PHYSICS

AAKASH INSTITUTE ENGLISH

ELECTROMAGNETIC INDUCTION

Example

1. A uniform magnetic field exists in the space $\vec{B} = B_1\hat{i} + B_2\hat{j} + B_3\hat{k}$. Find the magnetic flux through an area $\vec{S}$ if the area $\vec{S}$ is in (i) x-y plane (ii) y-z plane (iii) z-x plane

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2. Figure shows a long straight wire carrying current I and a square conducting wire loop of side l, at a distance 'a' from current wire. Both the current wire and loop are in the plane of paper. Find the flux of magnetic filed of current wire, passing through the loop.

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3. A current I = 1.5 A is flowing through a long solenoid of diameter 3.2 cm, having 220 turns per cm. At its centre, a 130 turn closely packed coil of diameter 2.1 cm is placed such that the coil is coaxial with the long solenoid. The current in the solenoid is reduced to zero at a steady rate in 25 ms. What is the magnitude of emf induced in the coil while the current in the solenoid is changing?

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5. Consider a coil (of area A, resistance R and number of turns N) held perpendicular to a uniform magnetic field of strength B. The coil is now turned through 180° in time Δt. What is

(i) Average induced emf

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(iii) Total charge that flows through a given cross-section of the coil?

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6. A conducting loop is moving from left to right through a region of uniform magnetic (B) field. Its four positiors are shown belwo. Show the direction of induced current in all four positions.

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7. A non uniform magnetic field $B = B_0 t\hat{i}$ in a region exists. A circular conducting loop of radius r and resistance R is placed with its plane in yz-plane. Determine the current through the loop and sense of the current.

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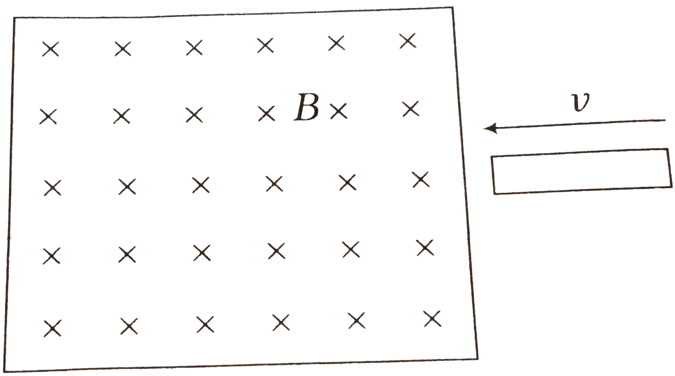
8. Through a uniform B field, A small rectangular loop is moving towards left with constant velocity as shown in the figure. Counting of time t begins at the moment, the loop starts entering the field.

Plot the variation of flux through the loop with respect to time. Also, plot the variation of induced emf w.r.t. time t.



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9. A conducting rod OA of length l is rotated about its end O with an angular velocity ω in a uniform magnetic field directed perpendicualr to the rotation. Find the emf induced in the rod, between it's ends.

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10. Figure shows two concentric loops of radii R and $(R > r)$. A current i is passed through the outer loop. Find the flux linked with inner loop and the mutual inductance of the arrangement.

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11. Find the mutual inductance between two coaxial loops of radii R and r (R gtgt r) with separation between the centre x.

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15. Prove the energy stored in a current inductor, per unit volume is $\frac{B^2}{2\mu_0}$, where B is the magnetic field inside the inductor.

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16. Compare the expression for magnetic energy density with electrostatic energy density stored in the space between the plates of a parallel plate capacitor.

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17. What is the physical role of self inductance?

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18. A time varying magnetic field $B = a + bt$ exists in a cylindrical region of radius R. A rectangular conducting loop of dimension $R \times 2R$ is kept as shown. Find the value of induced EMF in AE, ED and DB ltbegt

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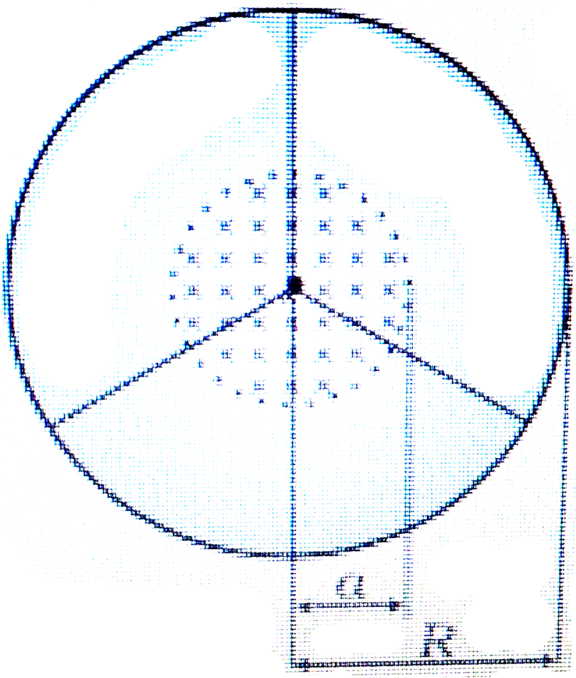
19. A line charge λ per unit length is lodged uniformly onto the rim of a wheel of mass M and radius R. The wheel has light non-conducting spokes and is free to rotate without friction about its axis (Fig. 6.22). A uniform magnetic field extends over a circular region within the rim. It is given by,

$B = B_0 k \qquad (ra \leq a, a < R)$

=0 (otherwise)

What is the angular velocity of the wheel after the field is suddenly switched off?



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20. Shows a wire of length l which can slide on a U- shaped rail of negligible resistance. The resistance of the wire is R. The wire is pulled ot the right with a constant speed v. Draw an equivalent circuit diagram representing the induced emf by a battery. Find the current in the wire usingj this diagram.

(##HCV_VOL2_C38_S01_019_Q01##)

(##HCV_VOL2_C38_S01_019_Q02##)

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21. Figure shows four conducting rods with end points marked on them. Their dimensions are also mentioned in the figure. Each rod is being moved with a constant velocity v as shown. What is the emf developed between the end points of each rod?

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22. An angle aob made of a conducting wire moves along its bisector through a magnetic field B as suggested by figure. Find the emf induced between the two free ends if the magnetic field is perpendicular ot the plane of the angle.

(##HCV_VOL2_C38_S01_022_Q01##)

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23. A conducting rod AB is bent in the form of a semicircle of radius R. It is kept in a region of uniform magnetic field B such that plane of semicircle is perpendicular to magnetic field. This rod is being moved with a constant speed v perpendicular to AB. Find the emf developed between the ends.

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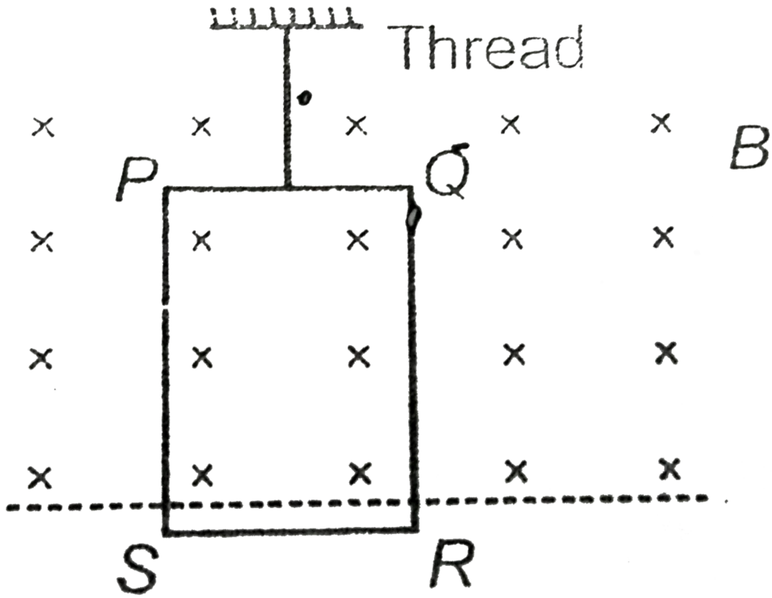
24. A rectangular conducting loop, PQRS is hanging from a thread as shown. Thread is now cut. Compute velocity with which the loop falls as function of time t. Show that if side PS is large enough the loop ultimately falls with constant speed. (m = mass of loop, r = Resistance of loop, PQ = l, PS = b)



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25. The figure shows a part of a complete circuit. At the instant shown, the current $i = 2A$ and it is decreasing at rate $2 \times 10^3 A / s$. Find the potential difference between A and B and energy stored in the magnetic field at this instant. $V_A - 12 + 3i + 15 + 5i + L\frac{di}{dt} + 2i = V_B$

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26. A magnetic flux of 8×10^{-4} weber is linked with each turn of a 200 - turn coil when thereis an electric current of 4 A in it. Calculate the self inductance of the coil.

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27. Two coils have self inductances $L_1 = 4mH$ and $L_2 = 8mH$. Current in both the coils is increasing at same rate. At an instant, when the power given to the two coils is same, find

(i) Ratio of current in the inductors.

(ii) Ratio of potential difference

(iii) Ratio of energy stored

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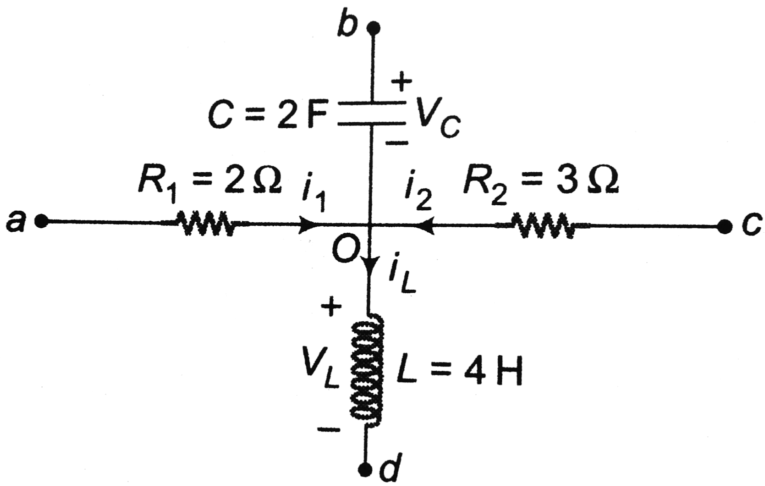
28. In the Figure shown $i_1 = 10e^{-2t}A, i_2 = 4A$ and $V_C = 3e^{-2t}V$. Determine



a. i_L and V_L b. V_{ac}, V_{ab}, V_{cd}

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29. Figure shows two concentric loops of radii R and $(R > r)$. A current i is passed through the outer loop. Find the flux linked with inner loop and the mutual inductance of the arrangement.

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30. Two coaxial coils are very close to each other and their mutual inductance is 10 mH. If a current (60 A) sin 500t is passed in one of the coils, then find the peak value of induced emf in the secondary coil.

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31. A resistor and inductor are connected in series through a battery. The switch s is closed at time t = 0.

(a) Plot the graph of rate of Joule heating (P) in resistor versus time (t).

(b) Find out the magnitude of current flowing when the rate of increase of magnetic energy in the inductor is maximum.

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32. A 20 H inductor is placed in series with 10 W resistor and an emf of 100 V is suddenly applied to the combination. At t = 1 s from t = 1 s from the start, find the rate at which energy is being stored in the magnetic field around the inductor (givne $e^{-0.5} = 0.61$).

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33. Buble-1 and Bulb-2 shown in the circuit are identical. Key is closed at time t = 0 and after the bulbs start glowing with their full intensities the key is again opened. Comment on the behaviour of the bulbs.

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34. A uniform magnetic field exists in the space $\overrightarrow{B} = B_1\hat{i} + B_2\hat{j} + B_3\hat{k}$. Find the magnetic flux through an area $\overrightarrow{S}$ if the area $\overrightarrow{S}$ is in (i) x-y plane (ii) y-z plane (iii) z-x plane

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40. There exists a uniform magnetic field $\overline{B} = B_0 t\bar{k}$ in a region. A circular conducting loop of radius r and resistance R is placed with its plane in x-y plane. Determine the current through the loop and sense of the current.

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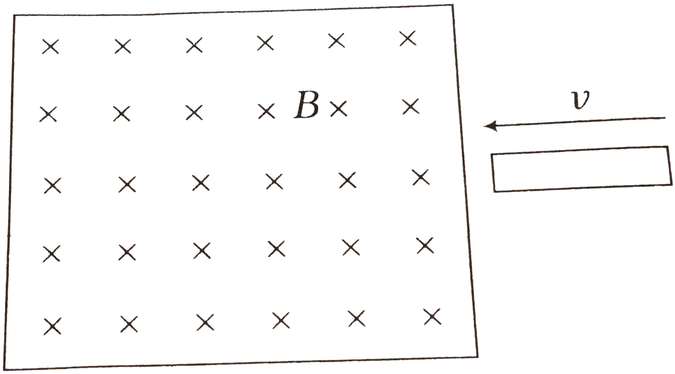

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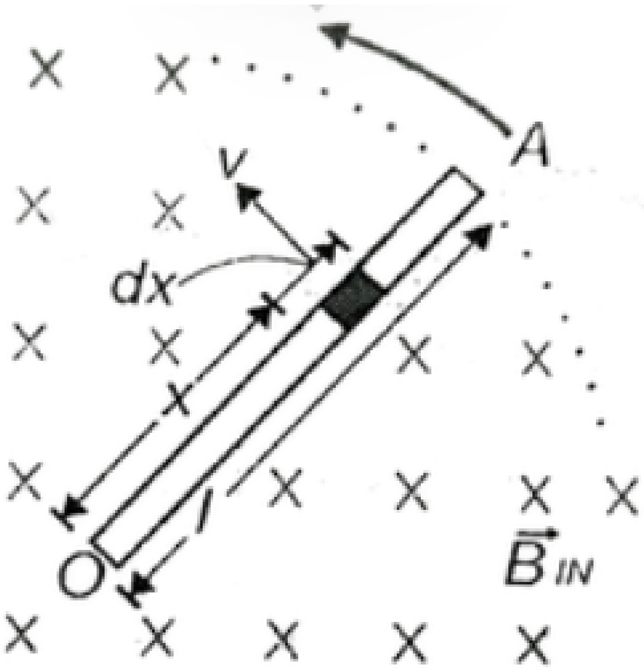
42. A conducting rod OA of length l is rotated about its end O with an angular velocity ω in a uniform magnetic field directed perpendicualr to the rotation. Find the emf induced in the rod, between it's ends.



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50. What is the physical role of self inductance?

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Try Yourself

1. (a) Solve the above question for part (ii).

(b) Solve the above question for part (iii).

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2. (a) In the example 2 the current flowing through the wire is $l_{(l)} = l_0 \sin \omega t$. What is the flux through the loop at $t = \frac{\pi}{2\omega}$?

(b) What is the maximum flux when current $l_t = l_0 \sin \omega t$

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3. Figure shows a graph between the magnitude of magnetic field passing normally through a closed loop and time t. Rank the five region's of the graph according to the emf in magnitude induced in the loop, greatest first.

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4. A magnet is moving towards a coil along its axis and the emf induced in the coil is ε . If the coil also strats moving towards the magnet with the same speed, the induced emf will be

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

B. ε

C. 2ε

D. 4ε

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5. What will be the acceleration of the bar magnet, if the loop had a cut in between (or if it was not a closed loop)?

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6. In example (7), find the tension T at time I developed in the loop as a result of induced current.

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7. A rectangular loop and a circular loop are moving out of a uniform magnetic field to a field-free region with a constant velocity 'v' as shown in the figure . Explain the which loop do you expect the induced emf to the constant during the passage out of the field region . The magnetic field is normal to the loops .

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8. Express the induced emf as scalar triple product of $\vec{v}$, $\vec{B}$ and $\vec{l}$.

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9. In example 9 if B is the mid point of rod then find $e_{OB} \leq_{BA}$

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10. If the rod were translating as well as rotating, what will be its emf? Assume that the centre of mass has a velocity v and the rod is rotating with an angular velocity ω about its ceritre of mass.

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11. Two electric circuits are placed near one another. Each circuit has self inductance Must there be a mutual inductance.

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12. Find mutual inductance if we have a square loop of side r instead of a small circular loop of side r at the centre of bigger circular loop.

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13. Modern day generators produce electric power as high as 500 MW. How many 100 watt bulb can one lit with this generator?

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14. Using Gauss's law obtain the expression for the electric field due to uniformly charged thin spherical shell of radius R at a point outside the shell. Draw a graph showing the variation of electric tield with r, for r gt R and r lt R.

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15. A sheet of relative permeability 100 is placed inside the solenoid, so as to fill the space. What will be the energy stored inside the solenoid?

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16. What is the frequency of rotation of armature coil in AC generators?

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17. Can an induced electric field exist at a point in space, when no magentic field is paresent at that point.

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18. Which of the two capacitor plates is at the higher potential ?

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19. What will be the magnitude and polarity of induced emf across the rod, if it is rotating about an axis at a distance $\frac{L}{4}$ from one of its ends.

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20. Can an inductor have potential difference across it ends even if does not store any energy.

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21. Is flux linked with all the inductors in parallel same?

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25. A uniform magnetic field exists in the space $B = B_1\hat{i} + B_2\hat{j} - B_3\hat{k}$. Find the magnetic flux through an area S, if the area S is in yz - plane.

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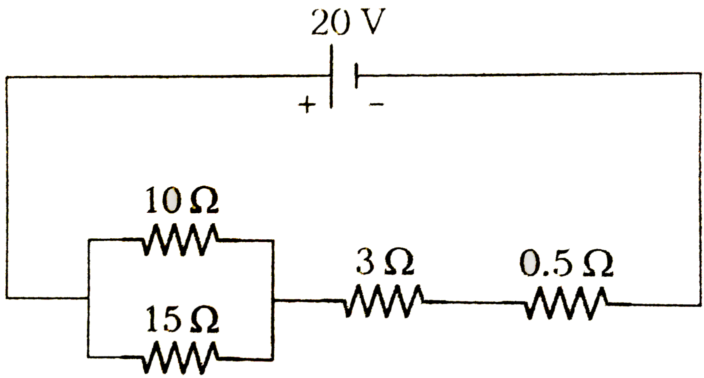
26. In the circuit, the current flowing through 10Ω resistance is



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29. Find the emf induced in the coil if it were positioned such that its plane contains the axis of the solenoid.

