PHYSICS

BOOKS - EDUCART PUBLICATION

SAMPLE PAPER 5

Section A

1. Consider the given statements:

(A) Electric field lines form always a closed loop

(B) A dipole do not exert any electric flux

(C) Coulomb's law follow the Newton's third law

Which of the above sentences are correct

A. (A), (B)

B. (B) and (C)

C. only (B)

D. only (C)

Answer: B

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2. If electric potential is zero, the $\overrightarrow{E}$ are:

A. zero

B. not zero

C. insufficient formation

D. ∞

Answer: B

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3. Torque acting on a dipole in $\vec{E}$ is given by:

A. $p \times E$

B. zero

C. p.E

D. $E \times p$

Answer: A

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4. What is the total capacitance if three capacitors of capacitance 2 pF, 3 pF and 4 pF are connected in parallel?

A. $9pF$

B. $\dfrac{12}{13}pF$

C. $\dfrac{13}{12}pF$

D. $\dfrac{29}{4}pF$

Answer: A

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5. Maximum $\overrightarrow{E}$ that a dielectric medium of a capacitor can withstand without breakdown is called its:

A. Capacitance

B. Dielectric strength

C. Polarisation

D. None of the above

Answer: B

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6. Gaussian surface should not pass through any discrete charge because:

A. Electric field remains constant

B. Electric field becomes zero

C. Electric field due to system of discrete charge is not will defined at location at any charge

D. Electric field is continuous charge distribution

Answer: C

7. Electrostatic energy stored in a capacitor of 12 pF capacitance connected to a 50 V battery is:

A. $1 \cdot 5 \times 10^{-8} J$

B. $3 \times 10^{-4} J$

C. $1 \cdot 5 \times 10^{-10} J$

D. $9 \times 10^{-3} J$

Answer: A

8. Which of the following draws no current from the voltage source being measured:

A. Potentiometer

B. Meter bridge

C. Wheatstone bridge

D. Both (a) and (c)

Answer: A

9. The unit of specific resistance is

    A. Ωcm^2

    B. Ωcm^{-2}

    C. Ωcm^{-1}

    D. Ωcm

Answer: D

10. Which of the following is constant when a steady current flows through a metallic conductor of non-uniform cross-section:

    A. drift speed

    B. current

    C. current density

    D. Resistivity

Answer: B

11. The resistance depends on:

A. Only, material

B. Dimension of the conductor

C. Both (a) and (b)

D. Colour of wire

Answer: C

12. What is the relation between V and I from Ohm's law.

A. V depends on I linearly

B. V doesn't depend on I

C. V depend on I non-linearly

D. Can't say

Answer: C

13. Numbers of electrons pass through lamp in one minute if current applied is 300 mA is:

    A. 1.125×10^{20}
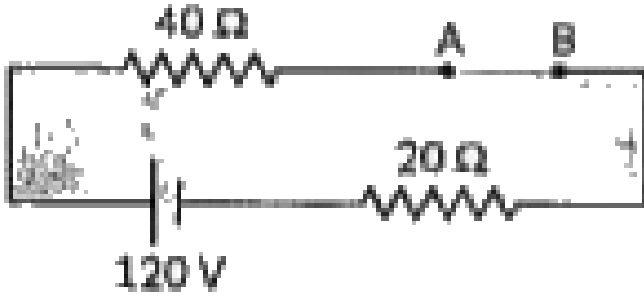
    B. 1.125×10^{19}

    C. 1.125×10^{10}

    D. 1.125×10^{36}

Answer: A

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14. Find the potential difference:

A. 20 V

B. 60 V

C. 120 V

D. Zero

Answer: C

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15. The ratio of radii of trajectories of a-particle and proton moving in plane of paper in a region of uniform magnetic field, normal to the plane of paper and having equal linear momentum:

A. $2:1$

B. $1:1$

C. $2:5$

D. $1:2$

Answer: D

16. Source of magnetic field is a analogue to the source of electric field:

A. True

B. False

C. Can't say

D. Magnetic field is not related to electric field

Answer: B

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17. Variation of magnetic field with distance from current carrying conductor is:

A. $B \propto a^2$

B. $B \propto \dfrac{1}{a^2}$

C. $B \propto a$

D. $B \propto \dfrac{1}{a}$

Answer: D

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18. The place where horizontal and vertical component of earth's magnetic field are equal to the only of dip is:

A. 90°

B. $45°$

C. $33\dfrac{1}{2}°$

D. $70°$

Answer: B

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19. The angle of dip $0°$ and $90°$ respectively are at:

A. North pole, South pole

B. Equator, poles

C. Poles, equator

D. Both (a) and (c)

Answer: B

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20. Mutual inductance depends on:

A. number of turns of coil 1 only

B. number of turns of coil 2 only

C. both (a) and (b)

D. neither (a) nor (b)

Answer: C

21. Find the inductance of a coil of 100 turns carrying 5 mA producing a magnetic flux of 10^{-5} Wb:

A. 0.02 mH

B. 0.2 mA

C. 2.0 mH

D. none of these

Answer: A

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22. The peak value of current in the circuit when the reading of an ammeter is 4 A is given by

A. $8A$

B. $4A$

C. $4\sqrt{2}A$

D. $2\sqrt{2}A$

Answer: C

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23. When 12 w bulb is connected to a step down transformer, the output is 24 V. Peak current is given by:

A. $\dfrac{1}{\sqrt{2}}A$

B. $2\sqrt{2}A$

C. $\sqrt{2}A$

D. $2A$

Answer: A

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24. Which is not possible for a transformer?

A. Direct current

B. Eddy current

C. Induced current

D. Alternating current

Answer: A

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$X_c = 90\,\Omega$

$200\,V,$
$60\,Hz$

$R_1 = 44\,\Omega$

$X_1 = 90\,\Omega$
$R_2 = 36\,\Omega$
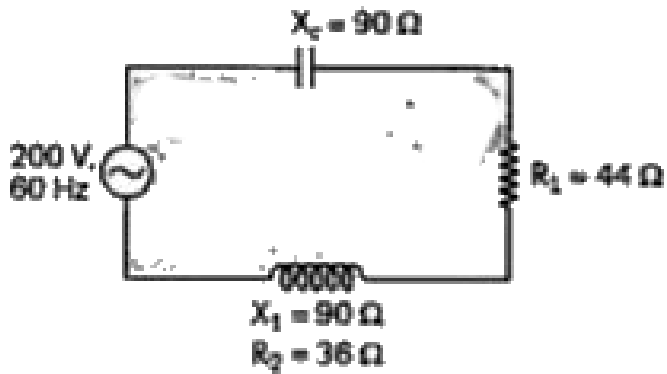
25.

Total impedance of a circuit is:

A. 4900Ω

B. 3600Ω

C. 1000Ω

D. 100Ω

Answer: D

Section B

1. Variation in force between two charges and their distance is given by:

A.

B.
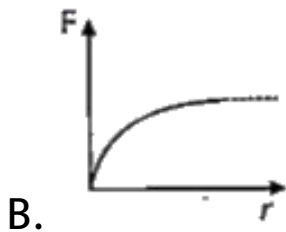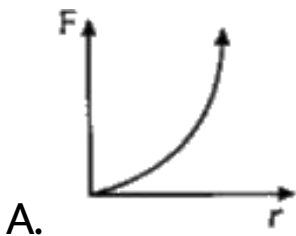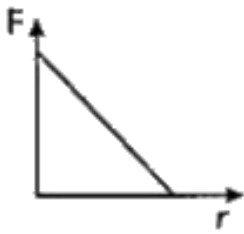
C.
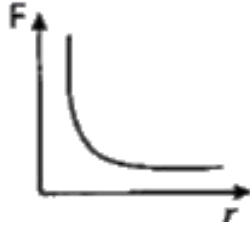
D.

Answer: D

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2. A body can be negatively charged by

A. removing some electrons

B. giving excess electrons

C. giving some protons

D. removing some neutrons

Answer: B

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3. What is the dipole moment of a dipole consisting two equal and opposite charges, each of 2 C seperated by 0.04 m:

A. 6×10^{-8} cm

B. 1.5×10^2 cm

C. 8×10^{-6} cm

D. 8×10^{-2} cm

Answer: D

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4. What is inherent characteristic of matter:

A. Charge has permanent characteristics

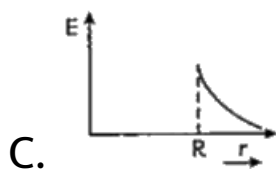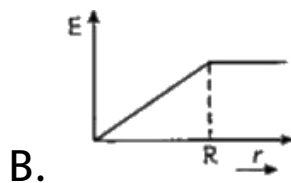B. Coulomb law is not applicable in vacuum
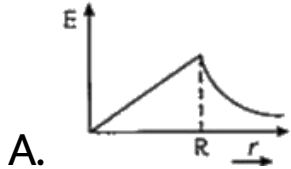
C. Quantization of charge

D. Charge are not transferable

Answer: C

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5. $\overrightarrow{E}$ due to uniformly charged sphere of radius R as a function of distance from its centre is represented by:

A.

B.

C.

D.
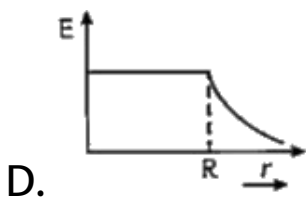
Answer: A

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6. Electric field at a point is:

A. Continuous if there is no charge at that point

B. Always continuous

C. Continuous, if there is charge at that point

D. discontinuous only if there is a negative charge at that point

Answer: A

7. Condition for step-down transformer is:

A. $i_s = i_p$ and $N_s = N_p$

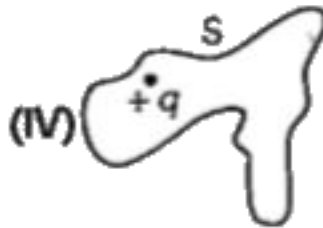B. $i_s = i_p$ and $N_s = N_p$

C. $i_s < i_p$ and $N_s > N_p$
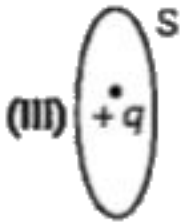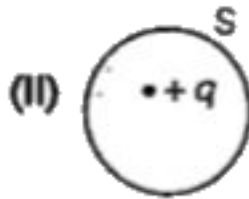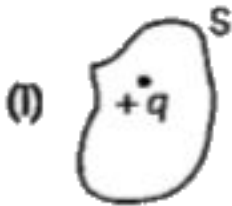
D. $i_s < i_p$ and $N_s = N_p$

Answer: A

8. The flux through the surface:

(I) +q
(II) •+q
(III) +q
(IV) +q

A. in fig (III) is largest
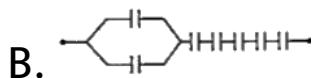
B. in fig (IV) is largest

C. Same in figure (II) and (III)

D. Same in all the figures

Answer: D

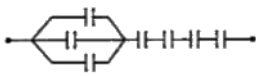**9.** Effective capacitance of $\dfrac{10}{11}$ is required to obtain from such capacitors, each of $2\mu F$ find the suitable combination:

A.

B.

C.

D.

Answer: A

10. Two plates, one at 300 V, other at - 100 V are 4 cm apart. The voltage at 3 cm from the second plate is:

A. 250 V

B. 500 V

C. 200 V

D. 400 V

Answer: C

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A

500 Ω

+
50 V

B

2 kΩ

$R_L = 500$ Ω

C
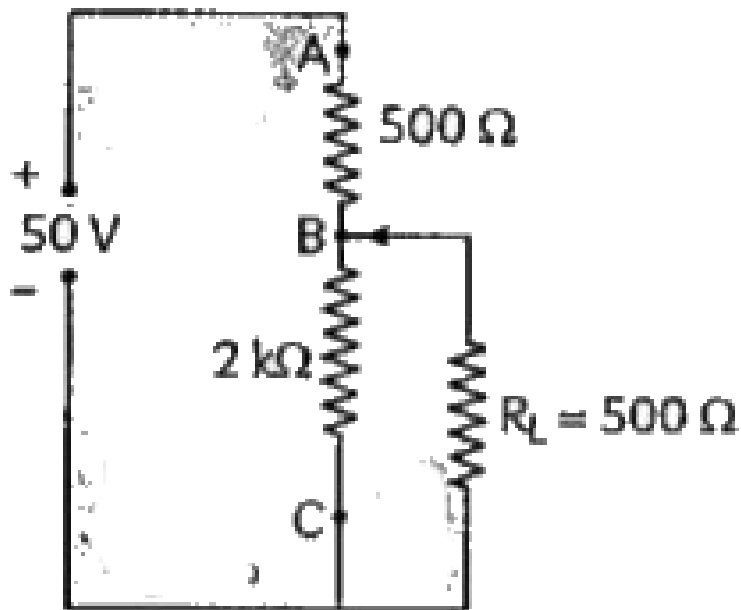
11.

The circuit has total resistance of:

A. 500Ω

B. 375Ω

C. 875Ω

D. 1500Ω

Answer: B

12. If a bar magnet is cut in half, then new magnetic moment m and pole strength M will be:

A. m, M.

B. $\dfrac{m}{2}, M$

C. $\dfrac{m}{2}, \dfrac{M}{2}$

D. $\dfrac{m}{4}, 2M$

Answer: B

13. Value of earth's magnetic field inside a metallic cage is:

A. 1

B. 10

C. Zero

D. 2

Answer: C

North
Magnetic
pole

Geographic
North pole

Geographic
South pole

South
Magnetic
pole
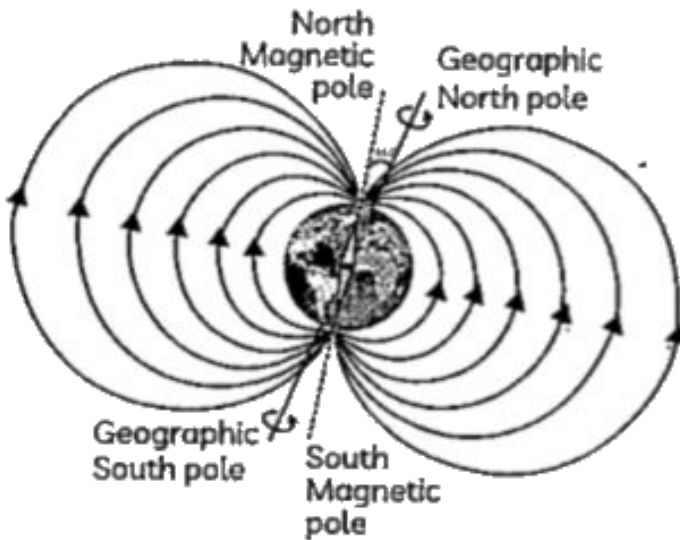
14.

Relation between earth's magnetic field is

given by:

A. $\sqrt{\dfrac{B_H^2 + B_V^2}{2}}$

B. $B = \sqrt{B_H^2 + B_V}$

C. $B = \sqrt{B_H^2 + B_V^2 + 2B_H B_V}$

D. $B = \sqrt{B_H^2 + B_V^2}$

Answer: D

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15. Due to orbital motion, magnetic moment is:

A. $\dfrac{1}{4}$ evr

B. $\dfrac{1}{2}$ evr

C. evr

D. $\dfrac{ev}{2r}$

Answer: B

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16. At a point on the right bisector of a magnetic dipole the magnetic potential

A. potential varies as $\dfrac{1}{r^2}$

B. field varies as r^3

C. potential is zero at all points

D. field is perpendicular to the axis

Answer: C

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17. At a certain $B_H = \dfrac{1}{\sqrt{3}}$ B dip, angle is:

A. $30°$

B. $45°$

C. $60°$

D. $90°$

Answer: C

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18. The condition of minimum impedance is:

A. $X_C \neq X_L$
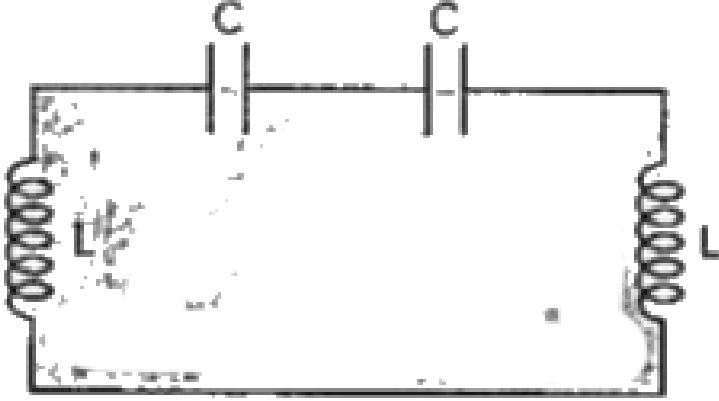
B. $X_C = X_R$

C. $X_C \neq X_R$

D. $X_C = X_L$

Answer: D

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19. The natural frequency of given circuit is shown by:

A. $\dfrac{1}{2\pi\sqrt{LC}}$

B. $\dfrac{2}{2\pi\sqrt{LC}}$

C. $\dfrac{1}{2\pi\sqrt{2LC}}$

D. $\dfrac{4}{2\pi\sqrt{4LC}}$

Answer: A

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20. Assertion (A): Current should not be passed through potentiometer for a long time.

Reason (R): Lechanche cell should be used in main circuit of potentiometer.

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

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

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

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

Answer: C

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21. Assertion (A): Resistivity of a conductor, increases on increasing temperature.

Reason (R): As temperature increases, time between collision decreases.

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

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

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

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

Answer: A

22. Assertion (A): As the relaxation time Increases drift velocity increases.

Reason (R): $V_d \propto \tau$

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

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

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

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

Answer: A

23. Assertion (A): Magnetic field due to a straight current carrying conductor is in the form of circular loops around it.

Reason (R): The magnetic field due to a current carrying conductor is weak at near points from the conductor.

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

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

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

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

Answer: C

24. Assertion (A): Magnetic field due to current carrying solenoid is independent of its length and cross-sectional area.

Reason (R): Magnetic field is uniform inside the solenoid.

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

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

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

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

Answer: B

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1. Two resistors R_1 and R_2 of 4Ω and 6Ω are connected in parallel across a battery. The ratio of power dissipated in them, $P_1 : P_2$ will be:

A. $4:9$

B. $3:2$

C. $9:4$

D. $2:3$

Answer: C

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2. What is voltage sensitivity? State its SI unit.

A. $\dfrac{NBR}{kA}$

B. $\dfrac{NBA}{k}$

C. $\dfrac{NBA}{kR}$

D. None of the above
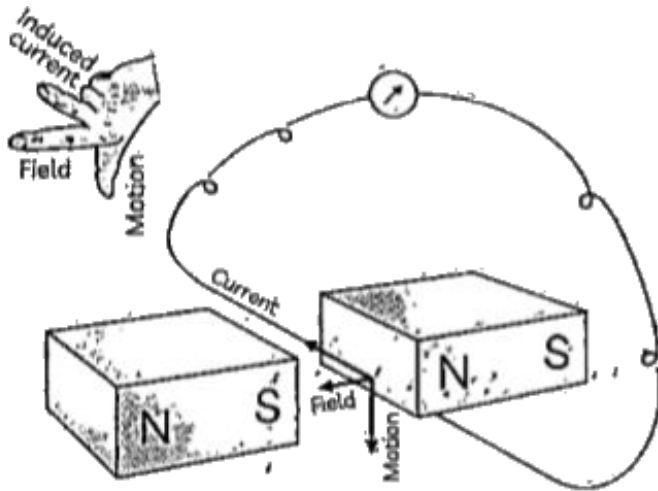
Answer: C

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3. Case Study:

Read the following paragraph and answer the questions:

As per Faraday's first law, emf is induced in a

circuit whenever an amount of magnetic flux is linked with it induced current is determined by the at which the magnetic flux changes.

The magnitude of induced emf is equal to rate of change of magnetic flux through the circuit.

As per Faraday's law, current is larger when:

A. Magnet is pushed towards coil faster

B. Magnet is pulled away from coil faster

C. Both (a) and (b)

D. Magnet is placed constant

Answer: C

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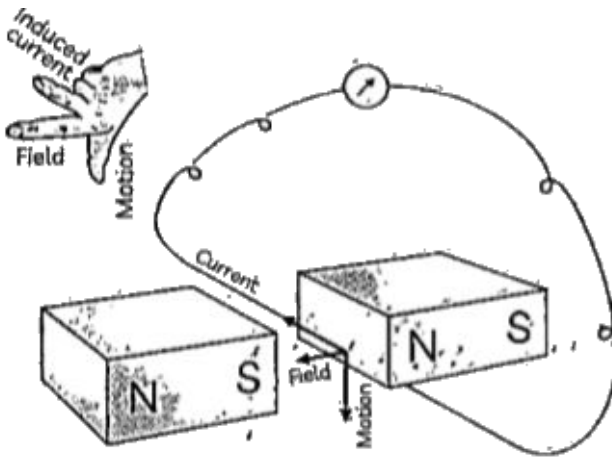**4.** Case Study:

Read the following paragraph and answer the questions:

As per Faraday's first law, emf is induced in a

circuit whenever an amount of magnetic flux is

linked with it induced current is determined by

the at which the magnetic flux changes.

The magnitude of induced emf is equal to rate

of change of magnetic flux through the circuit.

Flux linked is $\phi = t^3 + 3t - 7$. The graph

between time and induced emf will be:

A. Straight line through the origin

B. Parabola not through the origin

C. Straight line with negative intercept

D. Straight line with positive intercept

Answer: B

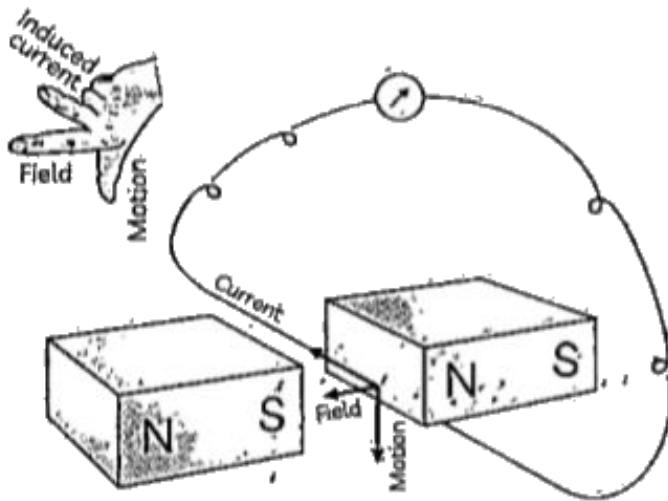**5.** Case Study:

Read the following paragraph and answer the questions:

As per Faraday's first law, emf is induced in a

circuit whenever an amount of magnetic flux is linked with it induced current is determined by the at which the magnetic flux changes. The magnitude of induced emf is equal to rate of change of magnetic flux through the circuit.

A loop of wire, is rotated in. a magnetic field. The frequency of change in direction of induced emf is:

A. One per revolution

B. Twice per revolution

C. Four times per revolution

D. Six times per revolution

Answer: B

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6. Case Study:

Read the following paragraph and answer the questions:

As per Faraday's first law, emf is induced in a circuit whenever an amount of magnetic flux is linked with it induced current is determined by the at which the magnetic flux changes.

The magnitude of induced emf is equal to rate of change of magnetic flux through the circuit.
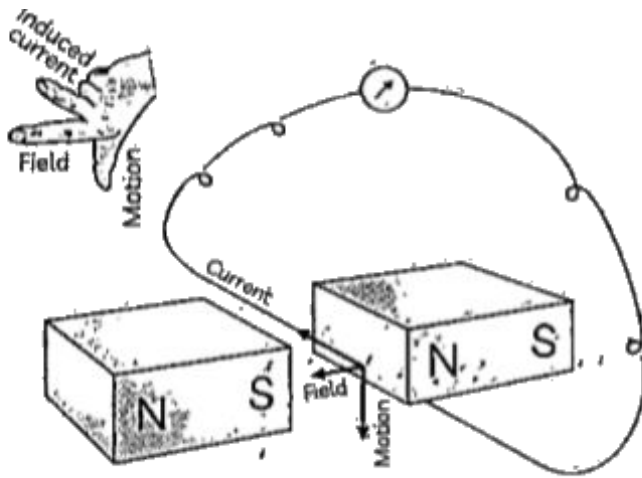
Instantaneous magnetic flux linked with coil is

$\phi = \left(5t^3 - 100t + 300\right)$. At t = 2 s, induced emf is:

A. $-40V$

B. $140V$

C. $300V$

D. $40V$

Answer: D

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