PHYSICS

BOOKS - XII BOARDS PREVIOUS YEAR

QUESTION PAPER 2022 TERM 1 SET 2

Section A

1. An electric dipole placed in a non uniform electric field may experience

A. only a force

B. only a torque

C. both force and torque

D. neither force nor torque

Answer:

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2. Let N_1 be the number of electric field lines going out of an imaginary cube of side a that encloses an isolated point charge 2q and N_2

be the corresponding number for an imaginary sphere of radius a that encloses an isolated point charge 3q. Then (N_1 / N_2) is:

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

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

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

D. π

Answer:

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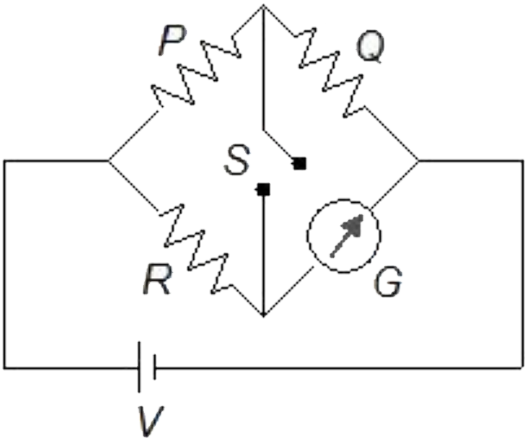
3. In the circuit shown as $P \neq R$ and the reading of the galvanometer G is same with the switch open or closer. Then



A. $I_Q = I_R$

B. $I_R = I_G$

C. $I_P = I_G$

D. $I_Q = I_G$

Answer:

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4. Two wires of the same material having lengths in the ratio $1:2$ and diameters in the ratio $2:3$ are connected in series with an accumulator. Compute the ratio of P.D. across the two wires.

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

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

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

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

Answer:

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5. Two moving coil galvanometers G_1 and G_2 have the following particulars respectively

$N_1 = 30, A_1 = 3.6 \times 10^{-3} m^2, B_1 = 0.25T$

$N_2 = 42, A_2 = 1.8 \times 10^{-3} m^2, B_2 = 0.50T$

The spring constant is same for both the

galvanometers. The ratio of current sensitivities of G_1 and G_2 is:

A. $5:7$

B. $7:5$

C. $1:4$

D. $1:1$

Answer:

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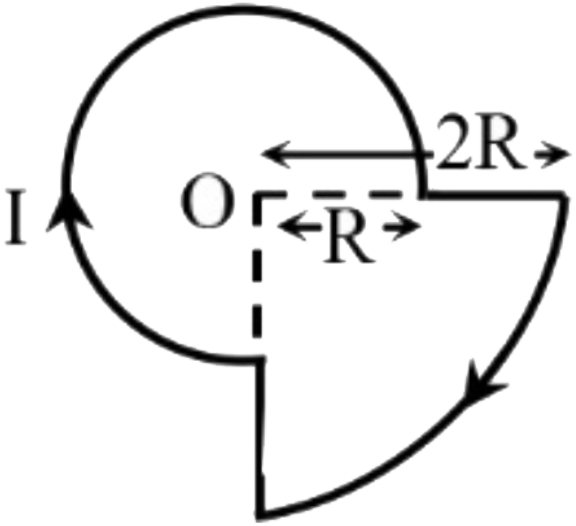
6. A current I is flowing through the loop , as shown in the figure . The magnetic field at centre O is



A. $\frac{5}{16}$, into the plane of the paper

B. $\frac{5}{16}$, out of the plane of the paper

C. $\frac{7}{16}$, out of the plane of the paper

D. $\frac{7}{16}$, into the plane of the paper

Answer:

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7. A capacitor and an inductor are connected in two different ac circuits with a bulb glowing in each circuit. The bulb glows more brightly when :

A. the number of turns in the inductor is increased

B. the separation between the plates of the capacitor is increased

C. an iron is introduced into the inductor

D. a dielectric is introduced into the gap between the plates of the capacitor

Answer:

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8. A pure inductor of 318 mH and a pure resistor of 75 Ω are connected in series to an ac source of 50 Hz. The voltage across 75 Ω resistor is found to be 150 V . The source voltage is :

A. 150 V

B. 175 V

C. 220 V

D. 250 V

Answer:

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9. The electric potential at a point on the axis of an electric dipole depends on the distance r of the point from the dipole as

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

B. $\frac{1}{x^{3/2}}$

C. $\frac{1}{x^3}$

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

Answer:

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10. The ratio of the force between two small spheres (with constant charges) F_1 in air and F_2 in a medium of dielectric constant k is respectively..