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30. In the above problem (example 3) what is the emf induced when current is reduced to zero and then increases again to 1.5 A in reverse direction in 25ms?

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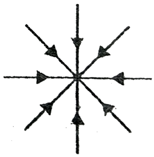
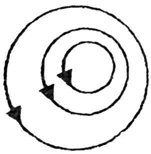
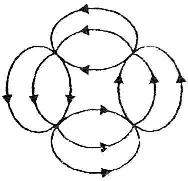
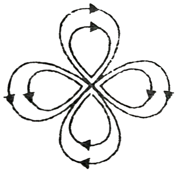
Assignment Section A

1. Which of the following field lines pattern could represent a magnetic field?

A. (1) 

B. (2) 

C. (3) 

(4) 

D.

Answer: B

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2. A spherical surface is spilt into two parts S_1 and S_2 by a circular loop. The sphere is placed near a bar magnet. Through which of the two parts, is the magnitude of mangetic flux larger?

A. S_1

B. S_2

C. The magnitude of flux is same for both

D. Cannot tell without more information about the magnetic field

Answer: C

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3. A sphere of radius R is placed near a long straight wire that carries a steady current I. The magnetic field generated by the current is B. The total magnetic flux passing through the sphere is

A. $\mu_0 l$

B. $\frac{\mu_0 l}{4\pi R^2}$

C. Zero

D. Need more information

Answer: C

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4. A coil wire rotates about a horizontal north-south axis with its plane kept along axis. Assume that at the point, the earth's magnetic field is along north direction. How does the magnetic field contribute to the emf induced in this coil?

A. Both the vertical and horizontal components contribute to the induced emf

B. Only the horizontal component induces an emf

C. Only vertical component induces an emf

D. There is no emf induced in the coil

Answer: C

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5. A magnent moves towards a coil. Which of the factors can affect the emf induced in the coil?

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6. A rectangular loop of wire is placed perpendicualr to a uniform magnetic field and then spun around one of its sides at frequency f. The induced emf is a maximum when the

A. Flux is zero

B. Flux is maximum

C. Flux is half its maximum value

D. Derivative of the flux with respect to time is zero

Answer: A

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7. Which of the following can produce maximum induced emf?

A. 50 ampere DC

B. 50 ampere 50 Hz AC

C. 50 ampere 500 Hz AC

D. 100 ampere DC

Answer: C

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8. The induced emf produced when a magnet is inserted into a coil does not depend upon the

A. Number of turns in the coil

B. Resistance of coil

C. Magnetic moment of the magnet

D. Speed of approach of the magnet

Answer: B

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9. A cylindrical bar magnet is kept along the axis of a circular coil. If the magnent is rotated about its axis, then

A. A current will be induced in the coil

B. No current will be induced in the coil

C. An emf and a current both will be induced in the coil

D. None of these

Answer: B

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10. A circular wire loop of radius r is placed in a region of uniform magnetic field B such that the plane of the loop makes an angle θ with the direction of B. In which of the following conditions, will no emf be induced in the loop?

A. Change in B with time

B. Change in r with time

C. B being nonuniform in space

D. Change in θ with time

Answer: C

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11. When a non magnetic metallic strip is moved away from between the poles of a horse-shoe magnet, there is

A. Force acting on the strip to oppose the motion

B. Force acting on the strip to help the motion

C. No force acting on the strip

D. Couple acting on the strip so as to rotate it

Answer: A

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12. A magnet is allowed to fall towards a metal ring. During the fall Its accelertion is

A. Equal to g

B. Greater than g

C. Less than g

D. Equal to the product of g and the radius of the ring

Answer: C

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13. A coil having 500 square loops each of side 10 cm is plance normal to a magnetic flux which increases at the rate of $1.0Ts^{-1}$. The induced emf in volts is

A. 0.1

B. 0.5

C. 1

D. 5

Answer: D

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14. The coefficient of mutual induction between two circuits is equal to the, emf produced in one circuit when the current in the second circuit is

A. Kept steady at 1 ampere

B. Cut-off at 1 ampere level

C. Changed at the rate of 1 A/s

D. Changed from 1 A/s to 2 A/s

Answer: C

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15. The back emf in a DC motor is maximum when,

A. Motor has picked up maximum speed

B. Motor has just started moving

C. Speed of motor is still increasing

D. Motor has been switched off

Answer: A

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16. If the radius of a coil is changing at the rate of 10^{-2} unit in a normal magnetic field of 10^{-3} units, the induced emf is $1\mu V$. What the final radius of the coil?

A. 1.6 cm

B. 16 cm

C. 12 cm

D. 1.2 cm

Answer: A

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17. If a coil of 40 turns and area $4.0cm^2$ is suddenly remove from a magnetic field, it is observed that a charge of $2.0 \times 10^{-4}C$ flows into the coil. If the resistance of the coil is 80Ω, the magnetic flux density in Wb/m^2 is

A. 0.5

B. 1.0

C. 1.5

D. 2.0

Answer: B

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18. The core of a transformer is laminated so that :

A. Ratio of voltage in the primary and secondary may be increased

B. Energy losses due to eddy currents may be minimised

C. Weights of transformer may be reduced

D. Rusting may be prevented

Answer: B

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19. In the circuit of figure , the bulb will be become suddenly bright , if

A. Contact is made or broken

B. Contact is made

C. Contact is broken

D. Would not become bright at all

Answer: C

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20. A conducting square loop of side l and resistance R moves in its plane with a uniform velocity v perpendicular ot one of its sides. A uniform and constant magnetic field B exists along the perpendicualr ot the plane of the loop as shown in . The current induced in the loop is

(##HCV_VOL2_C38_E01_025_Q01##)

A. $\frac{Blv}{R}$ clockwise

B. $\frac{Blv}{R}$ anticlockwise

C. $\frac{2Blv}{R}$ anticlockwise

D. Zero

Answer: D

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21. The coefficient of mutual inductance of two coils depends on

A. Current in the coil

B. Materials of the wires of the coil

C. Relative position and orientation of the coil

D. Rates at which the currents are changing in the coil

Answer: C

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22. A magnetic flux of 500 microweber passing through a 200 turn coil is reversed in $20 \times 10^{-3}s$. The average induced emf in the coil (in volt) is

A. 2.5

B. 5.0

C. 7.5

D. 10.0

Answer: D

Watch Video Solution

23. A coil of area $0.1m^2$ has 500 tums. After placing the coil in a magnetic field of strength $4 \times 10^{-4} Wb/m^2$ it is rotated through 90° in 0.1 s. The average emf induced in the coil is

A. 0.2 volt

B. 0.1 volt

C. 0.05 volt

D. 0.012 volt

Answer: A

Watch Video Solution

24. Two circular coils have their centres at the same point. The mutual inductance between them will be maximum when their axes

A. Perpendicular to each other

B. At 60° to each other

C. At 45° to each other

D. Parallel to each other

Answer: D

Watch Video Solution

25. When a battery is connected across a series combination of self-inductance L and resistance R, then the variation in the current i with time t is best represented by

A. 

B.

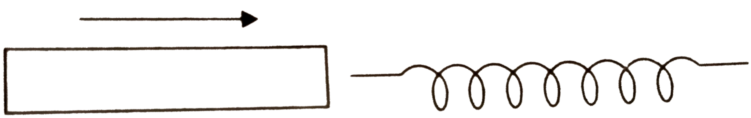
C.

D.

Answer: A

Watch Video Solution

26. The variation of induced emf (ε) with time (t) in a coil if a short bar magnet is moved along its axis with a constant velocity is best represented as



A.

B.

C.

D.

Answer: B

Watch Video Solution

27. In a uniform magnetic field B a wire in the form of a semicircle of radius r rotates obout the diameter of the circle with angular frequency ω. The axis of rotation is perpendicular to the field. If the total resistance of the circuit is R, the mean pwer generated per period of rotation is

A. $\frac{B\pi r^2\omega}{2R}$

B. $\frac{\left(B\pi r^2\omega\right)^2}{4R}$

C. $\frac{\left(B\pi r^2\omega\right)^2}{2R}$

D. $\frac{\left(B\pi r^2\omega\right)^2}{8R}$

Answer: D

Watch Video Solution

28. A metal conductor of length $1m$ rotates vertically about one of its ends at angular velocity 5 radians per second. If the horizontal component of earth's magnetic field is $0.2 \times 10^{-4} T$, then the emf developed between the two ends of hte conductor is

A. $5 \mu V$

B. $50 \mu V$

C. $5 mV$

D. $50 mV$

Answer: B

Watch Video Solution

29. A copper disc of the radius 0.1 m is rotated about its centre with 20 revolutions per second in a uniform magnetic field of 0.1 T with its plane perpendicular to the field. The emf induced across the radius of the disc is-

A. $\frac{\pi}{20}$vilt

B. 20π millivolt

C. 2π mV

D. $20\pi\mu V$

Answer: B

Watch Video Solution

30. Two coils of self-inductance 2 mH and 8 mH are placed, so close together that the effective flux in one coil is completely linked with the other. The mutual inductance between these coils is

A. 16 mH

B. 10 mH

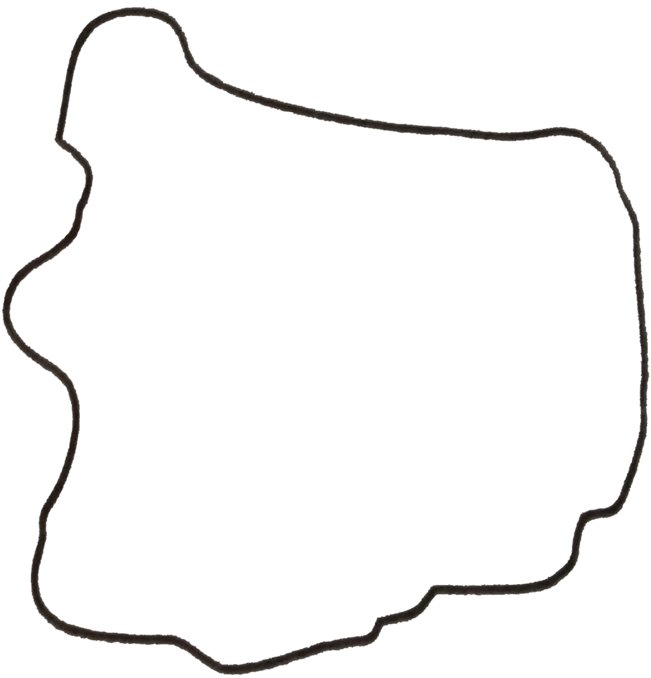
C. 6 mH

D. 4 mH

Answer: D

Watch Video Solution

31. As a result of change in the magnetic flux linked to the closed loop shown in figure, and emf, V volt is induced in the loop. The work done (in joule) in taking a charge q coulomb once along the loop is



A. QV

B. 2QV

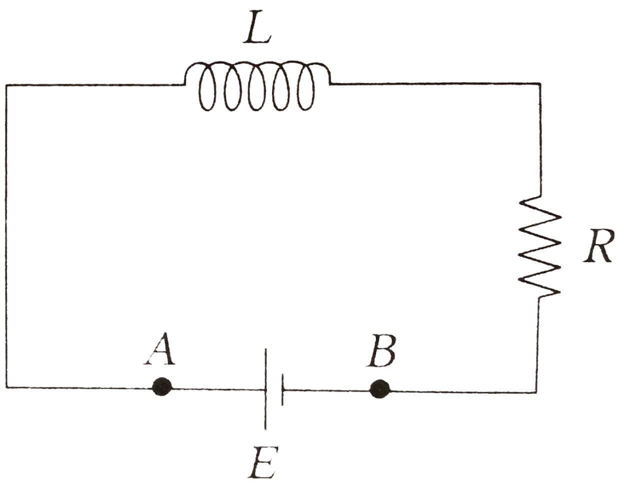
C. $Q\frac{V}{2}$

D. Zero

Answer: A

Watch Video Solution

32. An inductor (L = 100 mH), a resistor (R = 100Ω) and a battery (E = 100V) are initially connected in series as shown in the figure. After a long time, the battery is disconnected after short-circuiting the points A and B. The current in the circuit 1 ms after the short-circuit is



A. 0.041666666666667

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

C. eA

D. $0.1A$

Answer: B

Watch Video Solution

33. The equivalent quantity of mass in electricity is

A. Current

B. Self inductance

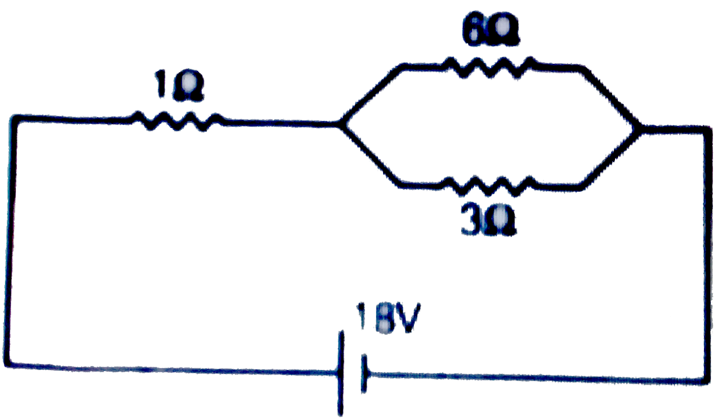
C. Potential

D. Charge

Answer: B

Watch Video Solution

34. In the circuit shown in figure, power generated in



A. 

B.

C.

D.

Answer: C

Watch Video Solution

35. Dimensional formula of self-inductance is

A. $\left[ML^2T^2A^{-2}\right]$

B. $\left[MLT^{-2}A^{-2}\right]$

C. $\left[ML^3T^{-2}A^{-2}\right]$

D. $\left[ML^2T^{-2}A^{-1}\right]$

Answer: A

Watch Video Solution

36. A time varying magnetic flux passing through a coil is given by $\phi = xt^2$, if at $t = 3s$, the emf induced is 9 V, then the value of x is

A. $0.66Wb/s^2$

B. $-0.66Wb/s^2$

C. $1.5Wb/s^2$

D. $-1.5Wb/s^2$

Answer: D

Watch Video Solution

37. A metallic ring is dropped down, keeping its plane perpendicular to a constant and horizontal magnetic field. The ring enters the region of magnetic field at t = 0 and completely emerges out at t = T sec. The current in the ring vauies as

A. 

B.

C.

D.

Answer: B

Watch Video Solution

38. Lights of a car become dim when the starter is operated. Why?

A. Increases

B. Decreases

C. Remains same

D. First increases then decreases

Answer: B

Watch Video Solution

39. Coefficient of coupling between two coils of self-inductances L_1 and L_2 is unity. It means

A. 50% flux of L_1 is linked with L_2

B. 100% flux of L_1 is linked with L_2

C. $\sqrt{L_1}$ times of flux of L_1 is linked with L_2

D. None of these

Answer: B

Watch Video Solution

40. There is uniform magnetic field directed perpendicular and into the plane of the paper. An irregular shaped conducting loop is slowly changing into a circular loop in the plane of the paper. Then,

A. Current is induced in the loop in anticlockwise direction

B. Current is induced in the loop in clockwise direction

C. AC is induced in the loop

D. No current induced in the loop

Answer: A

Watch Video Solution

41. A square loop of wire with side length 10 cm is placed at angle of 45° with a magnetic field that changes uniformly from 0.1 T to zero in 0.7s. The induced current in the loop (its resistance is 1Ω) is

A. 1.0 mA

B. 2.5 mA

C. 3.5 mA

D. 4.0 mA

Answer: A

Watch Video Solution

42. Near a circular loop of conducing wires as shown, an electron moves along a straight line. The direction of induced current if any, in the loop is

A. a.Variable

B. b.Clockwise

C. c..Anticlockwise

D. d.Zero

Answer: A

Watch Video Solution

43. A uniformly wound solenoid coil of self inductance $1.8 \times 10^{-4} H$ and resistance 6Ω is broken up into two identical coils. These identical coils are then connected in parallel across a $12V$ battery of negligible resistance. The time constant and steady state current will be

A. $0.1 \times 10^{-4}s$

B. $0.2 \times 10^{-4}s$

C. $0.3 \times 10^{-4}s$

D. $0.4 \times 10^{-4}s$

Answer: C

Watch Video Solution

44. The magnitude of the earth's magnetic field at a place is B_0 and angle of dip is δ. A horizontal conductor of lenth/lying along the magnetic north-south moves eastwards with a velocity v. The emf induced acroos the coductor is

A. Zero

B. $B_0 lve \sin \delta$

C. $B_0 lv \cos \delta$

D. $B_0 lv \tan \delta$

Answer: B

Watch Video Solution

45. Two parallel rails of a railway track insulated from each other and with the ground are connected to a millivoltmeter. The distance between the rails is one metre. A train is traveling with a velocity of $72kmph$ along the track. The reading of the millivoltmetre (in mV) is : (Vertical component of the earth's magnetic induction is $2 \times 10^{-5}T$)

A. 1.44

B. 0.72

C. 0.4

D. 0.2

Answer: C

Watch Video Solution

46. When a low flying aircraft passes overhead, we sometimes notice a slight shaking of the picture on our TV scren. This is because of between the direct signal and reflected signal

