EdLoop JEE

PHYSICS · JEE MAIN

Electromagnetic Induction

Previous Year Questions with answers

177 questions · **132** papers · **2002–2026** · newest paper first

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What is in this PDF: every Electromagnetic Induction question we hold from past JEE Main and AIEEE papers, with its options and answer. Where an answer comes from a source other than the official final key, it says so next to the answer.

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Chapter at a glance

3%
of Physics questions, 2019–2026

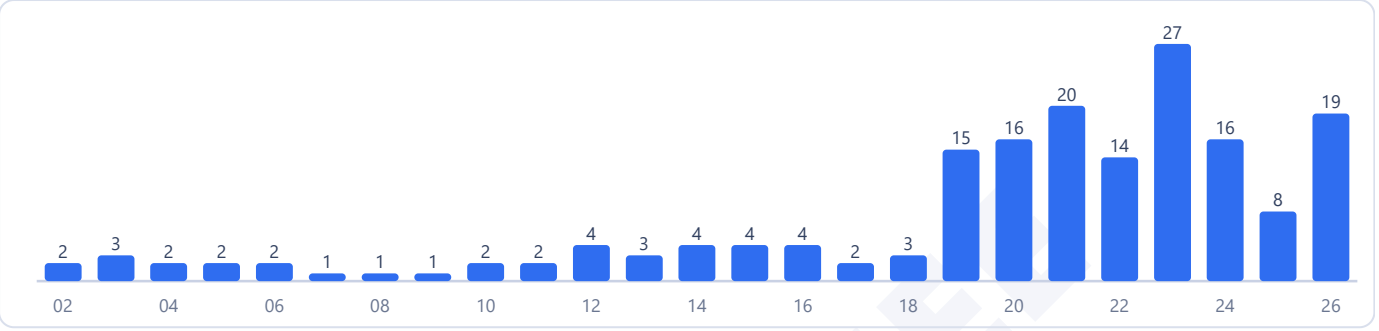
177
questions, 2002–2026

106 of 162
papers asked it, 2019–2026

128 / 49
MCQ / numerical, 2002–2026

Trend. Steady: 0.7 questions per paper in 2024–2026 against 0.9 in 2019–2023.

Questions per year



Counts are the questions we hold: 177 in 132 papers. No question in this chapter was found repeated across papers.

Most-asked topics in this chapter (2002–2026)

Faraday's & Lenz's Laws	48
Motional EMF	45
Inductance	42
LR & LC Circuits	42

How often it comes up

Electromagnetic induction links mechanics with electromagnetism under Unit 14: Electromagnetic Induction and Alternating Currents in the Class 12 NTA physics syllabus, holding rank 20 among the 29 physics chapters. Across 162 papers administered between 2019 and 2026, electromagnetic induction produced 135 questions, translating to 0.8 questions per sitting. Candidates encountered this topic in 106 of those 162 papers, and questions were included every single year throughout the cycle. In the three testing years from 2024 to 2026, 43 questions appeared across 58 papers, representing 0.7 questions per paper and a 2.8 percent subject share. The chapter's share has stayed about the same when compared to the 2002 to 2018 testing interval, which recorded 42 questions across 38 papers for a 3.1 percent share. During the 2026 testing sessions, 19 questions were featured across 19 papers, showing up in 13 separate shifts. Over the 2019 to 2026 testing window, 49 questions required numerical answers, reflecting a steady emphasis on exact calculations of induced electromotive forces, magnetic flux, and circuit time constants.

Most-asked topics

The chapter distributes its questions across four evenly balanced core topics:

- **Faraday's & Lenz's Laws**: 48 questions historically, including 39 from 2019 to 2026, tested through 2026. This topic tests flux changes through expanding or rotating loops, rate of change of time-varying magnetic fields, direction of induced currents using Lenz's rule, and thermal dissipation in closed resistive loops.
- **Motional EMF**: 45 questions overall, with 34 between 2019 and 2026, continuing in 2026. Problems evaluate conducting rods sliding along parallel rails in magnetic fields, rotating conducting spokes, falling conducting rods reaching terminal velocity, and external forces required for uniform rod translation.
- **Inductance**: 42 lifetime questions, with 33 asked from 2019 to 2026, tested up to 2026. Themes cover self-inductance of solenoids and coils, mutual inductance between coaxial loops, magnetic energy density, and energy

stored in magnetic fields.

- **LR & LC Circuits**: 42 total problems, including 29 from 2019 to 2026, tested in 2026. Core concepts evaluate growth and decay of currents in inductive DC circuits, inductive time constants, switch-on branch behavior where inductors act as open circuits, and energy oscillations in LC circuits.

What the questions look like

Exam questions in this chapter present dynamic physical setups and electrical transient networks:

- **Sliding conducting bars on rails**: A conducting crossbar slides along smooth horizontal or vertical rails within a uniform magnetic field. Questions ask for the induced electromotive force, the braking magnetic force, or the terminal steady speed attained under gravity.
- **Time-dependent magnetic fields**: Loops of defined geometric shape subjected to time-varying magnetic fields like linear or sinusoidal ramps. Students calculate instantaneous induced potential differences and total heat produced over a specified time duration.
- **Inductor transient branch currents**: DC circuits with resistors and inductors connected across a battery. Problems test branch currents immediately after closing a switch or long after steady state is established.
- **LC circuit energy exchange**: Evaluating the time elapsed for stored electric energy in a capacitor to transfer partially or wholly into magnetic energy in an inductor.

How to practise it

Master Lenz's law thoroughly by always asking what change the induced current opposes. If external flux through a loop increases, the induced magnetic field opposes the external field. If flux decreases, the induced field reinforces it.

Learn the limiting behaviors of inductors in DC circuits. At the initial instant a switch closes, an unenergized inductor behaves as an open circuit with zero current flow. In the long-time steady state, an ideal inductor behaves as a simple zero-resistance connecting wire.

For motional electromotive force, use the cross product relation of velocity and magnetic field integrated along the conductor path. For rotating rods, integrate the tangential velocity along the radius to obtain the standard half B omega L squared result.

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Q1 JEE Main 2026 · 8 Apr · Shift 2 MCQ

A 30 cm long solenoid has 10 turns per cm and area of 5 cm^2. The current through the solenoid coil varies from 2 A to 4 A in 3.14 s. The e.m.f. induced in the coil is $\alpha \times 10^{-5}$ V. The value α is _____.

(A) 60
(B) 12
(C) 120
(D) 34

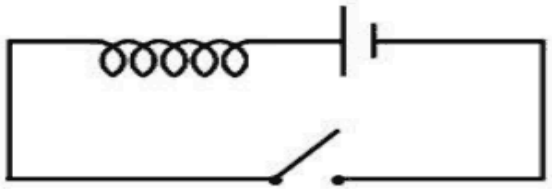
Answer: (B) 12 · Official NTA final key

Q2 JEE Main 2026 · 6 Apr · Shift 1 MCQ

An inductor of inductance 10 mH having resistance of 100 Ω is connected to battery of E.M.F. 1.0 V through a switch as shown in the figure below. After switch is closed, the ratio of instantaneous voltages across the inductor when the current passing through it is 2 mA and 4 mA is _____.

(see the figure above)

An inductor of inductance 10 mH having resistance of 100 Ω is connected to battery of E.M.F. 1.0 V through a switch as shown in the figure below. After switch is closed, the ratio of instantaneous voltages across the inductor when the current passing through it is 2 mA and 4 mA is _____.



Options :

6952787649. 4/3

6952787650. 3/4

6952787651. 5/3

6952787652. 3/5

(A) 4/3
(B) 3/4
(C) 5/3
(D) 3/5

Answer: (A) 4/3 · Official NTA final key

Q3 JEE Main 2026 · 6 Apr · Shift 2 MCQ

A square loop of side 2 cm is placed in a time varying magnetic field with magnitude as $B = 0.4\sin(300t)$ Tesla. The normal to the plane of loop makes an angle of 60° with the field. The

maximum induced emf produced in the loop is _____ mV.

(A) 12
(B) 18
(C) 21
(D) 24

Answer: (D) 24 · Official NTA final key

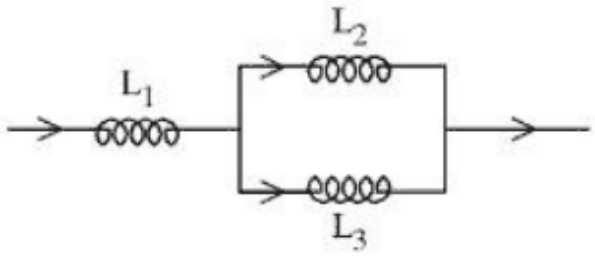
Q4 JEE Main 2026 · 5 Apr · Shift 1 Numerical

In the given circuit below inductance values of L_1, L_2 and L_3 are same. The magnetic energy stored in the entire circuit is (U_t) and that stored in the L_2 inductor is (U_j). U_t/U_j is _____.
(Ignore the mutual inductance if any)

(see the figure above)

Inscript

In the given circuit below inductance values of L_1, L_2 and L_3 are same. The magnetic energy stored in the entire circuit is (U_t) and that stored in the L_2 inductor is (U_j). U_t / U_j is _____.
(Ignore the mutual inductance if any)



Numerical value type: the answer is a number.

Answer: 6. · Official NTA final key

Q5 JEE Main 2026 · 5 Apr · Shift 2 MCQ

A metal rod of length L rotates about one end at origin with a uniform angular velocity ω. The magnetic field radially falls off as $B(\mathrm{r}) = B_o\, e^{-\lambda r}$; λ being a positive constant. The emf induced (neglecting the centripetal force on electrons in the rod) is :

(A) $B_o\omega\left[\frac{1}{\lambda^2} - e^{-\lambda L}\left(\frac{1}{\lambda^2} + \frac{L}{\lambda}\right)\right]$
(B) $B_o\omega\left[\frac{1}{\lambda^2} + e^{-\lambda L}\left(\frac{1}{\lambda^2} + \frac{L}{\lambda}\right)\right]$
(C) $B_o\omega\left[\frac{4}{\lambda^2} - e^{-2\lambda L}\left(\frac{1}{\lambda^2} + \frac{2L}{\lambda}\right)\right]$
(D) $B_o\omega\left[\frac{3}{\lambda^2} - e^{-3\lambda L}\left(\frac{3}{\lambda^2} + \frac{L}{\lambda}\right)\right]$

Answer: (A) $B_o\omega\left[\frac{1}{\lambda^2} - e^{-\lambda L}\left(\frac{1}{\lambda^2} + \frac{L}{\lambda}\right)\right]$ · Official NTA final key

Q6 JEE Main 2026 · 5 Apr · Shift 2 Numerical

A circular loop of radius 20 cm and resistance 2 Ω is placed in a time varying magnetic field $\vec{B} = (2t^2 + 2t + 3)$ T. At t = 0, for the plane of the loop being perpendicular to the magnetic field and, the induced current in the loop at $t = 3$ s is $\frac{\alpha}{50}$ A. The value of α is _____.
(Take $\pi = 22/7$)

Numerical value type: the answer is a number.

Answer: 44. · Official NTA final key

Q7 JEE Main 2026 · 2 Apr · Shift 1 MCQ

When a coil is placed in a time dependent magnetic field the power dissipated in it is P. The number of turns, area of the coil and radius of the coil wire are N, A and r respectively. For a second coils number of turns, area of the coil and radius of the coil wire are $2N$, $2A$ and $3r$ respectively. When the first coil is replaced with second coil the power dissipated in it is $\sqrt{2}\,\alpha P$. The value of α is _____.

(A) 36
(B) $128\sqrt{2}$
(C) 16
(D) 64

Answer: (A) 36 · Official NTA final key

Q8 JEE Main 2026 · 2 Apr · Shift 2 MCQ

A circular current loop of radius R is placed inside square loop of side length L ($L \gg R$) such that they are co-planar and their centers coincide. The permeability of free space is μ_0. The mutual inductance between circular loop and square loop is _____.

(A) $2\sqrt{2}\,\frac{\mu_0 L^2}{R}$
(B) $\sqrt{2}\,\frac{\mu_0 L^2}{R}$
(C) $\sqrt{2}\,\frac{\mu_0 R^2}{L}$
(D) $2\sqrt{2}\,\frac{\mu_0 R^2}{L}$

Answer: (D) $2\sqrt{2}\,\frac{\mu_0 R^2}{L}$ · Official NTA final key

Q9 JEE Main 2026 · 23 Jan · Shift 1 MCQ

A 20 m long uniform copper wire held horizontally is allowed to fall under the gravity ($g = 10$ m/s^2) through a uniform horizontal magnetic field of 0.5 Gauss perpendicular to the length of the wire. The induced EMF across the wire when it travells a vertical distance of 200 m is _____ mV.

(A) $0.2\sqrt{10}$
(B) $200\sqrt{10}$
(C) $2\sqrt{10}$
(D) $20\sqrt{10}$

Answer: (D) $20\sqrt{10}$ · Official NTA final key

Q10 JEE Main 2026 · 23 Jan · Shift 1 Numerical

A simple pendulum made of mass 10 g and a metallic wire of length 10 cm is suspended vertically in a uniform magnetic field of 2 T. The magnetic field direction is perpendicular to the plane of oscillations of the pendulum. If the pendulum is released from an angle of 60° with vertical, then maximum induced EMF between the point of suspension and point of oscillation is _____ mV. (Take $g = 10$ m/s^2)

Numerical value type: the answer is a number.

Answer: 100. · Official NTA final key

Q11 JEE Main 2026 · 23 Jan · Shift 2 MCQ

A circular loop of radius 7 cm is placed in uniform magnetic field of 0.2 T directed perpendicular to plane of loop. The loop is converted into a square loop in 0.5 s. The EMF induced in the loop is _____ mV.

(A) 13.2
(B) 8.25
(C) 6.6
(D) 1.32

Answer: (D) 1.32 · Official NTA final key

Q12 JEE Main 2026 · 23 Jan · Shift 2 MCQ

Suppose a long solenoid of 100 cm length, radius 2 cm having 500 turns per unit length, carries a current $I = 10\sin(\omega t)$ A, where $\omega = 1000$ rad./s. A circular conducting loop (B) of radius 1 cm coaxially slided through the solenoid at a speed $v = 1$ cm/s. The r.m.s. current through the loop when the coil B is inserted 10 cm inside the solenoid is $\alpha/\sqrt{2}$ μA. The value of α is _____.

[Resistance of the loop $= 10\,\Omega$]

(A) 197
(B) 100
(C) 80
(D) 280

Answer: (A) 197 · Official NTA final key

Q13 JEE Main 2026 · 22 Jan · Shift 1 MCQ

Three identical coils C_1, C_2 and C_3 are closely placed such that they share a common axis. C_2 is exactly midway. C_1 carries current I in anti-clockwise direction while C_3 carries current I in clockwise direction. An induced current flows through C_2 will be in clockwise direction when

(A) C_1 and C_3 move with equal speeds away from C_2

(B) C_1 moves away from C_2 and C_3 moves towards C_2

(C) C_1 moves towards C_2 and C_3 moves away from C_2

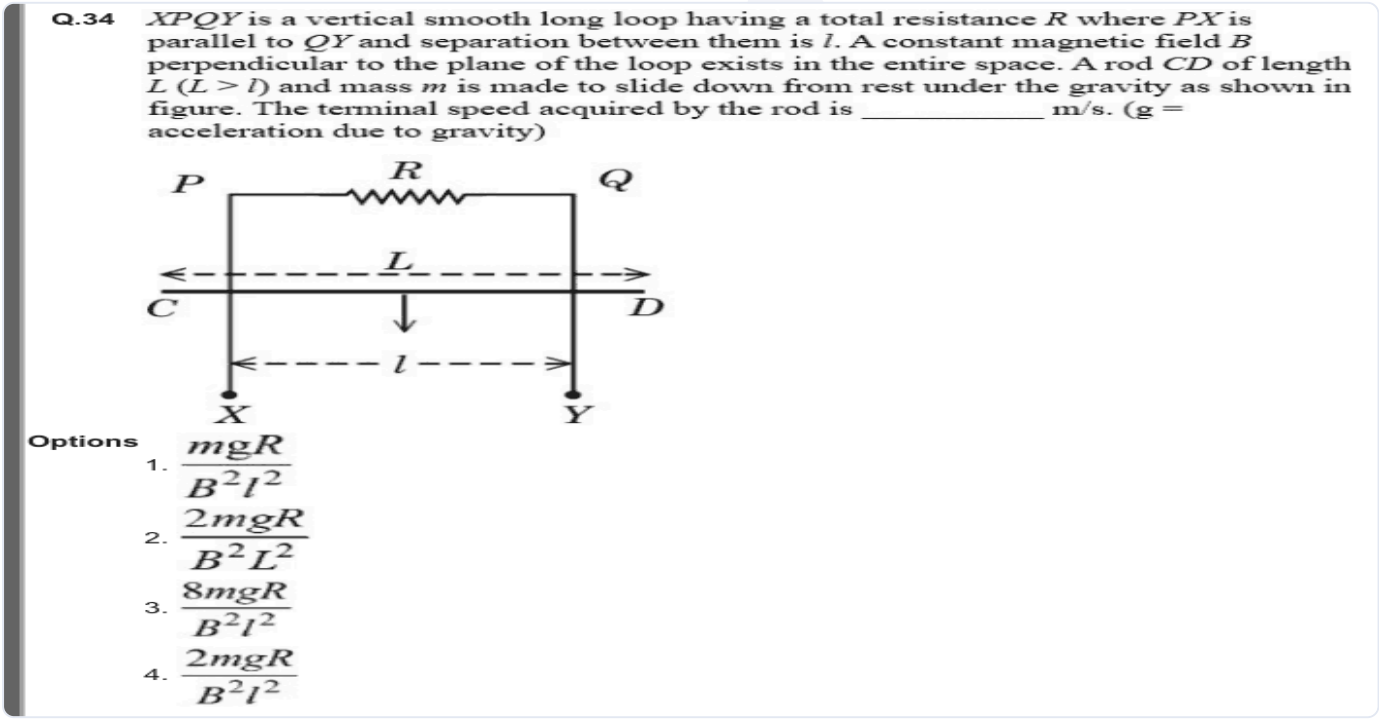
(D) C_1 and C_3 move with equal speeds towards C_2

Answer: (C) C_1 **moves towards** C_2 **and** C_3 **moves away from** C_2 · Official NTA final key

Q14 JEE Main 2026 · 22 Jan · Shift 1 MCQ

$XPQY$ is a vertical smooth long loop having a total resistance R where PX is parallel to QY and separation between them is l. A constant magnetic field B perpendicular to the plane of the loop exists in the entire space. A rod CD of length L ($L > l$) and mass m is made to slide down from rest under the gravity as shown in figure. The terminal speed acquired by the rod is _____ m/s. (g = acceleration due to gravity)

(see the figure above)



(A) $\frac{mgR}{B^2l^2}$

(B) $\frac{2mgR}{B^2L^2}$

(C) $\frac{8mgR}{B^2l^2}$

(D) $\frac{2mgR}{B^2l^2}$

Answer: (A) $\frac{mgR}{B^2l^2}$ · Official NTA final key

Q15 JEE Main 2026 · 22 Jan · Shift 1 · Numerical

Inductance of a coil with 10^4 turns is 10 mH and it is connected to a dc source of 10 V with internal resistance of $10\,\Omega$. The energy density in the inductor when the current reaches $\left(\frac{1}{e}\right)$ of its maximum value is $\alpha\pi \times \frac{1}{e^2}$ J/m^3. The value of α is _____.

($\mu_0 = 4\pi \times 10^{-7}$ Tm/A).

Numerical value type: the answer is a number.

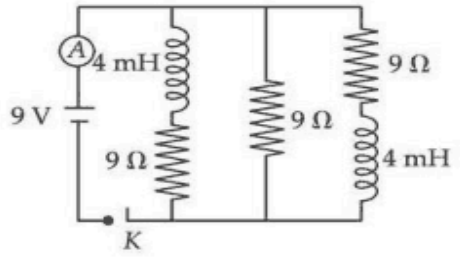
Answer: 20. · Official NTA final key

Q16 JEE Main 2026 · 22 Jan · Shift 2 · MCQ

Figure shows the circuit that contains three resistances ($9\,\Omega$ each) and two inductors (4 mH each). The reading of ammeter at the moment switch K is turned ON, is _____ A.

(see the figure above)

Q.34 Figure shows the circuit that contains three resistances (9 Ω each) and two inductors (4 mH each). The reading of ammeter at the moment switch K is turned ON, is _____A.



Options
1. zero
2. 2
3. 3
4. 1

(A) zero
(B) 2
(C) 3
(D) 1

Answer: (D) 1 · Official NTA final key

Q17 JEE Main 2026 · 21 Jan · Shift 1 · MCQ

A conducting circular loop of area 1.0 m^2 is placed perpendicular to a magnetic field which varies as $B = \sin(100\,t)$ Tesla. If the resistance of the loop is 100 Ω, then the average thermal energy dissipated in the loop in one period is _____ J.

(A) 2π

(B) π

(C) π^2

(D) $\frac{\pi}{2}$

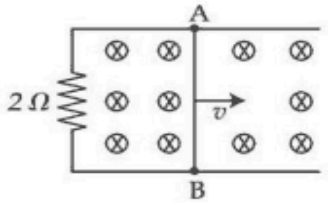
Answer: (B) π · Official NTA final key

Q18 JEE Main 2026 · 21 Jan · Shift 1 MCQ

A 1 m long metal rod AB completes the circuit as shown in figure. The area of circuit is perpendicular to the magnetic field of 0.10 T. If the resistance of the total circuit is 2 Ω then the force needed to move the rod towards right with constant speed (v) of 1.5 m/s is _____ N.