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

B. k

C. k^2

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

Answer:

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11. Infinity resistance in a resistance box has :

A. a resistance of $10^5\Omega$

B. a resistance of $10^7\Omega$

C. a resistance of ∞ resistance

D. a gap only

Answer:

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12. A battery of 15 V and negligible internal resistance is connected across a 50 Ω resistor . The amount of energy dissipated as heat in the resistor in one minute is :

A. 122 J

B. 270 J

C. 420 J

D. 720 J

Answer:

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13. Lenz's law is consequence of the law of conservation of

A. energy

B. charge

C. mass

D. momentum

Answer:

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14. The vertical component of earth's magnetic field at a place is $\left(\frac{1}{\sqrt{3}}\right)$ times the horizontal component. The angle of dip at that place is :

A. 0°

B. 30°

C. 45°

D. 60°

Answer:

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15. A long straight wire in the horizontal plane carries a current of 15 A in north to south direction. The magnitude and direction of magnetic field at a point 2.5 m east of the wire respectively are :

A. $1 \cdot 2\mu T$, vertically upward

B. $1 \cdot 2\mu T$, vertically downward

C. $0 \cdot 6\mu T$, vertically upward

D. $0 \cdot 6\mu T$ vertically downward

Answer:

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16. The emf induced in a 10 H inductor in which current changes from 11A to 2A in 9×10^{-1} s is :

A. $10^4 V$

B. 10^3 V

C. 10^2V

D. $10V$

Answer:

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17. A charge Q is placed at the centre of the line joining two charges q and q . The system

of the three charges will be in equilibrium if Q is :

A. $+\frac{q}{3}$

B. $-\frac{q}{3}$

C. $+\frac{q}{4}$

D. $-\frac{q}{4}$

Answer:

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18. Electric flux in an electric field $\vec{E}$ through area vector $\vec{ds}$ is given by

A. $\vec{E} \times d\vec{A}$

B. $\frac{\vec{E} \times d\vec{A}}{\varepsilon_0}$

C. $\vec{E} \cdot d\vec{A}$

D. $\frac{\vec{E} \cdot d\vec{A}}{\varepsilon_0}$

Answer:

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19. In a potentiometer experiment , the balancing length with a cell is 120 cm . When the cell is shunted by a 1Ω resistance , the balancing length becomes 40 cm. The internal resistance of the cell is .

A. 10Ω

B. 7Ω

C. 3Ω

D. 2Ω

Answer:

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20. An electron is projected with uniform velocity along the axis of a current carrying long solenoid. Which of the following is true?

A. The path of the electron will be circular about the axis .

B. The electron will be accelerated along the axis

C. The path of the electron will be helical

D. The electron will continue to move with the same velocity $\overrightarrow{v}$ along the axis of the solenoid .

Answer:

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21. If the speed v of a charged particle moving in a magnetic filed $\overrightarrow{B}$ ($\overrightarrow{v}$ is perpendicular to $\overrightarrow{B}$) is halved , then the radius of its path will:

A. not change

B. become two times

C. become one- fourth

D. become half

Answer:

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22. A metal plate is getting heated . Which one of following statements is incorrect ?

A. It is placed in a space varying magnetic field that does not vary with time .

B. A direct current in passing through the plate

C. An alternating current is passing through the plate

D. It is placed in a time varying magnetic filed.

Answer:

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23. In an AC circuit the voltage applied is $E = E_0 \sin \omega t$. The resulting current in the circuit is $I = I_0 \sin\left(\omega t - \frac{\pi}{2}\right)$. The power consumption in the circuit is given by

A. $E_0 I_0$

B. $\frac{E_0 I_0}{2}$

C. $\frac{E_0 I_0}{\sqrt{2}}$

D. Zero

Answer:

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24. The speed acquired by a free electron when accelerated from rest through a potential difference of 100 V is :

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

B. $3 \times 10^{6} ms^{-1}$

C. $4 \times 10^{-5} ms^{-1}$

D. $2 \times 10^{3} ms^{-1}$

Answer:

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25. Which one of the following is not affected by the presence of a magnetic field ?

