BYJU'S Part Test for Board Term I
(CBSE Grade 12)

Date: 17/11/2021
Subject: Physics **Class:** Standard XII

Time:90minutes **Maximum Marks: 35**

General Instructions:

1. The Question Paper contains three sections
2. Section A has 25 questions. Attempt any **20 questions**.
3. Section B has 24 questions. Attempt any **20 questions**.
4. Section C has 6 questions. Attempt any **5 questions**.
5. All questions carry equal marks.
6. There is no negative marking.

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Date: 17/11/2021

Subject: Physics

Topic : Section A

Class: Standard XII

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1. When a body is charged by induction, then the body

   A. becomes neutral

   B. does not lose any charge

   C. loses whole of the charge on it

   D. loses part of the charge on it

2. Consider three charged bodies P, Q and R. If P and Q repel each other, while P and R attract. What is the nature of force between Q and R ?

   A. Repulsive force

   B. Attractive force

   C. No force

   D. None of these

3. Two equal charges are placed at a separation of $1\ \mathrm{m}$. What should be the magnitude of the charges so that the force between them equals the weight of a $50\ \mathrm{kg}$ person ?
   (Take $g = 10\ \mathrm{m/s^2}$)

   A. $3 \times 10^{-4}\ C$

   B. $2.3 \times 10^{-4}\ C$

   C. $3.2 \times 10^{-4}\ C$

   D. $5 \times 10^{-5}\ C$

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4. Two equally charged identical metallic spheres A and B repel each other with a force 2×10^{-5} N, when placed in air (neglect the dimension of sphere as they are very small). Another identical uncharged sphere C is touched to B and then placed at the mid point of line joining A and B. What is the net electrostatic force on C ?

   A. 1×10^{-5} N, toward BA

   B. 2×10^{-5} N, towards AB

   C. 4×10^{-5} N, towards BA

   D. 0.5×10^{-5} N, towards AB

5. Three charges 4μC each are kept at the vertices of an equilateral triangle of side 9 cm. The magnitude of force on one of the charges is

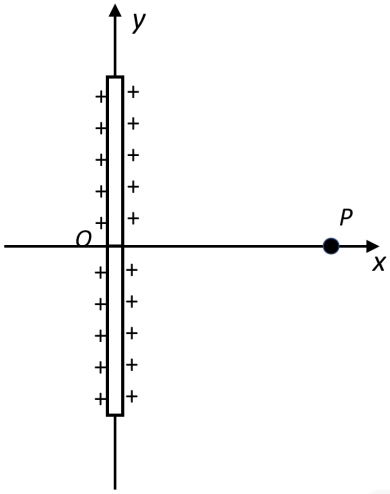
   A. $\frac{16\sqrt{3}}{9}$N

   B. $\frac{160}{9}\sqrt{3}$ N

   C. $\frac{80}{9}\sqrt{3}$ N

   D. $\frac{40}{9}\sqrt{3}$ N

6. Find the direction of electric field at point P for the uniform line charge distribution of finite length as shown in figure, if line OP is equidistant from both the ends.



A. Along positive $x-$ axis

B. Along negative $x-$ axis

C. Along positive $y-$ axis

D. Along negative $y-$ axis

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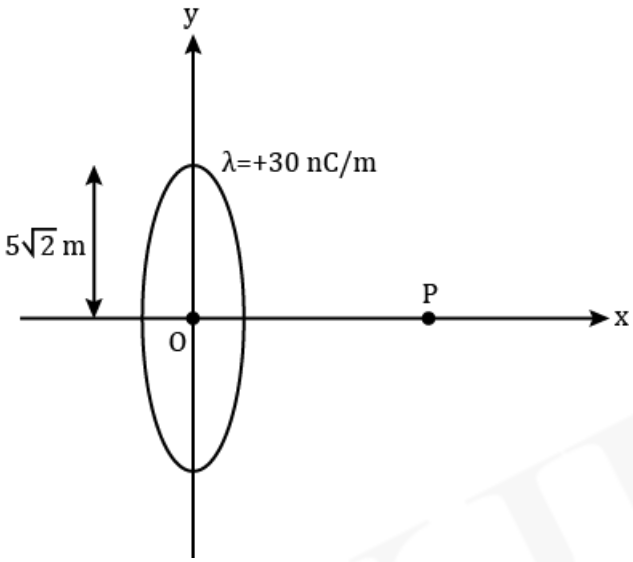
7. At what distance from the centre of a uniformly charged ring, maximum value of electric field will be obtained?



A. $3\ \mathrm{m}$

B. $5\ \mathrm{m}$

C. $7\ \mathrm{m}$

D. $9\ \mathrm{m}$

8. A particle of mass $2\ \mathrm{gm}$ and charge $1\ \mu\mathrm{C}$ is held at rest on a frictionless horizontal surface at a distance of $1\ \mathrm{m}$ from the fixed charge of $1\ \mathrm{mC}$. If the particle is released, it will be repelled. The speed of the particle when it is at a distance of $10\ \mathrm{m}$ from the fixed charge is

A. $45\ \mathrm{ms}^{-1}$

B. $60\ \mathrm{ms}^{-1}$

C. $90\ \mathrm{ms}^{-1}$

D. $100\ \mathrm{ms}^{-1}$

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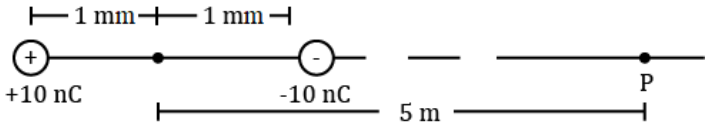
9. Find the net electric field at an axial point P of a dipole as shown in figure.



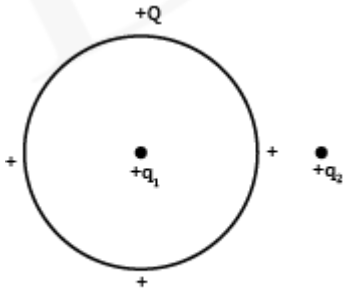
A. $1.50 \times 10^{-3}\ \mathrm{N/C}$

B. $2.25 \times 10^{-3}\ \mathrm{N/C}$

C. $1.88 \times 10^{-3}\ \mathrm{N/C}$

D. $2.88 \times 10^{-3}\ \mathrm{N/C}$

10. A thin metallic spherical shell contains a charge Q on its surface. A point charge q_1 is placed at the centre of the shell and another charge q_2 is placed outside the shell. All the three charges are positive. Then, the force on charge q_1 is



A. Towards right

B. Towards left

C. Zero

D. None of these

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11. Identify the correct statement regarding an equipotential surface:

A. An equipotential surface and electric line of force never intersect each other.

B. An equipotential surface and electric line of force intersect at an angle of 45°.

C. An equipotential surface and electric line of force intersect at an angle of 90°.

D. An equipotential surface and electric line of force intersect at an angle of 60°.

12. Electric potential in a region is varying according to the relation $V = \frac{3x^2}{2} - \frac{y^2}{4}$, where x and y are in meter and V is in volt. Electric field intensity in N/C at a point $(1\ \text{m},\ 2\ \text{m})$ is

A. $3\hat{i} - \hat{j}$

B. $-3\hat{i} + \hat{j}$

C. $6\hat{i} - 2\hat{j}$

D. $-6\hat{i} + 2\hat{j}$

13. A capacitor cannot be used as a battery because

A. It cannot store a large amount of charge

B. It produces too much heat

C. It gets discharged very rapidly

D. It is very costly as compared to a battery

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14. The phenomenon of 'outwards bending of electric field lines at the edges' of the plates of a capacitor is called

    A. Polarization of induced charge

    B. Induction of charges

    C. Fringing of the field

    D. Electric susceptibility

15. Two conductors of irregular shapes placed near each other are connected to the two terminals of a battery of $50\ \mathrm{V}$. It is observed that the charge on one of the conductors is $2\mu\mathrm{C}$. The capacitance of this arrangement is

    A. $2 \times 10^{-8}\ \mathrm{F}$

    B. $4 \times 10^{-8}\ \mathrm{F}$

    C. $10^{-8}\ \mathrm{F}$

    D. $4 \times 10^{-6}\ \mathrm{F}$

16. Three capacitors of capacitance $3\ \mu\mathrm{F},\ 10\ \mu\mathrm{F}$ and $15\ \mu\mathrm{F}$ are connected in series to a battery of $100\ \mathrm{V}$. The voltage across $10\ \mu\mathrm{F}$ is

    A. $10\ \mathrm{Volt}$

    B. $20\ \mathrm{Volt}$

    C. $30\ \mathrm{Volt}$

    D. $40\ \mathrm{Volt}$

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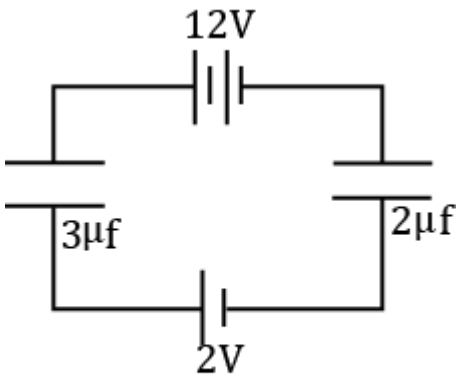
17. For the circuit shown in the figure, the total energy stored in the capacitors is



A. $120\ \mu J$

B. $30\ \mu J$

C. $60\ \mu J$

D. $20\ \mu J$

18. Which of the following cannot be used as a dielectric in a capacitor ?

A. Paper

B. Glass

C. Copper

D. Oil

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19. An air capacitor of capacity $10\ \mu\text{F}$ is connected to a battery of $12\ \text{V}$. Now the space between the plates is filled with a liquid of dielectric constant 5. The additional charge that flows to the capacitor is

    A. $120\ \mu\text{C}$

    B. $600\ \mu\text{C}$

    C. $480\ \mu\text{C}$

    D. $24\ \mu\text{C}$

20. What will be the number of electrons passing through a heater wire in one minute, if it carries a current of $8\ \text{A}$?

    A. 3×10^{21}

    B. 3×10^{28}

    C. 3×10^{30}

    D. 3×10^{12}

21. Two wires , each of the radius r but of different materials are connected together end to end (in series). If the densities of charge carried in the two wires are in the ratio $1:4$, the drift velocity of electrons in the two wires will be in the ratio of.

    A. $1:2$

    B. $2:1$

    C. $4:1$

    D. $1:4$

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22. Across a conductor of length $40\ \text{cm}$, a potential difference of $10\ \text{V}$ is maintained. The mobility of electrons if the drift velocity of electrons is $5 \times 10^{-6}\ \text{m/s}$ is

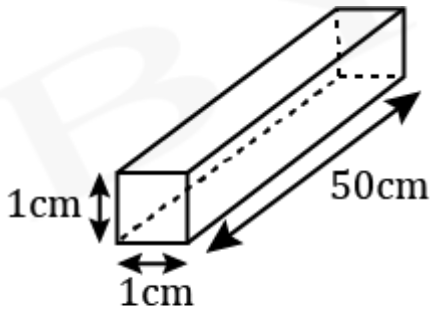
A. $2 \times 10^{-7}\ \text{m}^2/\text{Vs}$

B. $1 \times 10^{-7}\ \text{m}^2/\text{Vs}$

C. $4 \times 10^{-6}\ \text{m}^2/\text{Vs}$

D. $0.5 \times 10^{-7}\ \text{m}^2/\text{Vs}$

23. A rectangular carbon block has dimension $1.0\ \text{cm} \times 1.0\ \text{cm} \times 50\ \text{cm}$. Resistances are measured, first across two square ends and then across two rectangular ends, respectively. If resistivity of carbon is $3.5 \times 10^{-5}\ \Omega\text{m}$, then values of measured resistances respectively are:



A. $\frac{35}{2} \times 10^{-2}\ \Omega,\ 7 \times 10^{-5}\ \Omega$

B. $7 \times 10^{-5}\ \Omega,\ \frac{15}{2} \times 10^{-2}\ \Omega$

C. $\frac{35}{2} \times 10^{-4}\ \Omega,\ 7 \times 10^{-7}\ \Omega$

D. $\frac{15}{2}\Omega,\ 7 \times 10^{-2}\ \Omega$

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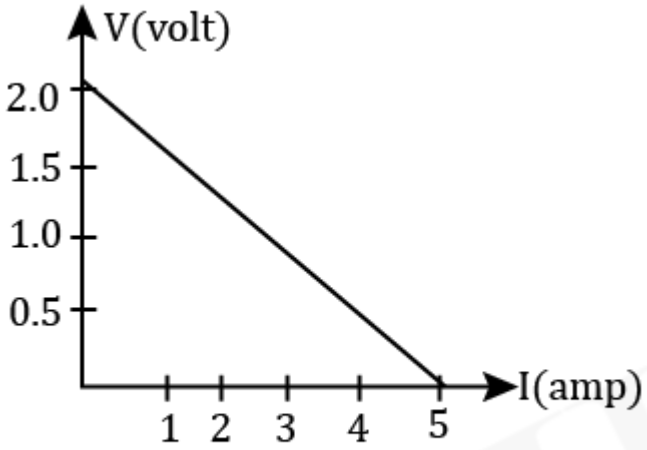
24. For a cell, a graph is plotted between the potential difference V across the terminals of the cell and the current I drawn from the cell (figure). The emf and the internal resistance of the cell are E and r respectively. Then



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

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

C. $E > 2\ \text{V},\ r = 0.5\ \Omega$

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

25. How much work is required to carry a $6\ \mu\text{C}$ charge from the negative terminal of a $9\ \text{V}$ cell to the positive terminal?

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

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

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

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

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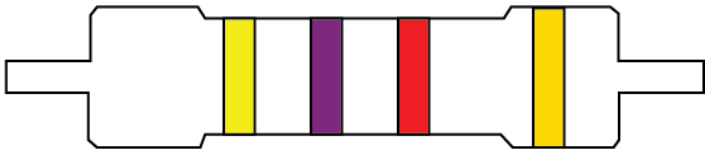
1. What is the resistance of this 4 strip resistor ?



Colour are in order- Yellow, violet, red, golden.

A. $[4.7 \pm 5\%]\ \mathrm{k\Omega}$

B. $[3.6 \pm 5\%]\ \mathrm{k\Omega}$

C. $[4.7 \pm 10\%]\ \mathrm{k\Omega}$

D. $[3.6 \pm 10\%]\ \mathrm{k\Omega}$

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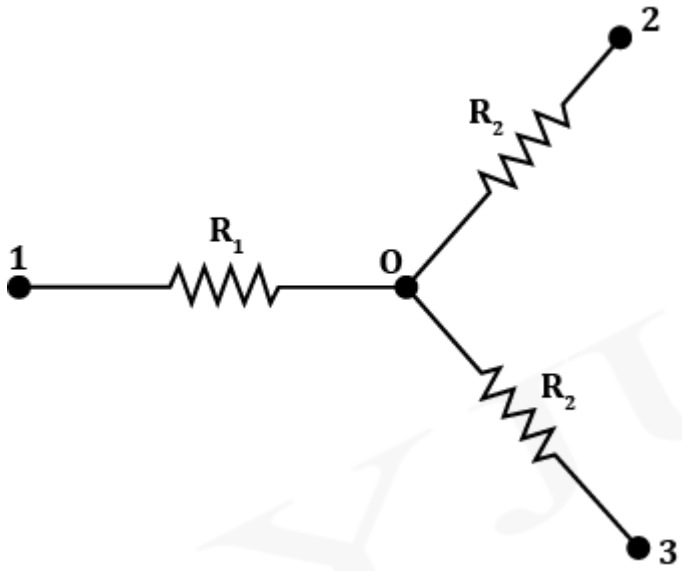
2. Find the current flowing through the resistance R_1 of the circuit shown in figure, if the resistances are equal to $R_1 = 10\ \Omega$, $R_2 = 10\ \Omega$ and $R_3 = 10\ \Omega$, and the potential of points $1,\ 2$ and 3 are equal to $V_1 = 10\ \text{V}$, $V_2 = 6\ \text{V}$ and $V_3 = 5\ \text{V}$.



A. $0.1\ \text{A}$

B. $0.2\ \text{A}$

C. $0.3\ \text{A}$

D. $0.4\ \text{A}$

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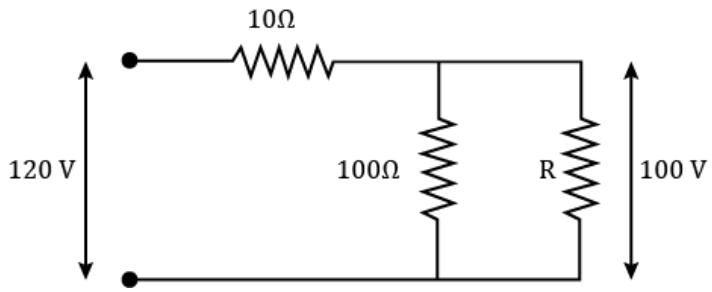
3. Find out the value of resistance R in figure.



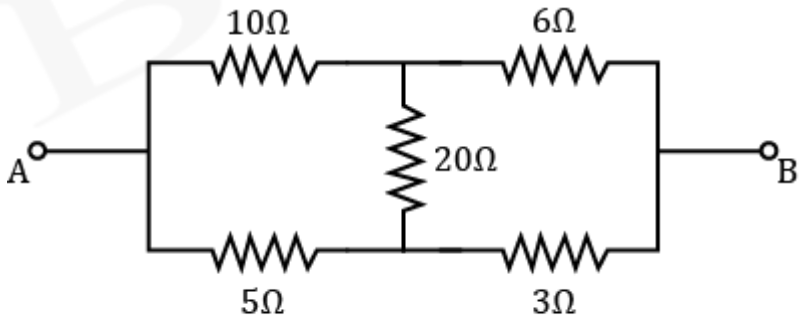
A. $100\ \Omega$

B. $200\ \Omega$

C. $500\ \Omega$

D. $150\ \Omega$

4. Find equivalent resistance of the circuit between the terminal A and B.



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

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

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

D. $\frac{32}{3}\Omega$

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5. In a meter bridge experiment, the value of unknown resistance is 2Ω. To get the balancing point at $40\ \text{cm}$ distance from the same end, then what will be the resistance in the resistance box?

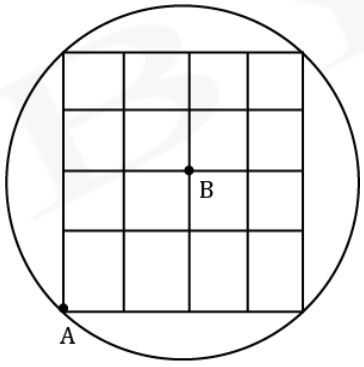
   A. $3\ \Omega$

   B. $6\ \Omega$

   C. $8\ \Omega$

   D. $9\ \Omega$

6. A finite square grid with each link having resistance r is fitted in a resistanceless conducting circular wire. The equivalent resistance between A and B will be:
   (Given, $r = 80/7\ \Omega$)



   A. $6\ \Omega$

   B. $8\ \Omega$

   C. $12\ \Omega$

   D. $15\ \Omega$

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7. In Oersted's experiment, deflection in magnetic needle

   A. decreases if current is increased in the wire

   B. reverses if current is reversed in the wire

   C. remains constant if current is increased

   D. All above statements are true

8. A negative charge is coming towards an observer. The direction of the magnetic field produced by it will be: (As seen by observer)

   A. Clockwise

   B. Anticlockwise

   C. In the direction of motion of charge

   D. In the direction opposite to motion of charge

9. A particle carrying charge equal to 100 times the charge of an electron is performing one rotation per second in a circular path of radius $0.8\ \mathrm{m}$. The value of magnetic field produced at the centre will be
   ($\mu_0 =$ permeability for vaccum)

   A. $\dfrac{10^{-7}}{\mu_0}\mathrm{T}$

   B. $10^{-17}\mu_0\ \mathrm{T}$

   C. $10^{-6}\mu_0\ \mathrm{T}$

   D. $10^{-16}\mu_0\ \mathrm{T}$

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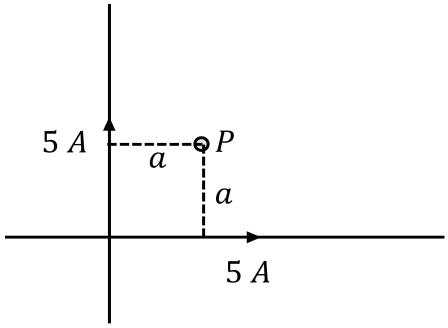
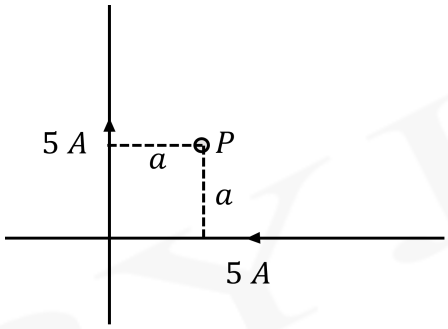
10. Two infinitely long wires carrying currents of $5\ \mathrm{A}$ each are shown in the options. For which of the following figures, the value of magnetic field at point $P(a, a)$ is zero?

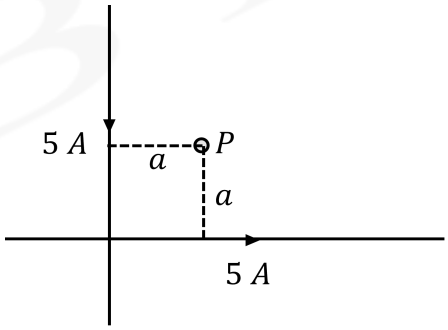
A.



B.



C.



D. None of these

11. A current i flows in a thin wire in the shape of a regular polygon with n sides. what will be the magnetic field at the centre of polygon? [R is the circum-radius of the polygon]

A. $\frac{\mu_0 ni}{2\pi R}\tan\frac{\pi}{6}$

B. $\frac{\mu_0 ni}{2\pi R}\tan\left(\frac{\pi}{n}\right)$

C. $\frac{\mu_0 i}{2nR}$

D. Zero

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12. A charge of $1\ \mathrm{C}$ is placed at one end of a non-conducting rod of length $0.6\ \mathrm{m}$. The rod is rotated in a vertical plane about a horizontal axis passing through the other end of the rod with angular frequency $10^4\pi\ \mathrm{rad/s}$. The magnetic field at a point on the axis of rotation at a distance $0.8\ \mathrm{m}$ from centre of the circular path will be:

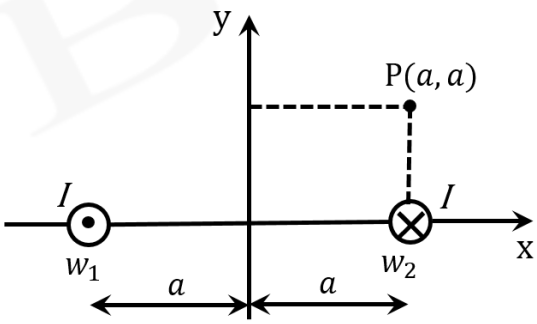
A. $1.13 \times 10^{-3}\ \mathrm{T}$

B. $2.44 \times 10^{-3}\ \mathrm{T}$

C. $1.75 \times 10^{-3}\ \mathrm{T}$

D. $3.25 \times 10^{-3}\ \mathrm{T}$

13. In the figure shown, two long wires w_1 and w_2, each carrying current I are placed parallel to each other and parallel to z- axis. The direction of current in w_1 and w_2 is perpendicularly outward and inward to the plane respectively. The $\vec{B}$ at point P will be given as:



A. $\vec{B} = \frac{2\mu_0 I}{5\pi a}\hat{i} + \frac{\mu_0 I}{5\pi a}\hat{j}$

B. $\vec{B} = \frac{\mu_0 I}{2\pi a}\hat{i} - \frac{\mu_0 I}{5\pi a}\hat{j}$

C. $\vec{B} = \frac{2\mu_0 I}{5\pi a}\hat{j}$

D. $\vec{B} = \frac{\mu_0 I}{5\pi a}\hat{i} - \frac{\mu_0 I}{5\pi a}\hat{j}$

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14. An α particle is moving along a circle of radius R with a constant angular velocity ω. Point A lies in the same plane at a distance $2R$ from the centre, and it records magnetic field produced by α particle. If the minimum time interval between two successive times at which A records zero magnetic field is t, the angular velocity ω is:

A. $\frac{2\pi}{t}$

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

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

D. $\frac{\pi}{t}$

15. A long straight wire of radius a carries a steady current I. The current is uniformly distributed across its cross-section. The ratio of the magnetic field at distance $\frac{a}{2}$ and $2a$ from axis of wire is

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

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

C. 4

D. 1

16. Determine the amount of current flowing through the solenoid having $5000\ \mathrm{turns}$ per unit length, if the magnetic field at the edge of the solenoid is $2.2\pi \times 10^{-5}\ \mathrm{T}$.

A. $0.02\ \mathrm{A}$

B. $0.2\ \mathrm{A}$

C. $0.002\ \mathrm{A}$

D. $2\ \mathrm{A}$

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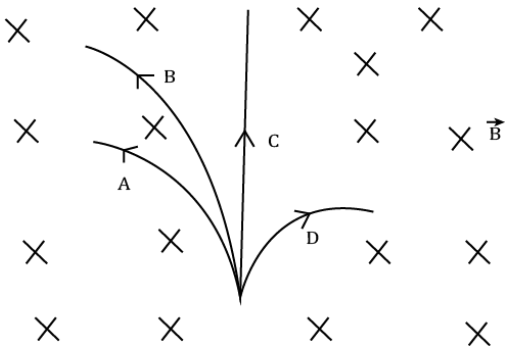
17. A neutron, a proton, an electron and an α particle enter a region of constant magnetic field with equal velocity. The $\vec{B}$ is along the perpendicularly inward to the plane of the paper. The path followed by each particle is shown in the figure.



The path followed by α particle is represented by:

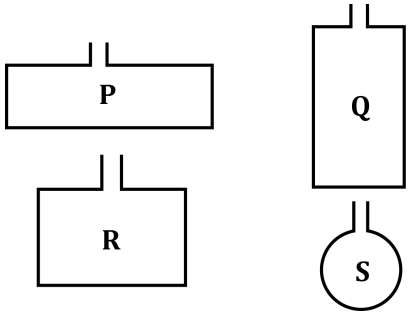
A. B

B. A

C. D

D. C

18. Four wires of equal lengths are bent in the shapes of four loops $\mathrm{P}, \mathrm{Q}, \mathrm{R}$ and S as shown in the figure. If each loop carries same current I in the same sense, which loop will have highest magnetic moment ?



A. P

B. Q

C. R

D. S

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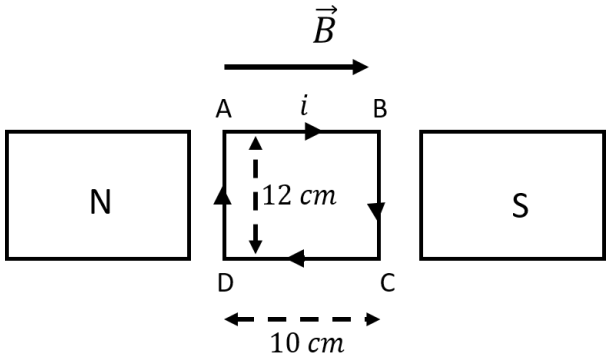
19. A coil of 50 turns is placed in a magnetic field of magnitude $B = 0.25\ \text{Weber}$ as shown in figure. A current of $2\ \text{A}$ is flowing in the coil. The torque acting on the coil will be:



A. $0.15\ \text{N}$

B. $0.30\ \text{N}$

C. $0.45\ \text{N}$

D. $0.60\ \text{N}$

20. In the given question, a statement of Assertion (A) is given, followed by a corresponding statement of Reason (R) just below of it. Mark the correct answer.

Assertion(A) : To draw more current at low potential difference through a low external resistance, parallel connection of identical cells is preferred.

Reason(R) : In parallel connection, current $i = \frac{nE}{r}$, if $r >> R$
[where r-internal resistance, E - emf of the cell and n - number of cells]

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

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

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

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

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21. Assertion $(A)-$ A current flows in a conductor only when there is an electric field within the conductor.
Reason $(R)-$ The drift velocity of electron in presence of electric field decreases

Of the following mark the correct statement.

A. Both $'A'$ and $'R'$ are true and $'R'$ is the correct explanation of $'A'$.

B. Both $'A'$ and $'R'$ are true and $'R'$ is not the correct explanation of $'A'$

C. $'A'$ is true and $'R'$ is false

D. $'A'$ is false and $'R'$ is true

22. In the given question, a statement of Assertion (A) is given, followed by a corresponding statement of Reason (R) just below of it. Mark the correct answer.

Assertion(A) : An uncharged conducting slab is placed normally in a uniform electric field. The resultant electric field inside the slab is zero.

Reason(R) : The charge in the conductor exists only on its surface

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

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

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

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

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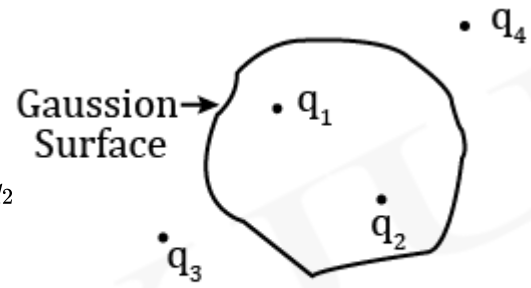
23. In the given question, a statement of Assertion (A) is given, followed by a corresponding statement of Reason (R) just below of it. Mark the correct answer.

Assertion(A) : Four point charges q_1, q_2, q_3 and q_4 are as shown in figure. The flux over the shown Gaussian surface depends only on charges q_1 and q_2

Reason(R) : Electric field at all points on Gaussian surface depends only on charges q_1 and q_2



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

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

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

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

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24. In the given question, a statement of Assertion (A) is given, followed by a corresponding statement of Reason (R) just below of it. Mark the correct answer.

Assertion(A) : AlNiCo is used for making permanent magnets.

Reason(R) : It has a high retentivity and high coercivity.

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

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

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

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

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Date: 17/11/2021

Subject: Physics

Topic : Section C

Class: Standard XII

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1. Case study (1)

A car battery with a $12\ \mathrm{V}$ emf and an internal resistance of $0.04\ \Omega$ is being charged with a current of $50\ \mathrm{A}$.

(i)The potential difference V across the terminals of the battery is

A. $10\ \mathrm{V}$

B. $14\ \mathrm{V}$

C. $16\ \mathrm{V}$

D. $12\ \mathrm{V}$

2. Case study (1)

A car battery with a $12\ \mathrm{V}$ of emf and an internal resistance of $0.04\ \Omega$ is being charged with a current of $50\ \mathrm{A}$.

(ii)The rate at which energy is being dissipated as heat inside the battery is

A. $100\ \mathrm{W}$

B. $200\ \mathrm{W}$

C. $700\ \mathrm{W}$

D. $600\ \mathrm{W}$

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3. Case study (1)

A car battery with a $12\ \mathrm{V}$ of emf and an internal resistance of $0.04\ \Omega$ is being charged with a current of $50\ \mathrm{A}$.

(iii)The rate of energy conversion from electrical to chemical is

A. $100\ \mathrm{W}$

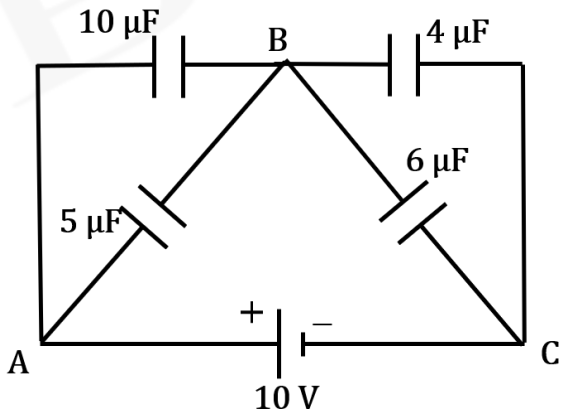
B. $500\ \mathrm{W}$

C. $600\ \mathrm{W}$

D. $700\ \mathrm{W}$

4. Case study (2)

In the circuit shown in the figure, four capacitors are connected to a battery.



(i)The equivalent capacitance of the circuit is

A. $8.4\ \mu\mathrm{F}$

B. $6\ \mu\mathrm{F}$

C. $10\ \mu\mathrm{F}$

D. $25\ \mu\mathrm{F}$

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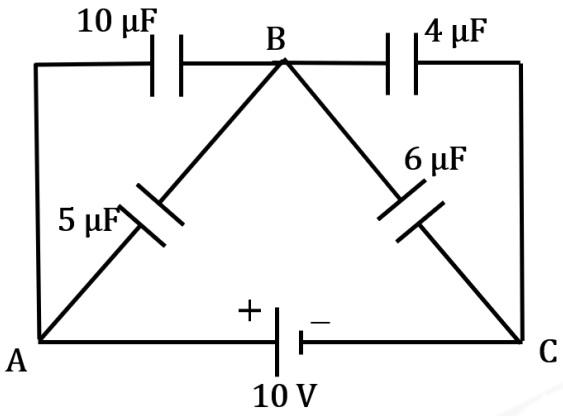
5. Case study (2)

In the circuit shown in the figure, four capacitors are connected to a battery.



(ii)The charge flowing out of the battery is

A. $60\ \mu C$

B. $6\ \mu C$

C. $600\ \mu C$

D. $36\ \mu C$

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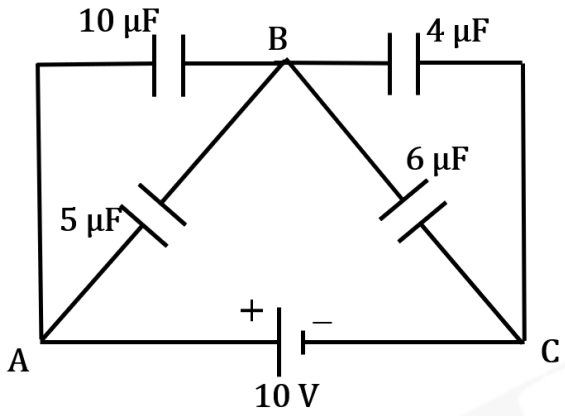
6. Case study (2)

In the circuit shown in figure, four capacitors are connected to a battery.



(iii)The potential difference across the $6\ \mu\text{F}$ capacitor is

A. $6\ \text{V}$

B. $4\ \text{V}$

C. $5\ \text{V}$

D. $7\ \text{V}$