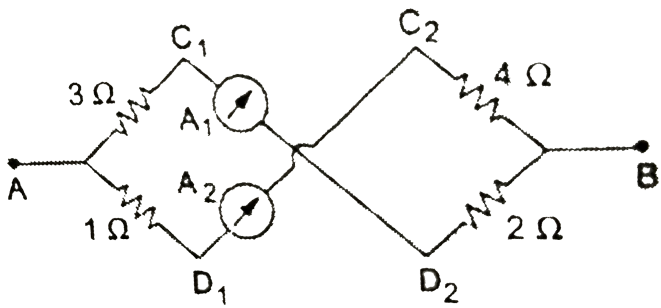
49. 

In the circuit shown above, A_1 and A_2 are ammeters of resistance 5Ω each. When an ideal cell of emf $10V$ is applied between A and B

A. the current drawn from the cell is $1A$

B. the reading of A_1 is $1A$

C. the reading of A_2 is $1A$

D. if C_1 is joined to C_2 and D_1 is joined to D_2, the ammeter readings will become equal

Answer: B::C::D

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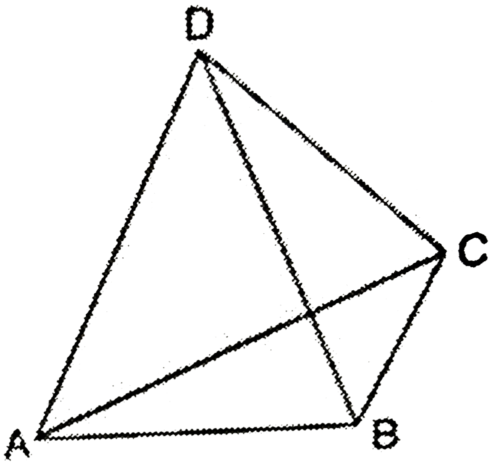

50.

Six identical wires of resistance R each are joined to form a pyramid, as shown in the figure above

A. The equivalent resistance between any two corners will depend on the choice of corners

B. The equivalent resistance between A and B is $R/2$

C. The equivalent resistance between D and C is zero

D. If an electric current enters at A and flows out at B, no current will pass through DC.

Answer: B::D

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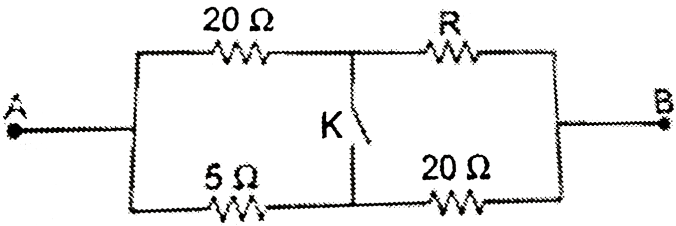
51. 

When the switch K is open, the equivalent resistance between A and B is 20Ω. Then, which is thte correct statemetn?

A. $R = 80\Omega$

B. No current flows through K when its closed.

C. The powers dissipated in R and in the $5 - \Omega$ resistor are always equal.

D. The power dissipated in the two $20 - \Omega$ resistors are unequal

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

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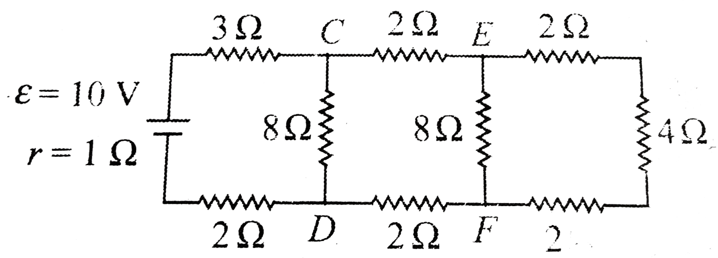
52. In the circuit shown in fig. the cell has emf

10V and internal resistance 1Ω



A. The current through the $3-\Omega s$ resistor

is $1A$.