A. A current carrying conductor

B. A moving charge

C. A stationary charge

D. A rectangular current loop with its plane parallel to the field

Answer:

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Section B

1. Two point charges $+8q$ and $-2q$ are located at $x = 0$ and $x = L$ respectively. The location of a point on the x axis at which the net electric field due to these two point charges is zero is

A. 8L

B. 6L

C. 4L

D. 2L

Answer:

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2. An electric dipole of dipole moment $4 \times 10^{-5} C - m$, kept in a uniform electric field of $10^{-3} NC^{-1}$,experiences a torque of

2×10^{-8} Nm. The angle which the dipole which the dipole makes with the electric field is :

A. 30°

B. 45°

C. 60°

D. 90°

Answer:

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3. Three identical charges are placed on x - axis from left to right with adjacent charges separated by a distance d. The magnitude of the force on a charge from its nearest neighbour charge is F. Let $\hat{i}$ be the unit vector along $+x$ axis, then the net force on each charge from left to right is :

A. $\left(2F\hat{i},\ -2F\hat{i}, 2F\hat{i}\right)$

B. $\left(F\hat{i}, 0, F\hat{i}\right)$

C. $\left(-\frac{5}{4}F\hat{i}, 0+\frac{5}{4}F\hat{i}\right)$

D. $\left(2F\hat{i}, 0, 2F\hat{i}\right)$

Answer:

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4. Two students A and B calculate the charge flowing through a circuit . A concludes that 300C of charge flows in 1 minute . B concludes that 3.125×10^{19} electrons flow in 1 second . If the current measured in the circuit is 5 A, then the correct calculation in done by :

A. A

B. B

C. both A and B

D. neither A nor B

Answer:

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5. The resistance of two wires having same length and same area of cross - section are 2Ω and 8Ω respectively . If the resistivity of 2Ω is

$2.65 \times 10^{-8}\Omega$ then the resistivity of 8Ω wire is

:

A. $10.60 \times 10^{-8}\Omega - m$

B. $8.32 \times 10^{-8}\Omega - m$

C. $7.61 \times 10^{-8}\Omega - m$

D. $5.45 \times 10^{-8}\Omega - m$

Answer:

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6. In a certain region of space electric field E and magnetic field B are perpendicular ot each other and an electron enters region perpendicular to the direction of B and E both and moves undeflected, then velocity of electron is

A. $\vec{E} \cdot \vec{B}$

B. $\left|\vec{E} \times \vec{B}\right|$

C. $\dfrac{\left|\vec{E}\right|}{\left|\vec{B}\right|}$

D. $\frac{\left|\overrightarrow{B}\right|}{\left|\overrightarrow{E}\right|}$

Answer:

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7. A test change of $1.6 \times 10^{-19} C$ is moving with velocity $\overrightarrow{v} = \left(4\hat{i} + 3\hat{k}\right) ms^{-1}$ in a magnetic field $\overrightarrow{B} = \left(3\hat{k} + 4\hat{i}\right) T$. The force on this test charge is :

A. $24\hat{j} N$

B. $-24\hat{i}N$

C. $24\hat{k}N$

D. 0

Answer:

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8. In a series LCR circuit, at resonance the current is equal to :

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

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

C. $\frac{V}{X_L - X_C}$

D. $\frac{C}{\sqrt{R^2 + (X_L - X_C)^2}}$

Answer:

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9. The frequency of an ac source for which a $10\mu F$ capacitor has a reactance of $1000\Omega is$:

A. $\frac{1000}{\pi} Hz$

B. $50Hz$

C. $\frac{50}{\pi}Hz$

D. $\frac{100}{\pi}Hz$

Answer:

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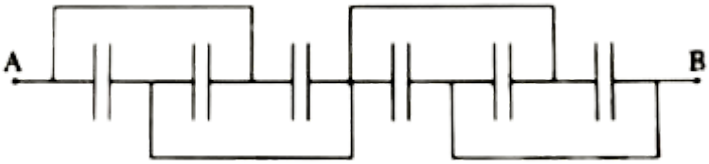
10. In the given network all capacitors used are identical and each one is of capacitance C. Which of the following is the equivalent

capacitance between the points A and B ?