A. Diffraction of the signal received from the antenna

B. Intererence of direct signal received by the antenna with the weak signal reflected by the passing aircraft

C. Change of magnetic flux occurring due to passage of aircraft

D. Vibration created by the passage of aircraft

Answer: C

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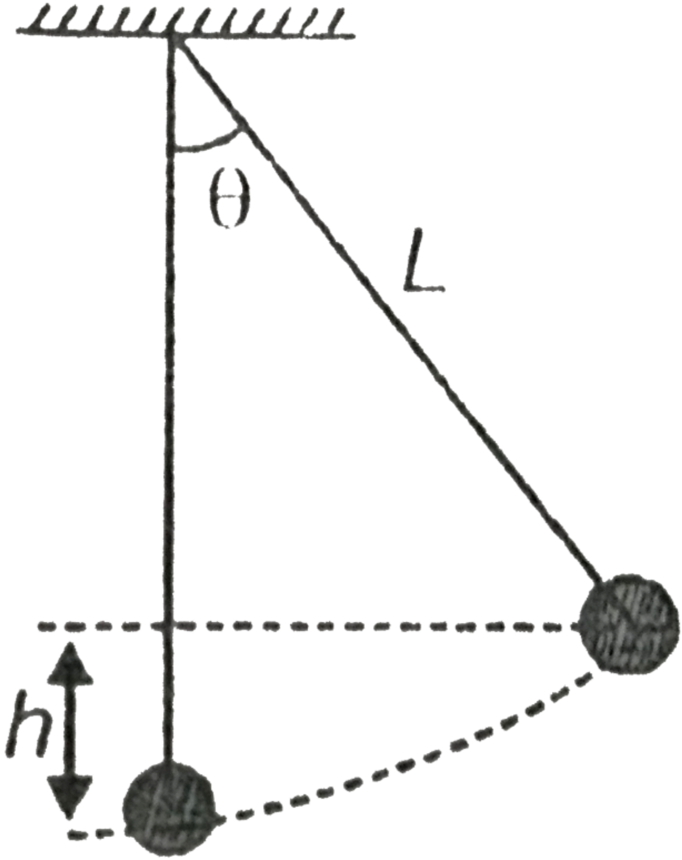
47. A simple pendulum with bob of mass m and conducting wire of length L swings under gravity through an angle 2θ. The earth's magnetic field component in the direction perpendicular to swing is B. The maximum potential difference induced across the pendulum is



A. a.$2BL\sin\left(\frac{\theta}{2}\right)\sqrt{gL}$

B. b.$BL\sin\left(\frac{\theta}{2}\right)\sqrt{(gl)}$

C. c..$BL\sin\left(\frac{\theta}{2}\right).\ (gL)^{3/2}$

D. d.$BL\sin\left(\frac{\theta}{2}\right).\ (gL)^{2}$

Answer: B

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48. Electric field induced by changing magnetic fields are

A. Conservative

B. Non-conservative

C. May be conservatie or non-conservative depending on the condition

D. Nothing can be said

Answer: B

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49. A circular loop of radius R, carrying current I, lies in XY-plane with its centre at origin. The total magnetic flux through X-Y plane is

A. Directly proportional to R

B. Directly proportional to l

C. Inversely proportional to l

D. Zero

Answer: D

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50. A helicopter rises vertically upwards with a speed of 100 m/s. If the helicopter has a length of 10m and horizontal component of earth's magnetic field is $5 \times 10^{-3} Wb/m^2$, then the induced emf between the tip of the nose and the tail of the helicopter is

A. 50 V

B. 0.5 V

C. 5 V

D. 25 V

Answer: C

Watch Video Solution

51. The energy stored in an inductor of self inductance L carrying current I, is given by

A. LI^2

B. $-LI^2$

C. $\frac{1}{2}LI^2$

D. $-\frac{1}{2}LI^2$

Answer: C

Watch Video Solution

52. An electric motor turns on DC source of emf 200 V and drawn a current of 10 A. If the efficiency be 40%, then the resistance of armature is

A. 5Ω

B. 12Ω

C. 120Ω

D. 160Ω

Answer: B

Watch Video Solution

53. Induction furnace make use of

A. Electric field

B. Eddy current

C. Magnetic field

D. Gravitational field

Answer: B

Watch Video Solution

54. Two identical circular loops of metal wires are lying on a table without touching each other. Loop A carries a current which increases with time. In response, the loop B

A. Is attracted by loop A

B. Is repelled by loop A

C. Remains stationary

D. None of these

Answer: B

Watch Video Solution

55. A short solenoid of length 4 cm, radius 2 cm and 100 turns is placed inside and on the axis of a long solenoid of length 80 cm and 1500 turns.

A current of 3 A flows through the short solenoid. The mutual inductance of two solenoid is

A. 0.12 H

B. $5.3 \times 10^5 H$

C. $3.52 \times 10^{-3} H$

D. $8.3 \times 10^{-5} H$

Answer: A

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Assignment Section B

1. Two loops carrying current in opposite sence placed paralled to each other are moved closer to each other. Then the current

A. In both of them increses

B. In both of them decreases

C. Increases in one and decreases in other

D. In both of them remains same

Answer: A

Watch Video Solution

2. The graph shows the variation of magnetic field B that exists through a conducing loop, perpendicular to the plane of the loop. The emf's induced in the loop during equal intervals a, b, c, d and e are related as

A. $E_b < E_d < E_e$

B. $E_a > E_c$

C. $E_c > E_a$

D. $E_b > E_d = E_e$

Answer: D

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3. A small square loop of n_1 turns and side l is placed at the centre of a large coplanar, circular loop of radius r and n_2 tuns. The mutual inductacne of the combination is

A. $\frac{\mu_0 n_1 n_2 \pi r^2}{l}$

B. $\frac{\mu_0 n_1 n_2 l^2}{2r}$

C. $\frac{\mu_0 n_2^2 l^2}{2r}$

D. $\frac{\mu_0 n_1^2 l}{2r}$

Answer: B

Watch Video Solution

4. A semi-circular loop of radius R is placed in a uniform magnetic field as shown. It is pulled with a constant velocity. The induced emf in the loop is

A. $Bv(\pi R)\cos\theta$

B. $Br(\pi R)\sin\theta$

C. $Bv(2R)\cos\theta$

D. $Bv(2R)\sin\theta$

Answer: D

Watch Video Solution

5. A capacitor in LC oscillatory circuit has a maximum potential of V volts and maximum energy E. When the capacitor has a potential V_1 volts and energy E_1 joules, what is the emf across the inductor and energy stered in the magnetic field

A. $V - V_1, E - E_1$

B. $V - V_1, E_1$

C. V_1, E_1

D. $V_1, E - E_1$

Answer: D

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6. Figure shows a conducting loop placed in a magnetic field. The flux through the loop changes due to change in magnetic field according to the equation $\phi = 5t - 10t^2$. What is the direction and magnitude of induced current at $t = 0.25s$?

A. a.0.45 A, A to B

B. b.0.5 A, B to A

C. c.1.5 A, A to B

D. d.Zero

Answer: D

Watch Video Solution

7. In a part of ac circuit shown in the figure, $R = 0.2\Omega$. At the instant shown, $V_A - V_B = 0.5V$, $i = 0.5A$, $\frac{di}{dt} = 8A/s$. The inductance L is

A. 0.01 H

B. 0.02 H

C. 0.05 H

D. 0.5 H

Answer: C

Watch Video Solution

8. A ring made of insulating material is rolling without slipping on a horizontal surface with velocity of centre of mass V_0. A conducting wire of length 2R (R = radius of ring) is fixed between two points of the circumference. At an instant, the wire is in vertical position as shown in figure. A uniform magnetic field B exists perpendicular to the plane of the ring. The magnitude to emf induced between the ends of wire is

A. $2BV_0R$

B. BV_0R

C. $3BV_0R$

D. $4BV_0R$

Answer: A

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9. In a region of space, magnetic field exists in a cylindrical region of radius a centred at origin with magnetic field along negative z-direction. The field is given by $\overrightarrow{B} = -B_0 t\hat{k}$. The force experienced by a stationary charge q placed at (r, 0, 0), where $r > a$ is

A. qB_0

B. $\frac{qB_0a^2}{2r}$

C. $\frac{qB_0r}{2}$

D. Zero

Answer: B

Watch Video Solution

10. A conducting rod of length L slides at a constant velocity V on two parallel conducting rails as shown in figure. The mechanical power required to pull the rod at constant velocity is

A. a. $\frac{B^2L^2V^2}{R}$

B. b. $\frac{BLV}{R}$

C. c. $\frac{BL^2V}{R}$

D. d. $\frac{B^2L^2}{RV^2}$

Answer: A

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11. The figure shown an L-shaped rod rotating about its end O in a plane perpendicular to a magnetic field B. The part OA of rod is non conducting while AB is conducting the emf induced between A and B is

A. a.Zero

B. b.$\frac{1}{2}B\omega L^2$

C. c.$\frac{1}{2\sqrt{2}}B\omega L^2$

D. d. $2B\omega L^2$

Answer: B

Watch Video Solution

12. Figure shows two circular rings of radii a & b (a gt b) joined together by wire of negligible resistance. If the arrangement is placed in a time varying magnetic field, $\frac{dB}{dt} = k$ and if the resistance per unit length of wire is λ, then induced current is

A. $\frac{k(a-b)}{2\lambda}$

B. $\frac{k(a+b)}{2\lambda}$

C. $\frac{k\left(a^2-b^2\right)}{2\lambda(a-b)}$

D. $\frac{k\left(a^2+b^2\right)}{2\lambda(a+b)}$

Answer: A

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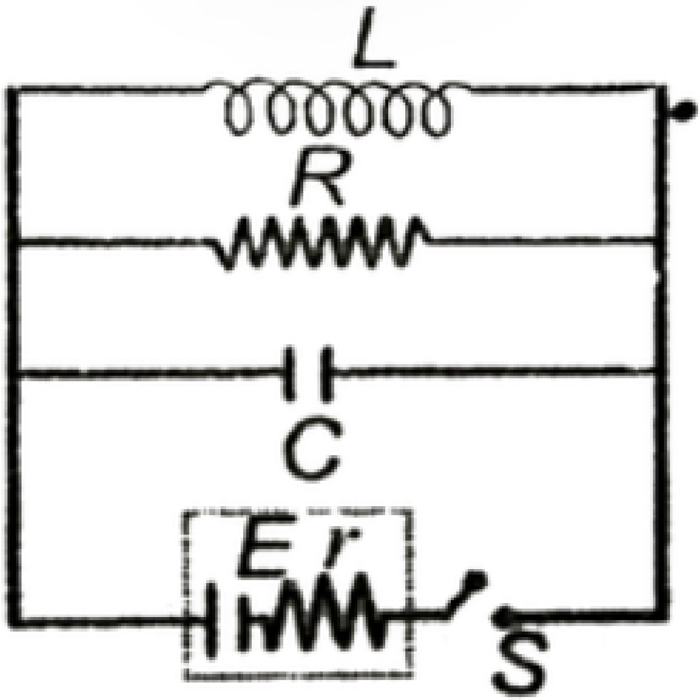
13. In the following circuit choose the correct statement. If the switch is closed at t = 0



A. Current through resistance R is zero all the time

B. Maximum charge stored in the capacitor is CE

C. Current through resistance R is zero at t = 0 and $t \to \infty$

D. None of these

Answer: C

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14. A small square loop of wire of side l is placed inside a large square loop of wire of side $L(> \; > l)$. The loops aer coplanar and their centres coincide. What is the mutual inductance of the system?

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

B. $\frac{r^2}{R}$

C. $\frac{r}{R^2}$

D. $\frac{r^2}{R^2}$

Answer: B

Watch Video Solution

15. Figure shows part of a circuit. If I = 5A and is decreasing at a constant rate of $10^3 A / s$ then $V_B - V_A$ is

A. 15 V

B. 20 V

C. 10 V

D. 5 V

Answer: A

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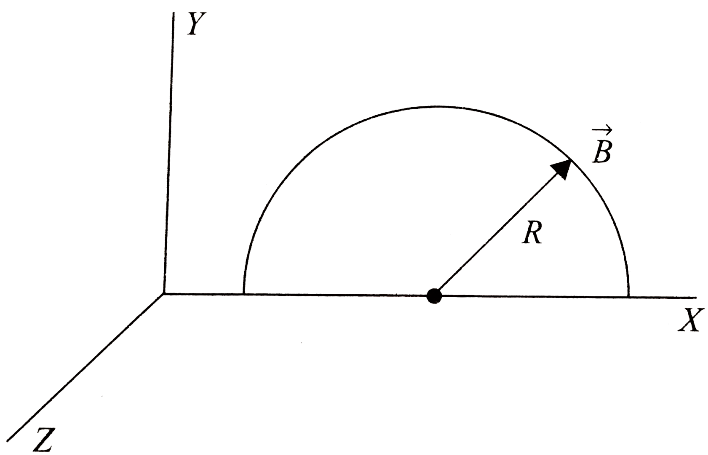
16. A semicircle conducting ring of radius R is placed in the xy plane, as shown in Fig. A uniform magnetic field is set up along the x-axis. No emf, will be induced in the ring if



A. It moves along x-axis

B. It moves along y-axis

C. It moves along z-axis

D. All of these

Answer: D

Watch Video Solution

17. A straight rod of length L is rotating about an axis passing through O and perpendicular to the plane. In the space a uniform magnetic field B exits normal to the plane of rotation. Potential difference between a & b is equal to

A. a. $\frac{8}{25}BL^2\omega$

B. b. $\frac{7}{25}BL^2\omega$

C. c. $\frac{3}{10}BL^2\omega$

D. d.Zero

Answer: C

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18. A uniform circular ring of radius R, mass m has uniformly distributed charge q. The ring is force to rotate about its own axis (which is vertical) without friction. In the space a uniform magnetic field B, directed vertically down ward exists in a cylindrical region. The cylindrical region is co-axial with B and has a radius greater than R. If B increasesa at a constant rate $\frac{dB}{dt} = \alpha$. angular acceleration of the ring will.

A. Directly proportional to R

B. Directly proportional to q

C. Directly proportional to m

D. Independent of R and m

Answer: B

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19. Two different coils have self inductances $L_1 = 8mH$ and $L_2 = 2mH$. The current in both the coil is increased at same constant rate. At a certain instant power given to two coils is same. At that time the energy stored in both the coils are $V_1 \& V_2$ respectively, then $\frac{V_1}{V_2}$ is

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

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

C. 2

D. 4

Answer: A

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20. A circular conducting ring is rotated about one of its diameter in a magnetic field

A. If magnetic field is uniform, no emf will be induced

B. If magnetic field is uniform and its induction increases with time, only them emf is induced

C. If magnetic field is uniform and induction of magnetic field is increasing at a constant rate, emf induced in ring may zero for an elemental time interval

D. None of these

Answer: D

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21. A inductor of inductance L is decayed through a resistance R. A radioactive sample decays with an average life T. The value of R for which the electric energy stored in the inductor to the activity of radioactive sample remains constant

A. $\frac{L}{T}$

B. $\frac{2L}{T}$

C. $\frac{L}{2T}$

D. $\left(\frac{L}{T}\right)^2$

Answer: C

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22. A conducting wire in the shape of Y with each side of length L is moving in a uniform B field with uniform speed V. The induced emf between X and Y of the wire will be

A. Zero

B. 2 BLV

C. $2BLV \sin. \frac{\theta}{2}$

D. $2BLV \sin \theta$

Answer: C

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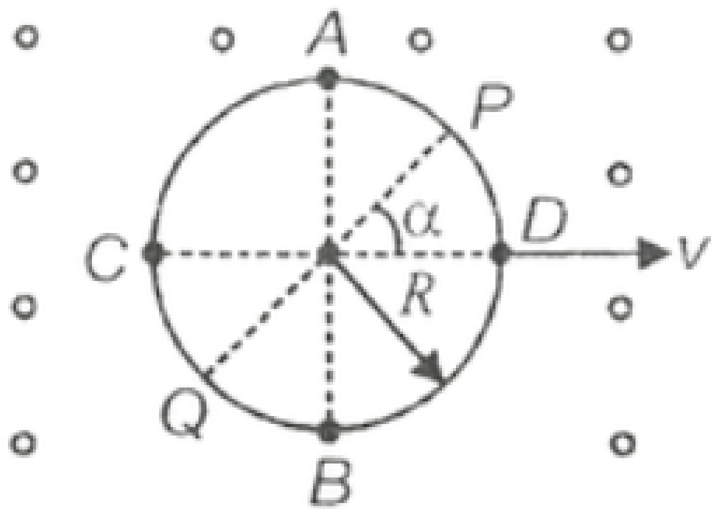
Assignment Section C

1. A conducting ring of radius R is being moved in a region of uniform magnetic field as shown. Let E_{AB} represent the potential difference between A and B then



A. $E_{AB} = 2BvR$

B. $E_{PQ} = 2BvR\sin\alpha.$

C. $E_{CD} = 0$

D. $E_{PQ} = 0$

Answer: A::B::C

Watch Video Solution

2. A thick conducting wire has a variable current flowing through it. Select the correct alternative

A. Inside the wire, both electric and magnetic fields are present

B. Outside the wire, both electric and magnetic fields are present

C. There is only a magnetic field inside and outside the wire

D. Inside there is an electric field, while outside, there is only a magnetic field

Answer: A::B

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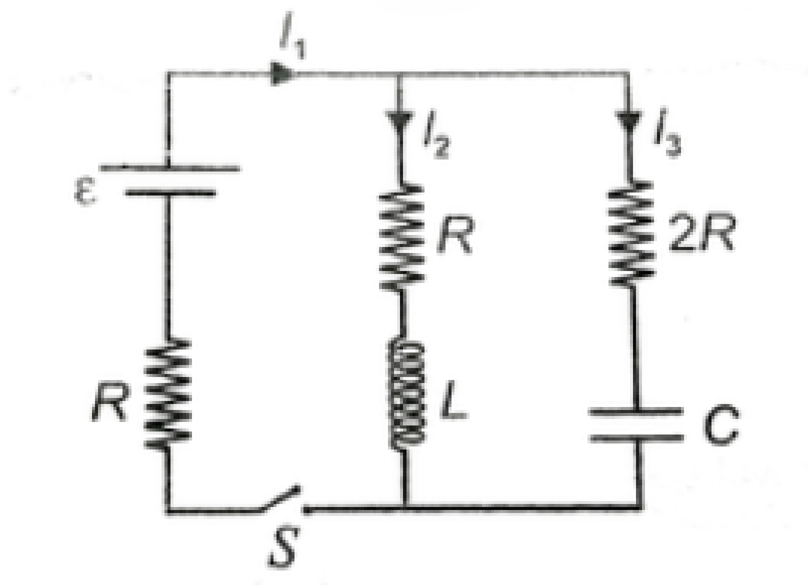
3. Consider the circuit shown. The switch is closed at t = 0. Currents in various branches are marked. Which of the following is correct?