(see the figure above)

Q.42 A 1 m long metal rod AB completes the circuit as shown in figure. The area of circuit is perpendicular to the magnetic field of 0.10 T. If the resistance of the total circuit is 2 Ω then the force needed to move the rod towards right with constant speed (v) of 1.5 m/s is _____N.



Options

1. 5.7×10^{-2}
2. 7.5×10^{-3}
3. 7.5×10^{-2}
4. 5.7×10^{-3}

(A) 5.7×10^{-2}

(B) 7.5×10^{-3}

(C) 7.5×10^{-2}

(D) 5.7×10^{-3}

Answer: (B) 7.5×10^{-3} · Official NTA final key

Q19 JEE Main 2026 · 21 Jan · Shift 2 MCQ

A capacitor C is first charged fully with potential difference of V_0 and disconnected from the battery. The charged capacitor is connected across an inductor having inductance L. In t s 25% of the initial energy in the capacitor is transferred to the inductor. The value of t is _____ s.

(A) $\pi\sqrt{\frac{LC}{2}}$
(B) $\frac{\pi\sqrt{LC}}{6}$
(C) $\frac{\pi\sqrt{LC}}{3}$
(D) $\frac{\pi\sqrt{LC}}{2}$

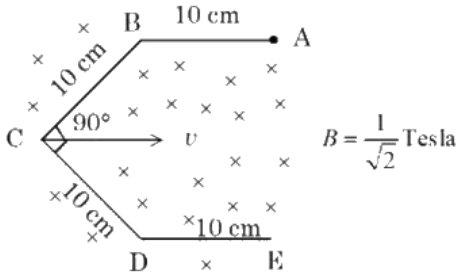
Answer: (B) $\frac{\pi\sqrt{LC}}{6}$ · Official NTA final key

Q20 JEE Main 2025 · 4 Apr · Shift 1 Numerical

Conductor wire ABCDE with each arm 10 cm in length is placed in magnetic field of $\frac{1}{\sqrt{2}}$ Tesla, perpendicular to its plane. When conductor is pulled towards right with constant velocity of $10cm/s$, induced emf between points A and E is _____ mV.

(see the figure above)

23. Conductor wire ABCDE with each arm 10 cm in length is placed in magnetic field of $\frac{1}{\sqrt{2}}$ Tesla, perpendicular to its plane. When conductor is pulled towards right with constant velocity of $10\,\mathrm{cm/s}$, induced emf between points A and E is _____ mV.



Numerical value type: the answer is a number.

Answer: 10. · Key from source paper

Q21 JEE Main 2025 · 2 Apr · Shift 2 MCQ

A solenoid having area A and length ' l ' is filled with a material having relative permeability 2. The magnetic energy stored in the solenoid is:

(A) B^2Al
(B) $\frac{B^2Al}{4\mu_0}$
(C) $\frac{B^2Al}{\mu_0}$
(D) $\frac{B^2Al}{2\mu_0}$

Answer: (B) $\frac{B^2Al}{4\mu_0}$ · Key from source paper

Q22 JEE Main 2025 · 29 Jan · Shift 1 MCQ

Consider I_1 and I_2 are the currents flowing simultaneously in two nearby coils 1 & 2, respectively. If L_1 = self inductance of coil 1, M_{12} = mutual inductance of coil 1 with respect to coil 2, then the value of

induced emf in coil 1 will be Options

(A) $\varepsilon_1 = -L_1 \frac{dI_2}{dt} - M_{12} \frac{dI_1}{dt}$

(B) $\varepsilon_1 = -L_1 \frac{dI_1}{dt} - M_{12} \frac{dI_2}{dt}$

(C) $\varepsilon_1 = -L_1 \frac{dI_1}{dt} - M_{12} \frac{dI_1}{dt}$

(D) $\varepsilon_1 = -L_1 \frac{dI_1}{dt} + M_{12} \frac{dI_2}{dt}$

Answer: (B) $\varepsilon_1 = -L_1 \frac{dI_1}{dt} - M_{12} \frac{dI_2}{dt}$ · Key from source paper

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Q23 JEE Main 2025 · 28 Jan · Shift 2 MCQ

A uniform magnetic field of 0.4 T acts perpendicular to a circular copper disc 20 cm in radius. The disc is having a uniform angular velocity of $10\pi \text{rads}^{-1}$ about an axis through its centre and perpendicular to the disc. What is the potential difference developed between the axis of the disc and the rim ? ($\pi = 3.14$)

(A) 0.5024 V

(B) V

(C) $0.2512V$ V

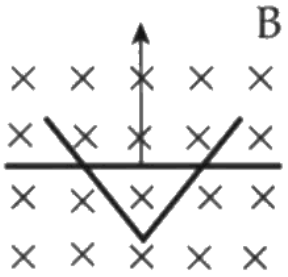
(D) $0.1256V$ V

Answer: (C) $0.2512V$ V · Key from source paper

Q24 JEE Main 2025 · 28 Jan · Shift 2 Numerical

see figure

Q49.



A conducting bar moves on two conducting rails as shown in the figure. A constant magnetic field B exists into the page. The bar starts to move from the vertex at time $t = 0$ with a constant velocity. If the induced EMF is $E \propto t^n$, then value of n is _.

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q25 JEE Main 2025 · 23 Jan · Shift 1 MCQ

Regarding self-inductance: A. The self-inductance of the coil depends on its geometry. B. Self-inductance does not depend on the permeability of the medium. C. Self-induced e.m.f. opposes any change in the current in a circuit. D. Self-inductance is electromagnetic analogue of mass in

mechanics. E. Work needs to be done against self-induced e.m.f. in establishing the current. Choose the correct answer from the options given below:

(A) A, B, C, E only
(B) B, C, D, E only
(C) A, C, D, E only
(D) A, B, C, D only

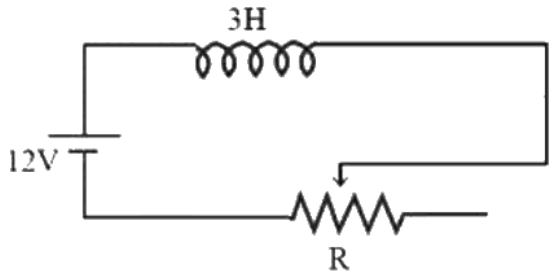
Answer: (C) A, C, D, E only · Key from source paper

Q26 JEE Main 2025 · 23 Jan · Shift 1 Numerical

In the given circuit the sliding contact is pulled outwards such that electric current in the circuit changes at the rate of 8 A/s. At an instant when R is 12Ω, the value of the current in the circuit will be _____ A.

(see the figure above)

Q47.



In the given circuit the sliding contact is pulled outwards such that electric current in the circuit changes at the rate of 8 A/s. At an instant when R is 12Ω, the value of the current in the circuit will be _____ A.

Numerical value type: the answer is a number.

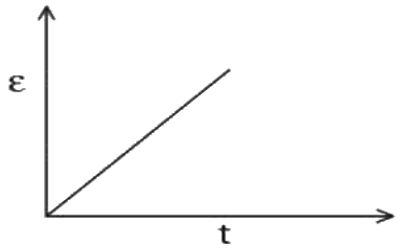
Answer: 3. · Key from source paper

Q27 JEE Main 2025 · 22 Jan · Shift 2 MCQ

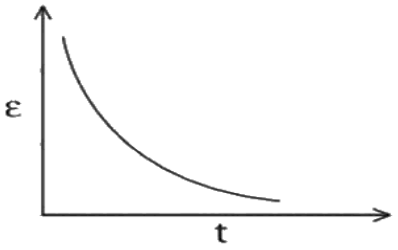
A rectangular metallic loop is moving out of a uniform magnetic field region to a field free region with a constant speed. When the loop is partially inside the magnate field, the plot of magnitude of induced emf (ε) with time (t) is given by

Q35. A rectangular metallic loop is moving out of a uniform magnetic field region to a field free region with a constant speed. When the loop is partially inside the magnate field, the plot of magnitude of induced emf (ε) with time (t) is given by

(1)



(2)



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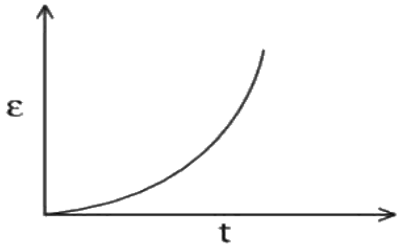
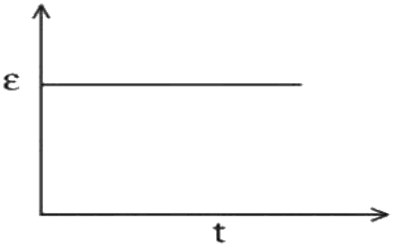


(4)



(A) *see figure*
(B) *see figure*
(C) *see figure*
(D) *see figure*

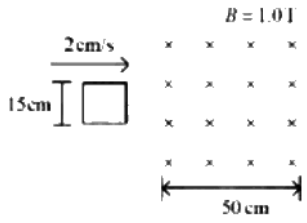
Answer: (D) · Key from source paper

Q28 JEE Main 2024 · 9 Apr · Shift 2 MCQ

A square loop of side 15 cm being moved towards right at a constant speed of 2 cm/s as shown in figure. The front edge enters the 50 cm wide magnetic field at $t = 0$. The value of induced emf in the loop at $t = 10$ s will be :

(see the figure above)

Q12. A square loop of side 15 cm being moved towards right at a constant speed of 2 cm/s as shown in figure. The front edge enters the 50 cm wide magnetic field at $t = 0$. The value of induced emf in the loop at $t = 10$ s will be :



(1) 0.3mV
(2) zero
(3) 4.5mV
(4) 3mV

(A) 0.3mV
(B) zero
(C) 4.5mV
(D) 3mV

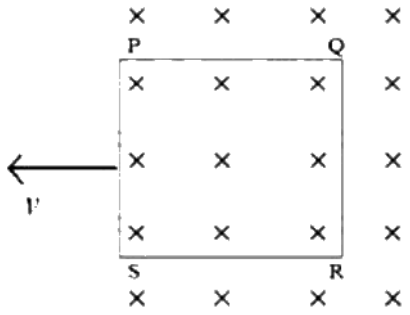
Answer: (B) zero · Key from source paper

Q29 JEE Main 2024 · 8 Apr · Shift 1 Numerical

A square loop PQRS having 10 turns, area $3.6 \times 10^{-3}\ \mathrm{m}^2$ and resistance 100Ω is slowly and uniformly being pulled out of a uniform magnetic field of magnitude B = 0.5 T as shown. Work done in pulling the loop out of the field in 1.0 s is _____ $\times 10^{-6}$ J.

(see the figure above)

Q28. A square loop PQRS having 10 turns, area $3.6 \times 10^{-3}\ \mathrm{m}^2$ and resistance 100Ω is slowly and uniformly being pulled out of a uniform magnetic field of magnitude $\mathrm{B} = 0.5\ \mathrm{T}$ as shown. Work done in pulling the loop out of the field in 1.0 s is _____ $\times 10^{-6}$ J.



Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q30 JEE Main 2024 · 6 Apr · Shift 2 MCQ

In a coil, the current changes from -2 A to $+2$ A in 0.2 s and induces an emf of 0.1 V. The self inductance of the coil is :

(A) 4mH
(B) 1mH
(C) 5mH
(D) 2.5mH

Answer: (C) 5mH · Key from source paper

Q31 JEE Main 2024 · 5 Apr · Shift 1 MCQ

Two conducting circular loops A and B are placed in the same plane with their centers coinciding as shown in figure. The mutual inductance between them is :

(see the figure above)

Q15. Two conducting circular loops A and B are placed in the same plane with their centers coinciding as shown in

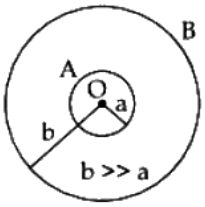


figure. The mutual inductance between them is :

(1) $\frac{\mu_0 \pi b^2}{2a}$
(2) $\frac{\mu_o}{2\pi} \cdot \frac{b^2}{a}$
(3) $\frac{\mu_0}{2\pi} \cdot \frac{a^2}{b}$
(4) $\frac{\mu_0 \pi a^2}{2b}$

(A) $\frac{\mu_0 \pi b^2}{2a}$
(B) $\frac{\mu_o}{2\pi} \cdot \frac{b^2}{a}$
(C) $\frac{\mu_0}{2\pi} \cdot \frac{a^2}{b}$
(D) $\frac{\mu_0 \pi a^2}{2b}$

Answer: (D) $\frac{\mu_0 \pi a^2}{2b}$ · Key from source paper

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Q32 JEE Main 2024 · 5 Apr · Shift 2 Numerical

The current in an inductor is given by I = (3t + 8) where t is in second. The magnitude of induced emf produced in the inductor is 12mV. The self-inductance of the inductor _____ mH.

Numerical value type: the answer is a number.

Answer: 4. · Key from source paper

Q33 JEE Main 2024 · 4 Apr · Shift 2 Numerical

A rod of length 60 cm rotates with a uniform angular velocity 20rads^{-1} about its perpendicular bisector, in a uniform magnetic filed 0.5T. The direction of magnetic field is parallel to the axis of rotation. The potential difference between the two ends of the rod is _____ V.

Numerical value type: the answer is a number.

Answer: 0. · Key from source paper

Q34 JEE Main 2024 · 1 Feb · Shift 1 Numerical

A rectangular loop of sides 12 cm and 5 cm, with its sides parallel to the x-axis and y-axis respectively moves with a velocity of 5 $\mathrm{cm\ s^{-1}}$ in the positive x axis direction, in a space containing a variable magnetic field in the positive z direction. The field has a gradient of $10^{-3}\ \mathrm{T\ cm^{-1}}$ along the negative x direction and it is decreasing with time at the rate of $10^{-3}\ \mathrm{T\ s^{-1}}$. If the resistance of the loop is 6 mΩ, the power dissipated by the loop as heat is _____ $\times 10^{-9}$ W.

Numerical value type: the answer is a number.

Answer: 216. · Key from source paper

Q35 JEE Main 2024 · 31 Jan · Shift 1 MCQ

A coil is placed perpendicular to a magnetic field of 5000 T. When the field is changed to 3000 T in 2 s, an induced emf of 22 V is produced in the coil. If the diameter of the coil is 0.02 m, then the number of turns in the coil is:

(A) 7
(B) 70
(C) 35
(D) 140

Answer: (B) 70 · Key from source paper

Q36 JEE Main 2024 · 31 Jan · Shift 1 Numerical

A small square loop of wire of side l is placed inside a large square loop of wire of side $LL = l^2$. The loops are coplanar and their centers coincide. The value of the mutual inductance of the system is $\sqrt{x} \times 10^{-7}$ H, where $x =$ _____.

Numerical value type: the answer is a number.

Answer: 128. · Key from source paper

Q37 JEE Main 2024 · 31 Jan · Shift 2 Numerical

The magnetic flux ϕ (in weber) linked with a closed circuit of resistance 8 Ω varies with time (in seconds) as $\phi = 5t^2 - 36t + 1$. The induced current in the circuit at $t = 2$ s is _____ A.

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q38 JEE Main 2024 · 30 Jan · Shift 1 Numerical

A ceiling fan having 3 blades of length 80 cm each is rotating with an angular velocity of 1200 rpm. The magnetic field of earth in that region is 0. 5 G and angle of dip is 30°. The emf induced across the blades is $N\pi \times 10^{-5}$ V. The value of N is _____.

Numerical value type: the answer is a number.

Answer: 32. · Key from source paper

Q39 JEE Main 2024 · 29 Jan · Shift 1 MCQ

A capacitor of capacitance 100 μF is charged to a potential of 12 V and connected to a 6.4 mH inductor to produce oscillations. The maximum current in the circuit would be :

(A) 3.2 A
(B) 1.5 A
(C) 2.0 A
(D) 1.2 A

Answer: (B) 1.5 A · Key from source paper

Q40 JEE Main 2024 · 29 Jan · Shift 1 Numerical

A square loop of side 10 cm and resistance 0.7 Ω is placed vertically in the east-west plane. A uniform magnetic field of 0.20 T is set up across the plane in the north-east direction. The magnetic field is decreased to zero in 1 s at a steady rate. Then, the magnitude of induced emf is $\sqrt{x} \times 10^{-3}$ V. The value of x is _____.

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q41 JEE Main 2024 · 29 Jan · Shift 2 Numerical

A horizontal straight wire 5 m long extending from east to west falling freely at right angle to horizontal component of earth's magnetic field 0.60×10^{-4} Wb m^{-2}. The instantaneous value of emf induced in the wire when its velocity is 10 m s^{-1} is _____ $\times 10^{-3}$ V.

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q42 JEE Main 2024 · 27 Jan · Shift 1 MCQ

A rectangular loop of length 2.5 m and width 2 m is placed at 60° to a magnetic field of 4 T. The loop is removed from the field in 10 sec. The average emf induced in the loop during this time is

(A) -2 V
(B) $+2$ V
(C) $+1$ V
(D) -1 V

Answer: (C) $+1$ V · Key from source paper

Q43 JEE Main 2024 · 27 Jan · Shift 1 Numerical

Two coils have mutual inductance 0.002 H. The current changes in the first coil according to the relation $i = i_0 \sin \omega t$, where i_0 = 5 A and $\omega = 50\pi$ rad s^{-1}. The maximum value of emf in the second coil is $\frac{\pi}{\alpha}$ V. The value of α is

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q44 JEE Main 2023 · 15 Apr · Shift 1 MCQ

A 12 V battery connected to a coil of resistance 6 Ω through a switch, drives a constant current in the circuit. The switch is opened in 1 ms. The emf induced across the coil is 20 V. The inductance of the coil is :

(A) 10 mH
(B) 8 mH
(C) 5 mH
(D) 12 mH

Answer: (A) 10 mH · Key from source paper

Q45 JEE Main 2023 · 15 Apr · Shift 1 Numerical

A 20 cm long metallic rod is rotated with 210 rpm about an axis normal to the rod passing through its one end. The other end of the rod is in contact with a circular metallic ring. A constant and uniform magnetic field 0.2 T parallel to the axis exists everywhere. The emf developed between the centre and the ring is _____ mV.
(Take $\pi = \frac{22}{7}$)

Numerical value type: the answer is a number.

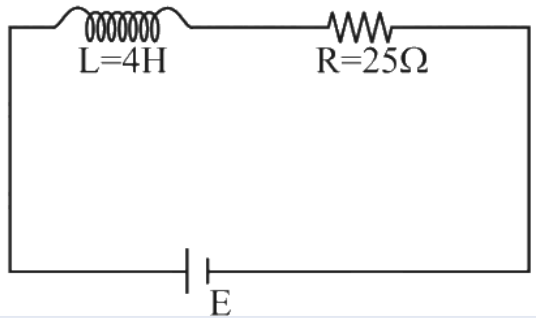
Answer: 88. · Key from source paper

Q46 JEE Main 2023 · 13 Apr · Shift 1 Numerical

In the given figure, an inductor and resistor are connected in series with a battery of emf E volt. $\frac{E^a}{2b}$ J s $^{-1}$ represents the maximum rate at which the energy is stored in the magnetic field (inductor). The numerical value of $\frac{b}{a}$ will be _____.

(see the figure above)

Q21. In the given figure, an inductor and resistor are connected in series with a battery of emf E volt. $\frac{E^a}{2b}$ J s^{-1} represents the maximum rate at which the energy is stored in the magnetic field (inductor). The numerical value of $\frac{b}{a}$ will be _____.



Numerical value type: the answer is a number.

Answer: 25. · Key from source paper

Q47 JEE Main 2023 · 13 Apr · Shift 2 Numerical

An insulated copper wire of 100 turns is wrapped around a wooden cylindrical core of the cross-sectional area 24 cm^2. The two ends of the wire are connected to a resistor. The total resistance in the circuit is 12 Ω. If externally applied uniform magnetic field in the core along its axis changes from 1.5 T in one direction to 1.5 T in the opposite direction, the charge flowing through a point in the circuit during the change of magnetic field will be _____ mC.

Numerical value type: the answer is a number.

Answer: 60. · Key from source paper

Q48 JEE Main 2023 · 12 Apr · Shift 1 Numerical

A conducting circular loop is placed in a uniform magnetic field of 0.4 T with its plane perpendicular to the field. Somehow, the radius of the loop starts expanding at a constant rate of $1\ \mathrm{mm\ s^{-1}}$. The magnitude of induced emf in the loop at an instant when the radius of the loop is 2 cm will be _____ μV.

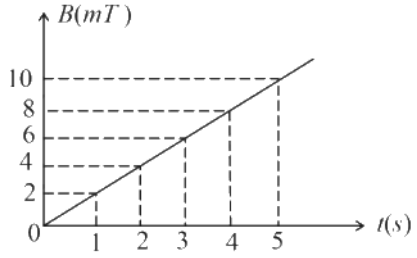
Numerical value type: the answer is a number.

