PHYSICS

BOOKS - XII BOARDS PREVIOUS YEAR

QUESTION PAPER 2022 TERM 1 SET 1

Section A

1. A negatively charged object X is repelled by another charged object Y. However an object Z

is attracted to object Y. Which of the following is the most possibility for the object Z?

A. A positively charged only

B. negatively charged only

C. neutral or positively charged

D. neutral or negatively charged

Answer:

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2. In an experiment three microscopic latex spheres are, sprayed into a chamber and became charged with charges +3e, +5e and 3e respectively. All the three spheres came in contact simultaneously for a moment and got separated. Which one of the following are possible values for the final charge on the spheres?

A. $+5e,\ -4e,\ +5e$

B. $+6e,\ +6e,\ -7e$

C. $+4e,\ +3.5e,\ +5.5e$

D. $+5e, \ -8e, \ +7e$

Answer:

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3. An object has charge of 1 C and gains 5.0×10^{18} electrons. The net charge on the object becomes-

A. $-80C$

B. $+0.80C$

C. $+1.80C$

D. $+0.20C$

Answer:

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4. Kirchhoff's first rule $\sum I = 0$ and second rule $\sum IR = \sum E$ (where the symbols have their usual meanings) are respectively based on

-

A. conservation of momentum and conservation of charge

B. conservation of energy, conservation of charge

C. conservation of charge, conservation of momentum

D. conservation of charge, conservation of energy

Answer:

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5. The electric power consumed by a 220 V - 100 W bulb when operated at 110 V is

A. 25W

B. 30W

C. 35W

D. 45W

Answer:

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6. Which of the following has negative temperature coefficient of resistivity ?

A. metal

B. metal and semiconductor

C. semiconductor

D. metal and alloy

Answer:

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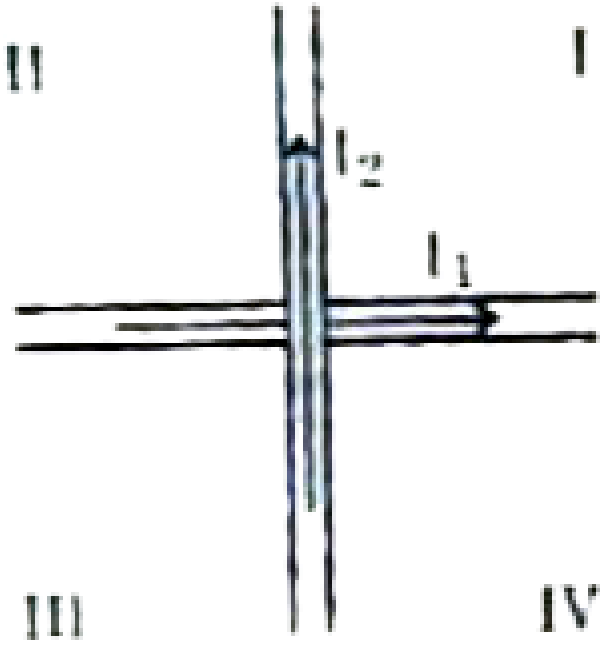
7. Two wires carrying currents I_1 and I_2 lie, one slightly above the other, in a horizontal plane as shown in figure. The region of vertically upward strongest magnetic field is



A. I

B. II

C. III

D. IV

Answer:

8. Two parallel conductors carrying current of 4.0 A and 10.0 A are placed 2.5 cm apart in vacuum. The force per unit length between them is -

A. $6.4 \times 10^{-5} N/m$

B. $6.4 \times 10^{-2} N/m$

C. $4.6 \times 10^{-4} N/m$

D. $3.2 \times 10^{-4} N/m$

Answer:

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

A. low resistance in parallel

B. low resistance in series

C. high resistance in parallel

D. high resistance in series

Answer:

10. The magnetic field at the centre of a current carrying circular loop of radius R, is B_1. The magnetic field at a point on its axis at a

distance R from the center of the loop is B_2.