A. At $t = 0, I = \frac{\varepsilon}{3R}, I_2 = \frac{\varepsilon}{6R}, I_3 = \frac{\varepsilon}{6R}$

B. At $t = 0, I = \frac{\varepsilon}{3R}, I_3 = \frac{\varepsilon}{3R}$

C. At $t = \infty, I_1 = \frac{\varepsilon}{2R}, I_2 = \frac{\varepsilon}{4R}, I_3 = \frac{\varepsilon}{4R}$

D. At $t = \infty, I, = \frac{\varepsilon}{2R}, I_2 = \frac{\varepsilon}{2R}$

Answer: B::D

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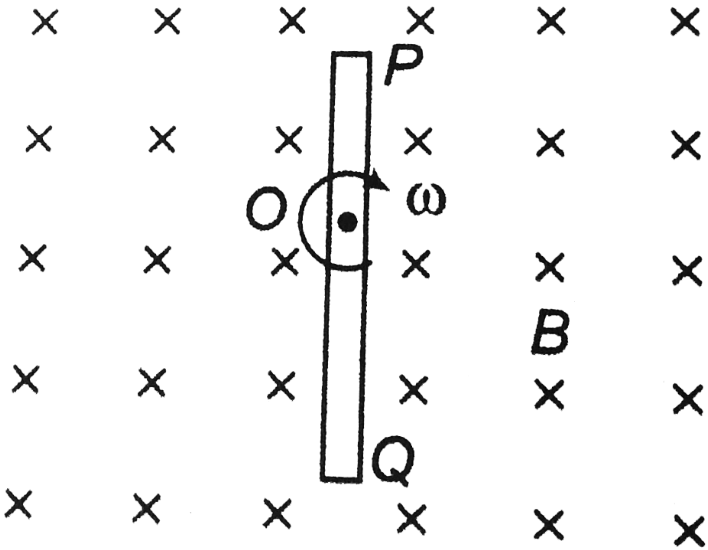
4. A rod is rotating with a constant angular velocity ω about point O (its centre) in a magnetic field B as shown. Which of the folloiwng figure correctly shows the distribution of charge inside the rod?



A. $V_{AO} = \frac{1}{2} B\omega L^2$

B. $V_{AO} = B\omega L^2$

C. $V_{AB} = B\omega L^2$

D. $V_{BC} = \frac{3}{8} B\omega L^2$

Answer: A::D

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5. An inductor L and a resistance R are connected in series with a battery of emf E and a switch. Initially the switch is open. The switch is closed at an instant t = 0. Select the correct alternatives

A. At t = 0, induced emf in inductor is zero

B. At $t = \frac{L}{R}$, energy stored in the inductor is $\left(1 - \frac{1}{e}\right)^2 \left(\frac{LE^2}{2R^2}\right)$

C. At $t = \frac{L}{R}$, induced emf in the inductor is $\frac{E}{e}$

D. At $t = \frac{L}{R}$, voltage drop across the resistor is $E\left(1 - \frac{1}{2}\right)$

Answer: B::C::D

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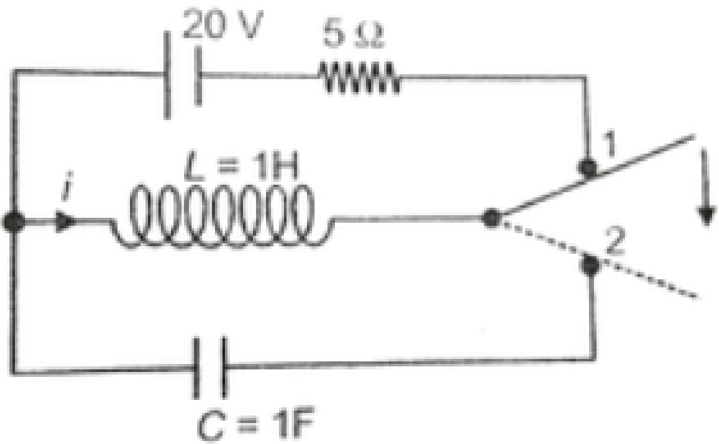
6. In the circuit shown, the switch has been in position 1 for a long time. Now the switch is shifted to position 2. If this instant is taken as t = 0, then at time $t = \frac{\pi}{2}$



A. Current through the inductor is zero

B. Current through the inductor is 4 A

C. Charge on the capacitor is 4 C

D. Potential difference across the capacitor is 4 V

Answer: A::C::D

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7. A wire of mass m and length l can freely slide on a pair of parallel, smooth, horizontal rails placed in a vertical magnetic field B . The rails are connected by a capacitor of capacitance C. The electric resistance of the rails and the wire is zero. If a constant force F acts on the wire as shown in the figure, find the acceleration of the wire.

(##HCV_VOL2_C38_S01_028_Q01##)

A. Current in the circuit is CBla

B. Charge on the capacitor is $Cbla \times \sqrt{\frac{2l}{a}}$

C. Acceleration $a = \frac{F}{m + CB^2l^2}$

D. Accelertion a $= \frac{F}{m}$

Answer: A::C

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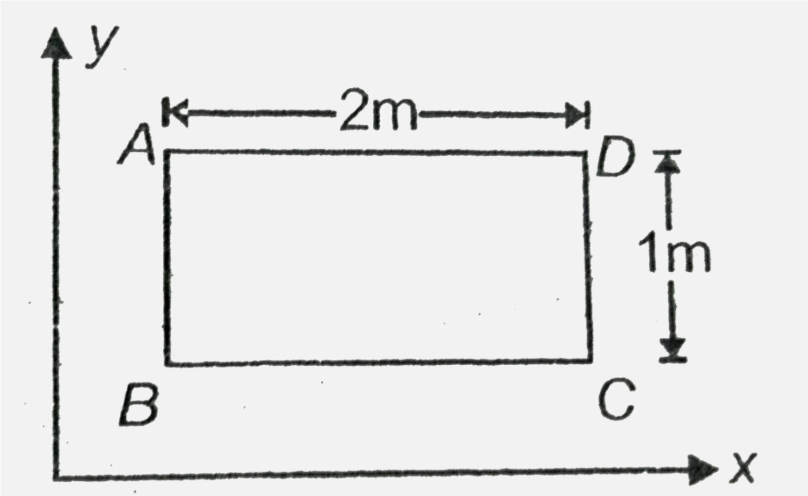
8. Figure shows a conducting Rectangular loop of electrical resistance R. There exists a uniform magnetic field given by $\overrightarrow{B} = B_0\left(10t^2 - 5t\right)\hat{k}$ in the region. The current in the loop at



A. t = 0 is zero

B. t = 0 is $\frac{10B_0}{R}$ A to B

C. $t = \frac{1}{4}s$ is zero

D. t = 1s is $\frac{30B_0}{R}$ B to A

Answer: B::C::D

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9. In a series LCR circuit, voltage applied is $V = 3\sin\left(314t + \frac{\pi}{6}\right)$ and current from the supply is $l = 2\sin\left(315t + \frac{\pi}{3}\right)$. Which of the following is correct ?

A. Impendance of circuit is 1.5Ω

B. Reactance of circuit is $\frac{4}{3}\Omega$

C. Resistance of circuit is $\frac{3\sqrt{3}}{4}\Omega$

D. Wattless component of current is $\frac{1}{\sqrt{2}}$

Answer: A::C::D

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10. An electron moves along the line XOX' which lies in the same plane as the square loop of conducting wire as shown. The direction of induced current, if any in the loop is

A. Clockwise as electron moves from X to O

B. Anticlockwise as electron moves from X to O

C. Clockwise as electron moves from O to X'

D. Anticlockwise as electrom moves from O to X'

Answer: B::D

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Assignment Section D

1. Electromagnetic brakes work on the principle of electromagnetic induction. If a metallic disc or a coil is rotating in a uniform magnetic field, it will experience a torque due to induced currents set up in the disc. According to Lenz's law, induced current is in a direction so as to oppose the rotation. Hence a retarding torque is produced. The rotating wheel of a vehicle is connected to a coil placed in a uniform emf is used to charge a battery. Thus kinetic enery of wheel is stored as chemical energy. The drawback of electromagnetic brake is that induced current or retarding torque is directly proportional to speed of rotation. The speed, therefore, decays exponentially and vehicle will take a long time to stop. Thus, mechanical brakes are used simultaneously.

The advantage of electromagnetic brakes is that

A. It is more effective as instant brakes are applied

B. It is more economical as it saves energy

C. It is easier and simple to design

D. It is based on conservation of energy

Answer: B

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2. Electromagnetic brakes work on the principle of electromagnetic induction. If a metallic disc or a coil is rotating in a uniform magnetic field, it will experience a torque due to induced currents set up in the disc. According to Lenz's law, induced current is in a direction so as to oppose the rotation. Hence a retarding torque is produced. The rotating wheel of a vehicle is connected to a coil placed in a uniform emf is used to charge a battery. Thus kinetic enery of wheel is stored as chemical energy. The drawback of electromagnetic brake is that induced current or retarding torque is directly proportional to speed of rotation. The speed, therefore, decays exponentially and vehicle will take a long time to stop. Thus, mechanical brakes are used simultaneously.

The main disadvantage of electromagnetic brakes is that

A. It cannot bring the vehicle to a halt

B. It has a complicated procedure

C. It wastes energy due to induced emf

D. It cannot provide a large braking force

Answer: A

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3. Electromagnetic brakes work on the principle of electromagnetic induction. If a metallic disc or a coil is rotating in a uniform magnetic field, it will experience a torque due to induced currents set up in the disc. According to Lenz's law, induced current is in a direction so as to oppose the rotation. Hence a retarding torque is produced. The rotating wheel of a vehicle is connected to a coil placed in a uniform emf is used to charge a battery. Thus kinetic enery of wheel is stored as chemical energy. The drawback of electromagnetic brake is that induced current or retarding torque is directly proportional to speed of rotation. The speed, therefore, decays exponentially and vehicle will take a long time to stop. Thus, mechanical brakes are used simultaneously.

The working of electromagnetic brakes does not involve

A. Lenz's law

B. Faradays law of electromagnetic induction

C. Frictional force

D. Dissipation of heat

Answer: C

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4. A dc motor works on the principle that a current carrying coil, when placed in a magnetic field experiences a torque. The arrangement consists of a coil suspended in a region of magnetic field. When a current is passed through the coil, it experiences torque and starts rotating. A simple arrangement is shown below.

The coil rotates under the action of torque. The current is supplied to the coil by an arrangement of two sliding contacts and a split ring. As the coil rotates, the magnetic flux linked with the coil changes. This leads to production of an induced emf ε in the coil. By Lenz's law, the induced emf opposes the applied voltage and therefore, it is called back emf. If R is the resistance in the coil, the current i flowing through the coil at any instant is $i = \frac{V - \varepsilon}{R}$. The back emf is developed due to induction and it is directly proportional to speed of rotation and it is directly proportional to speed of rotation of the motor. There is a continuous power loss i^2R in the motor, in form of heat.

In a dc motor, V is applied voltage, ε is back emf, i is current through the motor and R is resistance of the coil. mechanical power output of the motor is

A. a.$i^2 R$

B. b.εi

C. c.$(V - \varepsilon) i$

D. d.$\varepsilon i - i^2 R$

Answer: B

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5. A dc motor works on the principle that a current carrying coil, when placed in a magnetic field experiences a torque. The arrangement consists of a coil suspended in a region of magnetic field. When a current is passed through the coil, it experiences torque and starts rotating. A simple arrangement is shown below.

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The mechanical power output of a dc motor is maximum, when the current through the motor is

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

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

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

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

Answer: C

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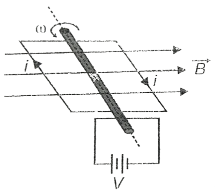
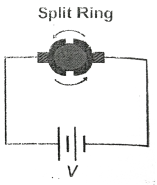
6. A dc motor works on the principle that a current carrying coil, when placed in a magnetic field experiences a torque. The arrangement consists of a coil suspended in a region of magnetic field. When a current is passed through the coil, it experiences torque and starts rotating. A simple arrangement is shown below.





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When a dc motor is running unloaded (full speed) the current through it is 1 A. What will be the current flowing through the motor, when it is loaded to run at half its maximum speed, it applied voltage is 10 V and armature resistance is 5Ω

A. 0.5 A

B. $1A$

C. $1.5A$

D. $2A$

Answer: C

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Assignment Section E

1. STATEMENT - 1 : For a current carrying wire, there is an electric field inside the wire and magnetic field outside the wire.

and

STATEMENT - 2 : A current carrying wire cannot generate an electric field outside it.

A. Statement-1 is True, Statement-2, is True, Statement-2 is a correct explanation for Statement-1

B. Statement-1 is True, Statement-2, is True, Statement-2 is NOT a correct explanation for Statement-1

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

Answer: C

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2. STATEMENT - 1 : When the current decreases in a conducting loop placed co-axially with a similar loop without current, they attract each other.

and STATEMENT - 2 : As the current in one loop decreases, an induced current starts flowing, in same sense, in the other loop.

A. Statement-1 is True, Statement-2, is True, Statement-2 is a correct explanation for Statement-2

B. Statement-1 is True, Statement-2, is True, Statement-2 is NOT a correct explanation for Statement-2

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

Answer: A

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3. STATEMENT - 1 : When there is mutual induction between two coils, their self inductance does not play a significant role.

and

STATEMENT - 2 : Self induction can take place in an isolated coil.

A. Statement-1 is True, Statement-2, is True, Statement-2 is a correct explanation for Statement-3

B. Statement-1 is True, Statement-2, is True, Statement-2 is NOT a correct explanation for Statement-3

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

Answer: D

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4. STATEMENT - 1 : Lenz's Law is another form of law of conservation of energy.

and

STATEMENT - 2 : All conservation laws are obtained from law of conservation of energy.

A. Statement-1 is True, Statement-2, is True, Statement-2 is a correct explanation for Statement-4

B. Statement-1 is True, Statement-2, is True, Statement-2 is NOT a correct explanation for Statement-4

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

Answer: C

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5. STATEMENT - 1 : By making suitable arrangement, a magnetic field can cause a stationary charge to accelerate.

and

STATEMENT - 2 : A constant magnetic field cannot interact with stationary chrages.

A. Statement-1 is True, Statement-2, is True, Statement-2 is a correct explanation for Statement-5

B. Statement-1 is True, Statement-2, is True, Statement-2 is NOT a correct explanation for Statement-5

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

Answer: B

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6. STATEMENT - 1 : Whenever there is a change in flux linked with a coil in a circuit, an induced current is set up in it.

and

STATEMENT - 2 : Whenever there is a change in flux linked with a coil in a circuit, an induced emf is set up in it.

A. Statement-1 is True, Statement-2, is True, Statement-2 is a correct explanation for Statement-6

B. Statement-1 is True, Statement-2, is True, Statement-2 is NOT a correct explanation for Statement-6

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

Answer: D

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7. STATEMENT - 1 : Energy associated with current configuration is a non-additive quantity.

and

STATEMENT - 2 : In case of two or more than two current elements, mutual interaction energy also comes into play.

A. Statement-1 is True, Statement-2, is True, Statement-2 is a correct explanation for Statement-7

B. Statement-1 is True, Statement-2, is True, Statement-2 is NOT a correct explanation for Statement-7

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

Answer: A

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8. STATEMENT - 1 : In a series L-C-R circuit, it is found that voltage leads current. When the capacitance of the circuit is increased, the power consumption will increase.

and

STATEMENT - 2 : The average power consumption at resonance is independent of inductor of capacitor.

A. Statement-1 is True, Statement-2, is True, Statement-2 is a correct explanation for Statement-8

B. Statement-1 is True, Statement-2, is True, Statement-2 is NOT a correct explanation for Statement-8

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

Answer: D

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Assignment Section F

1. Match the following :

	Column I		Column II
(A)	Steady electric field	(p)	Can accelerate a stationary charge
(B)	Steady magnetic field	(q)	Can accelerate a moving charge
(C)	Time varying magnetic field	(r)	Can change the speed of a charge
(D)	Induced electric field	(s)	Forms closed loops

,

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2. Colum shows different L-R circuits connected with cell. Column II shows amount to current passing through the inducotr & magnetic energy stored in inductor at in steady state. Match the column I with appropriate value in column II.

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Assignment Section G

1. A current of 6 A flows in a coil when connected to a dc source of 18 V. If the same coil is connected to an ac source of 20 V, 50 rad/s, a current of 4 A flows in the circuit. The inductance of the coil is 10x mH. Find out the value of x.

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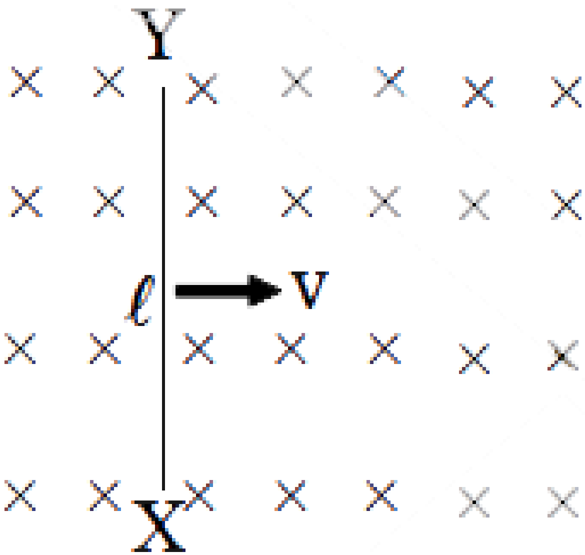
2. A small conducting rod of length l, moves with a uniform velocity v in a uniform magnetic field B as shown in fig __



A. Then the end X of the rod become positively charged

B. The end Y of the rod become positively charged

C. The entire rod is unevenly charged

D. The rod become hot due to joule heating

A. Then the end X of the rod become positively charged

B. The end Y of the rod become positively charged

C. The entire rod is unevenly charged

D. The rod become hot due to joule heating

Answer: D

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3. A large circular loop of radius 1 metre has total resistance 4Ω. A variable current is folwing through the loop. The current at any instant is given by equation I = IA, where i is time in second. A very small circular loop or radius 1 cm having resistance 3.14 Ω is placed coaxially with the larger loop at a distance of $\sqrt{3}$ metre from the centre of larger loop. If induced current in smaller loop is $\frac{\mu_0 x \times 10^{-4}}{16}$ ampere then, find x.