B. The current though the $3-Q$ resistor is

$0.5A$

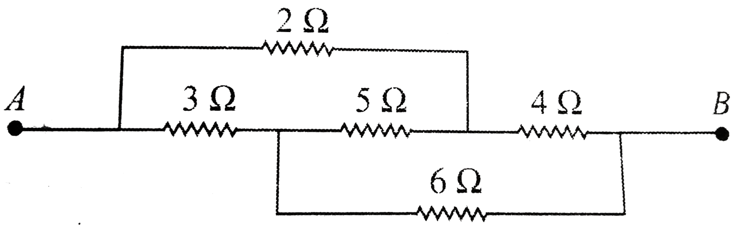
C. The current through the $4 - \Omega$ resistor is $0.5A$

D. The current through the $4 - \Omega$ resistor is $0.25A$

Answer: A::D

Watch Video Solution

53. In the circuit shown in fig. some potential difference is applied between A and B. The equivalent resistance between A and B is R.



A. No current flows through the $5 - \Omega$ resistor

B. $R = 15\Omega$

C. $R = 12.5\Omega$

D. $R = \frac{18}{5}\Omega$

Answer: A::D

Watch Video Solution

54. A uniform wire of resistance R is shaped into a regular $n-$ sided polygon (n is even), The equivalent resistance between any two corners can have.

(i) the maximum value $\frac{R}{4}$

(ii) the minimum value $\frac{R}{n}$

(iii) the minimum value $R\left(\frac{n-1}{n^2}\right)$

(iv) the minimum value $\frac{R}{n}$.

A. the maximum value $\frac{R}{4}$

B. the maximum value $\frac{R}{n}$

C. the minimum value $R\left(\frac{n-1}{n^2}\right)$

D. the minimum value $\frac{R}{n}$

Answer: A::C

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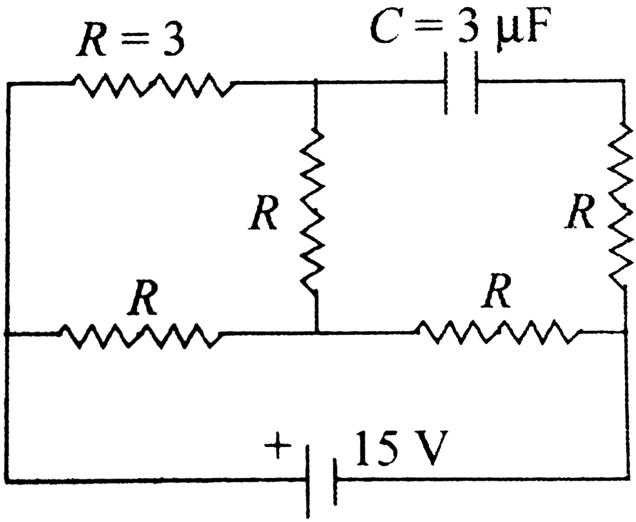
55. In the circuit shown in fig. the cell is ideal with emf 15V. Each resistance is of 3Ω. The potential difference across the capacitor in steady state is



A. zero

B. $9V$

C. $12V$

D. $15V$

Answer: C

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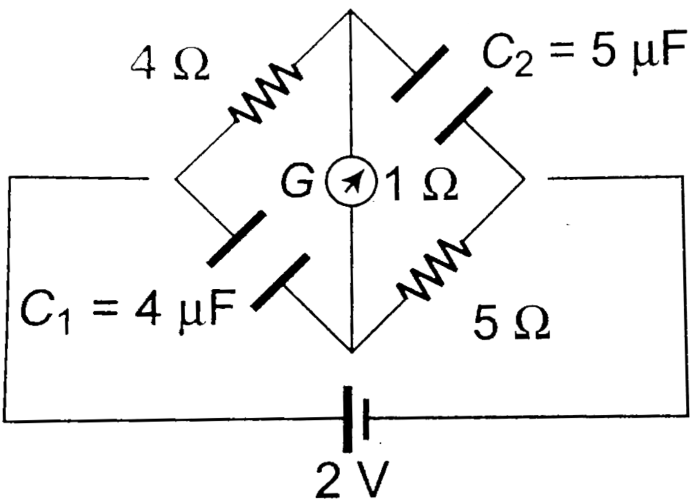
56. In the circuit shown, the cell is ideal with emf = $2V$. The resistance of the coil of the galvanometer G is 1Ω.



(i) No current flows in G

(ii) $0.2A$ current flows in G

(iii) potential difference across $C_1 is 1V$

(iv) Potential difference across C_2 is $1.2V$

A. No current flows in G

B. $0.2 - A$ current flows in G

C. Potential difference across C_1 is $1V$

D. Potential difference across C_2 is $1.2V$.

Answer: B::C::D

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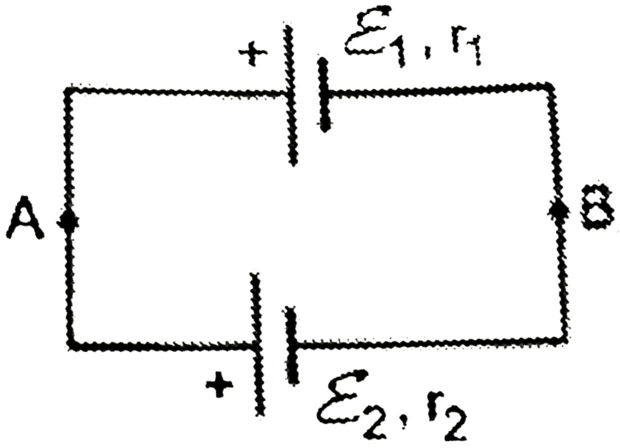
57. 

Two cells of unequal emfs, $\mathcal{E}_1$ and $\mathcal{E}_2$ and internal resistances r_1 and r_2 are joined as shown. V_A and V_B are the potentials at A and B respectively.

A. Once cell wil continuously suply energy to the other.

B. The potential difference across botht eh cells will be equal.

C. The potential difference across one cell will be greater than its emf.

D. $V_A - V_B = \frac{(\varepsilon_1 r_2 + \varepsilon_2 r_1)}{(r_1 + r_2)}$

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

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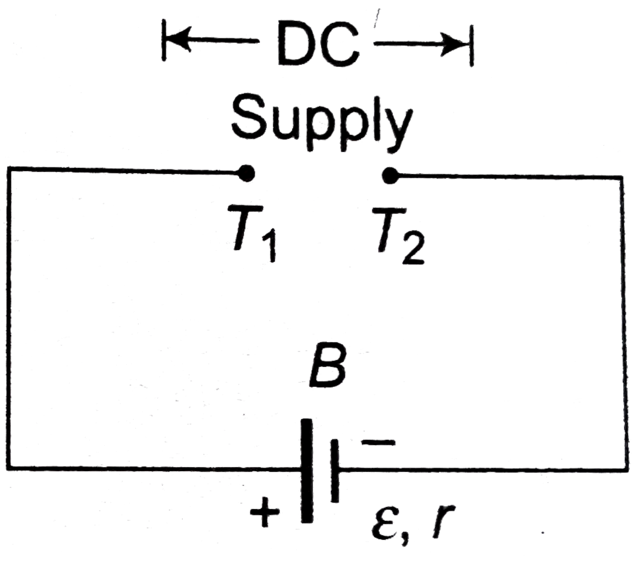
58. An accumulator battery (storage cell) B of emf ε and internal resistance r is being charged from DC supply whose terminals are T_1 and T_2



A. Potential difference bertween T_1 and T_2 must be $> \varepsilon$

B. T_1 must be positive with respect to T_2

C. in the battery, current flows from the positive to the negative terminal.

D. All the above options are incorrect.

Answer: A::B::C

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59. A voltmeter and an ammeter are connected in series to an ideal cell of $emf E$. The voltmeter reading is V, and the ammeter readings is I. Then