Then the ratio (B_1 / B_2) is

A. $2\sqrt{2}$

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

C. $\sqrt{2}$

D. -2

Answer:

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11. The self-inductance of a solenoid of 600 turns is 108 mH. The self-inductance of a coil having 500 turns with the same length, the same radius and the same medium will be

A. 95 mH

B. 90 mH

C. 85 mH

D. 75 mH

Answer:

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12. The rms current in a circuit connected to a 50 Hz ac source is 15 A. The value of the current in the circuit $\left(\frac{1}{600}\right)$s after the instant the current is-

A. $\frac{15}{\sqrt{2}}A$

B. $15\sqrt{2}A$

C. $\frac{\sqrt{2}}{15}A$

D. $8A$

Answer:

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13. In a circuit the phase difference between the alternating current and the source voltage $\frac{\pi}{2}$. Which of the following cannot be the element(s) of the circuit?

A. only C

B. only L

C. L and R

D. L or C

Answer:

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14. The electric potential V at any point (x, y, z) is given by V = $3x^2$ where x is in metres and V in volts. The electric field at the point (1 m, 0, 2m) is -

A. 6 V/m along -x-axis

B. 6 V/m along +x-axis

C. 1.5 V/m along -x-axis

D. 1.5 V/m along +x-axis

Answer:

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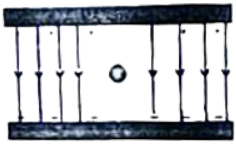
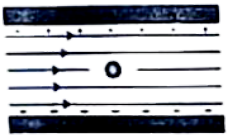
15. Which of the diagrams correctly represents the electric field between two charged plates if a neutral conductor is placed in between the places ?

A. 

B. 

C. 

D. 

Answer:

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16. A variable capacitor is connect to a 200 V battery . If its capacitance is changed from $2\mu F$

to X. μF , the decrease in energy of the capacitor is $2 \times 10^{-2} J$. The value of X is -

A. $1 \mu F$

B. $2 \mu F$

C. $3 \mu F$

D. $4 \mu F$

Answer:

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17. A potential difference of 200 V is maintained across a conductor of resistance 100Ω. The number of electrons passing through it in 1s is

A. 1.25×10^{19}

B. 2.5×10^{18}

C. 1.25×10^{18}

D. 2.5×10^{16}

Answer:

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18. Value of impedance of series LCR circuit is given by:

A. $R + X_L + X_C$

B. $\sqrt{\frac{1}{X_C^2} + \frac{1}{X_L^2} + R^2}$

C. $\sqrt{X_L^2 - X_C^2 + R^2}$

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

Answer:

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19. When an alternating voltage $E = E_0 \sin \omega t$ is applied to a circuit , a current $I = I_0 \sin\left(\omega t + \frac{\pi}{2}\right)$ flows through it . The average power dissipated in the circuit is

A. $E_{\text{rms}} I_{\text{rms}}$

B. $E_0 I_0$

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

D. Zero

Answer:

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20. A current carrying wire kept in a uniform magnetic field will experience a maximum force when it is

A. perpendicular to the magnetic field

B. parallel to the magnetic field

C. at an angle of 45° to the magnetic field.

D. at an angle of 60° to the magnetic field.

Answer:

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21. The voltage across a resistor , an inductor , and a capacitor connected in series to an ac source are 20V , 15 V and 30 V respectively. The resultant voltage in the circuit is

A. 5V

B. 20 V

C. 25 V

D. 65 V

Answer:

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22. In a dc circuit the direction of current inside the battery and outside the battery respectively are -

A. positive to negative terminal and negative to positive terminal

B. positive to negative terminal and positive to negative terminal

C. negative to positive terminal and positive to negative terminal

D. negative to positive terminal and negative to positive terminal

Answer:

23. The magnitude of electric field due to a point charge 2q, at distance r is E. Then the magnitude of electric field due to a uniformly charged thin spherical shell of radius R with

total charge q at a distance $\frac{r}{2}(r > > R)$ will be

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

B. 0

C. $2E$

D. $4E$

Answer:

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24. The horizontal component of earth's magnetic field at a place is 0.2 G whereas it's total magnetic field is 0.4 G. The angle of dip at the place is

A. 30°

B. 45°

C. 60°

D. 90°

Answer:

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25. The current in the primary coil of a pair of coils changes from 7 A to 3 A in 0.04 s. The mutual inductance between the two coils is 0.5 H. The induced emf in the secondary coil is -

A. 50 V

B. 76 V

C. 100 V

D. 220 V

Answer:

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Section B

1. A square sheet of side 'a' is lying parallel to XY plane at z = a The electric field in the region is $\vec{E} = cz^2\hat{k}$. The electric flux through the sheet is

A. a^4c

B. $\frac{1}{3}a^3c$

C. $\frac{1}{3}a^4c$

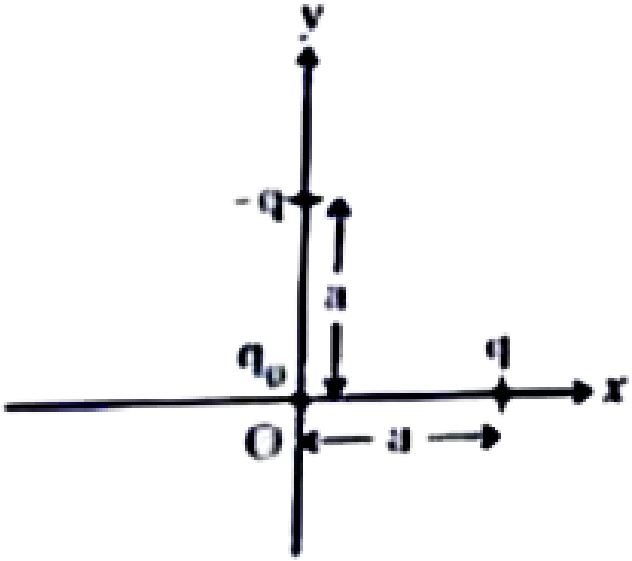
D. 0

Answer:

Watch Video Solution

2. Three charges q, -q and q_0, are placed as shown in figure. The magnitude of the net force

on the charge q_0 at point O is $\left[k = \frac{1}{(4\pi\varepsilon_0)}\right]$



A. 0

B. $\frac{2kqq_0}{a^z}$

C. $\frac{\sqrt{2}kqq_0}{a^2}$

D. $\frac{1}{\sqrt{2}}\frac{kqq_0}{a^2}$

Answer:

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3. A + 3.0 nC charge Q is initially at rest at a distance of $r_1 = 10$ cm from a +5.0 nC charge q fixed at the origin . The charge Q is moved away from q to a new position at $r_2 = 15cm$. In this process work done by the field is

A. $1.29 \times 10^{-5} J$

B. $3.6 \times 10^{5} J$

C. $-4.5 \times 10^{-7} J$

D. $4.5 \times 10^{-7} J$

Answer:

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4. A car battery is charged by a 12 V supply , and energy stored in it is $7.20 \times 10^{5} J$. The charge passed through the battery is -

A. $6.0 \times 10^{4} C$

B. $5.8 \times 10^3 J$

C. 8.64×10^6 J

D. $1.6 \times 10^5 C$

Answer:

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5. A straight conducting rod of length l and mass m is suspended in a horizontal plane by a pair of flexible strings in a magnetic field of magnitude B. To remove the tension in the

supporting strings, the magnitude of the current in the wire is .

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

B. $\frac{mgl}{B}$

C. $\frac{mg}{lB}$

D. $\frac{lB}{mg}$

Answer:

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6. A constant current I is maintained in a solenoid. Which of lthe following quantities will increase if an iron rod is inserted in the solenoid along its asix?

A. The magnetic field at the centre

B. The magnetic flux linked with the solenoid

C. The rate of heating

D. The self - inductance of the solenoid

Answer:

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7. As the frequency of an ac circuit increases, the current first increases and then decreases. What combination of circuit elements is most likely to comprise the circuit ?