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1. STATEMENT - 1 : Mutual induction depends on geometry and orientation of loops w.r.t. each other

STATEMENT - 2 : A capacitor acts as an infinite resistance for AC.

STATEMENT - 3 : The A. C. voltage across a resistance can be measured using a hot-sire volt meter.

A. TFT

B. FFT

C. TTF

D. TFF

Answer: A

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2. A bar magnet is released from rest along the axis of a very long, vertical copper tube. After some time the magnet.

A. FFF

B. TTT

C. TTF

D. FFT

Answer: B

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3. STATEMENT - 1 : The magnetic flux through a closed surface is zero.

STATEMENT - 2 : When a rod oriented along magnetic north and magnetic south direction falls under gravity. Potential difference developed across its ends is zero.

STATEMENT - 3 : A resistance is connected to an ac source. If an inductor is included in the circuit in series. The average power dissipated in the resistance will decrease.

A. TTT

B. FFT

C. TTF

D. TFF

Answer: A

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Assignment Section I

1. A rod of mass M and length L is placed on a smooth horizontal surface. It is hinged at one end so that it can rotate freely in a horizontal circle about this end. There exists a uniform magnetic field $\vec{B}$ perpendicular, into the horizontal surface everywhere. The strength of magnetic field starts varying as $B = B_0 t$.

(i) Find the torque acting on the rod about its hinged end.

(ii) Find the reaction produced at hinge at t = 0.

(A charge Q is distributed uniformaly on the rod)

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2. Two inductances L_1 and L_2 are placed far apart and in parallel. Their combined inductance is:

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3. A long wire carrying a constant current I is kept in the plane of a square loop of side a initially at a distance of b from the wire. The square loop is given a constant velocity v perpendicular to the wire as shown in figure.

(i) Find the emf induced in the loop as a function of x distance between wire and loop.

(ii) The loop is taken from initial position of distance b to final position of distance 2b from the wire in any time interval Δt. Find the total charge flown through any cross-through any cross-section of the loop in the same time interval Δt. Resistance of the loop is R.

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4. Calculate the inductance of a closely wound solenoid of length l whose winding is made of copper wire of mass m. The winding has a total resistance equal to R. The solenoid diameter is considerably less than its length.`.

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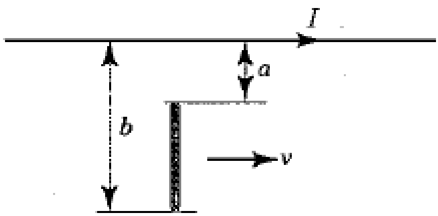
5. The figure shows a copper rod moving with velocity v parallel to a long straight wire carrying a current I = 100 A. Calculate the induced emf in the rod, assuming that v = 5 m/s, a = 1 cm and b = 100 cm.



A. 0.23mV

B. 0.46mv

C. 0.16mV

D. 0.32mV

Answer:

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6. A closed circuit consits of a source of constant and E and a choke coil of inductance L connected in series. The active resistance of the whole circuit is equal to R. At the moment $t=0$ the choke coil inductance was decreased abrupty η times. FInd the current in the circuit as a function of time t.

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Assignment Section J

1. A coiaxial cable consists of two thin coaxial cylinders electrically connected at one end, an inner cylindrical conducting tube of radius a carrying a steady current I which is screened by an outer cylindrical conducting sheath of radius b which provides a return path. There is no dielectric medium present.

Use Ampere's theorem to derive the total magnetic energy stored in the space between the conductors, show that the inductance of a length l of the cable is

$$L = \frac{\mu_0 l}{2\pi} \ln\left(\frac{b}{a}\right)$$

In this cable (a = 5 mm, b = 10 mm, l = 1000 m) is now employed in a (resistanceless) LC circuit containing a capacitance C = 1000 μF, determine the period of oscillations (neglect the capacitance of the cable itself).

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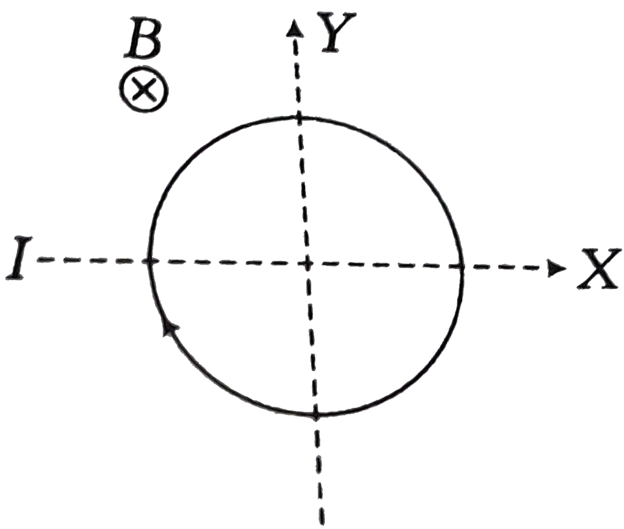
2. A conducting loop carrying a current I is placed in a uniform magnetic field pointing into the plane of the paper as shown. The loop will have a tendency to



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3. Two parallel rectangular superconducting plates of length l, width b and separation a (l gtgt b gtgt a) are joined at each end to form a one-turn coil of negligible resistance. What is its self-inductance? How much energy is stored in the magnetic field when a steady current / flows? The separation a increases by a small amount δa. Calculate the various energy changes (a) when the coil includes in its circuit a lossless battery which maintains a constant current I, and (b) when the circuit consists of the coil alone. Deduce the magnitue and direction of the force per unit area between the two plates.

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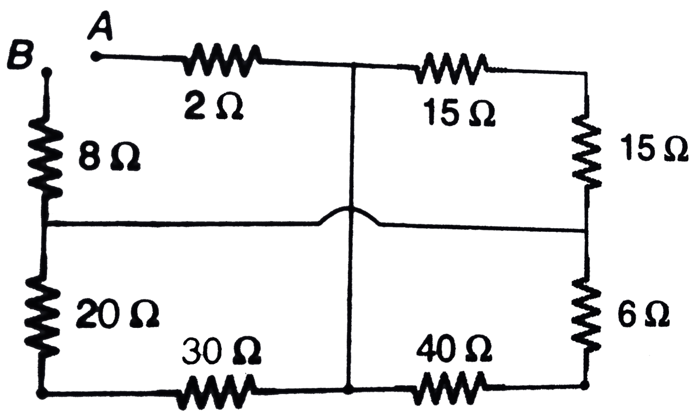
4. Find R_{AB} in the circuit shown in figure.



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5. Two inductors of self inductances L_1 and L_2 and of resistances R_1 and R_2 (not shown) respectively are conneted in the circuit as shown. At the instant t = 0, key k is closed. Obtain an expression for which the galvanometer will show zero deflection at all times after the key is closed.

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Exercise

1. A conducting ring of radius ris placed perpendicularly inside a time varying magnetic field given by $B = B_0 + \alpha l$. B_0 and a are positive constants. E.m.f. induced in the ring is

A. $-\pi\alpha r$

B. $-\pi\alpha r^2$

C. $-\pi\alpha^2 r^2$

D. $-\pi\alpha^2 r$

Answer: B

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2. In a circuit with a coil of resistance 2Ω, the magnetic flux changes from 2.0 Wb to 10.0 Wb in 0.2 s. The charge that flows in the coil during this time is

A. 1C

B. 2C

C. Zero

D. 0.5C

Answer: A

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3. Select correct statement about Lenz's law

A. It explains the physical significance of the negative sign in Faraday's law

B. It is a consequence of conservation of energy

C. It speaks about the transformation of mechanical energy into electrical energy

D. All of these

Answer: D

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4. As shown in the figure, à magnet is moved with a fast speed towards a coil at rest. Due to this induced emf, induced current and induced charge in the coll is E, I and Q respectively. If the speed of the magnet is doubled, the incorrect statement is

A. E increases

B. I increases

C. O remains same

D. Q increases

Answer: D

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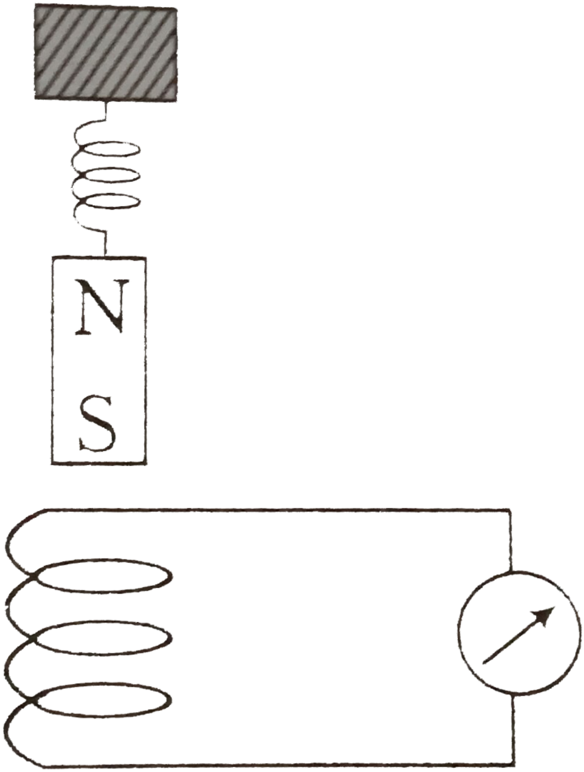
5. A magnet N-S is suspended from a spring and while at oscillates, the magnet moves in and out of the coil C. The coil is connected to a galvanometer G.



Then, as the magnet oscillates,

A. No deflection

B. Deflection to the left and right but the amplitude steadily decreases

C. Deflection to the left and right with constant amplitude

D. Deflection on one side

Answer: B

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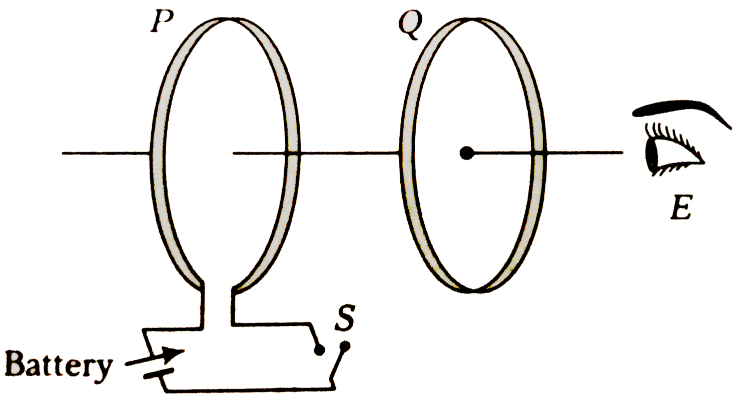
6. As shown in figure, P and Q are two co-axial conducting loops separated by some distance. When the switch S is closed, a clockwise current I_P flows in P (as seen by E) and an induced current I_{Q_1} flows in Q. The switch remains closed for a long time. When S is opened, a current I_{Q_2} flows in Q.

Then, the directions of I_{Q_1} and I_{Q_2} (as seen by E) are



A. Respectively clockwise and anticlockwise

B. Both anticlockwise

C. Both clockwise

D. Respectively anticlockwise and clockwise.

Answer: D

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7. Two different loops are concentric and lie in the same plane. The current in the outer loop is clockwise and increasing with time. The induced current in the inner loop, is

A. Clockwise

B. Zero

C. Anticlockwise

D. In a direction that depends on the ratio of the loop radiI

Answer: C

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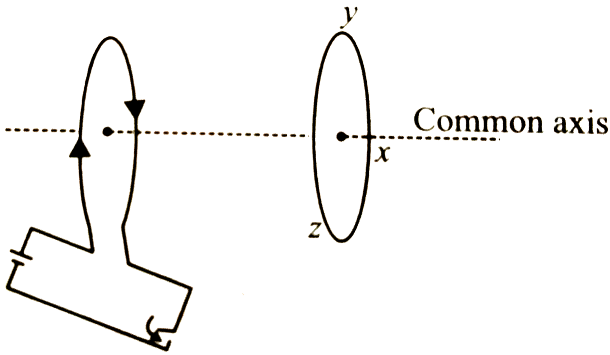
8. The direction of induced currnet in the right loop in the situation shown by the given figure is



(Tapping key just closed)

A. Clockwise

B. Anticlockwise

C. No current will induce

D. Can't be determined

Answer: B

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9. An aluminium ring B faces an electromagnet A. The current I through A can be altered. Then which of the following statement is correct?

A. If I decreases. A will repel B

B. Whether / increases or decreases, B will not experience any force

C. If I increases, A will repel B

D. If I increases, A will attract B

Answer: A

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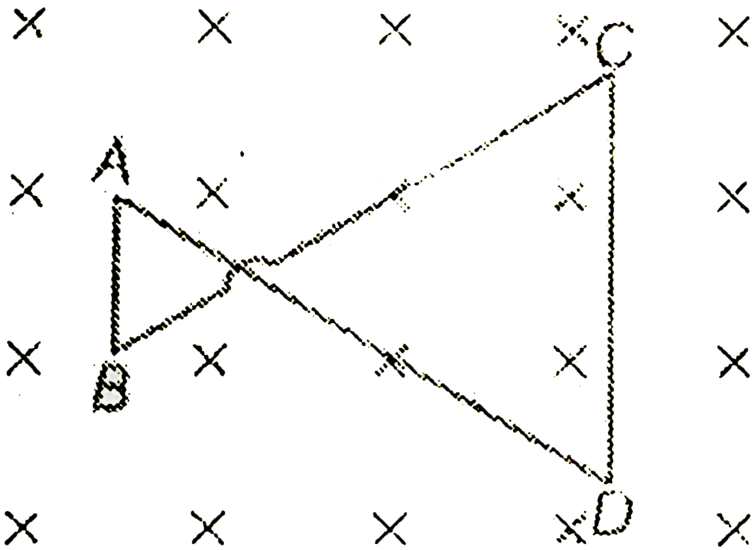
10. A conducting wire frame is placed is placed in a magnetic field which is directed into the paper. The magnetic field is increasing at a costant rae.

The directions of induced currents in wires AB and CD are



A. B to A and D to C

B. A to B and C to D

C. A to B and D to C

D. Bto A and C to D

Answer: A

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11. A vertical rod of length l is moved with constant velocity v towards east. The vertical component of earth magnetic field is B and angle of dip is θ. The induced e.m.f. in the rod is

A. $Blv\sin\theta$

B. $Blv\tan\theta$

C. $Blv\cot\theta$

D. $Blv\cos\theta$

Answer: C

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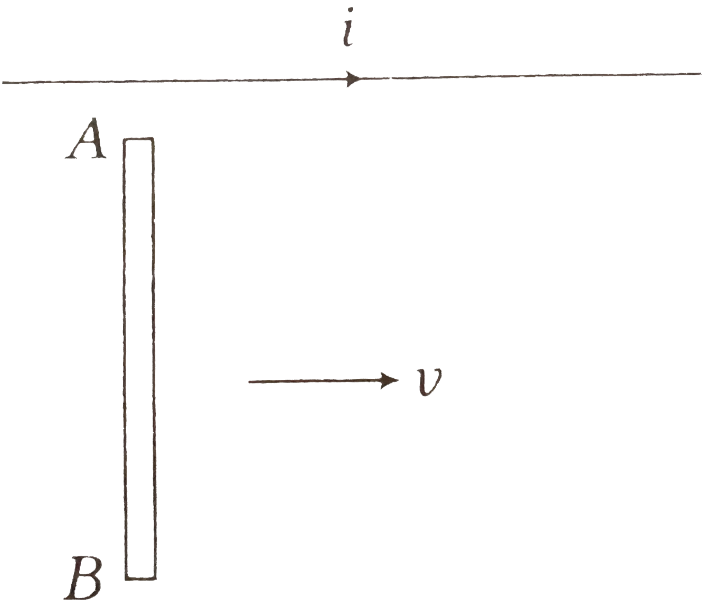
12. The current carrying wire and the rod AB are in the same plane. The rod moves parallel to the wire with a velocity v. Which one of the following statements is true about induced emf in the rod?



A. End A will be at lower potential with respect to B

B. A and B will be at same potential

C. There will be no induced emf in the rod

D. Potential at A will be higher than that at B

Answer: D

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13. A helicopter rises vertically upwards with a speed of 100 m/s. If the helicopter has a length of 10m and horizontal component of earth's magnetic field is $5 \times 10^{-3} Wb/m^2$, then the induced emf between the tip of the nose and the tail of the helicopter is

A. 50 V

B. 0.5 V

C. 5 V

D. 25 V

Answer: C

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14. A rod AB slides on a V shaped wire with speed v as shown, such that at any time OA = OB = l. Magnetic field in the region is perpendicular downwards and has strength B, induced emf in the rod is

A. Zero

B. Bvl

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

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

Answer: B

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15. if given arrangement is moving towards left with speed v, then potential difference between B and D and current in the loop are respectively

A. BvR and non-zero

B. 4BvR and non-zero

C. 2BvR and zero

D. 4BvR and zero

Answer: D

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16. A conducting rod is rotated about one end in a plane perpendicular to a uniform magnetic field with constant angular velocity. The correct graph between the induced emf (e) across the rod and time (t) is

A. $\frac{1}{2}B\omega l^2$

B. $B\omega l^2$

C. $2B\omega l^2$

D. Zero

Answer: D

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17. A semicircular loop of radius R is rotated with an angular velocity ω perpendicular to the plane of a magnetic field B as shown in the figure.

Emf Induced in the loop is

A. $B\omega R^2$

B. $\frac{1}{2}B\omega R^2$

C. $\frac{3}{2}B\omega R^2$

D. $\frac{1}{4}B\omega R^2$

Answer: B

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18. A force of 10N is required to move a conducting loop through a non-uniform magnetic field to 2m/s. The rate of production of internal energy in loop is:

A. 5

B. 20

C. 10

D. Zero

Answer: B

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19. A flexible wire bent in the form of a circle is placed in a uniform magnetic field perpendicular to the plane of the circle, The radius r of circle changes with time t as shown in the figure. The graph of magnitude of induced emf |e| versus time in the circle is represented by

A.

B.

C.

D.

Answer: B

Watch Video Solution

20. Radius ol a circular luop placed in a perpendicular uniform magnetic field is increasing at a constant rate of $r_o ms^1$. If at any instant radius of the loop is r, then emf induced in the loop at that instant will be

A. $-2brr_0$

B. $-2B\pi r$

C. $-B\pi r_0 r$

D. $-2B\pi r_0 r$

Answer: D

Watch Video Solution

21. A wire of fixed length is wound on a solenoid of length 'l' and radius 'r' . Its self inductiane is found to be Now if same wire is wound on a solenoid of length ad radius $\frac{r}{2}$ then the self inductance will be

A. 2L

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

C. 3L

D. 4L

Answer: A

Watch Video Solution

22. The length of thin wire required to manufacture a solenoid of inductance L and length l. (if the cross-sectional diameter is considered less than its length) is

A. $\sqrt{\frac{\pi L l}{2\mu_0}}$

B. $\sqrt{\frac{4\pi L l}{\mu_0}}$

C. $\sqrt{\frac{2\pi L l}{\mu_0}}$

D. $\sqrt{\frac{\pi L l}{\mu_0}}$

Answer: B

Watch Video Solution

23. A conducting ring of radius b is placed coaxially in a long solenoid of radius a (b < a) having n turns per unit length. A current $i = i_0, \cos \omega t$ flows through the solenoid. The induced emf in the ring is

A. Zero

B. $\mu_0 n i_0 \pi a^2 \omega$

C. $\mu_0 n i_0 \pi a^2 \cos \omega t$

D. $\mu_0 n i_0 \pi b^2 \omega \cos \omega t$

Answer: D

Watch Video Solution

24. In what form is the energy stored in an inductor or A coil of inductance L is carrying a steady current i . What is the nature of its stored energy

A. Electrical

B. Heat

C. Magnetic

D. Both electrical and magnetic

Answer: C

Watch Video Solution

25. Which of the following pairs of coils has zero coupling constant?

A.

B.

C.

D. All of these

Answer: B

Watch Video Solution

26. Two coils of self-inductance 2 mH and 8 mH are placed, so close together that the effective flux in one coil is completely linked with the other. The mutual inductance between these coils is

A. 10 mH

B. 6 mH

C. 4 mH

D. 16 mH

Answer: C

Watch Video Solution

27. The equivalent inductance of two inductors is 2.4 H when connected in parallel and 10 H when connected in series. What is the value of inductances of the individual inductors?

A. 2H

B. 3H

C. 4H

D. 5H

Answer: A

Watch Video Solution

28. In an A.C. sub-circuit as shown in figure, the resistance $R = 0.2\Omega$. At a certain instant $V_A - V_B = 0.5V$, I= 0.5 A, and current is increasing at the rate of $\frac{\Delta l}{\Delta t} = 8A/s$. The Inductance of the coil is

A. 0.01 H

B. 0.05 H

C. 0.02 H

D. 0.5 H

Answer: B

Watch Video Solution

29. A coil of self inductance 50 henry is joined t the terminals of a battery of e.m.f 2 volts through the circuit . If the battery is now disconnected , the time in which the currents will decay to 1/e of its steady value is :

A. 500s

B. 50 s

C. 5 s

D. 0.5 s

Answer: C

Watch Video Solution

30. The ratio of initial to final current through the battery when the switch is closed in the figure is

A. Zero

B. ∞

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

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

Answer: D

Watch Video Solution

Assignment Section A Objective Type Questions

1. The dimensional formula for magnetic flux is

A. $[ML^2T^{-2}A^{-1}]$

B. $[ML^1T^{-1}A^{-2}]$

C. $[ML^2T^{-3}A^{-1}]$

D. $[ML^{-2}T^{-2}A^{-2}]$

Answer: A

Watch Video Solution

2. An emf can be induced in stationary coil if it is kept in

A. Stationary uniform magnetic field

B. Stationary nonuniform magnetic field

C. Time varying magnetic field

D. Not possible

Answer: C

Watch Video Solution

3. The induced e.m.f. in a coil does not depend on

A. The number of turns in the coil

B. The rate of change of magnetic flux

C. Time of rotation

D. The resistance of the circuit

Answer: D

Watch Video Solution

4. The magnetic flux ϕ (in weber) in a closed circuit of resistance 10Ω varies with time t (in secnod) according to equation $\phi = 6t^2 - 5t + 1$. The magnitude of induced current at $t = 0.25$ s is

A. 1.2A

B. 0.2A

C. 0.6A

D. 0.8A

Answer: B

Watch Video Solution

5. A cylindrical bar magnet is kept along the axis of a circular coil. If the magnent is rotated about its axis, then

A. No current

B. A current

C. Only an e.m.f.

D. Both an e.m.f. and a current

Answer: A

Watch Video Solution

6. A magnet is brought towards a coil (i) speedly (ii) slowly, then induced emf/induced charge will be respectively

A. More in case (i)

B. More in case (ii)

C. Equal in both the cases

D. More or less according to the radius of the coil

Answer: C

Watch Video Solution

7. A circular loop of flexible conducting material is kept in a magnetic field directed perpendicularly into its plane. By holding the loop at diametrically opposite points its is suddenly stretched outwards, then

A. No current is induced in the loop

B. Anti-clockwiso current is induced

C. Clockwise current is induced

D. Only e.m.f. is induced

Answer: C

Watch Video Solution

8. An aeroplane is flying horizontally with a velocity of 360Km/hr. The distance between the tips of wings is 50m. If the vertical component of earth's magnetic field is $4 \times 10^{-4} T$, induced EMF across the wings is:

A. 1 V

B. 100V

C. 1 kV

D. Zero

Answer: A

Watch Video Solution

9. The magnetic flux through a coil varies with timet as shown in the diagram. Which graph best represents the variation of the e.m.f. E induced in the coil with time t?

A.

B.

C.

D.

Answer: C

Watch Video Solution

10. A coil having 500 square loops each of side 10 cm is plance normal to a magnetic flux which increases at the rate of $1.0 T s^{-1}$. The induced emf in volts is

A. 0.5

B. 0.1

C. 1

D. 5

Answer: D

Watch Video Solution

11. The physical quantity, which is conserved on the basis of Lenz's Law is

A. Charge

B. Momentum

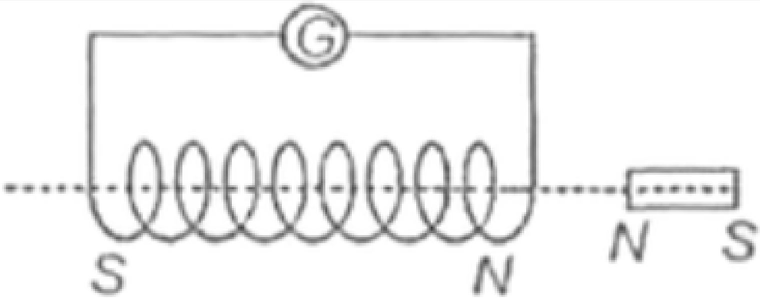
C. Mass

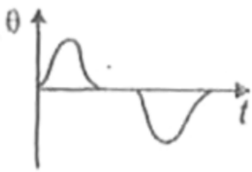
D. Energy

Answer: D

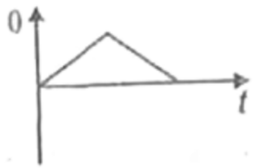
Watch Video Solution

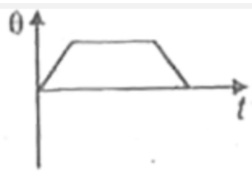
12. A short bar magnet passes at a steady speed right through a'long solenoid. A galvanometer is connected across the solencid. Which graph best represents the variation of the galvanometer deflection with time t?



A. 

B. 

C. 

D. 

Answer: A

Watch Video Solution

13. A metallic ring with a small cut is held horizontally and a magnet is allowed to fall vertically through the ring then the acceleration of the magnet is :

A. Equal to g

B. More than g

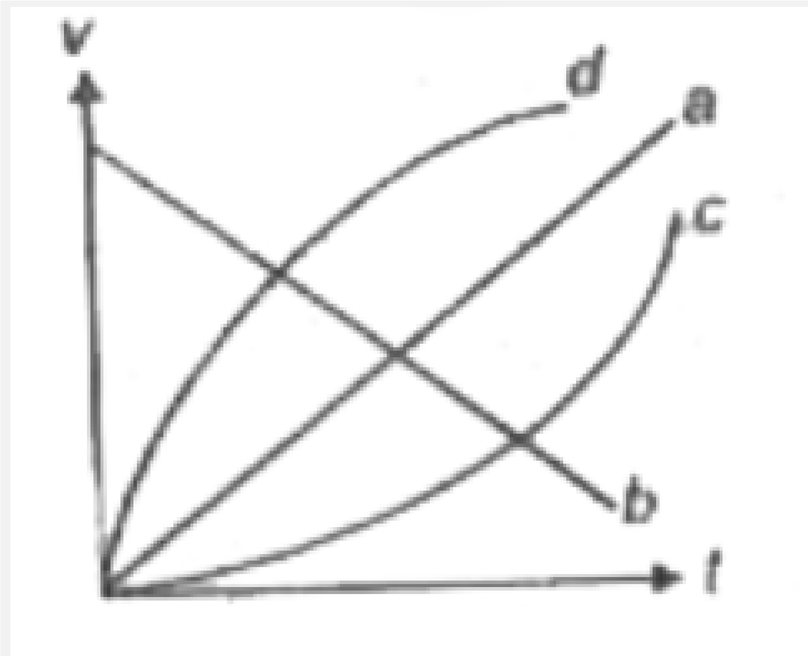
C. Less than g

D. Sometimes less and sometimes more than g

Answer: A

Watch Video Solution

14. A bar magnet is made to fall through a long vertica! copper tube. The speed (V) of the magnet as a function of time (t) is best represented by



A. a

B. b

C. c

D. d

Answer: D

Watch Video Solution

Watch Video Solution

15. A loop of Irregular shape made of flexible conducting wire carrying clockwise current is placed in uniform inward magnetic field, such that its plane is perpendicular to the field. Then the loop

A. Experiences force

B. Develops induced current for a short time

C. Changes to circular loop

D. All of these

Answer: D

Watch Video Solution

16. A loop of irregular shape of conducting wire PORS (as shown in figure) placed in a uniform magnetic field perpendicular to the plane of the paper changes into a circular shape. The direction of induced current will be

A. Clockwise

B. Anti-clockwise

C. No current

D. None of these

Answer: A

Watch Video Solution

17. When a conducting wire XY is moved towards the right, a current flows in the anti-clockwise direction. Direction of magnetic field at point O is

A. Parallel to motion of wire

B. Along XY

C. Perpendicular outside the paper

D. Perpendicular-inside the paper

Answer: C

Watch Video Solution

18. A copper rod of length l is rotated about one end perpendicular to the uniform magnetic field B with constant angular velocity ω . The induced e.m.f. between its two ends is

A. $B\omega l^2$

B. $\frac{3}{2}B\omega l^2$

C. $\frac{1}{2}B\omega l^2$

D. $2B\omega l^2$

Answer: C

Watch Video Solution

19. A coil of cross-sectional area A having n turns is placed in uniform magnetic field B. When it is rotated with an angular velocity ω, the maximum e.m.f. induced in the coil will be :

A. $NAB\omega$

B. $\frac{NAB}{\omega}$

C. $\frac{NA\omega}{B}$

D. $\frac{\omega B}{NA}$

Answer: A

Watch Video Solution

20. A flat coil of 500 turns each of area $50cm^2$ rotates in a uniform magnetic field of $0.14Wb/m^2$ at an angular speed of $150rad/\sec$. The coil has a resistance of 5Ω. The induced e.m.f. is applied to an external resistance of 10 ohm. Calculate the peak current through the resistance.

A. 1.5 A

B. 2.5 A

C. 3.5 A

D. 4.5 A

Answer: C

Watch Video Solution

21. Eddy current are produce when

A. A metal block is kept in a changing magnetic field

B. A metal block is kept in a changing magnetic field

C. A coil is kept in a uniform magnetic field

D. Current is passed in a coil

Answer: A

Watch Video Solution

22. A motor starter

A. Is a variable resistor

B. Offsets the back emf variations

C. Helps start a DC motor

D. All of these

Answer: D

Watch Video Solution

23. A simple electric motor has an armature resistance of 1Ω and runs from a dc source of 12 volt . When running unloaded it draws a current of 2 amp . When a certain load is connected , its speed becomes one-half of its unloaded value . The new value of current drawn

A. 3A

B. 6A

C. 2A

D. 1A

Answer: A

Watch Video Solution

24. Which of the following is possible application of an RC circuit?

A. Windshield wipers

B. Flashing red lights on roadway construction sites

C. Heart pacemakers

D. All of these

Answer: D

Watch Video Solution

25. The current passing through a choke coil of 5 henry is decreasing at the rate of $2ampere/\sec$. The e.mf. Developing across the coil is

A. 10 V

B. - 10 v

C. - 2.5 V

D. 2.5 V

Answer: A

Watch Video Solution

26. When the number of turns in a coil is doubled without any change in the length of the coil, its self-inductance becomes

A. Half

B. Double

C. Four times

D. Eight times

Answer: C

Watch Video Solution

27. A coil of resistance 10 W and an inductance 5H is connected to a 100 volt battery . Then energy stored in the coil is :

A. 31.25 J

B. 62.5 J

C. 125 J

D. 250 J

Answer: B

Watch Video Solution

28. (a) Obtain the expression for the magnetic energy stored in a solenoid in terms of magnetic field B, area A and length l of the solenoid. (b) How does this magnetic energy compare with the electrostatic energy stored in a capacitor?

A. $\dfrac{B^2AL}{2\mu_0^2}$

B. $\dfrac{AL}{2\mu_0}$

C. $\dfrac{1}{2}\mu_0 B^2 AL$

D. $\dfrac{B^2AL}{2\mu_0}$

Answer: D

Watch Video Solution

29. An inductor is connected to a direct voltage source through a switch. Now

A. Very large emf is induced in inductor when switch is closed

B. Larger emf is induced when switch is opened

C. Large emf is induced whether switch is closed or opened

D. No emf is induced whether switch is closed or opened

Answer: B

Watch Video Solution

30. A long solenoid has self inductance. L. If its length is doubled keeping total number of turns constant then its new self inductance will be

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

B. 2L

C. L

D. $\frac{L}{4}$

Answer: A

Watch Video Solution

31. If L and R denote inductance and resistance , respectively , then the dimensions of L/R are

A. $[M^0L^0T^{-1}]$

B. $\left[M^0L^0T^1\right]$

C. $\left[M^0L^0T^2\right]$

D. $\left[MLT^2\right]$

Answer: B

Watch Video Solution

32. A solenoid of 2000 turns is wound over a length of 0.3 m. The area aof cross section is $1.3 \times 10^{-3} m^2$. Around its central seciton, a coil of 300 turns is closely wound. If an initial current of 2 A is reversed in 0.25 s, find the e.m.f induced in the coil .

A. $6 \times 10^{-4} V$

B. $4.8 \times 10^{-2} V$

C. $2.4 \times 10^{-2} v$

D. 48kV

Answer: B

Watch Video Solution

33. With the decrease of current in the primary coil from 2 amperes to zero value in 0.01 s the emf generated in the secondary coil is 1000 volts. The mutual inductance of the two coils is

A. 1.25 H

B. 2.50 H

C. 5.00 H

D. 10.00 H

Answer: C

Watch Video Solution

34. Two coaxial coils are very close to each other and their mutual inductance is 5 mH. If a current (50 A) sin 500t is passed in one of the coils, then find the peak value of induced emf in the secondary coil.

A. 5000 V

B. 500 V

C. 150 V

D. 125 V

Answer: D

Watch Video Solution

35. The coefficients of self induction of two inductance coil are 0.01 H and 0.03H respectively . When they are conneted in series so as to support each other, then the resultant self inductance becomes 0.06 Henry. The value of coefficient of mutual induction be __

A. 5 mH

B. 10 mH

C. 20 mH

D. 40 mH

Answer: B

Watch Video Solution

Assignment Section B Objective Type Questions

1. A conducting rod AB of length l is projected on a frictionless frame PSRQ with velocity v_0 at any instant. The velocity of the rod after time t is

A. $v = v_0$

B. $v > v_0$

C. $v < v_0$

D. None of these

Answer: C

Watch Video Solution

2. In the circuit of figure , the bulb will be become suddenly bright , if

A. Switch is closed or opened

B. Switch is closed

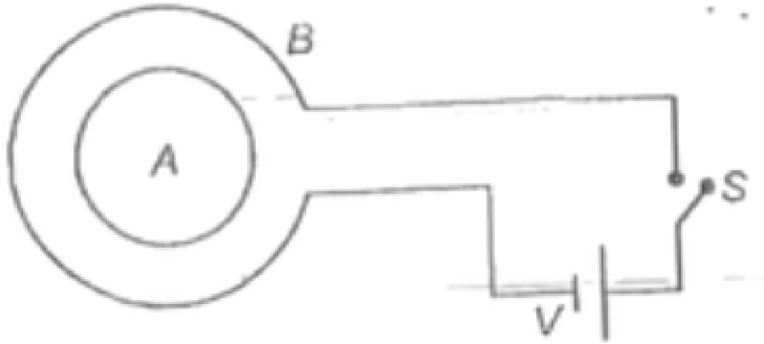
C. Switch is opened

D. None of these

Answer: C

Watch Video Solution

3. What will be the direction of current in the coil A as the switch S is closed?



A. Clockwise

B. Anticlockwise

C. Anticlockwise and then clockwise

D. Clockwise and then anticlockwise

Answer: A

Watch Video Solution

4. The armature of a generator of resistance 1Ω is rotated at its rated speed and produces 125 V without load and 115 V with full load. The current in the armature coil is

A. 240 A

B. 10 A

C. 1 A

D. 2A

Answer: B

Watch Video Solution

5. A copper disc of the radius 0.1 m is rotated about its centre with 20 revolutions per second in a uniform magnetic field of 0.1 T with its plane perpendicular to the field. The emf induced across the radius of the disc is-

A. $\frac{\pi}{10}$volt

B. $\frac{\pi}{100}$volt

C. $\frac{\pi}{1000}$volt

D. zero

Answer: B

Watch Video Solution

6. A frame CDEF is placed in a region where a magnetic field $\overline{B}$ is present. A rod of length one metre moves with constant velocity $20m/s$ and strength of magnetic field is one tesla. The power spent in the process is (take $R = 0.2\Omega$ and all other wires and rod have zero resistance)

A. 1 kW

B. 2 kW

C. 3 kW

D. 4 kW

Answer: A

Watch Video Solution

7. An ideal solenoid of cross-sectional area $10^{-4}m^2$ has 500 turns per metre. At the centre of this solenoid, another coil of 100 turns is wrapped closely around it. If the current in the coil changes from 0 to 2 A in 3.14 ms, the emf developed in the second coil is

A. 1 mv

B. 2 mv

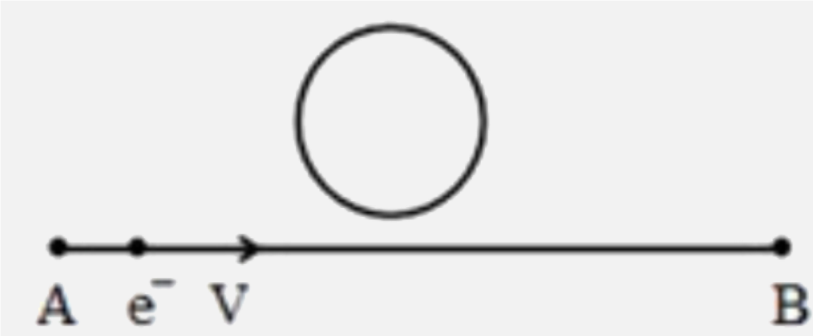
C. 3 mv

D. 4 mv

Answer: D

Watch Video Solution

8. An electron moves along the line AB with constant velocity V which lies in the same plane as a circular loop of conducting wire , as shown in the figure . What will be the direction of current induced in the loop ?



A. Clockwise

B. First anticlockwise then clockwise

C. First clockwise then anticlockwise

D. No current is induced

Answer: C

Watch Video Solution

9. Figure shows an L-R circuit. When the switch S is closed, the current through resistor R_1, R_2 and l_3 are l_1, l_2 and l_3 respectively. The value of l_1, l_2 and l_3 at t=0 s is

A. $l_1 = l_2 = l_3 = 0$

B. $l_1 = \frac{E}{R_2}, l_3 = l_2 = 0$

C. $l_1 = 0, l_2 = \frac{E}{R_2}, l_3 = \frac{E}{R_3}$

D. $l_1 = \frac{E}{R_1}, l_2 = \frac{E}{R_2 + L_1}, l_3 = \frac{E}{R_3 + L_3}$

Answer: B

Watch Video Solution

10. Two coils A and B are wound on the same iron core as shown in figure. The number of turns in the coil A and B are N_A and N_B respectively. Identify the correct statement

A. Both the coils have same magnitude of magnetic flux

B. The magnetic flux linked are in the ratio $\frac{\phi_A}{\phi_B} = \frac{N_A}{N_B}$

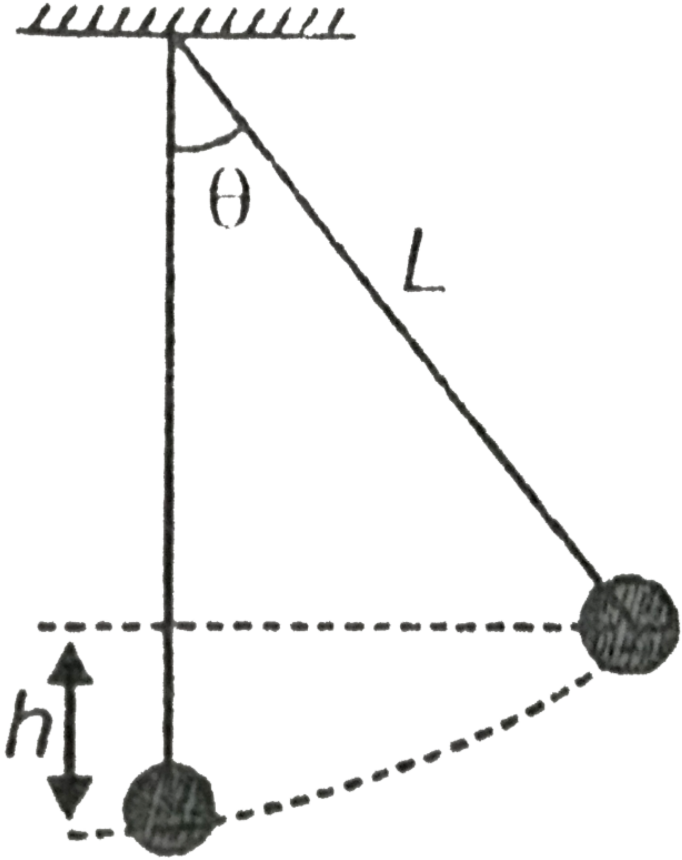
C. The induced emfacross each coil are in the ratio $\frac{E_A}{E_B} = \left(\frac{N_A}{N_B}\right)^2$

D. Both the coils have same magnitude of induced emf

Answer: B

Watch Video Solution

11. A simple pendulum with bob of mass m and conducting wire of length L swings under gravity through an angle 2θ. The earth's magnetic field component in the direction perpendicular to swing is B. The maximum potential difference induced across the pendulum is



A. $2BL\sin\left(\frac{\theta}{2}\right)\sqrt{gL}$

B. $BL\sin\left(\frac{\theta}{2}\right)\sqrt{gL}$

C. $BL\sin\left(\frac{\theta}{2}\right)\frac{(gL)^3}{2}$

D. $BL\sin\left(\frac{\theta}{2}\right)(gL)^2$

Answer: B

Watch Video Solution

12. The switch shown in the circuit is closed al t = 0, The current drawn from the battery by the circuit at t = 0 and $1 = \infty$ are in the ratio

A. 2:1

B. 1:2

C. 1:1

D. 1:4

Answer: C

Watch Video Solution

13. A small square loop of wire of side l is placed inside a large square loop of wire of side $L(> \; > l)$. The loops aer coplanar and their centres coincide. What is the mutual inductance of the system?

A. $\dfrac{2\sqrt{2}\mu_0 L}{\pi l}$

B. $\dfrac{2\sqrt{2}\mu_0 L^2}{\pi l}$

C. $\dfrac{2\sqrt{2}\mu_0 l}{\pi L}$

D. $\dfrac{2\sqrt{2}\mu_0 l^2}{\pi L}$

Answer: D

Watch Video Solution

14. A uniform magnetic field exista in reign given by . A rod of length 5m placed along y-axis is moved along x-axis with constant speed 1m/sec. The induced emf in the rod will be

A. Zero

B. 25 V

C. 5V

D. 10 V

Answer: B

Watch Video Solution

15. A copper rod AB-of length / pivoted at one end A, rotates at constant angular velocity ω, at right angles to a uniformn magnetic field of induction B. The emf, developed between the mid point of the rod and end B is

A. $\frac{B\omega l^2}{8}$

B. $\frac{3}{4}B\omega l^2$

C. $\frac{B\omega l^2}{4}$

D. $\frac{3}{8}B\omega l^2$

Answer: D

Watch Video Solution

16. Radius ol a circular luop placed in a perpendicular uniform magnetic field is increasing at a constant rate of $r_o ms^1$. If at any instant radius of the loop is r, then emf induced in the loop at that instant will be

A. $-2Brr_0$

B. $-2B\pi r$

C. $-B\pi rr_0$

D. $-2B\pi rr_0$

Answer: D

Watch Video Solution

17. The figure shows three circuits with identica batteries, inductors and resistances. Rank the circuits according to the currents through the battery just after the switch is closed, greatest fire

A. $l_2 > l_3 > l_1$

B. $l_2 > l_1 > l_3$

C. $l_1 > l_2 > l_3$

D. $l_1 > l_3 > l_2$

Answer: A

Watch Video Solution

18. In an inductor, the current / varies with time to $l = 5A + 16.\ (A/s)t.$

If-induced emf in the induct is 5 mV, the self inductance of the inductor is

A. $3.75X10^{-3}H$

B. $3.75X10^{-4}H$

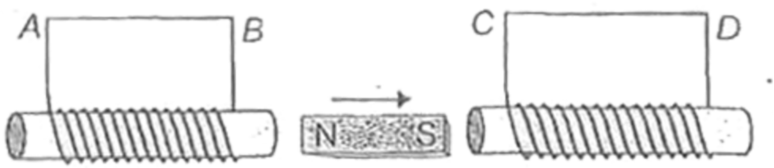
C. $3.125X10^{-3}H$

D. $3.125X10^{-4}H$

Answer: D

Watch Video Solution

19. A magnet is moved in the direction indicaled by an arrow between two coils AB and CD as shown in figure. The direction of induced current in the straight wire is



A. A to Band C to D

B. Bto A and C to D

C. A to B and D to C

D. B to A and D to C

Answer: C

Watch Video Solution

20. Two coils of self-inductance L_1 and L_2 are palced closer to each other. If M is mutual inductance between them, then

A. $M = L_1 L_2$

B. $M = \sqrt{L_1 L_2}$

C. $M < \sqrt{L_1 L_2}$

D. $M > \sqrt{L_1 L_2}$

Answer: B

Watch Video Solution

21. The network shown in figure is a part of a complete circuit. If at a certain instant, the current i is 4 A and is increasing at a rate of $10^3 A/S$. Then $V_B - V_A$ will be

A. -11 V

B. 11 V

C. 16 V

D. 21. V

Answer: C

Watch Video Solution

22. A magnetic flux through a stationary loop with a resistance R varies during the time interval τ as $\phi = at(\tau - t)$. Find the amount of heat the generated in the loop during that time

A. $\dfrac{a^2T^3}{3R}$

B. $\dfrac{a^2T^2}{3R}$

C. $\dfrac{a^2T}{3R}$

D. $\dfrac{a^3T^2}{3R}$

Answer: A

Watch Video Solution

23. A short-circuited coil is placed in a time-varying magnetic field. Electrical power is dissipated due to the current induced in the coil. If the number of turns were to be quadrupled and the wire radius halved, then the electrical power dissipated would be

A. Halved

B. The same

C. Doubled

D. Quadrupled

Answer: B

Watch Video Solution

24. In a collinear collision, a particle with an initial speed v0 strikes a stationary particle of the same mass. If the final total kinetic energy is 50% greater than the original kinetic energy, the magnitude of the relative velocity between the two particles, after collision, is :

A. $\frac{l^2}{r}$

B. $\frac{l^2}{r^2}$

C. $\frac{r}{l^2}$

D. $\frac{r^2}{l}$

Answer: A

Watch Video Solution

25. In which of the following situations, the magnetic field can accelerate a charge particle at rest?

I. When the magnetic field is uniform with respect to time as well as position

II. When the magnetic field is time varying but uniform w.r.t. position

III. When the magnetic field is time independent but position dependent

A. I, II & II

B. III only

C. II only

D. None of these

Answer: C

Watch Video Solution

Assignment Section C Previous Years Questions

1. Figure shows a circuit that contains three identical resistors with reisistance $R = 9.0\Omega$ each, two identical inductors with inductance $L = 2.0mH$ each, and an ideal battery with $emfe = 18V$. The current I through th battery just after the switch closed is

A. 2 mA

B. 0.2 A

C. 2A

D. O ampere

Answer: C

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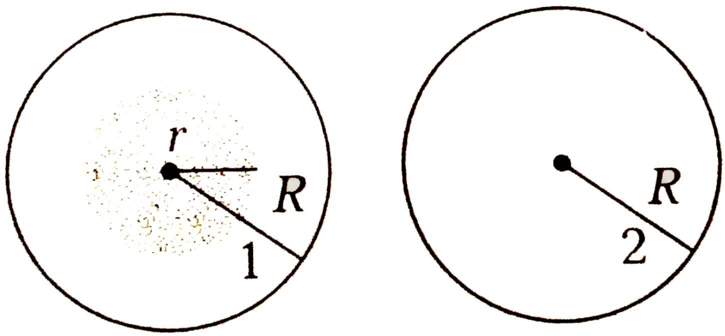
2. A uniform magnetic field is restricted within a region of radius r. The magnetic field changes with time at a rate $\frac{dB}{dt}$. Loop 1 of radius R $>$ r encloses the region r and loop 2 of radius R is outside the region of magnetic field as shown in figure. Then, the emf generated is



Zero in loop 1 and zero in loop 2

− d B d t π r 2 in loop 1 and − d B d t π 2 in loop 2

− d B d t π R 2 in loop 1 and zero in loop 2

− d B d t π r 2 in loop 1 and zero in loop 2

A. Zero in loop 1 and zero in loop 2

B. $-\frac{d\overline{B}}{dt}\pi r^2$ in loop 1 and $-\frac{d\overline{B}}{dt}\pi r^2$ in loop 2

C. $-\frac{d\overline{B}}{dt}\pi R^2$ in-loop 1 and zero in loop2

D. $-\frac{d\overline{B}}{dt}\pi r^2$ in-loop 1 and zero in loop2

Answer: D

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3. A long solenoid has 1000 turns. When a current of 4 A flows through it, then the magnetic flux linked with each turn of the solenoid is 4×10^{-3} Wb. The self-inductance of the solenoid is

A. 1H

B. 4H

C. 3H

D. 2H

Answer: A

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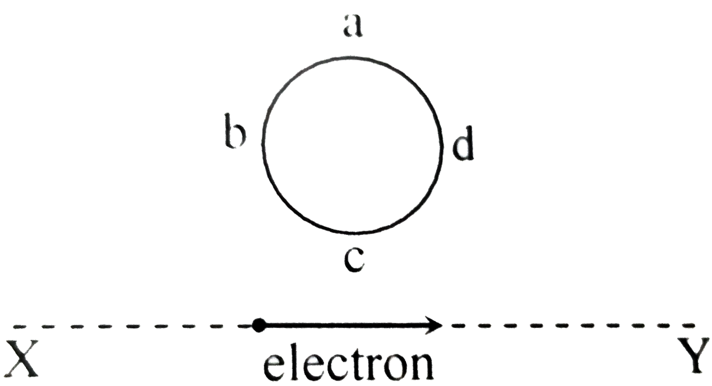
4. An electron moves on a straight line path XY as shown. The abcd is a coild adjacent to the path of electron. What will be the direction of current, if any, included in the coil?



A. No current induced

B. abcd

C. adcb

D. The current will reverse its direction as the electron goes past the coil

Answer: D

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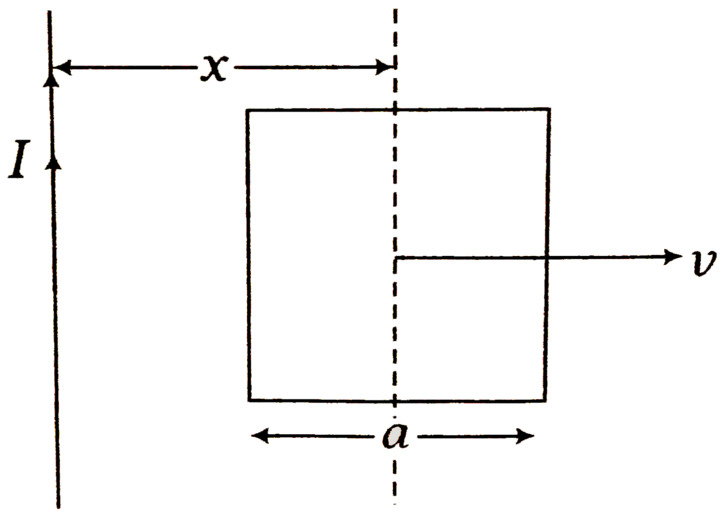
5. A conducting square frame of side a and a long straight wire carrying current I are located in the same plane as shown in the figure. The frame moves to the right with a constant velocity v.

The emf induced in the frame will be proportional to



A. $\frac{1}{2x - a}(2x + a)$

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

C. $\frac{1}{(2x - a)^2}$

D. $\frac{1}{(2x + a)^2}$

Answer: A

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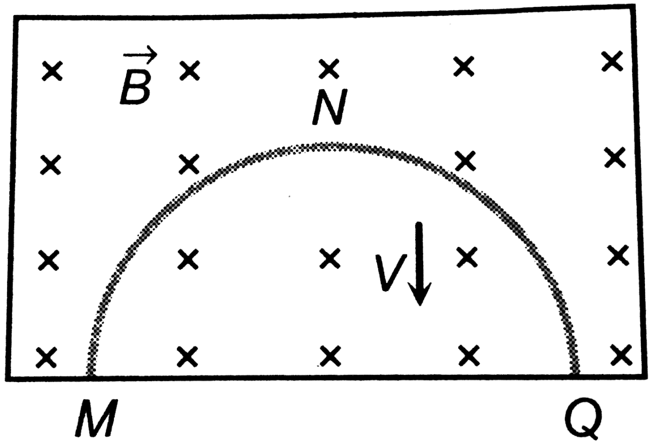
6. A thin semicircular conducting ring of radius R is falling with its plane verticle in a horizontal magnetic inducting B. At the position MNQ, the speed of the ring is V and the potential difference developed across the ring is



(1.) zero

(2.)$Bc\pi R^2/2$

(3.) πRBV

(4.) $2RBV$

A. Zero

B. $Bv\pi\frac{r^2}{2}$ and P is at higher potential

C. πrBv and R is at higher potential

D. $2rBv$ and R is at higher potential

Answer: D

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7. A coil of self-inductance L is connected in series with a bulb B and an AC source. Brightness of the bulb decreases when

A. Number of turns in the coil is reduced

B. A capacitance of reactance $X_c = X_L$ is included in the same circuit

C. An iron rod is inserted in the coil

D. Frequency of the AC source is decreased

Answer: C

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8. A wire loop is rotated in magneitc field. The frequency of change of direction of the induced e.m.f. is.

(1.) Once per revolution

(2.) twice per revolution

(3.) four times per revoution

(4.) six time per revolution

A. Twice per revolution

B. Four times per revolution

C. Six times per revolution

D. Once per revolution

Answer: A

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9. A coil of resitance 400Ω is placed in a magnetic field . If the magentic flux ϕ (Wb) linked with the coil varies with time t (second) as $\phi = 50t^2 + 4$ The current in the coils at t=2 s is

A. 2A

B. 1A

C. 0.5 A

D. 0.1 A

Answer: C

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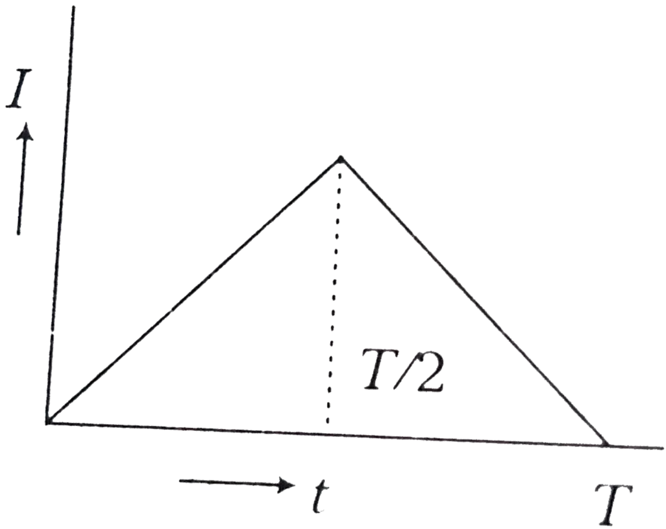
10. The current (I) in the inductance is varying with time according to the plot as shown in figure.



Which oneof the following is the correct variations of voltage with time in the coil?

A.

B.

C.

D.

Answer: B

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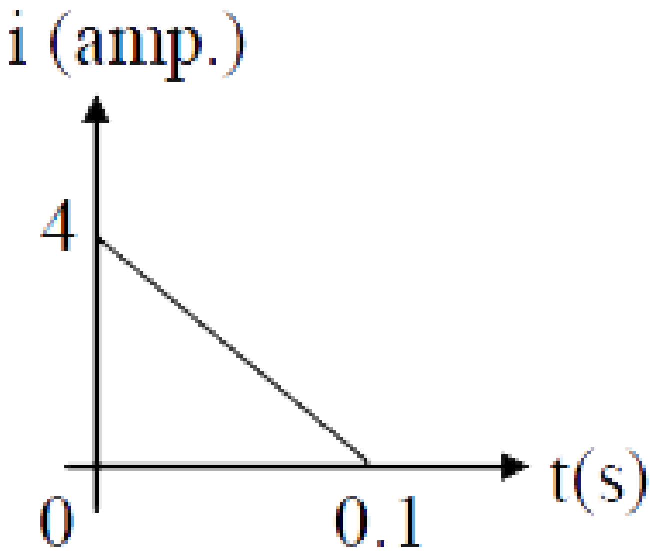
11. In a coil of resistance 10Ω, the induced current developed by changing magnetic flux through it, is shown in figure as a function of time. The magnitude of change in flux through the coil in Weber is -



A. 8

B. 2

C. 6

D. 4

Answer: B

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12. The current in a coil varies with time as shown in the figuro. The variation of induced emf with time would be

A.

B.

C.

D.

Answer: A

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13. A conducting circular loop is placed in a uniform magnetic field, B = 0.025 T with its plne perpendicular to the loop. The radius of the loop is made to shrink at a constant rate of $1mms^{-1}$. The induced emf when the radius is 2 cm, is

A. $2\pi\mu V$

B. $\pi\mu V$

C. $\frac{\pi}{2}\mu V$

D. $2\mu V$

Answer: B

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14. A conducting circular loop is placed in a uniform magnetic field $0.04T$ with its plane perpendicular to the magnetic field. The radius of the loop starts shrinking at $2mm/\sec$. The induced emf in the loop when the radius is $2cm$ is:

(1.) 3.2 π μ V

(2.) 4.8 π μ V

(3.) 0.8 π μ V

(4.) 1.6 π μ V

A. $4.8\pi\mu V$

B. $0.8\pi\mu V$

C. $1.6\pi\mu V$

D. $3.2\pi\mu V$

Answer: D

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15. A circular disc of radius $0.2m$ is placed in a uniform magnetic fied of induction $\frac{1}{\pi}\left(\frac{Wb}{m^2}\right)$

in such a way that its axis makes an angle of 60° with B. The magnetic flux linked with the disc is

A. 0.01 Wb

B. 0.02 Wb

C. 006 Wb

D. 0.08 Wb

Answer: B

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16. A long solenoid has 500 turns, When a current of 2 A is passed through it, then the resulting magnetic flux linked with each turn of the soleniod is $4 \times 10^{-3} Wb$. The self-inductance of the solenoid is

A. 4.0 H

B. 2.5 H

C. 2.0 H

D. 1.0 H

Answer: D

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17. What is the value of inductance L for which the current is maximum in a series LCR circuit with $C = 10\mu F$ and $\omega = 1000s^{-1}$

A. 10 mH

B. 100 mH

C. 1 mH

D. Cannot be calculated unless R is known

Answer: B

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18. Two coils of self-inductance 2 mH and 8 mH are placed, so close together that the effective flux in one coil is completely linked with the other. The mutual inductance between these coils is

A. 10 mH

B. 6 mH

C. 4 mH

D. 16 mH

Answer: C

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19. A closed iron ring is held horizontally and a bar magnet is dropped through the ring with its length along the axis of he ring. The acceleration of the falling is

A. More than g

B. Equal to g

C. Less than g

D. Either (1) or (3)

Answer: C

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20. The magnetic flux through Circuit of resistance R chages by an amount $\Delta\psi$ in a time Δt. Then the total quqntity in the circuit during thime Δt is respresented by

A. $Q = \frac{1}{R}\frac{\Delta\phi}{\Delta t}$

B. $Q = \frac{\Delta\phi}{R}$

C. $Q = \frac{\Delta\phi}{\Delta t}$

D. $Q = R.\frac{\Delta\phi}{\Delta t}$

Answer: B

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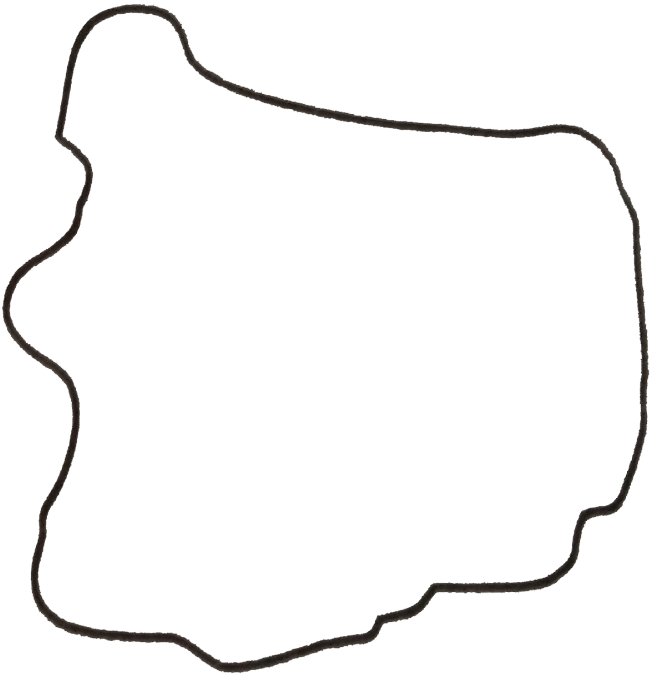
21. As a result of change in the magnetic flux linked to the closed loop shown in figure, and emf, V volt is induced in the loop. The work done (in joule) in taking a charge q coulomb once along the loop is



A. QV

B. 2QV

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

D. Zero

Answer: A

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22. A rectangular, a square, a circular and an elliptical loop, all in the XY-plane, are moving out of a uniform magnetic field with a constant velocity $v = u\hat{\text{I}}$. The magnetic field is directed along the negative Z-axis direction. The induced emf during the passage of these loops, out of the field region, will not remain constant for

A. Any of the four loops

B. The rectangular, circular and elliptical loops

C. The circular and the elliptical loops

D. Only the elliptical loop

Answer: C

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23. A conductor of $3m$ in length is moving perpendicularly to magnetic field of 10^{-4} tesla with the speed of $10^2 m/s$, then the e.m.f. produced across the ends of conductor will be

A. 0.3N

B. 0.9 N

C. Zero

D. $3 \times 10^{-3} N$

Answer: C

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24. In a circular conducting coil, when current increases from $2A$ to $18A$ in 0.05 sec., the induced e.m.f. is $20V$. The self-inductance of the coil is

A. 62.5 mH

B. 6.25 mH

C. 50 mH

D. Zero

Answer: A

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25. In the circuit given in tigure, 1 and 2 are ammeters. Just after key K is pressed to complete the circuit the reading will be

A. Zero in 1, maximum in 2

B. Maximum in both 1 and 2

C. Zero in both 1 and 2

D. Maximum in 1, zero in 2

Answer: D

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26. Self-inductance of a coil is 2mH, current through this coil is, $I = t^2 e^{-t}$ (t = time). After how much time will the induced emf be zero?

A. 2s

B. 1s

C. 4s

D. 3s

Answer: A

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27. When the number of turns and the length of the solenoid are doubled keeping the area of cross-section same, the inductance

A. Four times

B. Doubled

C. Halved

D. Unchanged

Answer: B

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28. The time constant of L-R circuit is doubled if

A. Both Land R become two times

B. L becomes four times and R becomes two times

C. L becomes two times and R becomes four times

D. L becomes two times and R becomes eight times

Answer: B

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29. Two neighbouring coils A and B have a mutual inductance of 20 mH. The current flowing through A is given by, $i = 3t^2 - 4t + 6$. The induced eml at t=2s is

A. 160 mV

B. 200 mV

C. 260 mV

D. 300 mV

Answer: A

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30. The self inductance L of a solenoid depends on the number of turns per unit length 'n' as

A. $L \propto n$

B. $L \propto n^2$

C. $L \propto n^{-1}$

D. $L \propto n^{-2}$

Answer: B

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31. Two coils have a mutual inductance 0.005 H. The current changes in the first coil according to equation $l = l_0 \sin \omega t$, where $l_0 = 10A$ and $\omega = 100\pi \text{rads}^{-1}$. The maximum value of emf in the second coil is (in volt)

A. π

B. 5π

C. 2π

D. 4π

Answer: B

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32. A transfomer has 500 primary tunrs and 10 secondary turns. If the secondary has a resistive load respectively, are

A. $0.16A, 3.2 \times 10^{-3}A$

B. $3.2 \times 10^{-3}A0.16A$

C. 0.16A0.16A

D. $3.2 \times 10^{-3}A3.2 \times 10^{-3}A$

Answer: B

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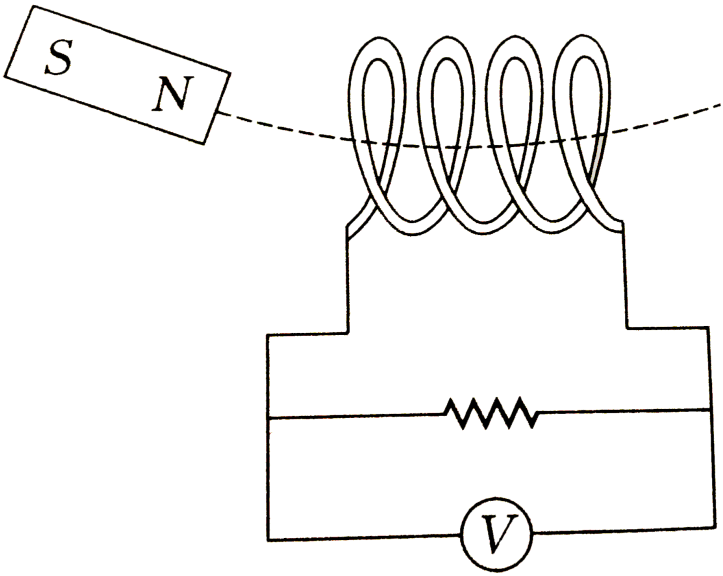
33. A magnet is made to oscillate with a particular frequency, passimg through a coil as shown in figure. The time variation of the magnitude of emf generated across the coil during one cycle



A.

B.

C.

D.

Answer: C

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34. Two coils have self-inductance $L_1 = 4mH$ and $L_2 = 1mH$ respectively. The currents in the two coils are increased at the same rate. At a certain instant of time both coils are given the same power. If I_1 and I_2 are the currents in the two coils at that instant of time respectively, then the value of $\frac{I_1}{I_2}$ is

A. $\frac{1}{8}$

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

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

D. 1

Answer: B

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Assignment Section D Assertion Reason Type Question

1. A : Total induced emf in a loop is not confined to any particular point but it is distributed around the loop in direct proportion to the resistances of its parts.

R: In general when there is no change in magnetic flux, no induced emf is produced.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion.

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion.

C. If Assertion is true statement but Reason is false.

D. If both Assertion and Reason are false statements.

Answer: B

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2. A: The induced current flows so as to oppose the cause producing it.

R: Lenz's law is based on energy conservation.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion.

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion.

C. If Assertion is true statement but Reason is false.

D. If both Assertion and Reason are false statements.

Answer: A

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3. A: Faraday's law is an experimental law. R: Time varying magnetic field cannot generale induced emf.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion.

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion.

C. If Assertion is true statement but Reason is false.

D. If both Assertion and Reason are false statements.

Answer: C

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4. Assertion : An electrostatic field line never form closed loop.

Reason : Electrostatic field is a conservative field.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion.

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion.

C. If Assertion is true statement but Reason is false.

D. If both Assertion and Reason are false statements.

Answer: A

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5. A: The mutual Induction between the two coils infinitely apart is zero. R: If the mutual induction between the two coils is zero, it means that their self inductances are also zero.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion.

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion.

C. If Assertion is true statement but Reason is false.

D. If both Assertion and Reason are false statements.

Answer: C

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6. A: An inductor is called the inertia of an electric circuit.

R: An inductor tends to keep the flux constant.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion.

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion.

C. If Assertion is true statement but Reason is false.

D. If both Assertion and Reason are false statements.

Answer: A

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7. A: At any instant, if the current through an inductor is zero, then the induced emf will also be zero.

R: In one time constant, the current flows to 37 percent of its maximum value in a series LR circuit.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion.

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion.

C. If Assertion is true statement but Reason is false.

D. If both Assertion and Reason are false statements.

Answer: D

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8. A: There may be an induced emf in a loop without induced current.

R: Induced current depends on the resistance of the loop as well.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion.

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion.

C. If Assertion is true statement but Reason is false.

D. If both Assertion and Reason are false statements.

Answer: B

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9. A: When the magnetic flux through a loop is maximum, induced emf is maximum.

R: When the magnetic flux through a loop is minimum, induced emf is minimum.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion.

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion.

C. If Assertion is true statement but Reason is false.

D. If both Assertion and Reason are false statements.

Answer: D

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10. A: When a conducting loop is kept stationary in a non-uniform magnetic field an emf is induced.

R: As per Faraday's law, whenever flux changes, an emf is induced.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion.

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion.

C. If Assertion is true statement but Reason is false.

D. If Assertion is false statement and Reason is true.

Answer: D

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11. A: When an electric motor is started, a variable resistance (that decreases with time) is used in series. This resistance is known as motor slarter,

R: The back-emf in the beginning, when motor starts, is very small.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion.

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion.

C. If Assertion is true statement but Reason is false.

D. If both Assertion and Reason are false statements.

Answer: A

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12. A: When a bar magnet is dropped into a vertical long hollow metallic tube, the magnet ultimately moves with zera acceleration.

R: The magnet falling into metallic tube causes the eddy currents in the metal tube, so the motion of the magnet is damped.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion.

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion.

C. If Assertion is true statement but Reason is false.

D. If both Assertion and Reason are false statements.

Answer: A

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13. A: The power output of a practical transformer is always smaller than the power input.

R: A transformer works on the principle of mutual induction.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion.

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion.

C. If Assertion is true statement but Reason is false.

D. If both Assertion and Reason are false statements.

Answer: B

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14. A: Electrical power through transmission lines is transmitted at high voltage.

R: At high voltage theft of power is checked.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion.

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion.

C. If Assertion is true statement but Reason is false.

D. If both Assertion and Reason are false statements.

Answer: C

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15. A: The electric field induced due to changing magnetic field is non-conservative,

R: The line integral of the electric field induced due to changing magnetic field along a closed loop is always zero.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion.

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion.

C. If Assertion is true statement but Reason is false.

D. If both Assertion and Reason are false statements.

Answer: C

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