(i) $V < E$ (ii) the voltmeter resistance is V / I

(iii) the potential difference across the ammeter is $E - V$

(iv) Voltmeter resistance + ammeter resistance = E//I`

Correct statements are

A. $V < \varepsilon$

B. The voltmeter resistance is V / I

C. The potential difference acros the ammeter is $(\varepsilon - V)$

D. Voltmeter resistance plus ammeter resistanc $= \varepsilon / I$

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

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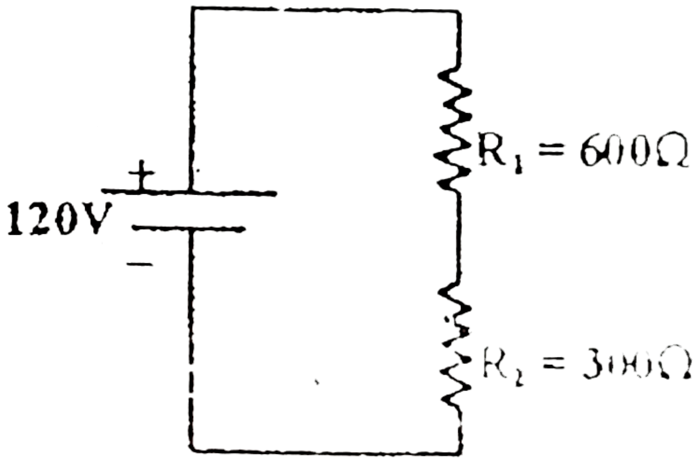
60. A voltmeter of resistance 600Ω when connected in turn across resistances R_1 and R_2 gives readings of V_1 and V_2, respectively. If the battery is ideal, then



A. $V_1 = 80V$

B. $V_1 = 60V$

C. $V_2 = 30V$

D. $V_2 = 40V$

Answer: B::C

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61. A voltmeter and an ammeter are joined, in series to an ideal cell, giving reading V and A respectively. If a resistance equal to the resistance of the ammeter is now joined in parallel to the ammeter then :

A. V will not change

B. V will increase slightly

C. A will become exactly half to its initial value

D. A will become slightly more than half of its initial value

Answer: B::D

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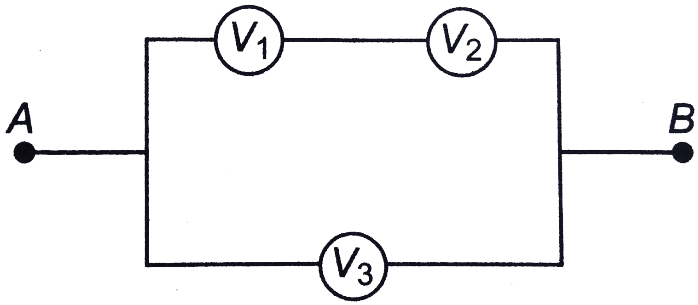
62. Three voltmeters all having different resistance, are joined as shown. When some potential difference is applied acros A and B, their readings are V_1, V_2 and V_3. Then



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

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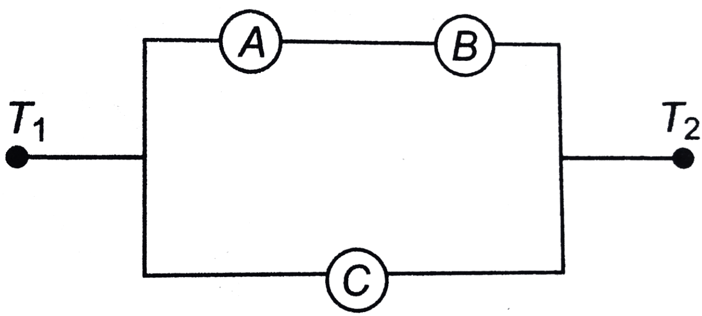
63. Three ammeters $A, B,$ and C of resistances R_A, R_b and R_C respectively are joined as shown. When some potential difference is appllied across the terminals T_1 and T_2 their readings are I_A, I_B and I_C respectively Then,



A. $I_A = I_B$

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

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

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

Answer: A::B::D

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64. A microameter has a resistance of 100ω and a full scale range of $50\mu A$. It can be used as a voltmeter or as a higher range ammeter provides a resistance is added to it . Pick the correct range and resistance combination(s)