A. $6C$

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

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

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

Answer:

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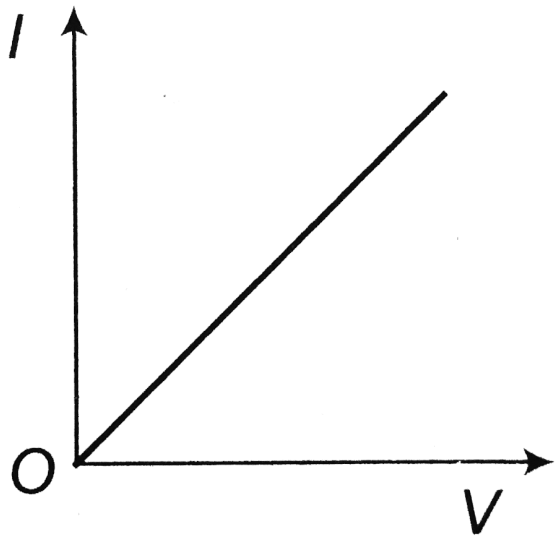
11. $I - V$ characteristics of a copper wire of length L and area fo cross-section A is shown in Fig. The slope of the curve becomes



A. less if the length of the wire is increased

B. more if the length of the wire is increased

C. more if a wire of steel of same dimension is used

D. more if the temperature of wire is increased

Answer:

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12. When a potential difference (V) is applied across a conductor at temperature T, the drift velocity of electrons is proportional to

A. T

B. $\sqrt{T}$

C. V

D. $\sqrt{V}$

Answer:

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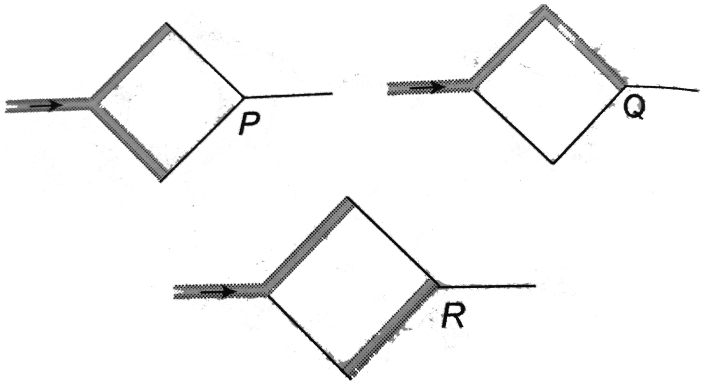
13. Two thick wires and two thin wires, all of the same materais and same length from a square in the three differenct ways, P, Q and R as shwon in figure with current connection shown, the magneitc feidl at the centre of the square is zero in cases.



A. P and R only

B. Q and R only

C. P and Q only

D. P, Q and R

Answer:

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14. A circular coil carrying a certain current produces a megnetic field B_o at its centre. The coil is now rewound so as to have 3 turns and

the same current is passed through it. The new magnetic field at the centre is

A. $3B_0$

B. $\frac{B_0}{3}$

C. $\frac{B_0}{9}$

D. $9B_0$

Answer:

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15. Which one of the following statements is true ?

A. An inductor has infinite resistance in a de circuit.

B. A inductor and a capacitor both cannot conduct in a de circuit.

C. A capacitor can conduct in a de circuit but not an inductor.

D. An inductor can conduct in a de circuit but not a capacitor.

Answer:

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16. The magnetic flux linked with a coil is given by $\phi = 5t^2 + 3t + 16$, where ϕ is in webers and t in seconds. The induced emf in the coil at t = 5 s will be :

A. 53 V

B. 43 V

C. 10 V

D. 6 V

Answer:

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17. When a charge is moved against the Coulomb's force of an electric field, then

A. intensity of the electric field increases

B. intensity of the electric field decreases

C. work is done by the electric field

D. work is done by the external source

Answer:

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18. A charge Q is located at the centre of a circle of radius r. The work done in moving a test charge q_0 from point A to point B (at

opposite ends of diameter AB) so as to complete a semicircle is $\left[k = \frac{1}{(4\pi\varepsilon_0)}\right]$:

A. $k\frac{q_0 Q}{r}$

B. $k\frac{Q q_0}{r^2}$

C. $k q_0 Q r$

D. Zero

Answer:

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19. A long solenoid carrying current produces a magnetic field B along its axis. If the number of turns in the solenoid is halved and current in it is doubled, the new magnetic field will be :

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

B. B

C. 2B

D. 4B

Answer:

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20. Assertion (A): A bar magnet experiences a torque when placed in a magnetic field.