A. L.C and R

B. L and C

C. L and R

D. R and C

Answer:

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8. 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 l and cross sectional area A is given by

A. $\frac{ne^2A}{2m\pi l}$

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

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

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

Answer:

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9. A proton and an alpha particle move in circular orbits in a uniform magnetic field. Their speeds are in the ratio of 9:4 . The ratio of radii of their circular orbits $\left(\frac{r_p}{r_{\text{alpha}}}\right)$ is

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

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

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

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

Answer:

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10. A coil of area $100cm^2$ is kept and angle of 30° with a magnetic field of 10^{-1} T. The magnetic field is reduced to zero in $10^{-4}s$. The induced emf in the coil is - .

A. $5\sqrt{3}V$

B. $50\sqrt{3}$ V

C. $5.0V$

D. $50.0\ \mathrm{V}$

Answer:

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11. A 15Ω resistor , an $80mH$ inductor and a capacitor of capacitance C are connected in series with a 50 HZ are source . If the source voltage and current in the circuit are in phase , then the value of capacitance is .

A. $100\mu F$

B. $127\mu F$

C. $142\mu F$

D. $160\mu F$

Answer:

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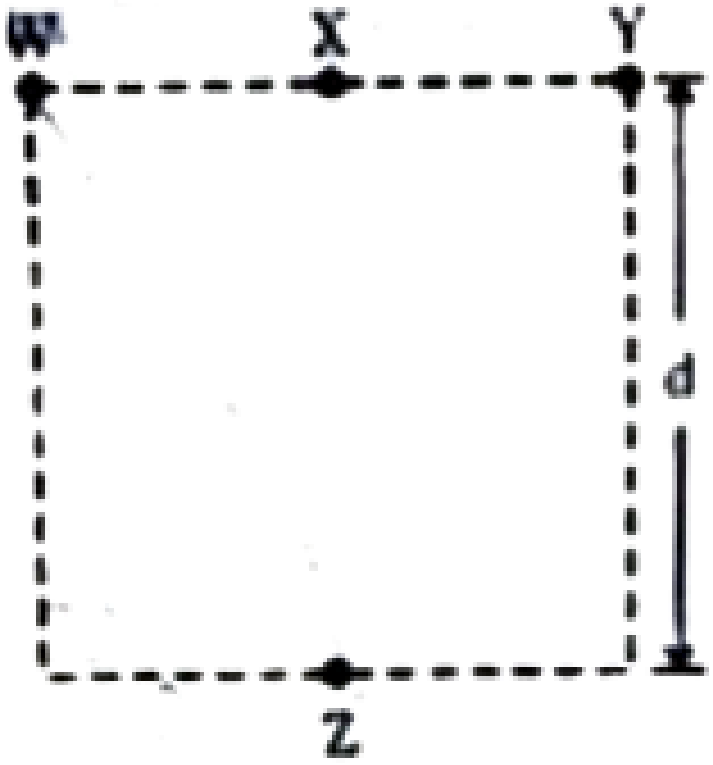
12. Four objects W, X, Y and Z each with charge $+q$ are held fixed at four points of a square of side d as a shown in the figure . Object X and Z

on the midpoints of the sides of the square . The electrostatic force exerted by object W on object X is F. Then the magnitude of the force exerted by object W on Z is .



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

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

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

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

Answer:

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13. Two sources of equal emf are connected to an external resistance R. The internal resistance of the two sources are R_1 and $R_2(R_1 > R_1)$.

if the potential difference across the source having internal resistance R_2 is zero, then

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

B. $r_2 - r_1$

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

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

Answer:

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14. Which of the following statements is correct?

A. Magnetic field lines do not form closed loops.

B. Magnetic field lines start from north pole and end at south pole of a magnet.

C. The tangent at a point on a magnetic field line represents the direction of the magnetic field at that point.

D. Two magnetic field lines may intersect each other.

Answer:

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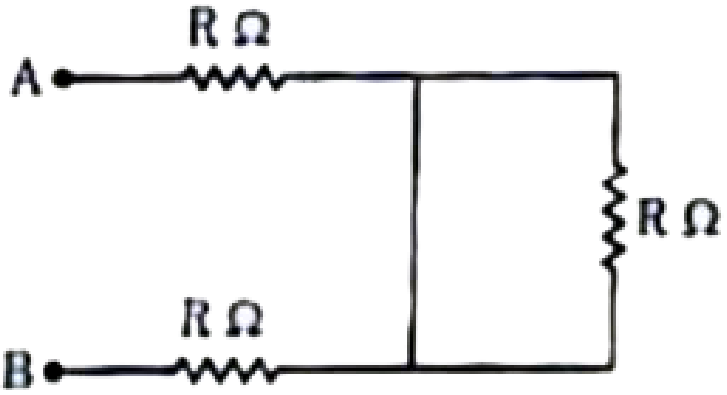
15. The equivalent resistance between A and B of the network shown in figure is



A. $3R\Omega$

B. $\left(\frac{3}{2}\right)R\Omega$

C. $2R\Omega$ s

D. $\left(\frac{2}{3}\right)R\Omega$

Answer:

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16. A bar magnet has magnetic dipole moment $\overrightarrow{M}$. Its initial position is parallel to the direction of uniform magnetic field $\overrightarrow{B}$. In this position the magnitudes of torque and force acting on it respectively are -

A. 0 and MB

B. MB and MB

C. 0 and 0

D. $\left|\overrightarrow{M} \times \overrightarrow{B}\right|$ and 0

Answer:

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17. Two charges $14\mu C$ and $-4\mu C$ are placed at (-12 cm, 0, 0) and (12 cm, 0, 0) in an external electric field $E = \left(\frac{B}{r^2}\right)$, where $B = 1.2 \times 10^6 N/\left(cm^2\right)$ and r is in metres. The electrostatic potential energy of the configuration is

A. 97.9 J

B. 102.1 J

C. 2.1 J

D. $-97.9J$

Answer:

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18. A 300Ω resistor and a capacitor of $\left(\frac{25}{\pi}\right)\mu F$ are connected in series to a 200 V - 50 Hz ac source. The current in the circuit is -

A. 0.1 A

B. 0.4 A

C. 0.6 A

D. 0.8 A

Answer:

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19. The core of a transformer is laminated to reduce

A. flux leakage

B. copper loss

C. hysteresis loss

D. eddy current

Answer:

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20. Assertion (A) : A negative charge in an electric field moves along the direction of the electric field.

Reason (R) : On a negative charge a force acts in the direction of the electric field.

A. Both (A) & (R) are true and (R) is correct explanation of (A)

B. Both (A) & (R) are true , and (R) is not correct explanation of (A)

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

D. (A) is false and (R) is also false

Answer:

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21. Assertion : We cannot make a magnet with only one pole.

Reason : Magnetic monopoles do not exist.

A. Both (A) & (R) are true and (R) is correct explanation of (A)

B. Both (A) & (R) are true , and (R) is not correct explanation of (A)

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

D. (A) is false and (R) is also false

Answer:

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22. Assertion: When radius of circular loop carrying current is doubled, its magnetic moment becomes four times.

Rrason: Magnetic moment depends on area of the loop.

A. Both (A) & (R) are true and (R) is correct explanation of (A)

B. Both (A) & (R) are true , and (R) is not correct explanation of (A)

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

D. (A) is false and (R) is also false

Answer:

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23. Assertion : Higher the range, greater is the resistance of ammeter.

Reason : To increase the range of ammeter, additional shunt needs to be used across it.

A. Both (A) & (R) are true and (R) is correct explanation of (A)

B. Both (A) & (R) are true , and (R) is not correct explanation of (A)

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

D. (A) is false and (R) is also false

Answer:

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24. Assertion (A) : A step - up transformer cannot be used as a step- down transformer.

Reason (R) : A transformer work only in one direction.