A. Range $50V$, with a $10 - kQ$ resistance in series

B. Range $10V$, with a $\left(2 \times 10^5 - 100\right) - \Omega$ resistance in series

C. Range $5mA$, with $1.01 - \Omega$ resistance in parallel

D. Range $10mA$, with a $1 - \Omega$ resistance in parallel

Answer: B::C

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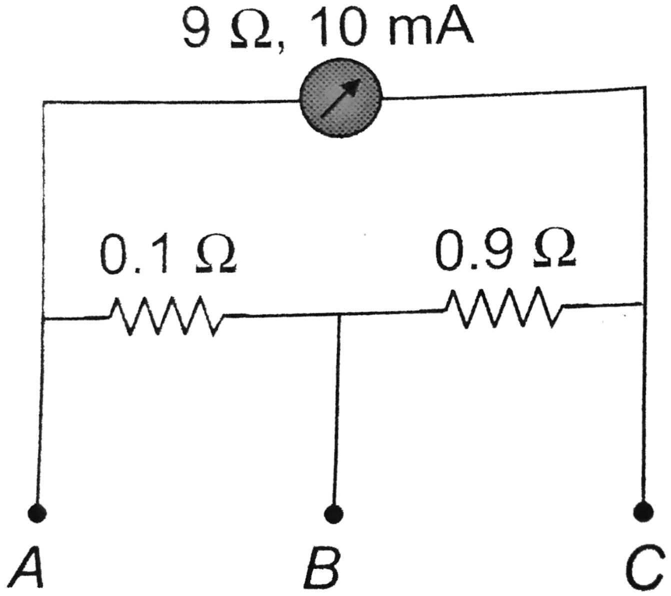
65. A milliammeter of range $10 mA$ and resistance 9Ω is joined in a circuit as shown. The metre gives full-scale deflection for curretn I when A and B are used as its terminals, i.e., current enters at A and leaves at B (C is left isolated). The value if I is



A. $100mA$

B. $900mA$

C. $1A$

D. $1.1A$

Answer: C

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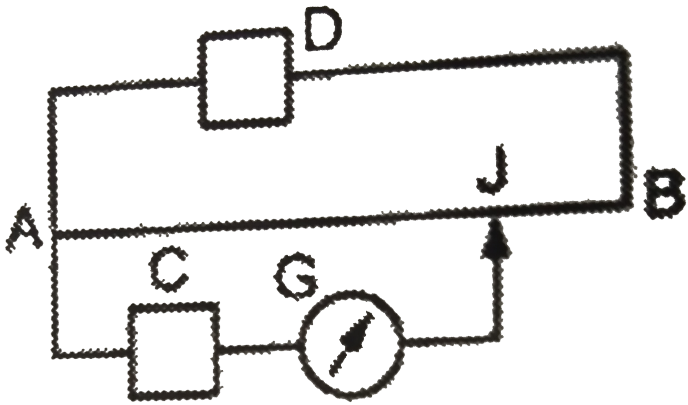

66.

The figure shows a potentiometer arrangement. D is the driving cell. C is the cell whose emf is to be determined. AB is the potentiometer wire and G is a galvanometer. J is a sliding contact which can touch any point on AB. Which of the following are essential conditions for obtaining balance?

A. The emf of D must be greater than the emf of C

B. Either the positive terminals of both D and C or the negative terminals of both D and C must be joined to A.

C. The positive terminals of D and C must be joined to A

D. The resitance of G must be less than te resistance of AB

Answer: A::B

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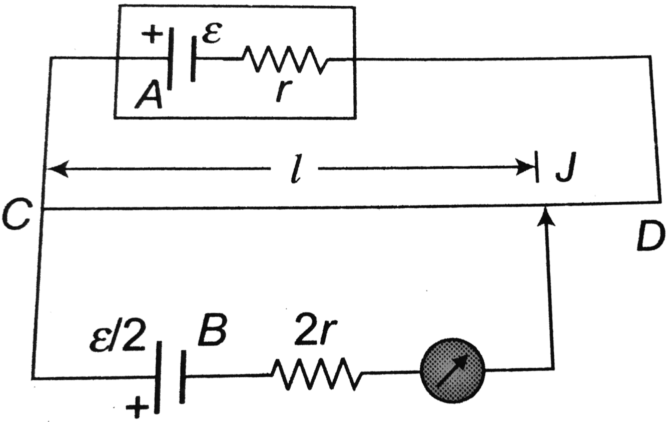
67. In the petentiometer arrangemeter shown, the driving cell A has emf ε and internal resistance r. The emf of the cell B is $\frac{\varepsilon}{2}$ and internal resistance $2r$. The petentiometer wire CD is $100cm$ long. If balance is obtained with length $CJ = l$, then



A. $l = 50cm$

B. $l > 50cm$

C. Balance will be obtaine donly if

resistance of AB is $> r$

D. Balance cannot be obtained.

Answer: B::C

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68. A cell drives a current through a circuit. The emf of the cell of equal to the work done in moving unit charge (Choose the incorrect option)