Reason (R): A bar magnet exerts a torque on itself due to its own magnetic field.

A. Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

B. Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct

explanation of Assertion (A).

C. Assertion (A) is true, but Reason (R) is false.

D. Assertion (A) is false, but Reason (R) is true.

Answer:

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21. Assertion (A): In a series LCR circuit connected to an ac source, resonance can take place.

Reason (R): At resonance $X_L = X_C$.

A. Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

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

C. Assertion (A) is true, but Reason (R) is false.

D. Assertion (A) is false, but Reason (R) is true.

Answer:

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22. Assertion (A): When a charged particle moves with velocity $\overrightarrow{v}$ in a magnetic field $\overrightarrow{B}$

$\left(\vec{v} \perp \vec{B}\right)$, the force on the particle does no work.

Reason (R): The magnetic force is perpendicular to the velocity of the particle.

A. Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

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

C. Assertion (A) is true, but Reason (R) is false.

D. Assertion (A) is false, but Reason (R) is true.

Answer:

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23. Assertion (A): Induced emf in two coils made of wire of the same length and the same thickness, one of copper and another of

aluminium is same. The current in copper coil is more than the aluminium coil.

Reason (R): Resistance of aluminium coil is more than that of copper coil.

A. Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

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

C. Assertion (A) is true, but Reason (R) is false.

D. Assertion (A) is false, but Reason (R) is true.

Answer:

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24. Assertion (A): A transformer is used to increase or decrease ac voltage only.

Reason (R): A transformer works on the basis of mutual induction.

A. Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

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

C. Assertion (A) is true, but Reason (R) is false.

D. Assertion (A) is false, but Reason (R) is true.

Answer:

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Section C

1. Two charged spheres A and B having their radii in the ratio 1 : 2 are connected together

with a conducting wire. The ratio of their surface charge densities $\left(\frac{\sigma_A}{\sigma_B}\right)$ will be :

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

B. 2

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

D. 4

Answer:

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2. A square current carrying loop is suspended in a uniform magnetic field acting in the plane of the loop. If the force on one arm of the loop is $\overrightarrow{F}$, the net force on the remaining three arms of the loop is

A. $3\overrightarrow{F}$

B. $-3\overrightarrow{F}$

C. $\overrightarrow{F}$

D. $-\overrightarrow{F}$

Answer:

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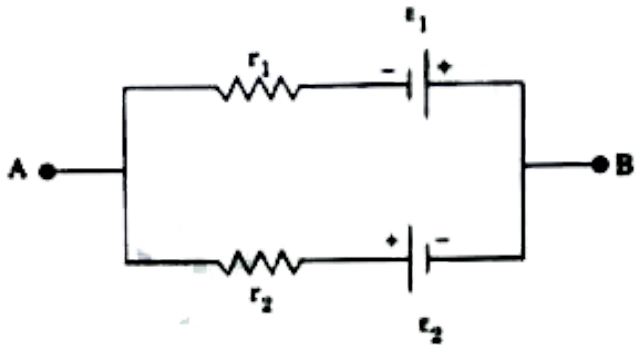
3. A battery is combination of two or more cells. In the following figure , a single battery is represented in which two cells of emf ε_1 and ε_2 and internal resistance r_1 and r_2 respectively are connected.



The equivalent emf of this combination is :

A. $\frac{\varepsilon_1 r_1 + \varepsilon_2 r_2}{r_1 + r_2}$

B. $\frac{\varepsilon_1 r_1 - \varepsilon_2 r_2}{r_1 + r_2}$

C. $\frac{\varepsilon_1 r_2 - \varepsilon_2 r_1}{r_1 + r_2}$

D. $es\pi_1 - \varepsilon_2$

Answer:

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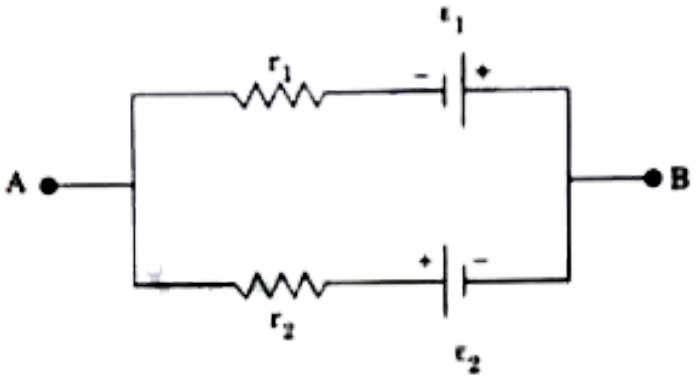
4. A battery is combination of two or more cells. In the following figure , a single battery is represented in which two cells of emf ε_1 and

ε_2 and internal resistance r_1 and r_2 respectively are connected.



For terminal B to be negative :

A. $\varepsilon_1 r_2 > \varepsilon_2 r_1$

B. $\varepsilon_1 r_2 < \varepsilon_2 \varepsilon_1$

C. $\varepsilon_1 r_1 > \varepsilon_2 r_2$

D. $\varepsilon_2 r_2 = \varepsilon_1 r_1$

Answer:

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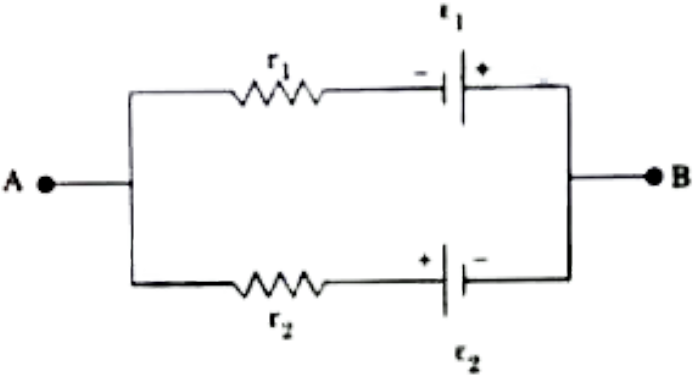
5. A battery is combination of two or more cells. In the following figure , a single battery is represented in which two cells of emf ε_1 and ε_2 and internal resistance r_1 and r_2 respectively are connected.



The current in the internal circuit is :

A. $\frac{\varepsilon_1 + \varepsilon_2}{r_1 + r_2}$

B. $\frac{\varepsilon_2 - \varepsilon_1}{r_1 + r_2}$

C. $\frac{\varepsilon_1}{r_1} - \frac{\varepsilon_2}{r_2}$

D. $\frac{\varepsilon_1}{r_2} - \frac{\varepsilon_2}{r_1}$

Answer:

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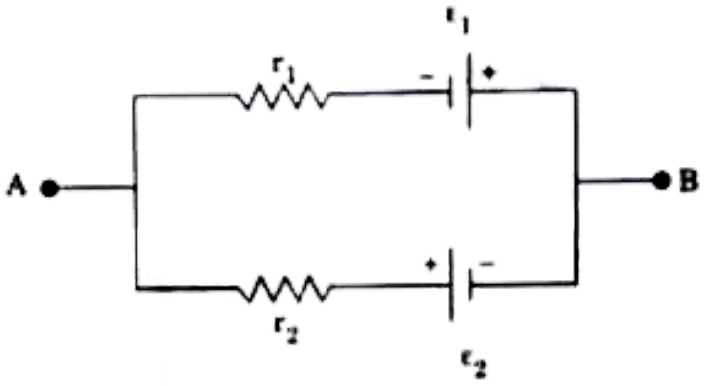
6. A battery is combination of two or more cells. In the following figure , a single battery is represented in which two cells of emf ε_1 and ε_2 and internal resistance r_1 and r_2 respectively are connected.



The equivalent internal resistance of the combination is :

A. $\frac{r_1 + r_2}{r_1 r_2}$

B. $r_1 + r_2$

C. $\frac{r_1 r_2}{r_1 + r_2}$

D. $r_1 - r_2$

Answer:

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