Answer: 50. · Key from source paper

Q49 JEE Main 2023 · 11 Apr · Shift 1 Numerical

The magnetic field B crossing normally a square metallic plate of area 4 $\mathrm{m^2}$ is changing with time as shown in figure. The magnitude of induced emf in the plate during $t = 2$ s to $t = 4$ s, is _____ mV.
(see the figure above)

Q28. The magnetic field B crossing normally a square metallic plate of area 4 $\mathrm{m^2}$ is changing with time as shown in figure. The magnitude of induced emf in the plate during $t = 2$ s to $t = 4$ s, is _____ mV.



Numerical value type: the answer is a number.

Answer: 8. · Key from source paper

Q50 JEE Main 2023 · 11 Apr · Shift 2 MCQ

Given below are two statements: one is labelled as **Assertion A** and the other is labelled as **Reason R**
Assertion A: A bar magnet dropped through a metallic cylindrical pipe takes more time to come down compared to a non-magnetic bar with same geometry and mass.
Reason R: For the magnetic bar, Eddy currents are produced in the metallic pipe which oppose the

motion of the magnetic bar.
In the light of the above statements, choose the correct answer from the options given below

(A) **A** is false but **R** is true
(B) Both **A** and R are true and **R** is the correct explanation of **A**
(C) **A** is true but **R** is false
(D) Both **A** and **R** are true and **R** is NOT the correct explanation of **A**

Answer: (B) Both A and R are true and R is the correct explanation of A · Key from source paper

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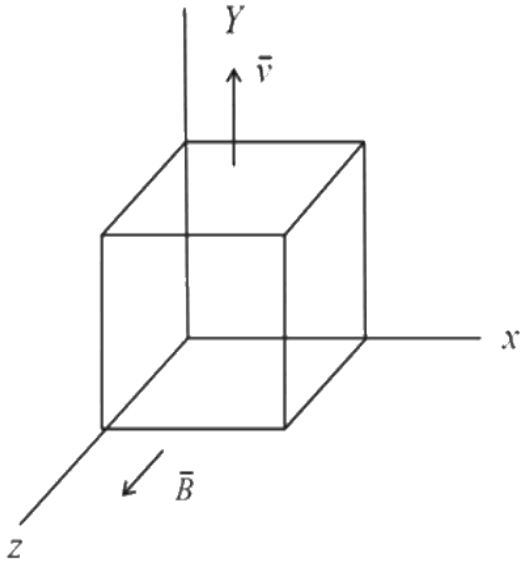
Q51 JEE Main 2023 · 11 Apr · Shift 2 Numerical

A metallic cube of side 15 cm moving along y-axis at a uniform velocity of $2\ \mathrm{m\ s^{-1}}$. In a region of uniform magnetic field of magnitude 0.5 T directed along z- axis. In equilibrium the potential difference between the faces of higher and lower potential developed because of the motion through the field will be mV.
(see the figure above)

Q22. A metallic cube of side $15\ \mathrm{cm}$ moving along y-axis at a uniform velocity of $2\ \mathrm{m\ s^{-1}}$. In a region of uniform magnetic field of magnitude $0.5\ \mathrm{T}$ directed along z- axis. In equilibrium the potential difference between the faces of higher and lower potential developed because of the motion through the field will be mV.



Numerical value type: the answer is a number.

Answer: 150. · Key from source paper

Q52 JEE Main 2023 · 11 Apr · Shift 2 Numerical

A coil has an inductance of 2 H and resistance of 4 Ω. A 10 V is applied across the coil. The energy stored in the magnetic field after the current has built up to its equilibrium value will be _____ $\times 10^{-2}$ J

Numerical value type: the answer is a number.

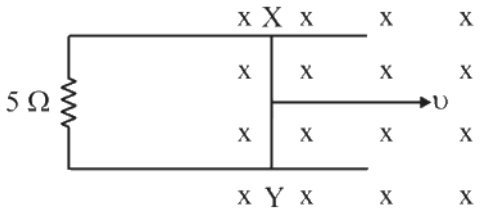
Answer: 625. · Key from source paper

Q53 JEE Main 2023 · 10 Apr · Shift 1 · Numerical

A 1 m long metal rod XY completes the circuit as shown in figure. The plane of the circuit is perpendicular to the magnetic field of flux density 0.15 T. If the resistance of the circuit is $5\ \Omega$, the force needed to move the rod in direction, as indicated, with a constant speed of $4\ \mathrm{m\,s^{-1}}$ will be _____ 10^{-3} N.

(see the figure above)

Q28. A 1 m long metal rod XY completes the circuit as shown in figure. The plane of the circuit is perpendicular to the magnetic field of flux density 0.15 T. If the resistance of the circuit is $5\ \Omega$, the force needed to move the rod in direction, as indicated, with a constant speed of 4 m s^{-1} will be _____ 10^{-3} N.



Numerical value type: the answer is a number.

Answer: 18. · Key from source paper

Q54 JEE Main 2023 · 10 Apr · Shift 2 · MCQ

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

(A) Move down with an acceleration equal to g
(B) Oscillate inside the tube
(C) Move down with almost constant speed
(D) Move down with an acceleration greater than g

Answer: (C) Move down with almost constant speed · Key from source paper

Q55 JEE Main 2023 · 10 Apr · Shift 2 · Numerical

A square loop of side 2.0 cm is placed inside a long solenoid that has 50 turns per centimetre and carries a sinusoidally varying current of amplitude 2.5 A and angular frequency $700\ \mathrm{rad\,s^{-1}}$. The central axes of the loop and solenoid coincide. The amplitude of the emf induced in the loop is $x \times 10^{-4}$ V. The value of x is _____ (Take, $\pi = \frac{22}{7}$)

Numerical value type: the answer is a number.

Answer: 44. · Key from source paper

Q56 JEE Main 2023 · 8 Apr · Shift 1 · Numerical

An oscillating LC circuit consists of a 75 mH inductor and a $1.2\ \mu\mathrm{F}$ capacitor. If the maximum charge to the capacitor is $2.7\ \mu\mathrm{C}$. The maximum current in the circuit will be _____ mA.

Numerical value type: the answer is a number.

Answer: 9. · Key from source paper

Q57 JEE Main 2023 · 8 Apr · Shift 2 MCQ

An emf of $0.08\ \mathrm{V}$ is induced in a metal rod of length $10\ \mathrm{cm}$ held normal to a uniform magnetic field of $0.4\ \mathrm{T}$, when move with a velocity of:

(A) $0.5\ \mathrm{m\,s^{-1}}$
(B) $20\ \mathrm{m\,s^{-1}}$
(C) $3.2\ \mathrm{m\,s^{-1}}$
(D) $2\ \mathrm{m\,s^{-1}}$

Answer: (D) $2\ \mathrm{m\,s^{-1}}$ · Key from source paper

Q58 JEE Main 2023 · 6 Apr · Shift 1 MCQ

The induced emf can be produced in a coil by

A. moving the coil with uniform speed inside uniform magnetic field

B. moving the coil with non uniform speed inside uniform magnetic field

C. rotating the coil inside the uniform magnetic field

D. changing the area of the coil inside the uniform magnetic field

Choose the correct answer from the options given below:

(A) B and C only
(B) A and C only
(C) C and D only
(D) B and D only

Answer: (C) C and D only · Key from source paper

Q59 JEE Main 2023 · 6 Apr · Shift 2 Numerical

Two concentric circular coils with radii $1\ \mathrm{cm}$ and $1000\ \mathrm{cm}$ and number of turns 10 and 200 respectively are placed coaxially with centers coinciding. The mutual inductance of this arrangement will be _____ $\times 10^{-8}\ \mathrm{H}$.
(Take, $\pi^2 = 10$)

Numerical value type: the answer is a number.

Answer: 4. · Key from source paper

Q60 JEE Main 2023 · 1 Feb · Shift 2 MCQ

A coil is placed in magnetic field such that plane of coil is perpendicular to the direction of magnetic field. The magnetic flux through a coil can be changed:
A. By changing the magnitude of the magnetic field within the coil.

B. By changing the area of coil within the magnetic field.
C. By changing the angle between the direction of magnetic field and the plane of the coil.
D. By reversing the magnetic field direction abruptly without changing its magnitude.
Choose the most appropriate answer from the options given below:

(A) A and B only
(B) A, B and C only
(C) A, B and D only
(D) A and C only

Answer: (B) A, B and C only · Key from source paper

Q61 JEE Main 2023 · 31 Jan · Shift 1 MCQ

Spherical insulating ball and a spherical metallic ball of same size and mass are dropped from the same height. Choose the correct statement out of the following {Assume negligible air friction}

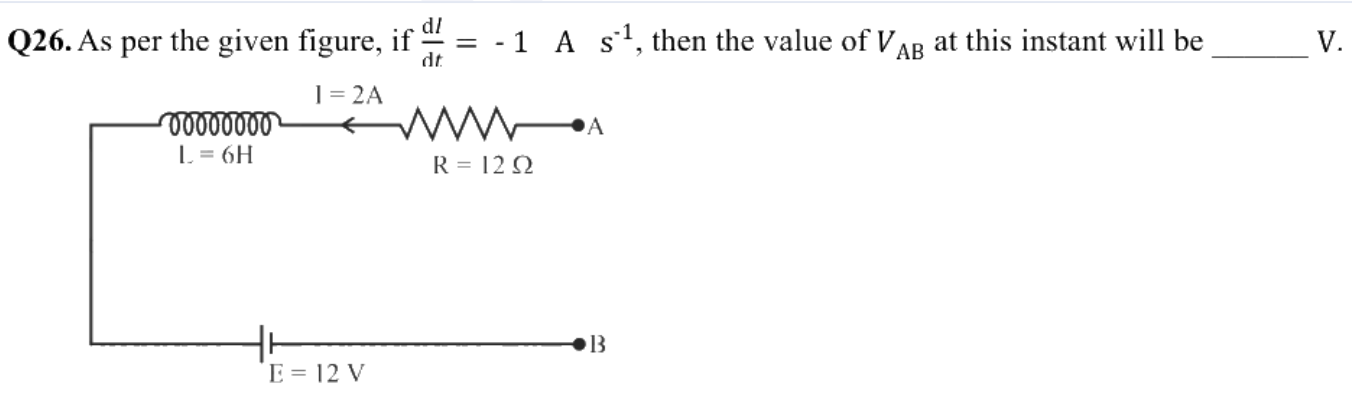
(A) Time taken by them to reach the earth's surface will be independent of the properties of their materials
(B) Insulating ball will reach the earth's surface earlier than the metal ball
(C) Both will reach the earth's surface simultaneously
(D) Metal ball will reach the earth's surface earlier than the insulating ball

Answer: (B) Insulating ball will reach the earth's surface earlier than the metal ball · Key from source paper

Q62 JEE Main 2023 · 30 Jan · Shift 1 Numerical

As per the given figure, if $\frac{dI}{dt} = -1$ A s^{-1}, then the value of V_{AB} at this instant will be _____ V.

(see the figure above)



Numerical value type: the answer is a number.

Answer: 30. · Key from source paper

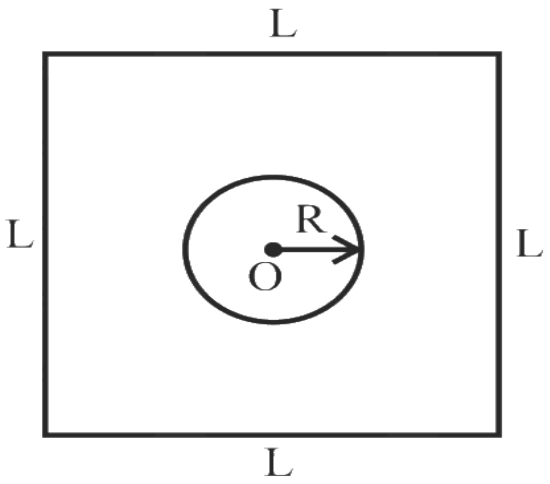
Q63 JEE Main 2023 · 29 Jan · Shift 1 MCQ

Find the mutual inductance in the arrangement, when a small circular loop of wire of radius R is placed inside a large square loop of wire of side $L(L \gg R)$. The loops are coplanar and their centres

coincide :

(see the figure above)

Q20. Find the mutual inductance in the arrangement, when a small circular loop of wire of radius R is placed inside a large square loop of wire of side $L(L \gg R)$. The loops are coplanar and their centres coincide :



(1) $M = \frac{\sqrt{2}\mu_0 R^2}{L}$
(2) $M = \frac{2\sqrt{2}\mu_0 R}{L^2}$
(3) $M = \frac{2\sqrt{2}\mu_0 R^2}{L}$
(4) $M = \frac{\sqrt{2}\mu_0 R}{L^2}$

(A) $M = \frac{\sqrt{2}\mu_0 R^2}{L}$
(B) $M = \frac{2\sqrt{2}\mu_0 R}{L^2}$
(C) $M = \frac{2\sqrt{2}\mu_0 R^2}{L}$
(D) $M = \frac{\sqrt{2}\mu_0 R}{L^2}$

Answer: (C) $M = \frac{2\sqrt{2}\mu_0 R^2}{L}$ · Key from source paper

Q64 JEE Main 2023 · 29 Jan · Shift 1 Numerical

A certain elastic conducting material is stretched into a circular loop. It is placed with its plane perpendicular to a uniform magnetic field $B = 0.8\ \mathrm{T}$. When released the radius of the loop starts shrinking at a constant rate of $2\ \mathrm{cm\,s^{-1}}$. The induced emf in the loop at an instant when the radius of the loop is $10\ \mathrm{cm}$ will be _____ mV.

Numerical value type: the answer is a number.

Answer: 10. · Key from source paper

Q65 JEE Main 2023 · 29 Jan · Shift 2 MCQ

A square loop of area $25\ \mathrm{cm^2}$ has a resistance of $10\ \Omega$. The loop is placed in uniform magnetic field of magnitude 40.0 T. The plane of loop is perpendicular to the magnetic field. The work done in pulling the loop out of the magnetic field slowly and uniformly in 1.0 sec, will be

(A) 2.5×10^{-3} J
(B) 1.0×10^{-3} J
(C) 1.0×10^{-4} J
(D) 5×10^{-3} J

Answer: (B) 1.0×10^{-3} J · Key from source paper

Q66 JEE Main 2023 · 25 Jan · Shift 1 MCQ

In an LC oscillator, if values of inductance and capacitance become twice and eight times, respectively, then the resonant frequency of oscillator becomes x times its initial resonant frequency ω_0. The value of x is:

(A) $\frac{1}{4}$
(B) 16
(C) $\frac{1}{16}$
(D) 4

Answer: (A) $\frac{1}{4}$ · Key from source paper

Q67 JEE Main 2023 · 25 Jan · Shift 2 MCQ

A wire of length 1 m moving with velocity $8\ \mathrm{m\,s^{-1}}$ at right angles to a magnetic field of 2 T. The magnitude of induced emf, between the ends of wire will be _____.

(A) 20 V
(B) 8 V
(C) 12 V
(D) 16 V

Answer: (D) 16 V · Key from source paper

Q68 JEE Main 2023 · 24 Jan · Shift 1 MCQ

A conducting loop of radius $\frac{10}{\sqrt{\pi}}$ cm is placed perpendicular to a uniform magnetic field of 0.5 T. The magnetic field is decreased to zero in 0.5 s at a steady rate. The induced emf in the circular loop at 0.25 s is:

(A) emf = 1mV
(B) emf = 10mV
(C) emf = 100mV
(D) emf = 5mV

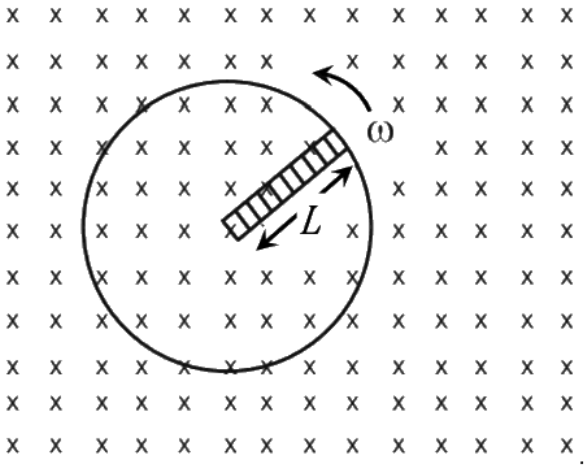
Answer: (B) emf = 10mV · Key from source paper

Q69 JEE Main 2023 · 24 Jan · Shift 2 MCQ

A metallic rod of length L is rotated with an angular speed of ω normal to a uniform magnetic field B about an axis passing through one end of rod as shown in figure. The induced emf will be :

(see the figure above)

Q21. A metallic rod of length L is rotated with an angular speed of ω normal to a uniform magnetic field B about an axis passing through one end of rod as shown in figure. The induced emf will be :



(1) $\frac{1}{2}B^2L^2\omega$
(2) $\frac{1}{4}BL^2\omega$
(3) $\frac{1}{2}BL^2\omega$
(4) $\frac{1}{4}B^2L\omega$

(A) $\frac{1}{2}B^2L^2\omega$
(B) $\frac{1}{4}BL^2\omega$
(C) $\frac{1}{2}BL^2\omega$
(D) $\frac{1}{4}B^2L\omega$

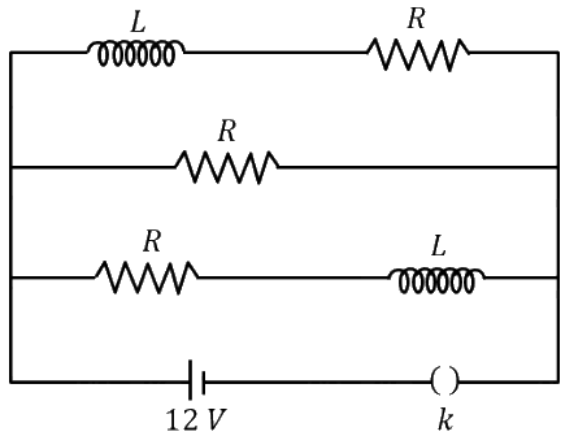
Answer: (C) $\frac{1}{2}BL^2\omega$ · Key from source paper

Q70 JEE Main 2023 · 24 Jan · Shift 2 Numerical

Three identical resistors with resistance $R = 12\ \Omega$ and two identical inductors with sell inductance $L = 5$ mH are connected to an ideal battery with emf of 12 V as shown in figure. The current through the battery long after the switch has been closed will be _____ A.

(see the figure above)

Q22. Three identical resistors with resistance $R = 12\ \Omega$ and two identical inductors with sell inductance $L = 5\ \text{mH}$ are connected to an ideal battery with emf of 12 V as shown in figure. The current through the battery long after the switch has been closed will be_____A.



Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q71 JEE Main 2022 · 29 Jul · Shift 1 MCQ

A coil of inductance 1 H and resistance 100 Ω is connected to a battery of 6 V. Determine approximately :
(a) The time elapsed before the current acquires half of its steady-state value
(b) The energy stored in the magnetic field associated with the coil at an instant 15 ms after the circuit is switched on. (Given $\ln 2 = 0.693$, $e^{\frac{-3}{2}} = 0.25$)

(A) $t = 10$ ms; $U = 2$ mJ
(B) $t = 10$ ms; $U = 1$ mJ
(C) $t = 7$ ms; $U = 1$ mJ
(D) $t = 7$ ms; $U = 2$ mJ

Answer: (C) $t = 7$ ms; $U = 1$ mJ · Key from source paper

Q72 JEE Main 2022 · 29 Jul · Shift 2 Numerical

A capacitor of capacitance 500 μF is charged completely using a dc supply of 100 V. It is now connected to an inductor of inductance 50 mH to form an LC circuit. The maximum current in LC circuit will be _____ A.

Numerical value type: the answer is a number.

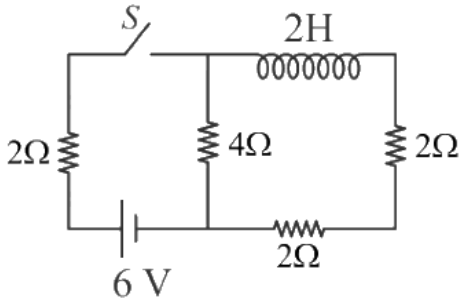
Answer: 10. · Key from source paper

Q73 JEE Main 2022 · 28 Jul · Shift 2 Numerical

For the given circuit the current through battery of 6 V just after closing the switch 'S' will be _____ A.

(see the figure above)

Q28. For the given circuit the current through battery of 6 V just after closing the switch 'S' will be _____ A.



Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q74 JEE Main 2022 · 27 Jul · Shift 2 Numerical

A conducting circular loop is placed in $X-Y$ plane in presence of magnetic field $\vec{B}=\left(3t^3\hat{j}+3t^2\hat{k}\right)$ in SI unit. If the radius of the loop is 1 m, the induced emf in the loop, at time, t = 2 s is $n\pi$ V. The value of n is _____ .

Numerical value type: the answer is a number.

Answer: 12. · Key from source paper

Q75 JEE Main 2022 · 26 Jul · Shift 2 Numerical

In a coil of resistance $8\ \Omega$, the magnetic flux due to an external magnetic field varies with time as $\phi=\frac{2}{3}9-t^2$. The value of total heat produced in the coil, till the flux becomes zero, will be _____ J.

Numerical value type: the answer is a number.