A. from the positive to the negative plate of the cell

B. from the positive plate, back to the positive plate

C. from the negative plate, back to the negative plate

D. from any point in the circuit back to the same point

Answer: B::C::D

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69. A cell of emf ε and internal resistance r drives a current i through an extermal resistance R

(i) The cell suppllied εi power

(ii) Heat is produced in R at the rate εi

(iii) Heat is produced in R at the rate $\varepsilon I\left(\frac{R}{R+r}\right)$

(iv) Heat is produced in the cell at the rate $\varepsilon i\left(\left(r\frac{?}{R+r}\right)\right.$

A. The cell suplies εi power

B. Hear is produced in R at the rate ε

C. Heat is produced in R at the rate

$$\varepsilon i\left(\frac{R}{R+r}\right)$$

D. Heat is produced in the cell at the rate

$$\varepsilon i\left(\frac{r}{R+r}\right)$$

Answer: A::C::D

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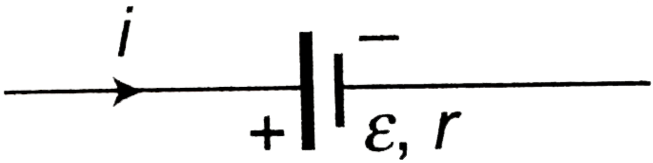
70. Current i is being driven through a cell of emf ε and internal resistance3 r, as shown



(i) the cell absorbs energy at rate of εi

(ii) The cell stores chemical energy at the rate of $\left(\varepsilon i-i^{2} r\right)$

(iii) The potential differnece across the cell is $\varepsilon+i r$

(iv) some heat is produced in the cell

A. The cell absorbs energy at the rate of εi

B. The cell stores chemical energy at the rate of $\left(\varepsilon i-i^{2} r\right)$

C. The potential difference across the cell is

$\varepsilon + ir$

D. Some heat is produced in the cell.

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

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71. Two electric bulbs rated $25W, 220V$ and $100W, 220V$ are connected in series across a $220V$ voltage source . The

$25W$ and $100W$ bulbs now draw P_1 and P_2 powers , respectively.

A. $P_1 = 16W$

B. $P_1 = 4W$

C. $P_2 = 16W$

D. $P_2 = 4W$

Answer: A::D

Watch Video Solution

72. 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 paralle $t=\frac{t_1 t_2}{(t_1+t_2)}$

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

Answer: A::C

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73. In a household electrlic circuit,

A. all electric appliances drawing power are joined in parallel

B. a switch may be either in series or in parallel with the appliance which it controls

C. if a switch is in parallel with an appliane it will draw power when the switch is in the 'off' position (open)

D. if a switch is in parallel with an appliance, the fuse wil blwo (burn out) when the switch is put 'on' (closed)

Answer: A::C::D

View Text Solution

74. Two identical fuses are rated at $10A$. If they are joined

A. in parallel, the combination acts as a fuse of rating $20A$

B. in parallel the combination acts as a fuse of rating $5A$

C. in series, the combination acts as a fuse of rating $10A$

D. in series, the combination acts as a fuse of rating $20A$

Answer: A::C

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75. The charge flowing through a resistance R varies with time $tasQ = at - bt^2$. The total heat produced in R is

A. $\frac{a^3 R}{6b}$

B. $\frac{a^3 R}{3b}$

C. $\frac{a^3 R}{2b}$

D. $\frac{a^3 R}{b}$

Answer: A

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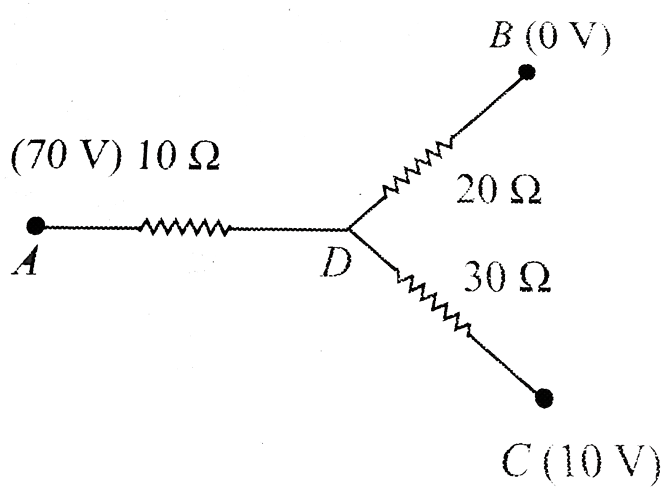
76. In the network shown in fig. , points A, B, and C are at potentials of 70 V, 0, and 10V, respectively.



A. Point D is at a potential of $40V$.

B. The currents in the sections AD, DB, DC are int eh ratio $3:2:1$

C. The currents in the sections AD, DB, DC are in the ratio $1:2:3$

D. The network draws a total power of $200W$

Answer: A::B::D

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77. Two identical capcitors A and B are charged to the same potential and then made to discharge through resistance R_A and R_B respectively with $R_A > R_B$

A. A will require greater time then B to discharge completely

B. More heat will be produced in A than in B

C. More heat will be produced in B than in A

D. All the above options are incorrect.

Answer: D

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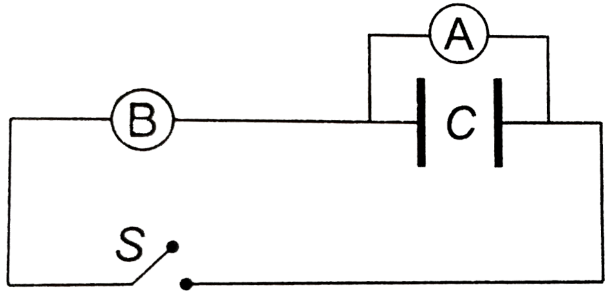
78. a capacitor of capacitance C is connected to two voltmeter A and B. A is ideal , having infinite resistance, while B has resistance R. The capcitor is charged and then switch S is closed. The reading of A and B will be equal



A. at all times

B. after time RC

C. after time $RCIn2$

D. only after a very long time

Answer: A

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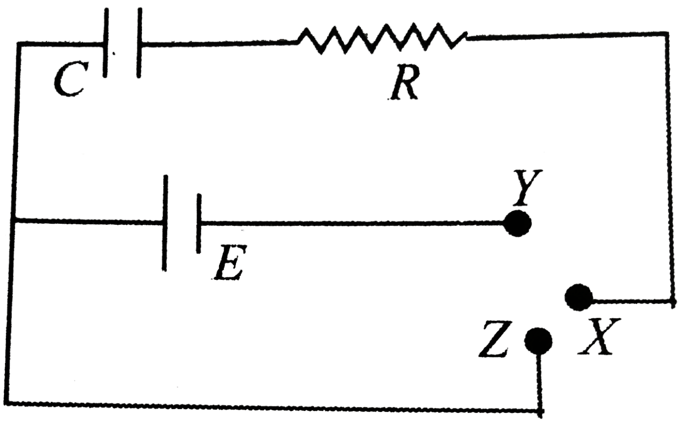
79. The capacitor C is initially without charge. X is now joined to Y for a long time, during which H_1 heat is produced in the resistance R. X is now joined to Z for a long time, during which H_2 heat is produced in R



A. $H_1 = H_2$

B. $H_1 = \frac{1}{2} H_2$

C. $H_1 = 2H_2$

D. The maximum energy stored in C at any time is H_1

Answer: A::D

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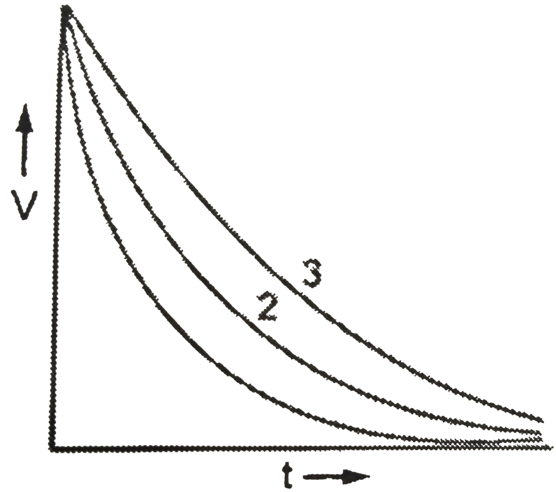
80.



Three identical capacitors A, B and C are charged to the same potential and then made to discharge thorugh three resistances R_A, R_B and R_C, where $R_A > R_B > R_C$. Their potential differences (V) are plotted agains time t giving the curves 1,2, and 3. Find the correlations between A, B, C and 1,2,3

A. $1 \rightarrow A$

B. $2 \rightarrow B$

C. $1 \rightarrow C$

D. $3 \rightarrow A$

Answer: B::C::D

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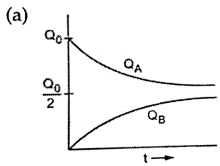
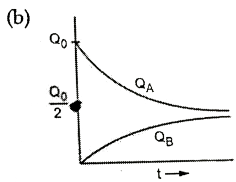
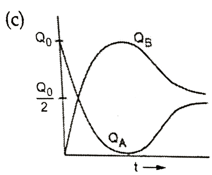
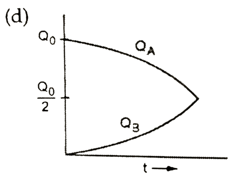
81. A capacitor A with charge Q_0 is connected through a resistance to another identical capacitor B, which has no charge. The charges on A and B after time t are Q_A and Q_B respectively, and they are plotted against time t. Find the correct curves

A. 

B. 

C. 

D. 

Answer: A

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82. A parallel- plate capacitor, fileld with a dielectric of dielectric consatnt k, is charged to a potential V_0. It is now disconnected from the cell and the slab is removed. If it now discharges, with time constant τ, through a resistance then find time after which the potential difference across it will be V_0 ?

A. $k\tau$

B. $\tau In k$

C. $\tau In\left(1 - \frac{1}{k}\right)$

D. $\tau In(k - 1)$

Answer: B

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83. When a capacitor discharges through a resistance R, the time constant is τ and the maximum current in the circuit is i_0

A. The initial charge on the capacitor was

$i_0\tau$

B. The initial charge on the capacitor was

$\frac{1}{2}i_0\tau$

C. The initial energy stored in the capacitor

was $i_0^2\tau$

D. The initial energy stored in the capacitor

was $\frac{1}{2}i_0^2R\tau$

Answer: A::D

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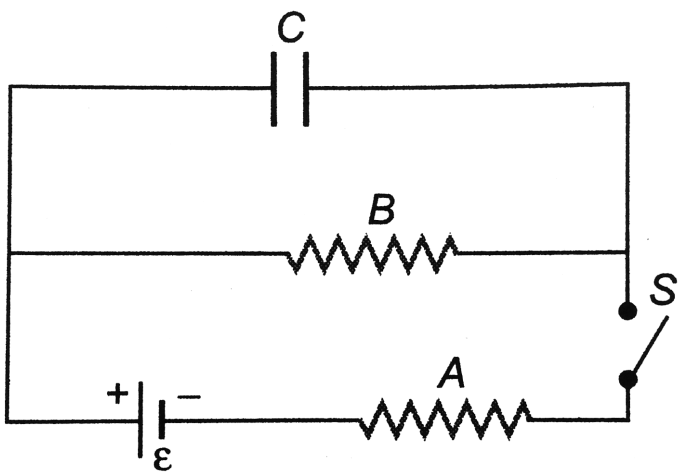
84. In the circuit shown, A and B are equal resistances. When S is closed, the capcitor Ccharges from the cell of emf epsilon and reaches a steady state.



A. During charging more heat is produced in A and B

B. In the steady state,heat is produced at te same rate in A and B

C. In the steady state, energy stored in C is $\frac{1}{4}C\varepsilon^2$

D. In the steady state, energy stored in C is $\frac{1}{8}C\varepsilon^2$

Answer: A::B::D

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85. Capacitors $C_1 = 1\mu F$ and $C_2 = 2\mu F$ are separately charged from the same battery. They are allowed to discharge separately through equal resistors

A. The currents in the two discharging circuits at $t = 0$ is zero

B. The currents in te two discharging circuits at $t = 0$ are equal but not zero.

C. The currents in the two discharging circuits at $t = 0$ are unequal.

D. C_1 loses 50% of its initial charge sooner than C_2 loses 50% of its initial charge.

Answer: C::D

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