A. Both (A) & (R) are true and (R) is correct explanation of (A)

B. Both (A) & (R) are true , and (R) is not correct explanation of (A)

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

D. (A) is false and (R) is also false

Answer:

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Section C

1. Equipotentials at a great distance from a collection of charges whose total sum is not zero are approximately

A. spheres

B. planes

C. ellipsoids

D. paraboloids

Answer:

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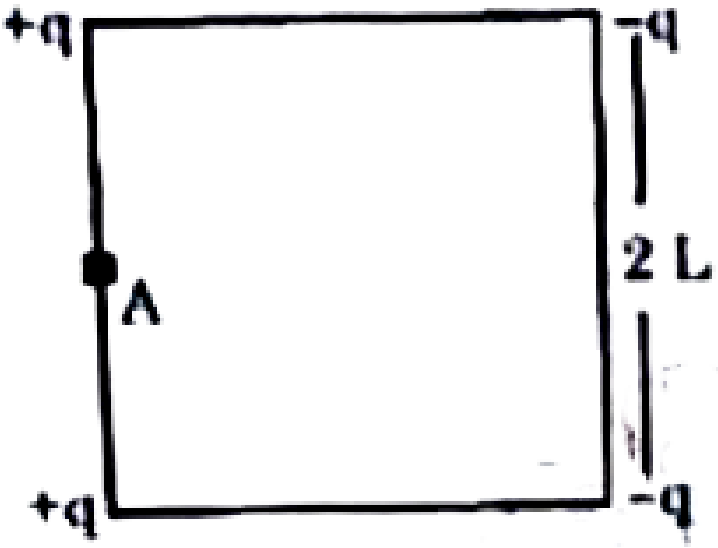
2. Four charges - q,-q,+ q and +q are placed at the corners of a square of side 2 L is shown in figures. The electric potential at point. A midway

between the two charges + q and + q is -



A. $\frac{1}{4\pi \in_0}\frac{2q}{L}\left(1-\frac{1}{\sqrt{5}}\right)$

B. $\frac{1}{4\pi \in_0}\frac{2q}{L}\left(1+\frac{1}{\sqrt{5}}\right)$

C. $\frac{1}{4\pi \in_0}\frac{q}{2L}\left(1-\frac{1}{\sqrt{5}}\right)$

D. Zero

Answer:

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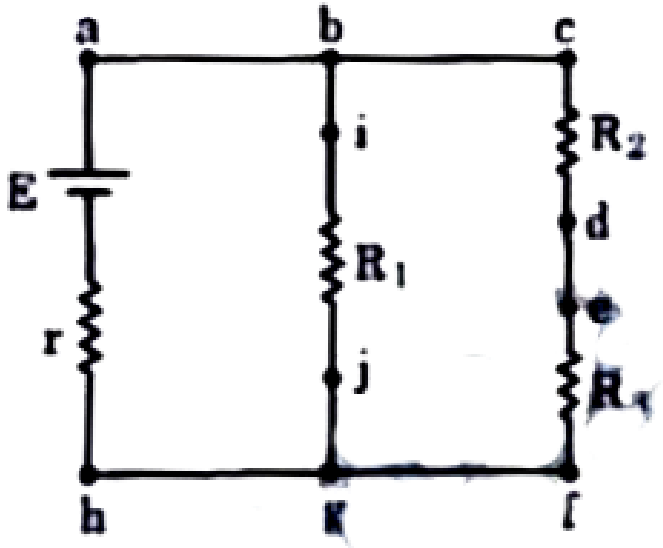
3. Case Study :

An experiment was set up with the circuit diagram shown in figure.

Given that

$R_1 = 10\Omega, R_2 = R_3 = 5\Omega, r = 0\Omega$ and $E = 5V$



The points with the same potential are -

A. b,c,d

B. f,h,j

C. d,e,f

D. a,b,j

Answer:

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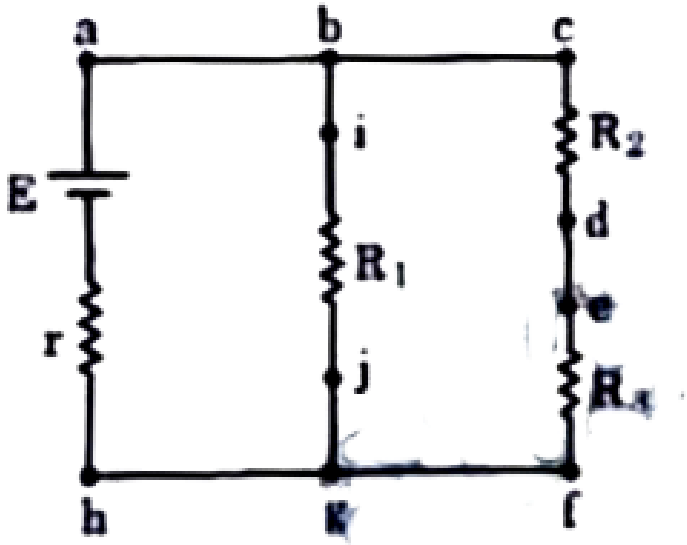
4. Case Study :

An experiment was set up with the circuit diagram shown in figure.