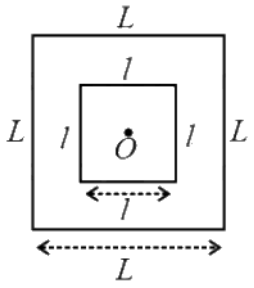
Answer: 2. · Key from source paper

Q76 JEE Main 2022 · 25 Jul · Shift 1 MCQ

A small square loop of wire of side l is placed inside a large square loop of wire L ($L \gg l$). Both loops are coplanar and their centres coincide at point O as shown in figure. The mutual inductance of the system is

(see the figure above)

Q13. A small square loop of wire of side l is placed inside a large square loop of wire $LL \gg l$. Both loops are coplanar and their centres coincide at point O as shown in figure. The mutual inductance of the system is



(1) $\frac{2\sqrt{2}\mu_0 L^2}{\pi l}$
(2) $\frac{\mu_0 l^2}{2\sqrt{2}\pi L}$
(3) $\frac{\mu_0 L^2}{2\sqrt{2}\pi l}$
(4) $\frac{2\sqrt{2}\mu_0 l^2}{\pi L}$

(A) $\frac{2\sqrt{2}\mu_0 L^2}{\pi l}$
(B) $\frac{\mu_0 l^2}{2\sqrt{2}\pi L}$
(C) $\frac{\mu_0 L^2}{2\sqrt{2}\pi l}$
(D) $\frac{2\sqrt{2}\mu_0 l^2}{\pi L}$

Answer: (D) $\frac{2\sqrt{2}\mu_0 l^2}{\pi L}$ · Key from source paper

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Q77 JEE Main 2022 · 25 Jul · Shift 2 Numerical

Magnetic flux (in weber) in a closed circuit of resistance $20\ \Omega$ varies with time t(s) as $\phi = 8t^2 - 9t + 5$. The magnitude of the induced current at $t = 0.25$ s will be _____ mA.

Numerical value type: the answer is a number.

Answer: 250. · Key from source paper

Q78 JEE Main 2022 · 28 Jun · Shift 2 MCQ

A coil is placed in a time varying magnetic field. If the number of turns in the coil were to be halved and the radius of wire doubled, the electrical power dissipated due to the current induced in the coil would be (Assume the coil to be short circuited.)

(A) Doubled
(B) The same
(C) Quadrupled
(D) Halved

Answer: (A) Doubled · Checked by our team

Q79 JEE Main 2022 · 27 Jun · Shift 2 Numerical

A metallic rod of length $20\ \text{cm}$ is placed in North-South direction and is moved at a constant speed of $20\ \text{m s}^{-1}$ towards East. The horizontal component of the Earth's magnetic field at that place is $4 \times 10^{-3}\ \text{T}$ and the angle of dip is 45°. The emf induced in the rod is _____ mV.

Numerical value type: the answer is a number.

Answer: 16. · Key from source paper

Q80 JEE Main 2022 · 26 Jun · Shift 1 MCQ

The magnetic flux through a coil perpendicular to its plane is varying according to the relation $\phi = (5t^3 + 4t^2 + 2t - 5)$ Weber. If the resistance of the coil is 5 ohm, then the induced current through the coil at $t = 2$ s will be,

(A) 15.6 A
(B) 16.6 A
(C) 17.6 A
(D) 18.6 A

Answer: (A) 15.6 A · Key from source paper

Q81 JEE Main 2022 · 26 Jun · Shift 1 Numerical

A 10Ω, 20 mH coil carrying constant current is connected to a battery of 20 V through a switch. Now after switch is opened current becomes zero in 100μs. The average e.m.f. induced in the coil is _____ V.

Numerical value type: the answer is a number.

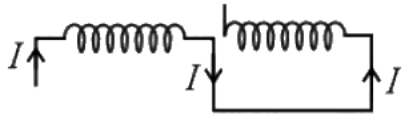
Answer: 400. · Key from source paper

Q82 JEE Main 2022 · 26 Jun · Shift 2 MCQ

Two coils of self inductance L_1 and L_2 are connected in series combination having mutual inductance of the coils as M. The equivalent self inductance of the combination will be

(see the figure above)

Q15. Two coils of self inductance L_1 and L_2 are connected in series combination having mutual inductance of the coils as M. The equivalent self inductance of the combination will be



(1) $\frac{1}{L_1} + \frac{1}{L_2} + \frac{1}{M}$
(2) $L_1 + L_2 - 2M$
(3) $L_1 + L_2 + M$
(4) $L_1 + L_2 + 2M$

(A) $\frac{1}{L_1} + \frac{1}{L_2} + \frac{1}{M}$
(B) $L_1 + L_2 - 2M$
(C) $L_1 + L_2 + M$
(D) $L_1 + L_2 + 2M$

Answer: (B) $L_1 + L_2 - 2M$ · Key from source paper

Q83 JEE Main 2022 · 26 Jun · Shift 2 MCQ

A metallic conductor of length $1\ \mathrm{m}$ rotates in a vertical plane parallel to east-west direction about one of its end with angular velocity $5\ \mathrm{rad\ s^{-1}}$. If the horizontal component of earth's magnetic field is $0.2 \times 10^{-4}\ \mathrm{T}$, then emf induced between the two ends of the conductor is

(A) $5\mu\mathrm{V}$
(B) $50\mu\mathrm{V}$
(C) $5\ \mathrm{mV}$
(D) $50\ \mathrm{mV}$

Answer: (B) $50\mu\mathrm{V}$ · Key from source paper

Q84 JEE Main 2022 · 25 Jun · Shift 1 Numerical

The current in a coil of self inductance $L = 2.0\ \mathrm{H}$ is increasing according to the law $i = 2\sin t^2$. Find the amount of energy spent (in J) during the period when the current changes from 0 to $2\ \mathrm{A}$.

Numerical value type: the answer is a number.

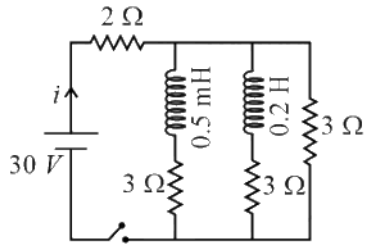
Answer: 4. · Key from source paper

Q85 JEE Main 2021 · 1 Sep · Shift 2 MCQ

For the given circuit the current i through the battery when the key in closed and the steady state has been reached is

(see the figure above)

Q15. For the given circuit the current i through the battery when the key in closed and the steady state has been reached is



(1) 10 A
(2) 6 A
(3) 25 A
(4) 0 A

(A) 10 A
(B) 6 A
(C) 25 A
(D) 0 A

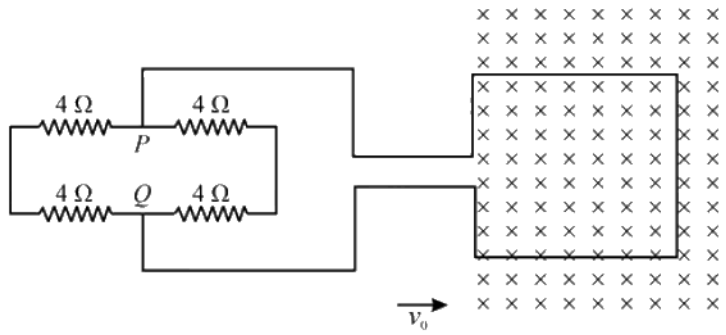
Answer: (A) 10 A · Key from source paper

Q86 JEE Main 2021 · 1 Sep · Shift 2 MCQ

A square loop of side 20 cm and resistance 1 Ω is moved towards right with a constant speed v_0. The right arm of the loop is in a uniform magnetic field of 5 T. The field is perpendicular to the plane of the loop and is going into it. The loop is connected to a network of resistors each of value 4Ω. What should be the value of v_0 so that a steady current of 2 mA flows in the loop ?

(see the figure above)

Q16. A square loop of side 20 cm and resistance 1 Ω is moved towards right with a constant speed v_0. The right arm of the loop is in a uniform magnetic field of 5 T. The field is perpendicular to the plane of the loop and is going into it. The loop is connected to a network of resistors each of value 4Ω. What should be the value of v_0 so that a steady current of 2 mA flows in the loop ?



(1) 10^{-2} cm s^{-1}
(2) 1 m s^{-1}
(3) 1 cm s^{-1}
(4) 10^{2} m s^{-1}

(A) 10^{-2} cm s^{-1}
(B) 1 m s^{-1}
(C) 1 cm s^{-1}
(D) 10^{2} m s^{-1}

Answer: (C) 1 cm s^{-1} · Key from source paper

Q87 JEE Main 2021 · 31 Aug · Shift 1 MCQ

A small square loop of side a and one turn is placed inside a larger square loop of side b and one turn ($b \gg a$). The two loops are coplanar with their centres coinciding. If a current I is passed in the square loop of side b, then the coefficient of mutual inductance between the two loops is :

(A) $\frac{\mu_0}{4\pi} 8\sqrt{2} \frac{a^2}{b}$
(B) $\frac{\mu_0}{4\pi} 8\sqrt{2} \frac{b^2}{a}$
(C) $\frac{\mu_0}{4\pi} \frac{8\sqrt{2}}{b}$
(D) $\frac{\mu_0}{4\pi} \frac{8\sqrt{2}}{a}$

Answer: (A) $\frac{\mu_0}{4\pi} 8\sqrt{2} \frac{a^2}{b}$ · Key from source paper

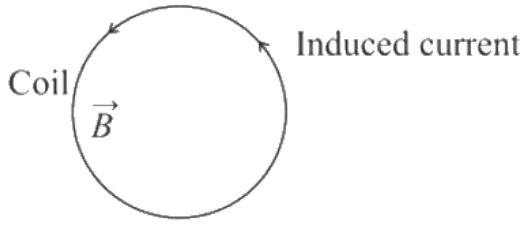
Q88 JEE Main 2021 · 31 Aug · Shift 2 MCQ

A coil is placed in a magnetic field $\vec{B}$ as shown below :

(see the figure above)

A current is induced in the coil because $\vec{B}$ is :

Q15. A coil is placed in a magnetic field $\vec{B}$ as shown below :



A current is induced in the coil because $\vec{B}$ is :

(1) parallel to the plane of coil and increasing with time

(2) outward and increasing with time

(3) outward and decreasing with time

(4) parallel to the plane of coil and decreasing with time

(A) parallel to the plane of coil and increasing with time

(B) outward and increasing with time

(C) outward and decreasing with time

(D) parallel to the plane of coil and decreasing with time

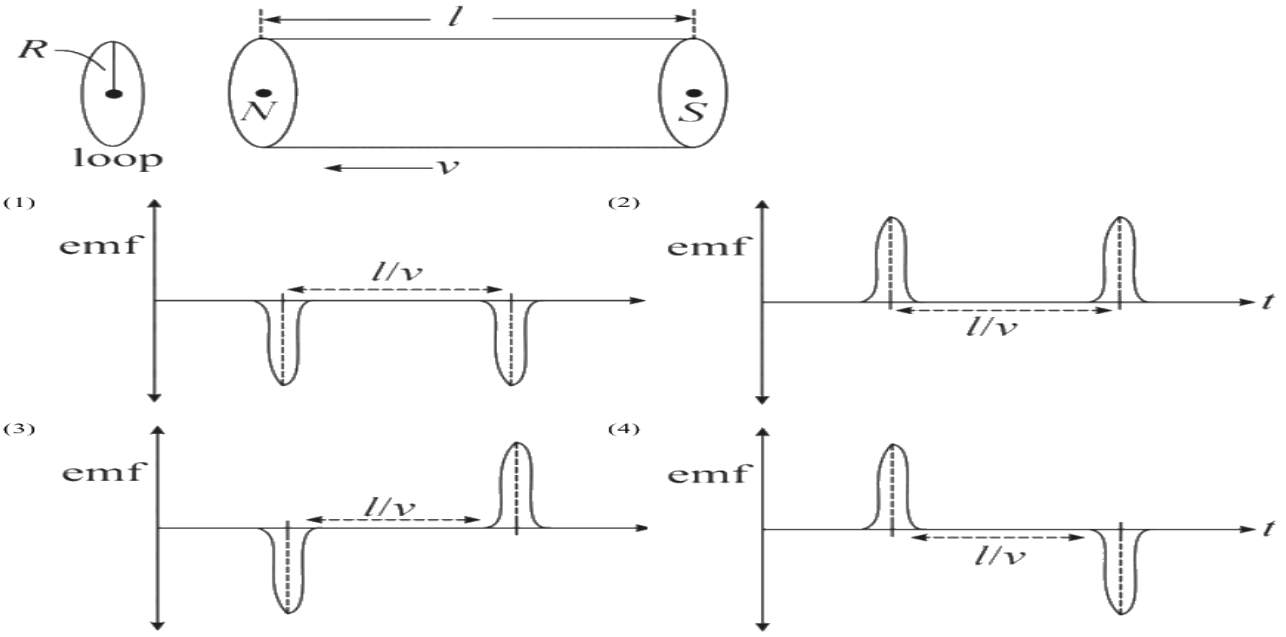
Answer: (C) outward and decreasing with time · Key from source paper

Q89 JEE Main 2021 · 27 Aug · Shift 1 MCQ

A bar magnet is passing through a conducting loop of radius R with velocity v. The radius of the bar magnet is such that it just passes through the loop. The induced e.m.f. in the loop can be represented by the approximate curve:

(see the figure above)

Q14. A bar magnet is passing through a conducting loop of radius R with velocity v. The radius of the bar magnet is such that it just passes through the loop. The induced e.m.f. in the loop can be represented by the approximate curve:



(A) *see figure*

(B) *see figure*

(C) *see figure*

(D) *see figure*

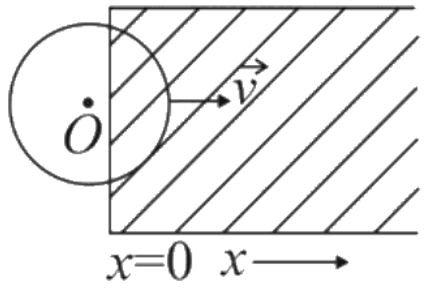
Options (3) or (4) were accepted. More than one answer was accepted. · Key from source paper

Q90 JEE Main 2021 · 27 Aug · Shift 2 MCQ

A constant magnetic field of 1 T is applied in the $x > 0$ region. A metallic circular ring of radius 1 m is moving with a constant velocity of 1 m s^{-1} along the x-axis. At $t = 0$ s, the centre O of the ring is at $x = -1$ m. What will be the value of the induced emf in the ring at $t = 1$ s ? (Assume the velocity of the ring does not change.)

(see the figure above)

Q15. A constant magnetic field of 1 T is applied in the $x > 0$ region. A metallic circular ring of radius 1 m is moving with a constant velocity of 1 m s^{-1} along the x-axis. At $t = 0$ s, the centre O of the ring is at $x = -1$ m. What will be the value of the induced emf in the ring at $t = 1$ s ? (Assume the velocity of the ring does not change.)



(1) 0 V

(2) 2 V

(3) 2π V

(4) 1 V

(A) $0\ \text{V}$
(B) $2\ \text{V}$
(C) $2\pi\ \text{V}$
(D) $1\ \text{V}$

Answer: (B) $2\ \text{V}$ · Key from source paper

Q91 JEE Main 2021 · 26 Aug · Shift 1 MCQ

An inductor coil stores $64\ \text{J}$ of magnetic field energy and dissipates energy at the rate of $640\ \text{W}$ when a current of $8\ \text{A}$ is passed through it. If this coil is joined across an ideal battery, find the time constant of the circuit (in s).

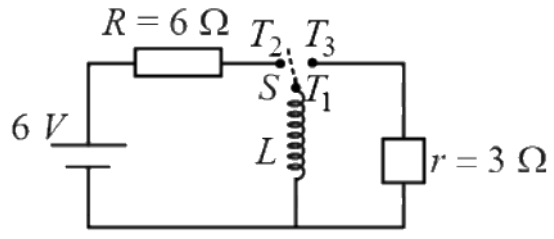
(A) 0.4
(B) 0.2
(C) 0.125
(D) 0.8

Answer: (B) 0.2 · Key from source paper

Q92 JEE Main 2021 · 27 Jul · Shift 1 Numerical

Consider an electrical circuit containing a two way switch S. Initially S is open and then T_1 is connected to T_2. As the current in $R = 6\ \Omega$ attains a maximum value of steady-state level, T_1 is disconnected from T_2 and immediately connected to T_3. Potential drop across $r = 3\ \Omega$ resistor immediately after T_1 is connected to T_3 is _____ V. (Round off to the Nearest Integer)
(see the figure above)

Q24. Consider an electrical circuit containing a two way switch S. Initially S is open and then T_1 is connected to T_2. As the current in $R = 6\ \Omega$ attains a maximum value of steady-state level, T_1 is disconnected from T_2 and immediately connected to T_3. Potential drop across $r = 3\ \Omega$ resistor immediately after T_1 is connected to T_3 is _____V. (Round off to the Nearest Integer)



Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

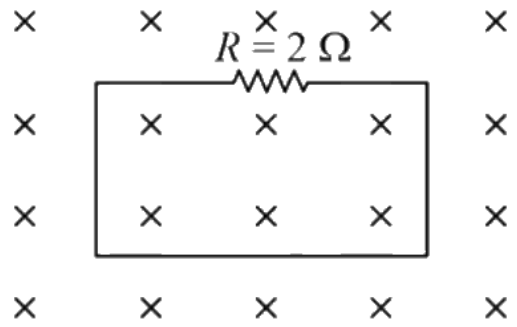
Q93 JEE Main 2021 · 27 Jul · Shift 2 Numerical

In the given figure the magnetic flux through the loop increases according to the relation $\phi_B(t) = 10t^2 + 20t$, where ϕ_B is in milliwebers and t is in seconds. The magnitude of current through $R = 2\ \Omega$

resistor at $t = 5$ s is _____ mA.

(see the figure above)

Q27. In the given figure the magnetic flux through the loop increases according to the relation $\phi_B(t) = 10t^2 + 20t$, where ϕ_B is in milliwebers and t is in seconds. The magnitude of current through $R = 2\ \Omega$ resistor at $t = 5$ s is _____ mA.



Numerical value type: the answer is a number.

Answer: 60. · Key from source paper

Q94 JEE Main 2021 · 25 Jul · Shift 1 Numerical

A circular conducting coil of radius $1\ \mathrm{m}$ is being heated by the change of magnetic field $\vec{B}$ passing perpendicular to the plane in which the coil is laid. The resistance of the coil is $2\ \mu\Omega$. The magnetic field is slowly switched off such that its magnitude changes in time as

$B = \frac{4}{\pi} \times 10^{-3}\ \mathrm{T}\ 1 - \frac{t}{100}$

The energy dissipated by the coil before the magnetic field is switched off completely is $E =$ _____ mJ.

Numerical value type: the answer is a number.

Answer: 80. · Key from source paper

Q95 JEE Main 2021 · 25 Jul · Shift 1 Numerical

An inductor of $10\ \mathrm{mH}$ is connected to a $20\ \mathrm{V}$ battery through a resistor of $10\ \mathrm{k}\Omega$ and a switch. After a long time, when maximum current is set up in the circuit, the current is switched off. The current in the circuit after $1\ \mu\mathrm{s}$ is $\frac{x}{100}\ \mathrm{mA}$. Then x is equal to _____. (Take $e^{-1} = 0.37$)

Numerical value type: the answer is a number.

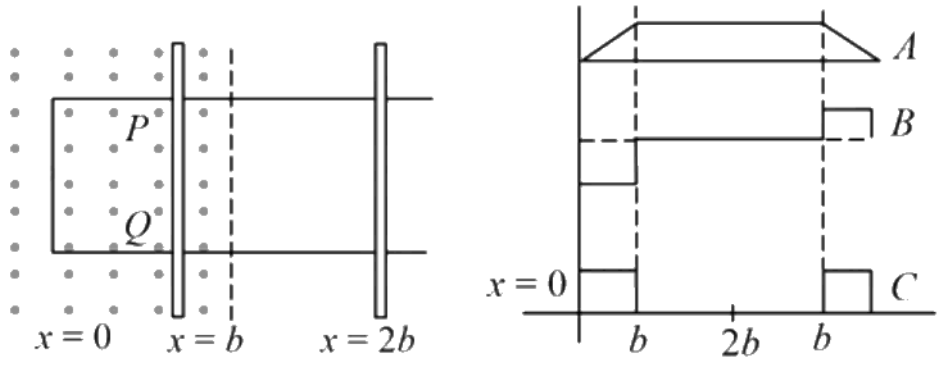
Answer: 74. · Key from source paper

Q96 JEE Main 2021 · 20 Jul · Shift 1 MCQ

The arm PQ of a rectangular conductor is moving from $x = 0$ to $x = 2b$ outwards and then inwards from $x = 2b$ to $x = 0$ as shown in the figure. A uniform magnetic field perpendicular to the plane is acting from $x = 0$ to $x = b$. Identify the graph showing the variation of different quantities with distance:

(see the figure above)

Q14. The arm PQ of a rectangular conductor is moving from $x = 0$ to $x = 2b$ outwards and then inwards from $x = 2b$ to $x = 0$ as shown in the figure. A uniform magnetic field perpendicular to the plane is acting from $x = 0$ to $x = b$. Identify the graph showing the variation of different quantities with distance:



(1) A—Flux, B—Power dissipated, C—EMF
(2) A—Power dissipated, B—Flux, C—EMF
(3) A—Flux, B—EMF, C—Power dissipated
(4) A—EMF, B—Power dissipated, C—Flux

(A) A—Flux, B—Power dissipated, C—EMF
(B) A—Power dissipated, B—Flux, C—EMF
(C) A—Flux, B—EMF, C—Power dissipated
(D) A—EMF, B—Power dissipated, C—Flux

Answer: (C) A—Flux, B—EMF, C—Power dissipated · Key from source paper

Q97 JEE Main 2021 · 18 Mar · Shift 2 MCQ

The time taken for the magnetic energy to reach 25% of its maximum value, when a solenoid of resistance R, inductance L is connected to a battery, is :

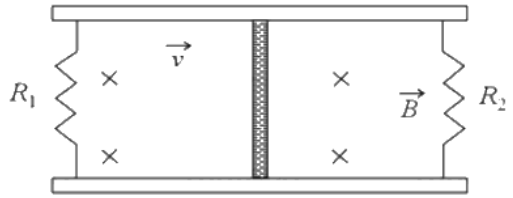
(A) $\frac{L}{R}\ln 5$
(B) infinite
(C) $\frac{L}{R}\ln 2$
(D) $\frac{L}{R}\ln 10$

Answer: (C) $\frac{L}{R}\ln 2$ · Key from source paper

Q98 JEE Main 2021 · 16 Mar · Shift 1 MCQ

A conducting bar of length L is free to slide on two parallel conducting rails as shown in the figure *(see the figure above)*
Two resistors R_1 and R_2 are connected across the ends of the rails. There is a uniform magnetic field $\vec{B}$ pointing into the page. An external agent pulls the bar to the left at a constant speed v.
The correct statement about the directions of induced currents I_1 and I_2 flowing through R_1 and R_2 respectively is :

Q14. A conducting bar of length L is free to slide on two parallel conducting rails as shown in the figure



Two resistors R_1 and R_2 are connected across the ends of the rails. There is a uniform magnetic field $\vec{B}$ pointing into the page. An external agent pulls the bar to the left at a constant speed v.

The correct statement about the directions of induced currents I_1 and I_2 flowing through R_1 and R_2 respectively is :

(1) Both I_1 and I_2 are in anticlockwise direction
(2) Both I_1 and I_2 are in clockwise direction
(3) I_1 is in clockwise direction and I_2 is in anticlockwise direction
(4) I_1 is in anticlockwise direction and I_2 is in clockwise direction

(A) Both I_1 and I_2 are in anticlockwise direction
(B) Both I_1 and I_2 are in clockwise direction
(C) I_1 is in clockwise direction and I_2 is in anticlockwise direction
(D) I_1 is in anticlockwise direction and I_2 is in clockwise direction

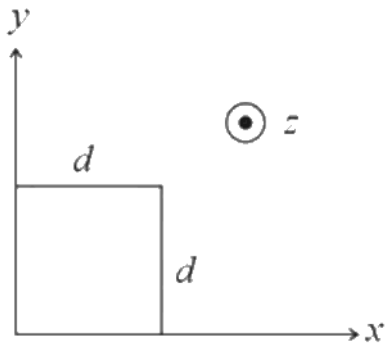
Answer: (C) I_1 is in clockwise direction and I_2 is in anticlockwise direction · Key from source paper

Q99 JEE Main 2021 · 16 Mar · Shift 2 MCQ

The magnetic field in a region is given by $\vec{B} = B_0\left(\frac{x}{a}\right)\hat{k}$. A square loop of side d is placed with its edges along the x and y axes. The loop is moved with a constant velocity $\vec{v} = v_0\hat{i}$. The emf induced in the loop is :

(see the figure above)

Q12. The magnetic field in a region is given by $\vec{B} = B_0\left(\frac{x}{a}\right)\hat{k}$. A square loop of side d is placed with its edges along the x and y axes. The loop is moved with a constant velocity $\vec{v} = v_0\hat{i}$. The emf induced in the loop is :



(1) $\frac{B_0 v_0^2 d}{2a}$
(2) $\frac{B_0 v_0 d}{2a}$
(3) $\frac{B_0 v_0 d^2}{a}$
(4) $\frac{B_0 v_0 d^2}{2a}$

(A) $\frac{B_0 v_0^2 d}{2a}$
(B) $\frac{B_0 v_0 d}{2a}$
(C) $\frac{B_0 v_0 d^2}{a}$
(D) $\frac{B_0 v_0 d^2}{2a}$

Answer: (C) $\frac{B_0 v_0 d^2}{a}$ · Key from source paper

Q100 JEE Main 2021 · 26 Feb · Shift 2 MCQ

An aeroplane, with its wings spread $10\ \mathrm{m}$, is flying at a speed of $180\ \mathrm{km\,h^{-1}}$ in a horizontal direction. The total intensity of earth's field at that part is $2.5 \times 10^{-4}\ \mathrm{Wb\,m^{-2}}$ and the angle of dip is 60°. The emf induced between the tips of the plane wings will be

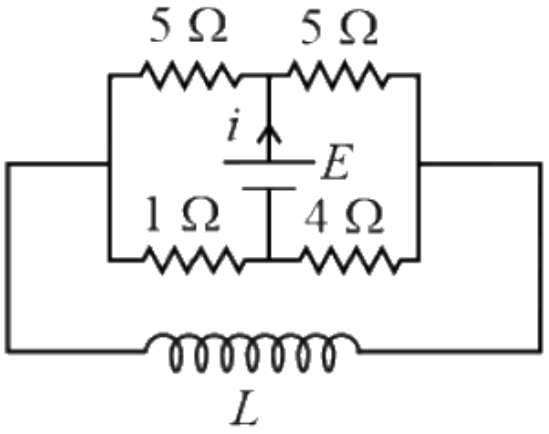
(A) $108.25\ \mathrm{mV}$
(B) $54.125\ \mathrm{mV}$
(C) $88.37\ \mathrm{mV}$
(D) $62.50\ \mathrm{mV}$

Answer: (A) $108.25\ \mathrm{mV}$ · Key from source paper

Q101 JEE Main 2021 · 25 Feb · Shift 1 MCQ

The current (i) at time $t = 0$ and $t = \infty$ respectively for the given circuit is :
(see the figure above)

Q13. The current (i) at time $t = 0$ and $t = \infty$ respectively for the given circuit is :



(1) $\frac{5E}{18}, \frac{18E}{55}$
(2) $\frac{5E}{18}, \frac{10E}{33}$
(3) $\frac{10E}{33}, \frac{5E}{18}$
(4) $\frac{18E}{55}, \frac{5E}{18}$

(A) $\frac{5E}{18}, \frac{18E}{55}$
(B) $\frac{5E}{18}, \frac{10E}{33}$
(C) $\frac{10E}{33}, \frac{5E}{18}$
(D) $\frac{18E}{55}, \frac{5E}{18}$

Answer: (B) $\frac{5E}{18}, \frac{10E}{33}$ · Key from source paper

Q102 JEE Main 2021 · 25 Feb · Shift 1 Numerical

A coil of inductance $2\ \mathrm{H}$ having negligible resistance is connected to a source of supply whose voltage is given by $V = 3t$ volt. (where t is in second). If the voltage is applied when $t = 0$, then the energy stored in the coil after $4\ \mathrm{s}$ in J,

Numerical value type: the answer is a number.

Answer: 144. · Key from source paper

Q103 JEE Main 2021 · 25 Feb · Shift 1 Numerical

A transmitting station releases waves of wavelength $960\ \mathrm{m}$. A capacitor of $2.56\ \mu\mathrm{F}$ is used in the resonant circuit. The self-inductance of coil necessary for resonance is $x \times 10^{-8}\ \mathrm{H}$. find x

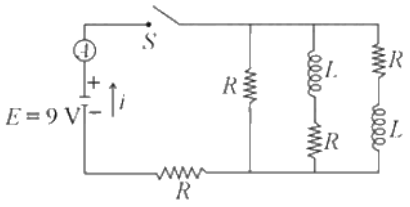
Numerical value type: the answer is a number.

Answer: 10. · Key from source paper

Q104 JEE Main 2021 · 24 Feb · Shift 2 MCQ

The figure shows a circuit that contains four identical resistors with resistance $R = 2.0\ \Omega$, two identical inductors with inductance $L = 2.0\ \mathrm{mH}$ and an ideal battery with E.M.F. $E = 9\ \mathrm{V}$. The current i just after the switch S is closed will be:
(see the figure above)

Q12. The figure shows a circuit that contains four identical resistors with resistance $R = 2.0\ \Omega$, two identical inductors with inductance $L = 2.0\ \mathrm{mH}$ and an ideal battery with E.M.F. $E = 9\ \mathrm{V}$. The current i just after the switch S is closed will be:



(1) 9 A
(2) 3.37 A
(3) 2.25 A
(4) 3.0 A

(A) $9\ \mathrm{A}$

(B) $3.37\ \mathrm{A}$

(C) $2.25\ \mathrm{A}$

(D) $3.0\ \mathrm{A}$

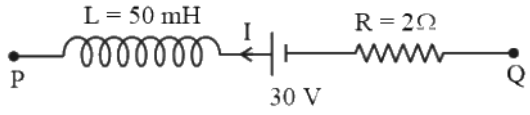
Answer: (C) $2.25\ \mathrm{A}$ · Key from source paper

Q105 JEE Main 2020 · 6 Sep · Shift 1 Numerical

A part of a complete circuit is shown in the figure. At some instant, the value of current I is 1A and it is decreasing at a rate of $10^2\ \mathrm{As}^{-1}$. The value of the potential difference $\mathrm{V_P} - \mathrm{V_Q}$, (in volts) at that instant is-

(see the figure above)

Q25. A part of a complete circuit is shown in the figure. At some instant, the value of current I is 1A and it is decreasing at a rate of $10^2\ \mathrm{As}^{-1}$. The value of the potential difference $\mathrm{V_P} - \mathrm{V_Q}$, (in volts) at that instant is-



Numerical value type: the answer is a number.

Answer: 33. · Key from source paper

Q106 JEE Main 2020 · 5 Sep · Shift 1 Numerical

Two concentric circular coils, C_1 and C_2, are placed in the XY plane. C_1 has 500turns, and a radius of 1 cm. C_2 has 200 turns and radius of 20 cm . C_2 carries a time dependent current $I(t) = \left(5t^2 - 2t + 3\right)$A where t is in s. The emf induced in C_1(in mV) at the instant t = 1s is $\frac{4}{x}$. The value of x is .....

Numerical value type: the answer is a number.

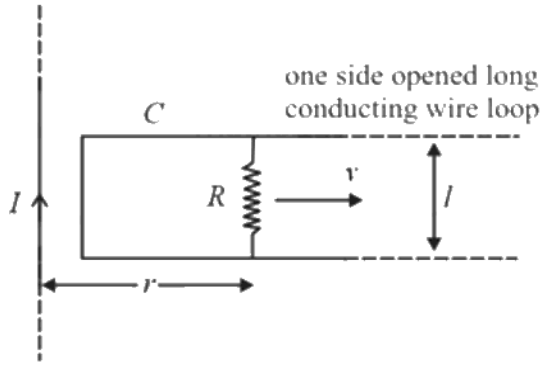
Answer: 5. · Key from source paper

Q107 JEE Main 2020 · 5 Sep · Shift 2 MCQ

An infinitely long straight wire carrying current I, one side opened rectangular loop and a conductor C with a sliding connector are located in the same plane, as shown in the figure. The connector has length 1. and resistance R. It slides to the right with a velocity v. The resistance of the conductor and the self inductance of the loop are negligible. The induced current in the loop, as a function of separation r, between the connector and the straight wire is

(see the figure above)

Q16. An infinitely long straight wire carrying current I, one side opened rectangular loop and a conductor C with a sliding connector are located in the same plane, as shown in the figure. The connector has length l. and resistance R. It slides to the right with a velocity v. The resistance of the conductor and the self inductance of the loop are negligible. The induced current in the loop, as a function of separation r, between the connector and the straight wire is



(1) $\frac{\mu_0}{4\pi}\frac{\mathrm{Iv}\,\ell}{\mathrm{Rr}}$
(2) $\frac{\mu_0}{\pi}\frac{\mathrm{Iv}\,\ell}{\mathrm{Rr}}$
(3) $\frac{2\mu_0}{\pi}\frac{\mathrm{Iv}\,\ell}{\mathrm{Rr}}$
(4) $\frac{\mu_0}{2\pi}\frac{\mathrm{Iv}\,\ell}{\mathrm{Rr}}$

(A) $\frac{\mu_0}{4\pi}\frac{Iv\ell}{Rr}$
(B) $\frac{\mu_0}{\pi}\frac{Iv\ell}{Rr}$
(C) $\frac{2\mu_0}{\pi}\frac{Iv\ell}{Rr}$
(D) $\frac{\mu_0}{2\pi}\frac{Iv\ell}{Rr}$

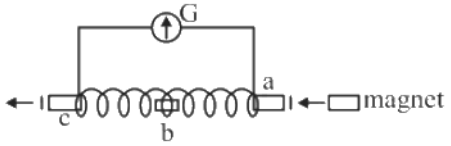
Answer: (D) $\frac{\mu_0}{2\pi}\frac{Iv\ell}{Rr}$ · Key from source paper

Q108 JEE Main 2020 · 4 Sep · Shift 1 MCQ

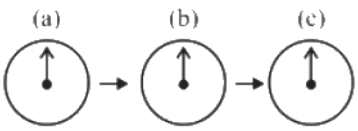
A small bar magnet is moved through a coil at constant speed from one end to the other. Which of the following series of observations will be seen on the galvanometer G attached across the coil? *(see the figure above)*

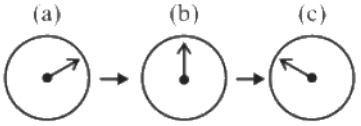
Three positions shown describe: (a) the magnet's entry (b) magnet is completely inside and (c) magnet's exit.

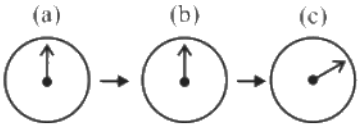
Q15. A small bar magnet is moved through a coil at constant speed from one end to the other. Which of the following series of observations will be seen on the galvanometer G attached across the coil?

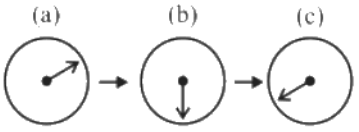


Three positions shown describe: (a) the magnet's entry (b) magnet is completely inside and (c) magnet's exit.

(1) 

(2) 

(3) 

(4) 

(A) *see figure*
(B) *see figure*
(C) *see figure*
(D) *see figure*

Answer: (B) · Key from source paper

Q109 JEE Main 2020 · 4 Sep · Shift 2 MCQ

A series $L-R$ circuit is connected to a battery of emf V. If the circuit is switched on at $t=0$, then the time at which the energy stored in the inductor reaches $\left(\frac{1}{n}\right)$ times of its maximum value, is :

(A) $\frac{L}{R}\ln\left(\frac{\sqrt{n}}{\sqrt{n}-1}\right)$
(B) $\frac{L}{R}\ln\left(\frac{\sqrt{n}+1}{\sqrt{n}-1}\right)$
(C) $\frac{L}{R}\ln\left(\frac{\sqrt{n}}{\sqrt{n}+1}\right)$
(D) $\frac{L}{R}\ln\left(\frac{\sqrt{n}-1}{\sqrt{n}}\right)$

Answer: (A) $\frac{L}{R}\ln\left(\frac{\sqrt{n}}{\sqrt{n}-1}\right)$ · Key from source paper

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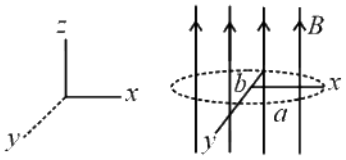
Q110 JEE Main 2020 · 3 Sep · Shift 1 MCQ

An elliptical loop having resistance R, of semi major axis a , and semi minor axis b is placed in a magnetic field as shown in the figure. If the loop is rotated about the x-axis with angular frequency ω, the average power loss in the loop due to Joule heating is :

(see the figure above)

Q10. An elliptical loop having resistance R, of semi major axis a , and semi minor axis b is placed in a magnetic field as shown in the figure. If the loop is rotated about the x-axis with angular frequency ω, the average power loss in the loop due to Joule heating is :



(1) $\frac{\pi^2 a^2 b^2 B^2 \omega^2}{2R}$
(2) zero
(3) $\frac{\pi \mathrm{bB}\,\omega}{\mathrm{R}}$
(4) $\frac{\pi^2 a^2 b^2 B^2 \omega^2}{R}$

(A) $\frac{\pi^2 a^2 b^2 B^2 \omega^2}{2R}$
(B) zero
(C) $\frac{\pi \mathrm{bB}\,\omega}{\mathrm{R}}$
(D) $\frac{\pi^2 a^2 b^2 B^2 \omega^2}{R}$

Answer: (A) $\frac{\pi^2 a^2 b^2 B^2 \omega^2}{2R}$ · Key from source paper

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Q111 JEE Main 2020 · 3 Sep · Shift 2 MCQ

A uniform magnetic field B exists in a direction perpendicular to the plane of a square loop made of a metal wire. The wire has a diameter of $4\ \mathrm{mm}$ and a total length of $30\ \mathrm{cm}$. The magnetic field changes with time at a steady rate $dB/dt = 0.032\ \mathrm{Ts}^{-1}$. The induced current in the loopis close to (Resistivity of the metal wire is $1.23 \times 10^{-8}\ \Omega\mathrm{m}$)

(A) $0.43\ \mathrm{A}$
(B) $0.61\ \mathrm{A}$
(C) $0.34\ \mathrm{A}$
(D) $0.53\ \mathrm{A}$

Answer: (B) $0.61\ \mathrm{A}$ · Key from source paper

Q112 JEE Main 2020 · 9 Jan · Shift 1 Numerical

In a fluorescent lamp choke (a small transformer) $100V$ of reverse voltage is produced when the choke current changes uniformly from $0.25A$ to 0 in a duration of $0.025ms$. The self-inductance of the choke (in mH) is estimated to be _____.

Numerical value type: the answer is a number.

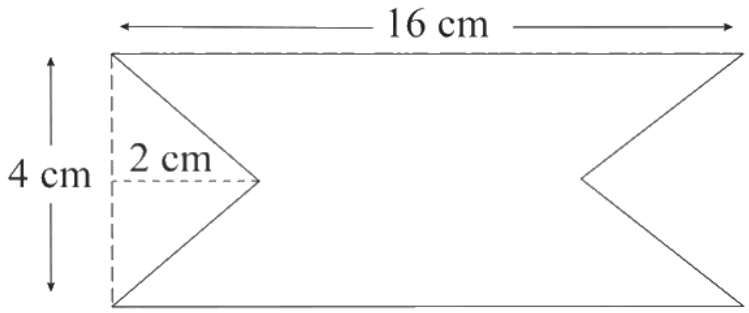
Answer: 10. · Key from source paper

Q113 JEE Main 2020 · 8 Jan · Shift 1 MCQ

At time $t = 0$ magnetic field of 1000 Gauss is passing perpendicularly through the area defined by the closed loop shown in the figure. If the magnetic field reduces linearly to 500 Gauss, in the next 5s, then induced EMF in the loop is:
(see the figure above)

Q15. At time $t = 0$ magnetic field of 1000 Gauss is passing perpendicularly through the area defined by the closed loop shown in the figure. If the magnetic field reduces linearly to 500 Gauss, in the next 5s, then induced

EMF in the loop is:



(1) 56μV
(2) 28μV
(3) 48μV
(4) 36μV

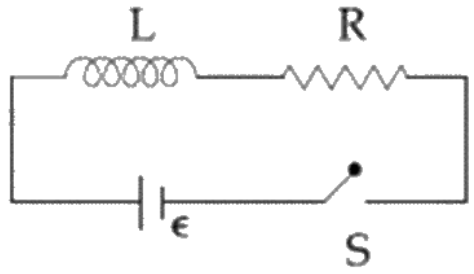
(A) $56\mu V$
(B) $28\mu V$
(C) $48\mu V$
(D) $36\mu V$

Answer: (A) $56\mu V$ · Key from source paper

Q114 JEE Main 2020 · 8 Jan · Shift 2 MCQ

see figure

Q15.



As shown in the figure, a battery of emf $\in$ is connected to an inductor L and resistance R in series. The switch is closed at $t = 0$. The total charge that flows from the battery, between $t = 0$ and $t = t_c$ (t_c is the time constant of the circuit) is:

(1) $\frac{\in L}{eR^2}$
(2) $\frac{\in L}{R^2}\left(1 - \frac{1}{e}\right)$
(3) $\frac{\in L}{R^2}$
(4) $\frac{\in R}{eL^2}$

(A) $\frac{\varepsilon L}{eR^2}$
(B) $\frac{\varepsilon L}{R^2}\left(1 - \frac{1}{e}\right)$
(C) $\frac{\varepsilon L}{R^2}$
(D) $\frac{\varepsilon R}{eL^2}$

Answer: (A) $\frac{\varepsilon L}{eR^2}$ · Key from source paper

Q115 JEE Main 2020 · 7 Jan · Shift 1 MCQ

A long solenoid of radius R carries a time (t) dependent current $I(t) = I_0 t(1-t)$. A ring of radius $2R$ is placed coaxially near its middle. During the time interval $0 \leq t \leq 1$, the induced current (I_R) and the induced $EMF(V_R)$ in the ring change as:

(A) Direction of I_R remains unchanged and V_R is maximum at $t = 0.5$

(B) At $t = 0.25$ direction of I_R reverses and V_R is maximum

(C) Direction of I_R remains unchanged and V_R is zero at $t = 0.25$

(D) At $t = 0.5$ direction of I_R reverses and V_R is zero

Answer: (D) At $t = 0.5$ direction of I_R reverses and V_R is zero · Key from source paper

Q116 JEE Main 2020 · 7 Jan · Shift 1 MCQ

Consider a circular coil of wire carrying constant current I, forming a magnetic dipole. The magnetic flux through an infinite plane that contains the circular coil and excluding the circular coil area is given by ϕ_i The magnetic flux through the area of the circular coil area is given by ϕ_0 . Which of the following option is correct?

(A) $\phi_i = \phi_0$

(B) $\phi_i > \phi_0$

(C) $\phi_i < \phi_0$

(D) $\phi_i = -\phi_0$

Answer: (D) $\phi_i = -\phi_0$ · Key from source paper

Q117 JEE Main 2020 · 7 Jan · Shift 1 MCQ

A LCR circuit behaves like a clamped harmonic oscillator. Comparing it with a physical spring-mass damped oscillator having damping constant 'b', the correct equivalence would be:

(A) $L \leftrightarrow m, C \leftrightarrow k, R \leftrightarrow b$

(B) $L \leftrightarrow \frac{1}{b}, C \leftrightarrow \frac{1}{m}, R \leftrightarrow \frac{1}{k}$

(C) $L \leftrightarrow k, C \leftrightarrow b, R \leftrightarrow m$

(D) $L \leftrightarrow m, C \leftrightarrow \frac{1}{k}, R \leftrightarrow b$

Answer: (D) $L \leftrightarrow m, C \leftrightarrow \frac{1}{k}, R \leftrightarrow b$ · Key from source paper

Q118 JEE Main 2020 · 7 Jan · Shift 1 Numerical

A loop ABCDEFA of straight edges has six corner points $A(0,0,0), B(5,0,0), C(5,5,0), D(0,5,0), E(0,5,5)$ and $F(0,0,5)$. The magnetic field in this region is $\vec{B} = \left(3\hat{i} + 4\hat{k}\right) T$. The quantity of flux through the loop ABCDEFA (in Wb) is _____

Numerical value type: the answer is a number.

Answer: 175. · Key from source paper

Q119 JEE Main 2020 · 7 Jan · Shift 2 MCQ

A planar loop of wire rotates in a uniform magnetic field. Initially, at $t = 0$, the plane of the loop is perpendicular to the magnetic field. If it rotates with a period of 10s about an axis in its plane then the magnitude of induced emf will be maximum and minimum, respectively at:

(A) 2.5 s and 7.5 s
(B) 2.5 s and 5.0 s
(C) 5.0 s and 7.5 s
(D) 5.0 s and 10.0 s

Answer: (B) 2.5 s and 5.0 s · Key from source paper

Q120 JEE Main 2020 · 7 Jan · Shift 2 MCQ

An emf of 20 V is applied at time $t = 0$ to a circuit containing in series 10 mH inductor and $5\ \Omega$ resistor. The ratio of the currents at time $t = \infty$ and at $t = 40$ s is close to: (Take $e^2 = 7.389$)

(A) 1.06
(B) 1.15
(C) 1.46
(D) 0.84

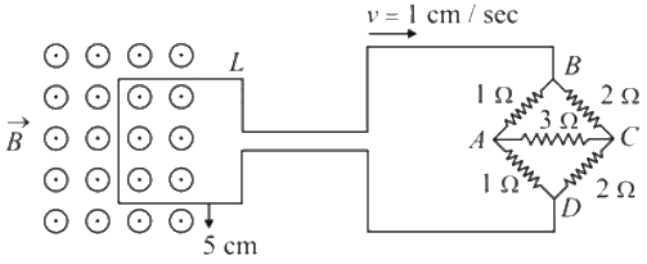
Answer: (A) 1.06 · Key from source paper

Q121 JEE Main 2019 · 12 Apr · Shift 1 MCQ

The figure shows a square loop L of side 5 cm which is connected to a network of resistances. The whole setup is moving towards the right with a constant speed of $1\ \text{cm}\ \text{s}^{-1}$. At some instant, a part of L is in a uniform magnetic field of 1T perpendicular to the plane of the loop. If the resistance of L is $1.7\ \Omega$, the current in the loop at that instant will be close to:

(see the figure above)

Q22. The figure shows a square loop L of side 5 cm which is connected to a network of resistances. The whole setup is moving towards the right with a constant speed of $1\ \text{cm}\ \text{s}^{-1}$. At some instant, a part of L is in a uniform magnetic field of 1T perpendicular to the plane of the loop. If the resistance of L is $1.7\ \Omega$, the current in the loop at that instant will be close to:



(1) 115 μA
(2) 60 μA
(3) 150 μA
(4) 170 μA

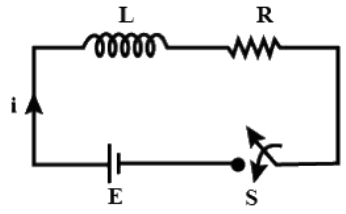
(A) $115\ \mu A$
(B) $60\ \mu A$
(C) $150\ \mu A$
(D) $170\ \mu A$

Answer: (D) $170\ \mu A$ · Key from source paper

Q122 JEE Main 2019 · 12 Apr · Shift 2 MCQ

Consider the LR circuit shown in the figure. If the switch S is closed at $t = 0$ then the amount of charge that passes through the battery between $t = 0$ and $t = \frac{L}{R}$ is:
(see the figure above)

Q21. Consider the LR circuit shown in the figure. If the switch S is closed at $t = 0$ then the amount of charge that passes through the battery between $t = 0$ and $t = \frac{L}{R}$ is:



(1) $\frac{7.3\,EL}{R^2}$
(2) $\frac{EL}{7.3R^2}$
(3) $\frac{2.7\,EL}{R^2}$
(4) $\frac{EL}{2.7R^2}$

(A) $\frac{7.3\,EL}{R^2}$
(B) $\frac{EL}{7.3R^2}$
(C) $\frac{2.7\,EL}{R^2}$
(D) $\frac{EL}{2.7R^2}$

Answer: (D) $\frac{EL}{2.7R^2}$ · Key from source paper

Q123 JEE Main 2019 · 10 Apr · Shift 2 MCQ

A coil of self inductance $10\ mH$ and resistance of $0.1\ \Omega$ is connected through a switch to a battery of internal resistance $0.9\ \Omega$. After the switch is closed, the time taken for the current to attain 80% of the saturation value is: $[\ln 5 = 1.6]$

(A) $0.103\ s$
(B) $0.002\ s$
(C) $0.324\ s$
(D) $0.016\ s$

Answer: (D) $0.016\ s$ · Key from source paper

Q124 JEE Main 2019 · 9 Apr · Shift 1 MCQ

The total number of turns and cross-section area in a solenoid is fixed. However, its length L is varied by adjusting the separation between windings. The inductance of solenoid will be proportional to:

(A) L
(B) $\frac{1}{L^2}$
(C) $\frac{1}{L}$
(D) L^2

Answer: (C) $\frac{1}{L}$ · Key from source paper

Q125 JEE Main 2019 · 9 Apr · Shift 2 MCQ

Two coils 'P' and 'Q' are separated by some distance. When a current of 3 A flows through coil 'P', a magnetic flux of 10^{-3} Wb passes through 'Q'. No current is passed through 'Q'. When no current passes through 'P' and a current of 2 A passes through 'Q', the flux through 'P' is:

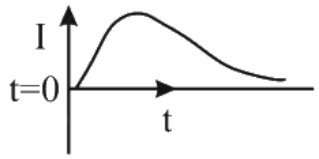
(A) 3.67×10^{-3} Wb
(B) 6.67×10^{-4} Wb
(C) 3.67×10^{-4} Wb
(D) 6.67×10^{-3} Wb

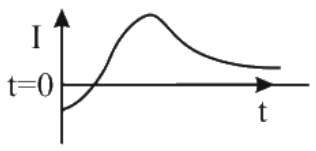
Answer: (B) 6.67×10^{-4} Wb · Key from source paper

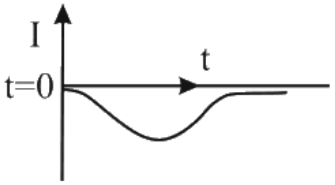
Q126 JEE Main 2019 · 9 Apr · Shift 2 MCQ

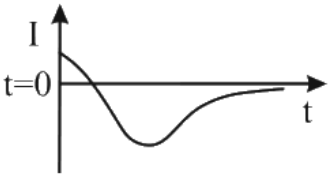
A very long solenoid of radius R is carrying current $I(t) = kte^{-\alpha t}$ $(k > 0)$, as a function of time $(t \geq 0)$. Counterclockwise current is taken to be positive. A circular conducting coil of radius 2R is placed in the equitorial plane of the solenoid and concentric with the solenoid. The current induced in the outer coil is correctly depicted, as a function of time, by:

Q22. A very long solenoid of radius R is carrying current $I(t) = kte^{-\alpha t}(k > 0)$, as a function of time $(t \geq 0)$. Counterclockwise current is taken to be positive. A circular conducting coil of radius 2R is placed in the equitorial plane of the solenoid and concentric with the solenoid. The current induced in the outer coil is correctly depicted, as a function of time, by:

(1)


(2)


(3)


(4)


(A) *see figure*
(B) *see figure*
(C) *see figure*
(D) *see figure*

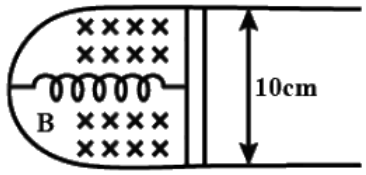
Answer: (B) · Key from source paper

Q127 JEE Main 2019 · 8 Apr · Shift 1 MCQ

A thin strip 10 cm long is on a U shaped wire of negligible resistance and it is connected to a spring of spring constant 0.5 $\mathrm{N\,m^{-1}}$ (see figure). The assembly is kept in a uniform magnetic field of 0.1 T. If the strip is pulled from its equilibrium position and released, the number of oscillations it performs before its amplitude decreases by a factor of e is N . If the mass of the strip is 50 grams, its resistance 10Ω and air drag negligible, N will be close to:
(see the figure above)

Q20. A thin strip 10 cm long is on a U shaped wire of negligible resistance and it is connected to a spring of spring constant 0.5 N m^{-1} (see figure). The assembly is kept in a uniform magnetic field of 0.1 T. If the strip is pulled from its equilibrium position and released, the number of oscillations it performs before its amplitude decreases by a factor of e is N . If the mass of the strip is 50 grams, its resistance 10Ω and air drag negligible,

N will be close to:



(1) 1000 (2) 5000 (3) 10000 (4) 50000

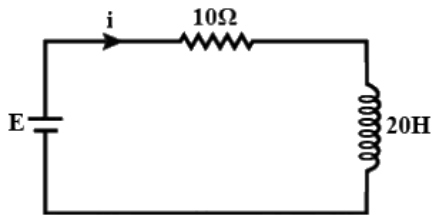
(A) 1000
(B) 5000
(C) 10000
(D) 50000

Answer: (B) 5000 · Key from source paper

Q128 JEE Main 2019 · 8 Apr · Shift 1 MCQ

A 20 H inductor coil is connected to a 10 Ω resistance in series as shown in figure. The time at which rate of dissipation of energy (Joule's heat) across resistance is equal to the rate at which magnetic energy is stored in the inductor, is:
(see the figure above)

Q21. A 20 H inductor coil is connected to a 10 Ω resistance in series as shown in figure. The time at which rate of dissipation of energy (Joule's heat) across resistance is equal to the rate at which magnetic energy is stored in the inductor, is:



(1) $\frac{1}{2}\ln 2$ (2) $2\ln 2$ (3) $\frac{2}{\ln 2}$ (4) $\ln 2$

(A) $\frac{1}{2}\ln 2$
(B) $2\ln 2$
(C) $\frac{2}{\ln 2}$
(D) $\ln 2$

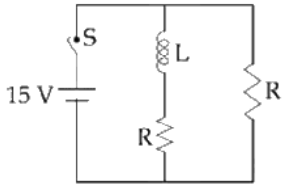
Answer: (B) $2\ln 2$ · Key from source paper

Q129 JEE Main 2019 · 12 Jan · Shift 1 MCQ

In the figure shown, a circuit contains two identical resistors with resistance $R = 5\ \Omega$ and an inductance with $L = 2\ mH$. An ideal battery of $15V$ is connected in the circuit. What will be the current through the battery long after the switch is closed?

(see the figure above)

Q21. In the figure shown, a circuit contains two identical resistors with resistance $R = 5\,\Omega$ and an inductance with $L = 2\,mH$. An ideal battery of $15V$ is connected in the circuit. What will be the current through the battery long after the switch is closed?



(1) 5.5 A (2) 6 A
(3) 3 A (4) 7.5 A

(A) 5.5 A
(B) 6 A
(C) 3 A
(D) 7.5 A

Answer: (B) 6 A · Key from source paper

Q130 JEE Main 2019 · 12 Jan · Shift 2 MCQ

A 10 m long horizontal wire extends from North East to South West. It is falling with a speed of 5.0 m s^{-1}, at right angles to the horizontal component of the earth's magnetic field of 0.3×10^{-4} Wb m^{-2}. The value of the induced emf in the wire is:

(A) 0.3×10^{-3} V
(B) 1.1×10^{-3} V
(C) 2.5×10^{-3} V
(D) 1.5×10^{-3} V

Answer: (B) 1.1×10^{-3} V · Key from source paper

Q131 JEE Main 2019 · 11 Jan · Shift 1 MCQ

There are two long co-axial solenoids of same length l. The inner and outer coils have radii r_1 and r_2 and number of turns per unit length n_1 and n_2, respectively. The ratio of mutual inductance to the self-inductance of the inner-coil is :

(A) $\frac{n_1}{n_2}$
(B) $\frac{n_2}{n_1} \cdot \frac{r_1}{r_2}$
(C) $\frac{n_2}{n_1} \cdot \frac{r_2^2}{r_1^2}$
(D) $\frac{n_2}{n_1}$

Answer: (D) $\frac{n_2}{n_1}$ · Key from source paper

Q132 JEE Main 2019 · 11 Jan · Shift 2 MCQ

A copper wire is wound on a wooden frame, whose shape is that of an equilateral triangle. If the linear dimension of each side of the frame is increased by a factor of 3, keeping the number of turns of the coil per unit length of the frame the same, then the self inductance of the coil:

(A) decreases by a factor of 9
(B) increases by a factor of 27
(C) increases by a factor of 3
(D) decreases by a factor of $9\sqrt{3}$

Answer: (B) increases by a factor of 27 · Checked by our team

Q133 JEE Main 2019 · 10 Jan · Shift 1 MCQ

A solid metal cube of edge length 2 cm is moving in the positive y-direction, at a constant speed of 6 m s^{-1}. There is a uniform magnetic field of 0.1 T in the positive z-direction. The potential difference between the two faces of the cube, perpendicular to the x-axis, is

(A) 12 mV
(B) 1 mV
(C) 2 mV
(D) 6 mV

Answer: (A) 12 mV · Key from source paper

Q134 JEE Main 2019 · 10 Jan · Shift 2 MCQ

The self induced emf of a coil is 25 volts. When the current in it is changed at uniform rate from $10\mathrm{A}$ to $25\mathrm{A}$ in $1\mathrm{s}$, the change in the energy of the inductance is:

(A) $637.5\ \mathrm{J}$
(B) $740\ \mathrm{J}$
(C) $437.5\ \mathrm{J}$
(D) $540\ \mathrm{J}$

Answer: (C) $437.5\ \mathrm{J}$ · Key from source paper

Q135 JEE Main 2019 · 9 Jan · Shift 1 MCQ

A conducting circular loop made of a thin wire has area $3.5 \times 10^{-2}\ \mathrm{m}^2$ and resistance $10\ \Omega$ It is placed perpendicular to a time-dependent magnetic field $Bt = 0.4\ T \sin 50\pi t$ The field is uniform in space. Then the net charge flowing through the loop during $t = 0$ s and $t = 10$ ms is close to

(A) $1.4\ mC$
(B) $7\ mC$
(C) $21\ mC$
(D) $6\ mC$

Answer: (A) $1.4\ mC$ · Key from source paper

Q136 JEE Main 2018 · 15 Apr · Shift 1 MCQ

An ideal capacitor of capacitance $0.2\mu\mathrm{F}$ is charged to a potential difference of $10\ \mathrm{V}$. The charging battery is then disconnected. The capacitor is then connected to an ideal inductor of self inductance $0.5\mathrm{mH}$. The current at a time when the potential difference across the capacitor is $5\ \mathrm{V}$, is:

(A) $0.17\ \mathrm{A}$
(B) $0.15\ \mathrm{A}$
(C) $0.34\ \mathrm{A}$
(D) $0.25\ \mathrm{A}$

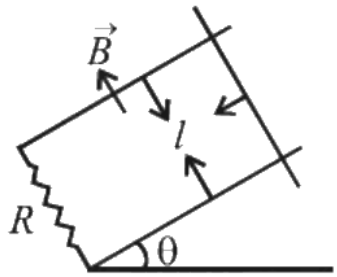
Answer: (A) $0.17\ \mathrm{A}$ · Key from source paper

Q137 JEE Main 2018 · 15 Apr · Shift 2 MCQ

A copper rod of mass m slides under gravity on two smooth parallel rails, with separation l and set at an angle of θ with the horizontal. At the bottom, rails are joined by a resistance R. There is a uniform magnetic field B normal to the plane of the rails, as shown in the figure. The terminal speed of the copper rod is:

(see the figure above)

Q21. A copper rod of mass m slides under gravity on two smooth parallel rails, with separation l and set at an angle of θ with the horizontal. At the bottom, rails are joined by a resistance R. There is a uniform magnetic field B normal to the plane of the rails, as shown in the figure. The terminal speed of the copper rod is:



(1) $\frac{\mathrm{mgR}\cos\theta}{\mathrm{B}^2l^2}$
(2) $\frac{\mathrm{mgR}\sin\theta}{\mathrm{B}^2l^2}$
(3) $\frac{\mathrm{mgR}\tan\theta}{\mathrm{B}^2l^2}$
(4) $\frac{\mathrm{mgR}\cot\theta}{\mathrm{B}^2l^2}$

(A) $\frac{\mathrm{mgR}\cos\theta}{\mathrm{B}^2l^2}$
(B) $\frac{\mathrm{mgR}\sin\theta}{\mathrm{B}^2l^2}$
(C) $\frac{\mathrm{mgR}\tan\theta}{\mathrm{B}^2l^2}$
(D) $\frac{\mathrm{mgR}\cot\theta}{\mathrm{B}^2l^2}$

Answer: (B) $\frac{\mathrm{mgR}\sin\theta}{\mathrm{B}^2l^2}$ · Key from source paper

Q138 JEE Main 2018 · 15 Apr · Shift 2 MCQ

At the centre of a fixed large circular coil of radius R, a much smaller circular coil of radius r is placed. The two coils are concentric and are in the same plane. The larger coil carries a current I. The smaller coil is set to rotate with a constant angular velocity ω about an axis along their common diameter. Calculate the emf induced in the smaller coil after a time t of its start of rotation.

(A) $\frac{\mu_0 I}{2R}\omega r^2 \sin\omega t$
(B) $\frac{\mu_0 I}{4R}\omega \pi r^2 \sin\omega t$
(C) $\frac{\mu_0 I}{2R}\omega \pi r^2 \sin\omega t$
(D) $\frac{\mu_0 I}{4R}\omega r^2 \sin\omega t$

Answer: (C) $\frac{\mu_0 I}{2R}\omega \pi r^2 \sin\omega t$ · Key from source paper

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Q139 JEE Main 2017 · 8 Apr · Online MCQ

A small circular loop of wire of radius a is located at the centre of a much larger circular wire loop of radius b. The two loops are in the same plane. The outer loop of radius b carries an alternating current $I = I_0\cos(\omega t)$. The emf induced in the smaller inner loop is nearly:

(A) $\pi\mu_0 I_0 \frac{a^2}{b}\omega \sin(\omega t)$
(B) $\frac{\pi\mu_0 I_0}{2} \cdot \frac{a^2}{b}\omega \cos(\omega t)$
(C) $\frac{\pi\mu_0 I_0 b^2}{a}\omega \cos(\omega t)$
(D) $\frac{\pi\mu_0 I_0}{2} \cdot \frac{a^2}{b}\omega \sin(\omega t)$

Answer: (D) $\frac{\pi\mu_0 I_0}{2} \cdot \frac{a^2}{b}\omega \sin(\omega t)$ · Key from source paper

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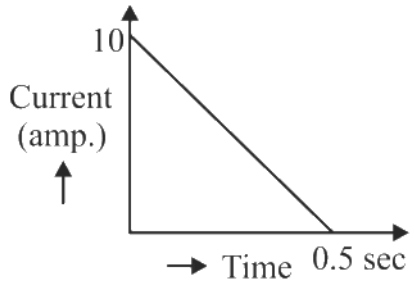
Q140 JEE Main 2017 · 2 Apr · Offline MCQ

In a coil of resistance 100 Ω, a current is induced by changing the magnetic flux through it as shown in the figure. The magnitude of change in flux through the coil is:

(see the figure above)

Q22. In a coil of resistance 100 Ω, a current is induced by changing the magnetic flux through it as shown in the figure. The magnitude of change in flux through the coil is:



(1) 275 Wb
(2) 200 Wb
(3) 225 Wb
(4) 250 Wb

(A) 275 Wb
(B) 200 Wb
(C) 225 Wb
(D) 250 Wb

Answer: (D) 250 Wb · Key from source paper

Q141 JEE Main 2016 · 10 Apr · Online MCQ

A fighter plane of length $20\ \mathrm{m}$, wing span (distance from tip of one wing to the tip of the other wing) of $15\ \mathrm{m}$ and height $5\ \mathrm{m}$ is flying towards east over Delhi. Its speed is $240\ ms^{-1}$. The earth's magnetic field over Delhi is $5 \times 10^{-5} T$ with the declination angle $\sim 0^o$ and dip of θ such that $\sin\theta = \frac{2}{3}$. If the voltage developed is V_B between the lower and upper side of the plane and V_W between the tips of the wings then V_B and V_W are close to :

(A) $V_B = 40\ mV;\ V_W = 135\ mV$ with left side of pilot at higher voltage
(B) $V_B = 45\ mV;\ V_W = 120\ mV$ with right side of pilot at higher voltage
(C) $V_B = 40\ mV;\ V_W = 135\ mV$ with right side of pilot at high voltage
(D) $V_B = 45\ mV;\ V_W = 120\ mV$ with left side of pilot at higher voltage

Answer: (D) $V_B = 45\ mV;\ V_W = 120\ mV$ **with left side of pilot at higher voltage** · Key from source paper

Q142 JEE Main 2016 · 10 Apr · Online MCQ

A conducting metal circular-wire-loop of radius r is placed perpendicular to a magnetic field which varies with time as $B = B_0 e^{-\frac{t}{\tau}}$, where B_0 and τ are constants at time $t = 0$. If the resistance of the loop is R, then the heat generated in the loop after a long time $(t \to \infty)$ is

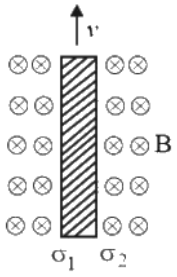
(A) $\frac{\pi^2 r^4 B_0^4}{2\tau R}$
(B) $\frac{\pi^2 r^4 B_0^2}{2\tau R}$
(C) $\frac{\pi^2 r^4 B_0^2 R}{\tau}$
(D) $\frac{\pi^2 r^4 B_0^2}{\tau R}$

Answer: (B) $\frac{\pi^2 r^4 B_0^2}{2\tau R}$ · Key from source paper

Q143 JEE Main 2016 · 10 Apr · Online MCQ

Consider a thin metallic sheet perpendicular to the plane of the paper moving with speed v in a uniform magnetic field B going into the plane of the paper (see figure). If charge densities σ_1 and σ_2 are induced on the left and right surfaces respectively of the sheet, then (ignore fringe effects)
(see the figure above)

Q20. Consider a thin metallic sheet perpendicular to the plane of the paper moving with speed v in a uniform magnetic field B going into the plane of the paper (see figure). If charge densities σ_1 and σ_2 are induced on the left and right surfaces respectively of the sheet, then (ignore fringe effects)



(1) $\sigma_1 = \frac{-\epsilon_0 vB}{2},\ \sigma_2 = \frac{\epsilon_0 vB}{2}$
(2) $\sigma_1 = \epsilon_0 vB,\ \sigma_2 = -\epsilon_0 vB$
(3) $\sigma_1 = \frac{\epsilon_0 vB}{2},\ \sigma_2 = \frac{-\epsilon_0 vB}{2}$
(4) $\sigma_1 = \sigma_2 = \epsilon_0 vB$

(A) $\sigma_1 = \frac{-\epsilon_0 vB}{2},\ \sigma_2 = \frac{\epsilon_0 vB}{2}$

(B) $\sigma_1 = \epsilon_0\, vB,\ \sigma_2 = -\epsilon_0\, vB$

(C) $\sigma_1 = \frac{\epsilon_0 vB}{2},\ \sigma_2 = \frac{-\epsilon_0 vB}{2}$

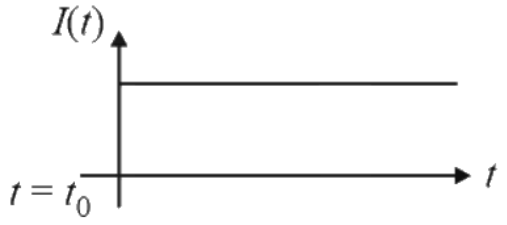
(D) $\sigma_1 = \sigma_2 = \epsilon_0\, vB$

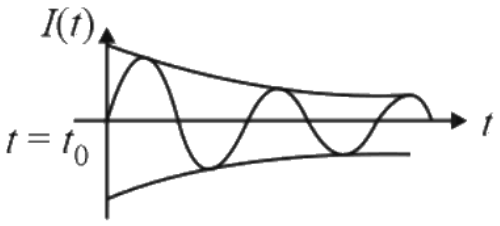
Answer: (B) $\sigma_1 = \epsilon_0\, vB,\ \sigma_2 = -\epsilon_0\, vB$ · Key from source paper

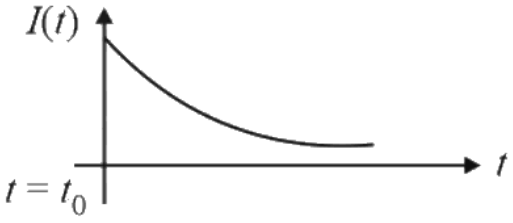
Q144 JEE Main 2016 · 9 Apr · Online MCQ

A series LR circuit is connected to a voltage source with $V(t) = V_0 \sin(\omega t)$. After a very large time, current $I(t)$ behaves as $\left(t_0 \gg \frac{L}{R}\right)$:

Q20. A series LR circuit is connected to a voltage source with $V(t) = V_0 \sin(\omega t)$. After a very large time, current $I(t)$ behaves as $\left(t_0 \gg \frac{L}{R}\right)$:

(1) 

(2) 

(3) 

(4) 

(A) *see figure*

(B) *see figure*

(C) *see figure*

(D) *see figure*

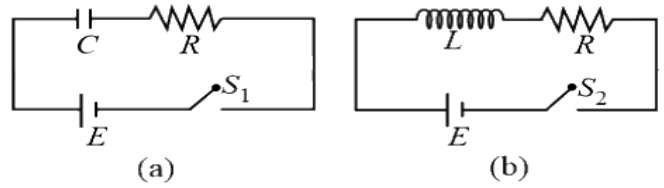
Answer: (D) · Key from source paper

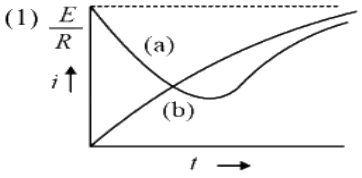
Q145 JEE Main 2015 · 10 Apr · Online MCQ

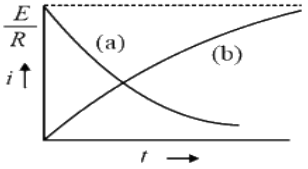
In the given circuits (a) and (b), switches S_1 and S_2 are closed at $t = 0$ and kept close for a long time. The variation of currents in the two circuits for $t \geq 0$ are shown in the options. (Figures are schematic and not drawn to scale.)

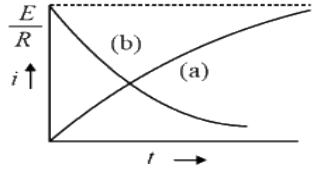
(see the figure above)

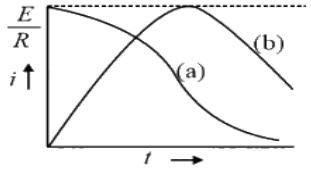
Q17. In the given circuits (a) and (b), switches S_1 and S_2 are closed at $t = 0$ and kept close for a long time. The variation of currents in the two circuits for $t \geq 0$ are shown in the options. (Figures are schematic and not drawn to scale.)



(1) 

(2) 

(3) 

(4) 

(A) *see figure*
(B) *see figure*
(C) *see figure*
(D) *see figure*

Answer: (B) · Key from source paper

Q146 JEE Main 2015 · 10 Apr · Online MCQ

When the current in a coil changes from 5 A to 2 A in 0.1 s, an average voltage of 50 V is produced. The self-inductance of the coil is

(A) 1.67 H
(B) 6 H
(C) 3 H
(D) 0.67 H

Answer: (A) 1.67 H · Key from source paper

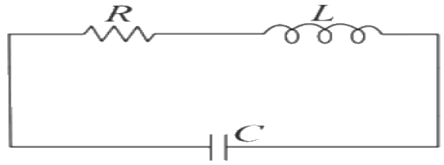
Q147 JEE Main 2015 · 4 Apr · Offline MCQ

An LCR circuit is equivalent to a damped pendulum. In an LCR circuit the capacitor is charged to Q_0 and then connected to the L and R as shown below:

(see the figure above)

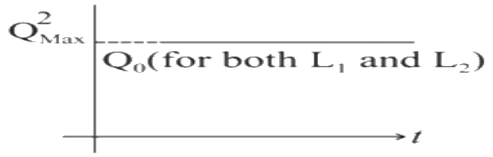
If a student plots graphs of the square of maximum charge $\left(Q_{\text{Max}}^2\right)$ on the capacitor with time (t) for two different values L_1 and L_2 $(L_1 > L_2)$ of L then which of the following represents this graph correctly? (plots are schematic and not drawn to scale)

Q22. An LCR circuit is equivalent to a damped pendulum. In an LCR circuit the capacitor is charged to Q_0 and then connected to the L and R as shown below:

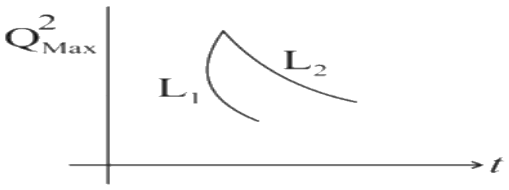


If a student plots graphs of the square of maximum charge (Q^2_{Max}) on the capacitor with time (t) for two different values L_1 and $L_2(L_1 > L_2)$ of L then which of the following represents this graph correctly? (plots are schematic and not drawn to scale)

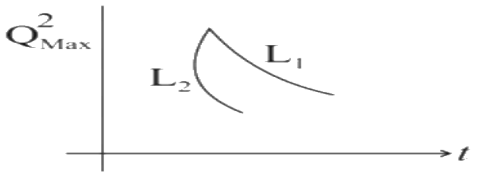
(1)



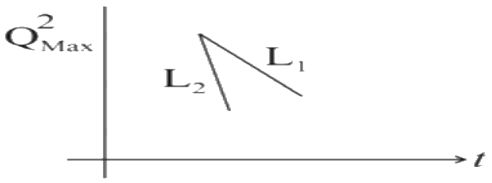
(2)



(3)



(4)



(A) *see figure*

(B) *see figure*

(C) *see figure*

(D) *see figure*

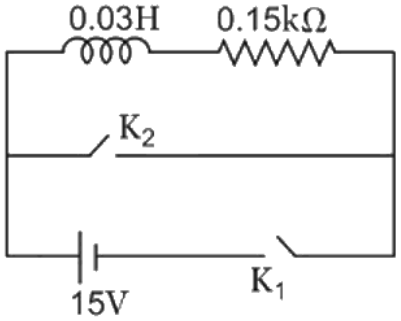
Answer: (C) · Key from source paper

Q148 JEE Main 2015 · 4 Apr · Offline MCQ

An inductor ($L = 0.03$ H) and a resistor ($R = 0.15$ kΩ) are connected in series to a battery of 15 V E.M.F. in a circuit shown below. The key K_1 has been kept closed for a long time. Then at $t = 0$, K_1 is opened and key K_2 is closed simultaneously. At $t = 1$ ms, the current in the circuit will be : (Take, $e^5 \approx 150$)

(see the figure above)

Q23. An inductor $(L = 0.03\,\text{H})$ and a resistor $(R = 0.15\ \text{k}\Omega)$ are connected in series to a battery of 15 V E.M.F. in a circuit shown below. The key K_1 has been kept closed for a long time. Then at $t = 0$, K_1 is opened and key K_2 is closed simultaneously. At $t = 1\,\text{ms}$, the current in the circuit will be : $(\text{Take, } e^5 \approx 150)$



(1) 0.67 mA

(2) 100 mA

(3) 67 mA

(4) 6.7 mA

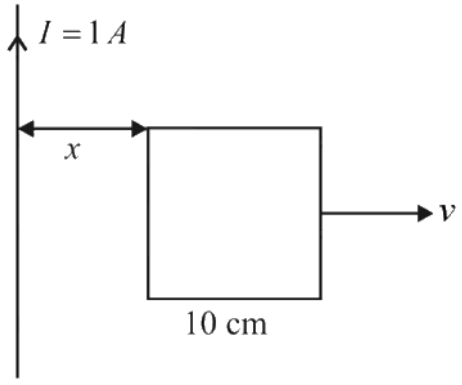
(A) 0.67 mA
(B) 100 mA
(C) 67 mA
(D) 6.7 mA

Answer: (A) 0.67 mA · Key from source paper

Q149 JEE Main 2014 · 19 Apr · Online MCQ

see figure

Q20. A square frame of side 10 cm and a long straight wire carrying current 1 A are in the plane of the paper. Starting from close to the wire, the frame moves towards the right with a constant speed of $10\ \mathrm{m\,s^{-1}}$ (see figure). The e.m.f induced at the time the left arm of the frame is at $x = 10$ cm from the wire is



(1) 0.75 μV
(2) 1 μV
(3) 2 μV
(4) 0.5 μV

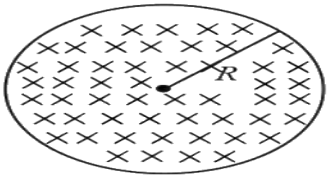
(A) 0.75 μV
(B) 1 μV
(C) 2 μV
(D) 0.5 μV

Answer: (B) 1 μV · Key from source paper

Q150 JEE Main 2014 · 19 Apr · Online MCQ

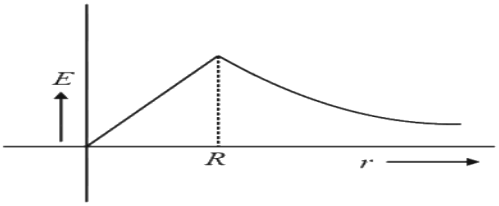
see figure

Q21.

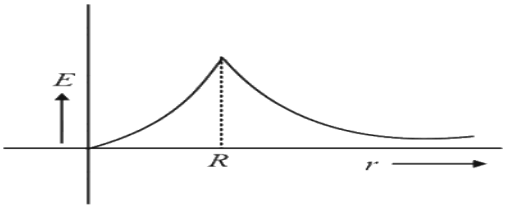


The figure shows a circular area of tthe radius R where a uniform magnetic field $\vec{B}$ is going into the plane of the paper and increasing in magnitude at a constant rate. In that case, which of the following graphs, drawn schematically, correctly shows the variation of the induced electric field $E(r)$?

(1)



(2)



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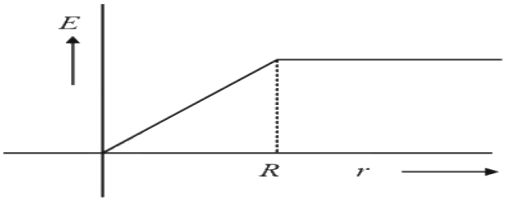
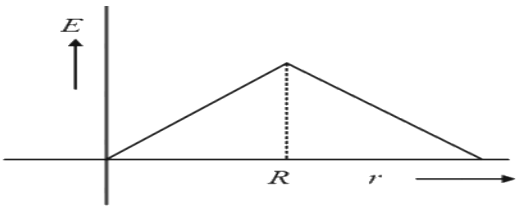


(4)



(A) *see figure*

(B) *see figure*

(C) *see figure*

(D) *see figure*

Answer: (A) · Key from source paper

Q151 JEE Main 2014 · 11 Apr · Online MCQ

A coil of circular cross-section having 1000 turns and $4\ \mathrm{cm}^2$ face area is placed with its axis parallel to a magnetic field which decreases by $10^{-2}\ \mathrm{Wb\ m}^{-2}$ in $0.01\ \mathrm{s}$. The e.m.f. induced in the coil is:

(A) $400\mathrm{mV}$

(B) $200\mathrm{mV}$

(C) $4\mathrm{mV}$

(D) $0.4\mathrm{mV}$

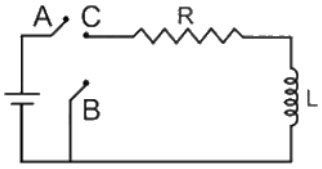
Answer: (A) $400\mathrm{mV}$ · Key from source paper

Q152 JEE Main 2014 · 6 Apr · Offline MCQ

In the circuit shown here, the point 'C" is kept connected to point A " till the current flowing through the circuit becomes constant. Afterward, suddenly, point 'C" is disconnected from point A " and connected to point 'B' at time $t = 0$. Ratio of the voltage across resistance and the inductor at $t = \frac{L}{R}$ will be equal to :

(see the figure above)

Q21. In the circuit shown here, the point 'C' is kept connected to point A " till the current flowing through the circuit becomes constant. Afterward, suddenly, point 'C' is disconnected from point A " and connected to point 'B' at time $t = 0$. Ratio of the voltage across resistance and the inductor at $t = \frac{L}{R}$ will be equal to :



(1) $\frac{e}{1-e}$
(2) 1
(3) - 1
(4) $\frac{1-e}{e}$

(A) $\frac{e}{1-e}$
(B) 1
(C) 1
(D) $\frac{1-e}{e}$

Answer: (C)

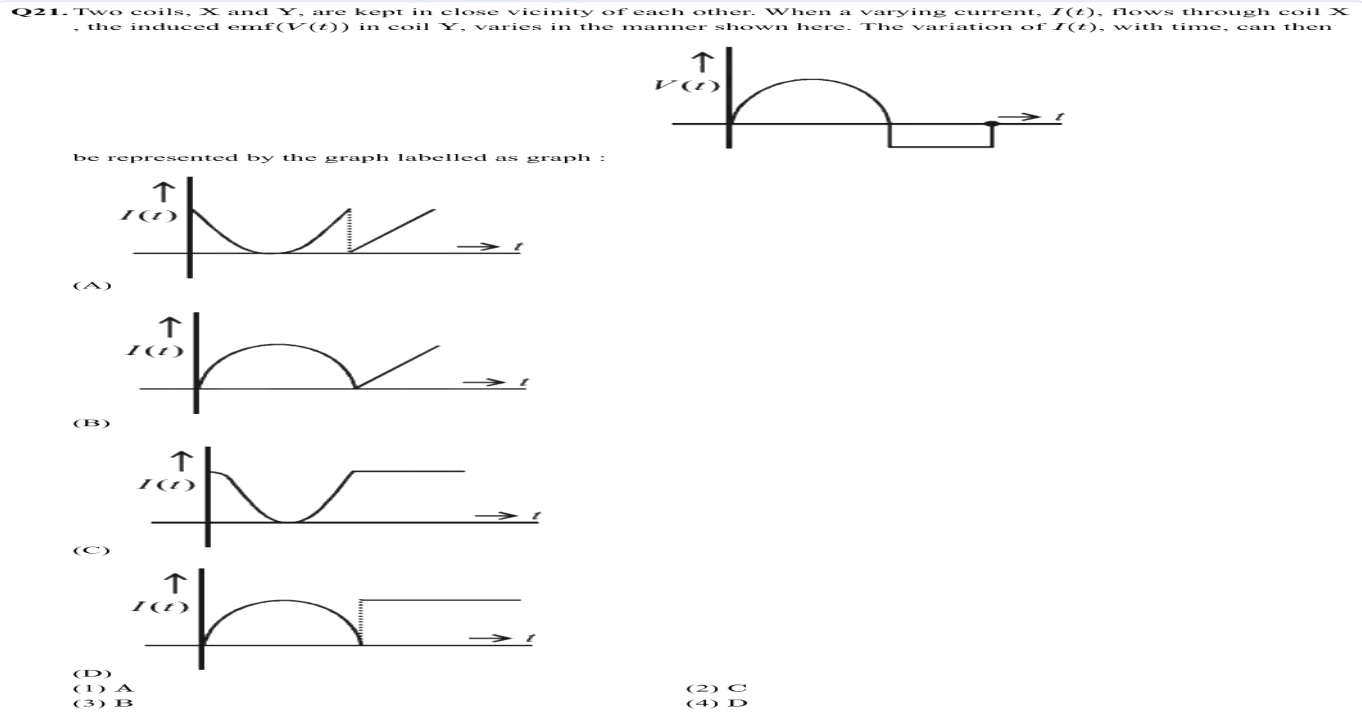
- 1

· Key from source paper

Q153 JEE Main 2013 · 9 Apr · Online MCQ

Two coils, X and Y, are kept in close vicinity of each other. When a varying current, $I(t)$, flows through coil X , the induced $\mathrm{emf}(V(t))$ in coil Y, varies in the manner shown here. The variation of $I(t)$, with time, can then be represented by the graph labelled as graph :

(see the figure above)



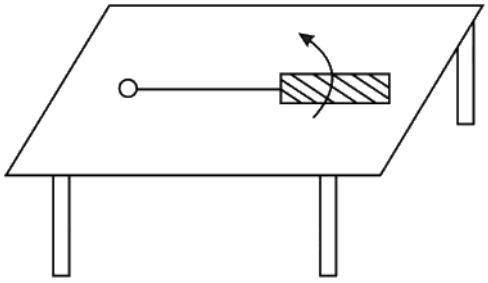
(A) A
(B) C
(C) B
(D) D

Answer: (B) C · Checked by our team

Q154 JEE Main 2013 · 7 Apr · Offline MCQ

A metallic rod of length l is tied to a string of length $2l$ and made to rotate with angular speed ω on a horizontal table with one end of the string fixed. If there is a vertical magnetic field B in the region, the e.m.f. induced across the ends of the rod is:
(see the figure above)

Q19. A metallic rod of length l is tied to a string of length $2l$ and made to rotate with angular speed ω on a horizontal table with one end of the string fixed. If there is a vertical magnetic field B in the region, the e.m.f. induced across the ends of the rod is:



(1) $\frac{4B\omega l^2}{2}$
(2) $\frac{5B\omega l^2}{2}$
(3) $\frac{2B\omega l^2}{2}$
(4) $\frac{3B\omega l^2}{2}$

(A) $\frac{4B\omega l^2}{2}$
(B) $\frac{5B\omega l^2}{2}$
(C) $\frac{2B\omega l^2}{2}$
(D) $\frac{3B\omega l^2}{2}$

Answer: (B) $\frac{5B\omega l^2}{2}$ · Key from source paper

Q155 JEE Main 2013 · 7 Apr · Offline MCQ

A circular loop of radius 0.3 cm lies parallel to a much bigger circular loop of radius 20 cm. The centre of the small loop is on the axis of the bigger loop. The distance between their centres is 15 cm. If a current of 2.0 A flows through the smaller loop, then the flux linked with a bigger loop is:

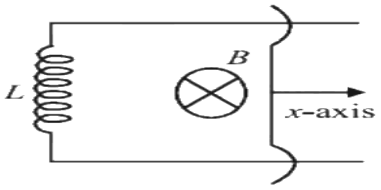
(A) 3.3×10^{-11} weber
(B) 6.6×10^{-9} weber
(C) 9.1×10^{-11} weber
(D) 6×10^{-11} weber

Answer: (C) 9.1×10^{-11} **weber** · Key from source paper

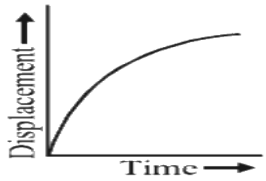
Q156 AIEEE 2012 · 19 May · Online MCQ

A coil of self inductance L is connected at one end of two rails as shown in figure. A connector of length l, mass m can slide freely over the two parallel rails. The entire set up is placed in a magnetic field of induction B going into the page. At an instant $t = 0$ an initial velocity v_0 is imparted to it and as a result that it starts moving along x-axis. The displacement of the connector is represented by the figure. *(see the figure above)*

Q20. A coil of self inductance L is connected at one end of two rails as shown in figure. A connector of length l, mass m can slide freely over the two parallel rails. The entire set up is placed in a magnetic field of induction B going into the page. At an instant $t = 0$ an initial velocity v_0 is imparted to it and as a result of that it starts moving along x-axis. The displacement of the connector is represented by the figure.



(1)



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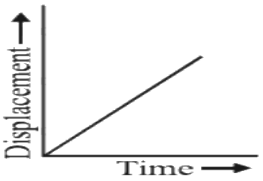

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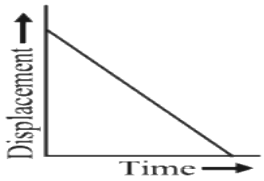

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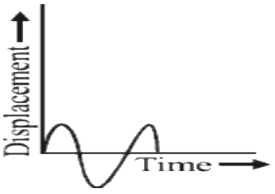

(A) *see figure*
(B) *see figure*
(C) *see figure*
(D) *see figure*

Answer: (D) · Key from source paper

Q157 AIEEE 2012 · 19 May · Online MCQ

This question has Statement 1 and Statement 2. Of the four choices given after the Statements, choose the one that best describes the two Statements. Statement 1: Self inductance of a long solenoid of length L, total number of turns N and radius r is less than $\frac{\pi\mu_0 N^2 r^2}{L}$. Statement 2: The magnetic induction in the solenoid in Statement 1 carrying current I is $\frac{\mu_0 NI}{L}$ in the middle of the solenoid but becomes less as we move towards its ends.

(A) Statement 1 is true, Statement 2 is false.
(B) Statement 1 is true, Statement 2 is true, Statement 2 is the correct explanation of Statement 1.
(C) Statement 1 is false, Statement 2 is true.
(D) Statement 1 is true, Statement 2 is true, Statement 2 is not the correct explanation of Statement 1.

Answer: (B) Statement 1 is true, Statement 2 is true, Statement 2 is the correct explanation of Statement 1. · Key from source paper

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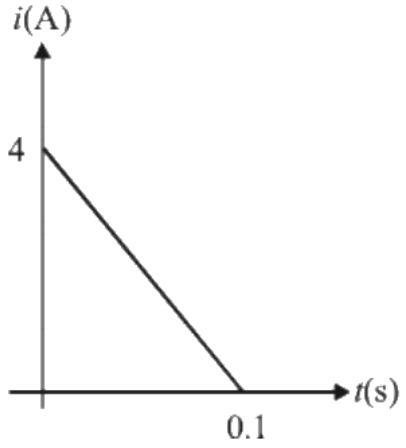
Q158 AIEEE 2012 · 12 May · Online MCQ

Magnetic flux through a coil of resistance $10\,\Omega$ is changed by $\Delta\phi$ in 0.1 s. The resulting current in the coil varies with time as shown in the figure. Then $|\Delta\phi|$ is equal to (in weber)
(see the figure above)

Q21. Magnetic flux through a coil of resistance 10Ω is changed by $\Delta\phi$ in 0.1 s. The resulting current in the coil varies with time as shown in the figure. Then $|\Delta\phi|$ is equal to (in weber)



(1) 6
(2) 4
(3) 2
(4) 8

(A) 6
(B) 4
(C) 2
(D) 8

Answer: (C) 2 · Key from source paper

Q159 AIEEE 2012 · Offline MCQ

A coil is suspended in a uniform magnetic field, with the plane of the coil parallel to the magnetic lines of force. When a current is passed through the coil it starts oscillating; it is very difficult to stop. But if an aluminium plate is placed near to the coil, it stops. This is due to :

(A) development of air current when the plate is placed.
(B) induction of electrical charge on the plate
(C) shielding of magnetic lines of force as aluminium is a paramagnetic material.
(D) electromagnetic induction in the aluminium plate giving rise to electromagnetic damping.

Answer: (D) electromagnetic induction in the aluminium plate giving rise to electromagnetic damping. · Key from source paper

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Q160 AIEEE 2011 MCQ

A boat is moving due east in a region where the earth's magnetic field is $5.0 \times 10^{-5}\ \mathrm{NA^{-1}\,m^{-1}}$ due north and horizontal. The boat carries a vertical aerial $2\ \mathrm{m}$ long. If the speed of the boat is $1.50\ \mathrm{ms^{-1}}$, the magnitude of the induced emf in the wire of aerial is :

(A) $0.75\mathrm{mV}$
(B) $0.50\mathrm{mV}$
(C) $0.15\mathrm{mV}$
(D) $1\mathrm{mV}$

Answer: (C) $0.15\mathrm{mV}$ · Key from source paper

Q161 AIEEE 2011 MCQ

A fully charged capacitor C with initial charge q_0 is connected to a coil of self inductance L at $t = 0$. The time at which the energy is stored equally between the electric and the magnetic field is :

(A) $\frac{\pi}{4}\sqrt{LC}$
(B) $2\pi\sqrt{LC}$
(C) $\sqrt{LC}$
(D) $\pi\sqrt{LC}$

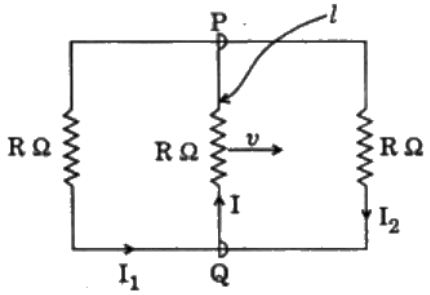
Answer: (A) $\frac{\pi}{4}\sqrt{LC}$ · Key from source paper

Q162 AIEEE 2010 MCQ

A rectangular loop has a sliding connector PQ of length ℓ and resistance $\mathrm{R\Omega}$ and it is moving with a speed v as shown. The set-up is placed in a uniform magnetic field going into the plane of the paper. The three currents I_1, I_2 and I are

(see the figure above)

Q19. A rectangular loop has a sliding connector PQ of length ℓ and resistance RΩ and it is moving with a speed v as shown. The set-up is placed in a uniform magnetic field going into the plane of the paper. The three currents



I_1, I_2 and I are

(1) $\mathrm{I_1 = -I_2 = \frac{B\ell v}{R}, I = \frac{2\,B\ell v}{R}}$

(2) $\mathrm{I_1 = I_2 = \frac{B\ell v}{3R}, I = \frac{2\,B\ell v}{3R}}$

(3) $l_1 = I_2 = I = \frac{B\ell v}{R}$

(4) $I_1 = I_2 = \frac{B\ell v}{6R}, I = \frac{B\ell v}{3R}$

(A) $I_1 = -I_2 = \frac{B\ell v}{R}, I = \frac{2\,B\ell v}{R}$

(B) $I_1 = I_2 = \frac{B\ell v}{3R}, I = \frac{2\,B\ell v}{3R}$

(C) $I_1 = I_2 = I = \frac{B\ell v}{R}$

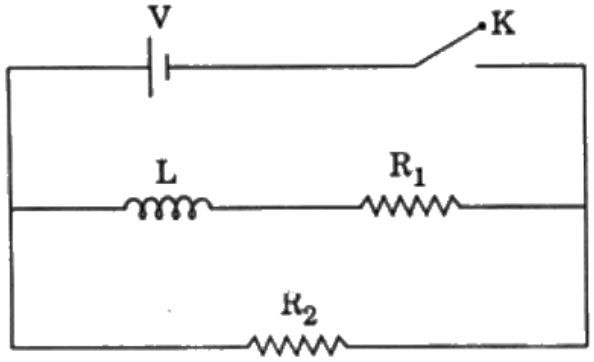
(D) $I_1 = I_2 = \frac{B\ell v}{6R}, I = \frac{B\ell v}{3R}$

Answer: (B) $I_1 = I_2 = \frac{B\ell v}{3R}, I = \frac{2\,B\ell v}{3R}$ · Key from source paper

Q163 AIEEE 2010 MCQ

In the circuit shown below, the key K is closed at t = 0. The current through the battery is *(see the figure above)*

Q20. In the circuit shown below, the key K is closed at t = 0. The current through the battery is



(1) $\mathrm{\frac{VR_1R_2}{\sqrt{R_1^2+R_2^2}}}$ at t = 0 and $\mathrm{\frac{V}{R_2}}$ at t = ∞

(2) $\frac{V}{R_2}$ at $t = 0$ and $\frac{V(R_1+R_2)}{R_1R_2}$ at $t = \infty$

(3) $\frac{V}{R_2}$ at $t = 0$ and $\frac{VR_1R_2}{\sqrt{R_1^2+R_2^2}}$ at $t = \infty$

(4) $\frac{V(R_1+R_2)}{R_1R_2}$ at $t = 0$ and $\frac{V}{R_2}$ at $t = \infty$

(A) $\frac{VR_1R_2}{\sqrt{R_1^2+R_2^2}}$ at t = 0 and $\frac{V}{R_2}$ at t = ∞

(B) $\frac{V}{R_2}$ at $t = 0$ and $\frac{V(R_1+R_2)}{R_1R_2}$ at $t = \infty$

(C) $\frac{V}{R_2}$ at $t = 0$ and $\frac{VR_1R_2}{\sqrt{R_1^2+R_2^2}}$ at $t = \infty$

(D) $\frac{V(R_1+R_2)}{R_1R_2}$ at $t = 0$ and $\frac{V}{R_2}$ at $t = \infty$

Answer: (B) $\frac{V}{R_2}$ at $t = 0$ and $\frac{V(R_1+R_2)}{R_1R_2}$ at $t = \infty$ · Key from source paper

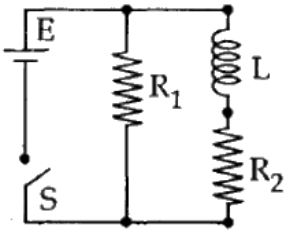
Q164 AIEEE 2009 MCQ

An inductor of inductance L = 400mH and resistors of resistances $\mathrm{R}_1 = 2\Omega$ and $\mathrm{R}_2 = 2\Omega$ are connected to a battery of emf 12 V as shown in the figure. The internal resistance of the battery is negligible. The switch S is

(see the figure above)

closed at $t = 0$. The potential drop across L as a function of time is

Q21. An inductor of inductance $\mathrm{L} = 400\mathrm{mH}$ and resistors of resistances $\mathrm{R}_1 = 2\Omega$ and $R_2 = 2\Omega$ are connected to a battery of emf 12 V as shown in the figure. The internal resistance of the battery is negligible. The switch S is



closed at $t = 0$. The potential drop across L as a function of time is

(1) $6e^{-5t}V$ (2) $\frac{12}{t}e^{-3t}V$

(3) $6\left(1 - e^{-t/0.2}\right)V$ (4) $12e^{-5t}V$

(A) $6e^{-5t}V$

(B) $\frac{12}{t}e^{-3t}V$

(C) $6\left(1 - e^{-t/0.2}\right)V$

(D) $12e^{-5t}V$

Answer: (D) $12e^{-5t}V$ · Key from source paper

Q165 AIEEE 2008 MCQ

Two coaxial solenoids are made by winding thin insulated wire over a pipe of cross sectional area $A = 10\ \mathrm{cm}^2$ and length = 20 cm. If one of the solenoids has 300 turns and the other 400 turns, their mutual inductance is ($\mu_0 = 4\pi \times 10^{-7}\ \mathrm{TmA}^{-1}$)

(A) $2.4\pi \times 10^{-5}\ \mathrm{H}$

(B) $4.8\pi \times 10^{-4}\ \mathrm{H}$

(C) $4.8\pi \times 10^{-5}\ \mathrm{H}$

(D) $2.4\pi \times 10^{-4}\ \mathrm{H}$

Answer: (D) $2.4\pi \times 10^{-4}\ \mathrm{H}$ · Key from source paper

Q166 AIEEE 2007 MCQ

An ideal coil of 10H is connected in series with a resistance of 5Ω and a battery of 5 V. 2 second after the connection is made the current flowing in amperes in the circuit is

(A) $(1 - e)$
(B) e
(C) e^{-1}
(D) $(1 - e^{-1})$

Answer: (D) $(1 - e^{-1})$ · Key from source paper

Q167 AIEEE 2006 MCQ

The flux linked with a coil at any instant ' t ' is given by $\phi = 10t^2 - 50t + 250$ The induced emf at $t = 3$ s is

(A) 190 V
(B) -190 V
(C) -10 V
(D) 10 V

Answer: (C) -10 V · Key from source paper

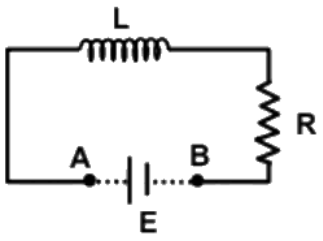
Q168 AIEEE 2006 MCQ

An inductor $(L = 100\text{mH})$, a resistor $(R = 100\Omega)$ and a battery $(E = 100\text{ V})$ 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.

(see the figure above)

The current in the circuit 1 mm (sic) after the circuit is

Q40. An inductor $(L = 100\text{mH})$, a resistor $(R = 100\Omega)$ and a battery $(E = 100\text{ V})$ 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 mm after the circuit is

(1) 1 A
(2) 1/eA
(3) e A
(4) 0.1 A

(A) 1 A
(B) 1/eA
(C) e A
(D) 0.1 A

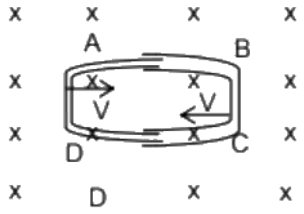
Answer: (B) 1/eA · Key from source paper

Q169 AIEEE 2005 MCQ

One conducting U tube can slide inside another as shown in figure, maintaining electrical contacts between the tubes. The magnetic field B is perpendicular to the plane of the figure. if each tube moves towards the other at a constant speed V, then the emf induced in the circuit in terms of B, ℓ and V where ℓ is the width of each tube will be

(see the figure above)

Q58. One conducting U tube can slide inside another as shown in figure, maintaining electrical contacts between the tubes. The magnetic field B is perpendicular to the plane of the figure. if each tube moves towards the other at a constant speed V, then the emf induced in the circuit in terms of B, ℓ and V where ℓ is the width of each tube



will be

(1) $\mathrm{B}\ell\mathrm{V}$ (2) $-\mathrm{B}\ell\mathrm{V}$

(3) zero (4) $2\mathrm{B}\ell\mathrm{V}$

(A) $\mathrm{B}\ell\mathrm{V}$

(B) $-\mathrm{B}\ell\mathrm{V}$

(C) zero

(D) $2\mathrm{B}\ell\mathrm{V}$

Answer: (D) $2\mathrm{B}\ell\mathrm{V}$ · Key from source paper

Q170 AIEEE 2005 MCQ

A coil of inductance $300\mathrm{mH}$ and resistance 2Ω is connected to a source of voltage 2V. The current reaches half of its steady state value in

(A) 0.05 s

(B) 0.1 s

(C) 0.15 s

(D) 0.3 s

Answer: (B) 0.1 s · Key from source paper

Q171 AIEEE 2004 MCQ

A coil having n turns and resistance $\mathrm{R}\,\Omega$ is connected with a galvanometer of resistance $4\mathrm{R}\,\Omega$. This combination is moved in time t seconds from a magnetic field W_1 weber to W_2 weber. The induced current in the circuit is

(A) $-\frac{W_2-W_1}{5Rnt}$
(B) $-\frac{\mathrm{n(W_2-W_1)}}{\mathrm{5Rt}}$
(C) $-\frac{W_2-W_1}{\mathrm{Rnt}}$
(D) $-\frac{\mathrm{n(W_2-W_1)}}{\mathrm{Rt}}$

Answer: (B) $-\frac{\mathrm{n(W_2-W_1)}}{\mathrm{5Rt}}$ · Key from source paper

Q172 AIEEE 2004 MCQ

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

(A) $5\ \mu\mathrm{V}$
(B) $50\ \mu\mathrm{V}$
(C) $5\ \mathrm{mV}$
(D) $50\ \mathrm{mV}$

Answer: (B) $50\ \mu\mathrm{V}$ · Key from source paper

Q173 AIEEE 2003 MCQ

Two coils are placed close to each other. The mutual inductance of the pair of coils depends upon

(A) the rates at which currents are changing in the two coils
(B) relative position and orientation of the two coils
(C) the materials of the wires of the coils.
(D) the currents in the two coils

Answer: (B) relative position and orientation of the two coils · Key from source paper

Q174 AIEEE 2003 MCQ

When the current changes from +2 A to -2 A in 0.05 second, an e.m.f. of 8 V is induced in a coil. The coefficient of self-induction of the coil is

(A) 0.2H
(B) 0.4H
(C) 0.8H
(D) 0.1H

Answer: (D) 0.1H · Key from source paper

Q175 AIEEE 2003 MCQ

In an oscillating LC circuit the maximum charge on the capacitor is Q. The charge on the capacitor when the energy is stored equally between the electric and magnetic field is

(A) $\frac{Q}{2}$
(B) $\frac{Q}{\sqrt{3}}$
(C) $\frac{Q}{\sqrt{2}}$
(D) Q

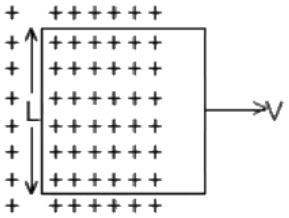
Answer: (C) $\frac{Q}{\sqrt{2}}$ · Key from source paper

Q176 AIEEE 2002 MCQ

A conducting square loop of side L and resistance R moves in its plane with a uniform velocity v perpendicular to one of its sides. A magnetic induction B constant in time and space, pointing perpendicular and into the plane at the loop exists everywhere with half the loop outside the field, as shown in figure. The induced emf is

(see the figure above)

Q56. A conducting square loop of side L and resistance R moves in its plane with a uniform velocity v perpendicular to one of its sides. A magnetic induction B constant in time and space, pointing perpendicular and into the plane at the loop exists everywhere with half the loop outside the field, as shown in figure. The



induced emf is

(1) zero
(2) RvB
(3) VBL/R
(4) VBL

(A) zero
(B) RvB
(C) VBL/R
(D) VBL

Answer: (D) VBL · Key from source paper

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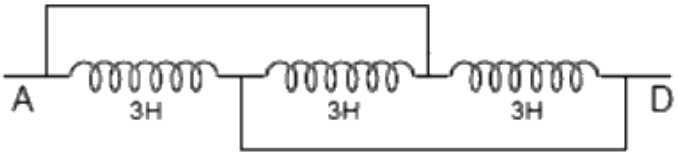
The inductance between A and D is

(see the figure above)

Q57.



The inductance between A and D is

(1) 3.66 H
(2) 9 H
(3) 0.66 H
(4) 1 H

(A) 3.66 H
(B) 9 H
(C) 0.66 H
(D) 1 H

Answer: (D) 1 H · Key from source paper

EdLoop JEE