Given that

$R_1 = 10\Omega, R_2 = R_3 = 5\Omega, r = 0\Omega$ and $E = 5V$



The current through branch bg is -

A. $1A$

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

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

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

Answer:

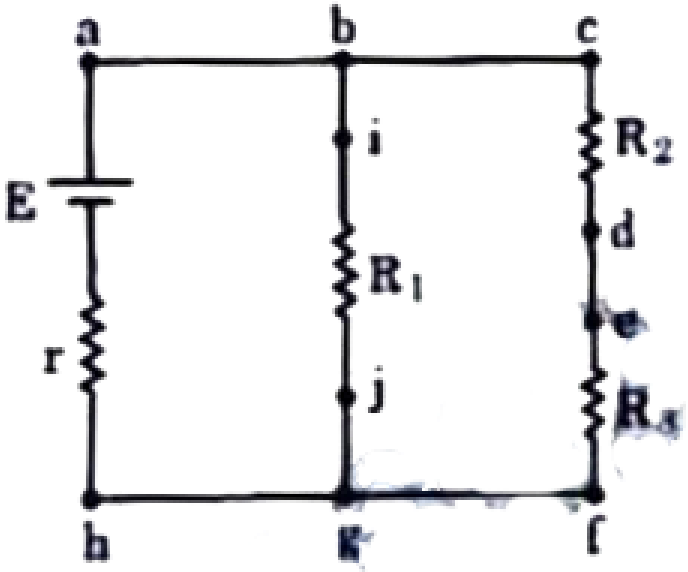
Watch Video Solution

5. Case Study :

An experiment was set up with the circuit diagram shown in figure.

Given that

$R_1 = 10\Omega, R_2 = R_3 = 5\Omega, r = 0\Omega$ and $E = 5V$



The power dissipated in R_1 is -

A. 2 W

B. 2.5 W

C. 3 W

D. 4.5 W

Answer:

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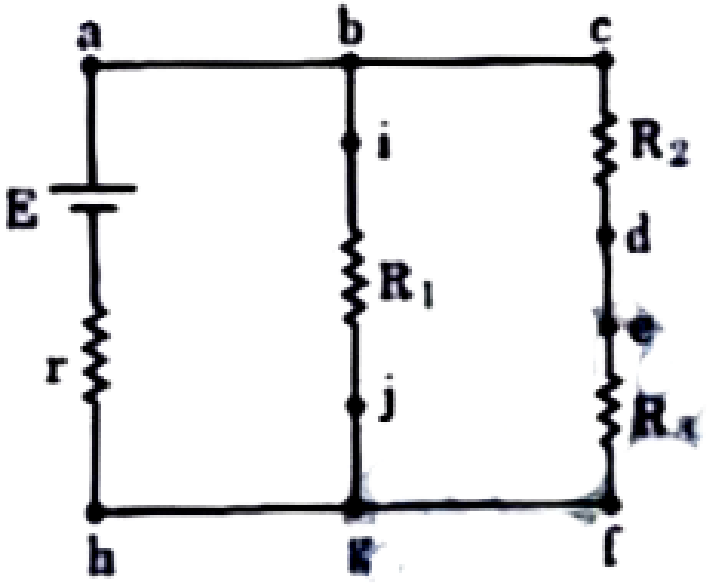
6. Case Study :

An experiment was set up with the circuit diagram shown in figure.

Given that

$R_1 = 10\Omega, R_2 = R_3 = 5\Omega, r = 0\Omega$ and $E = 5V$



The potential difference across R_3 is -

A. 1.5 V

B. 2 V

C. 2.5 V

D. 3 V

Answer: