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ELECTROMAGNETIC INDUCTION

MCQs from Previous Papers

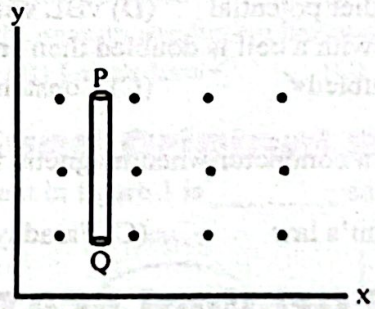
Fully Solved Original ECAT MCQs-2008

1. The change of magnetic flux through a circuit will produced:
(A) Magnetic field (B) Electric field (C) emf✓ (D) None of these

2. Which of the following is generated first?
(A) Induced emf✓ (B) Induced current (C) Both at the same time (D) Depends upon conditions

3. The emf induced in a coil of wire which is rotating in a magnetic field does not depend upon:
(A) The angular speed of rotation (B) The number of turns of coil
(C) Area of the coil (D) Resistance of the coil✓

4. A conducting rod PQ moves parallel to positive x-axis in a uniform magnetic field pointing in positive z-direction then:



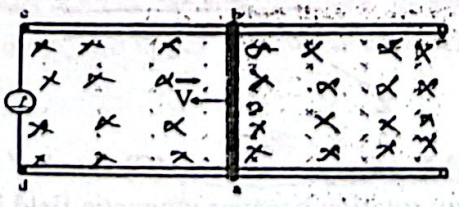
(A) The end Q of the rod becomes positively charged✓
(B) The end P becomes positively charged (C) Both ends will remain neutral
(D) None of these

5. A train is moving towards south with uniform speed of 10m/sec. If the vertical component of earth's magnetic induction is 1×10^{-4} weber/metre^2, the emf induced in an axle 1.0 metre long is:
(A) 0.001 volt✓ (B) 0.01 volt (C) 0.1 volt (D) 1 volt

Fully Solved Original ECAT MCQs-2009

1. A bar magnet is passed through a wire loop. The induced current will be greatest when:
(A) North pole of magnet enters the coil first (B) South pole of magnet enters the coil first
(C) The magnet moves fastly✓ (D) The magnet moves slowly

2. In the figure, a conducting straight rod is placed on two parallel metal rails separated by a distance L in a uniform magnetic field $\vec{B}$ directed into the page. If the conducting rod is moving towards left then:



(A) A charge carrier within the rod is experiencing a magnetic force $(q\vec{v} \times \vec{B})$ from b to a

(B) A charge carrier within the rod is experiencing an electric force ($\vec{E}_q$) from a to b

(C) The conducting rod is experiencing magnetic force ($I\vec{L}\times\vec{B}$) towards right

(D) All of these✓

3. If a conductor is pulled parallel to magnetic field, the induced emf in the conductor is

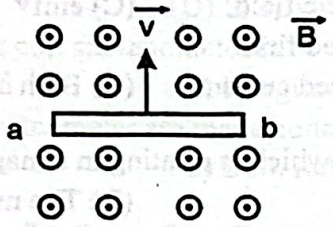
(A) Clockwise (B) Anti-clockwise (C) Downwards (D) Zero✓

4. If a conductor is moving towards east and magnetic field is towards west, then motional emf in the conductor is towards

(A) North (B) South (C) North east (D) Arbitrary direction✓

Fully Solved Original ECAT MCQs-2010

1. As shown in the figure, the potential difference between the points 'a' and 'b' will be



(A) 0 (B) $\frac{1}{2}$ vBL, with point 'a' at the higher potential

(C) vBL, with point 'a' at the higher potential (D) vBL with point 'b' at the higher potential✓

2. If rate of change of flux linking with a coil is doubled then emf induced in the coil is

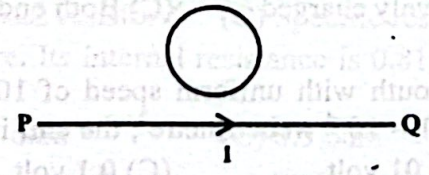
(A) Halved (B) Doubled✓ (C) Constant (D) Increased by four times

3. An electric field is produced in a conductor when magnetic field lines move across it is referred to as

(A) Lenz's law (B) Ohm's law (C) Faraday's law✓ (D) Ampere's law

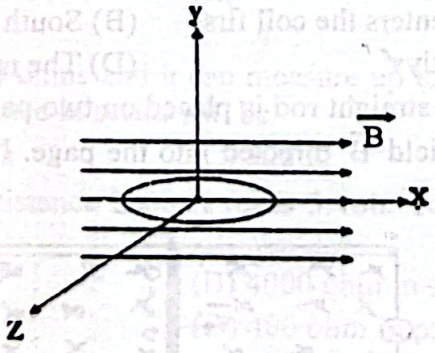
Fully Solved Original ECAT MCQs-2011

1. A straight wire PQ carries a steady current I, the induced current in circular loop will be:



(A) Clockwise (B) Anticlockwise (C) Zero✓ (D) None of these

2. Around which of three coordinate axes should the coil be rotated in order to generate an emf and a current in the coil?



(A) X-axis (B) Y-axis (C) Z-axis✓

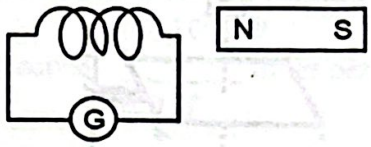
(D) No emf will induce at ay rotation because magnetic field is uniform

Fully Solved Original ECAT MCQs-2012

1. Lenz's law is according to law of conservation of
(A) Mass (B) Energy✓ (C) Momentum (D) All of these

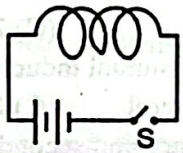
2. Direction of induced current is determined by
(A) Lenz's law✓ (B) Faraday's law (C) Mutual induction (D) All of these

3. As shown in the figure, if a bar magnet is pushed towards the coil, then direction of current is



(A) Clockwise✓ (B) Anticlockwise (C) May be clockwise or anticlockwise
(D) Arbitrary

4. As shown in battery circuit, if S is closed, then induced current is

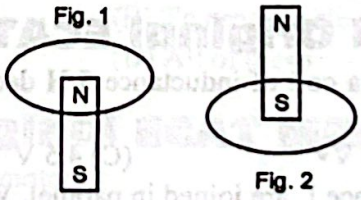


(A) Clockwise (B) Anticlockwise✓
(C) Maybe clockwise or anticlockwise (D) First clockwise then anticlockwise

5. If a copper ring is brought near an oscillating bar magnet then the bar magnet stops according to
(A) Back motor effect (B) Lenz's Law✓ (C) Motional emf (D) Self induction

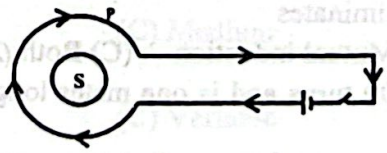
Fully Solved Original ECAT MCQs-2013

1. As shown in figure, current in figure 1 is _____ and in figure 2, it is _____.



(A) Clockwise, Anticlockwise (B) Anticlockwise, clockwise✓
(C) Clockwise, Clockwise (D) Anticlockwise, Anticlockwise

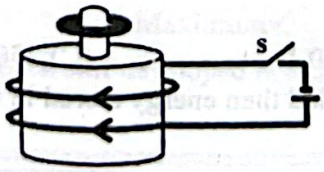
2. Two coils P and S are arranged as shown in Fig. The direction of induced current in S when the switch is closed is



(A) Clockwise (B) Anticlockwise✓ (C) Zero (D) None of these

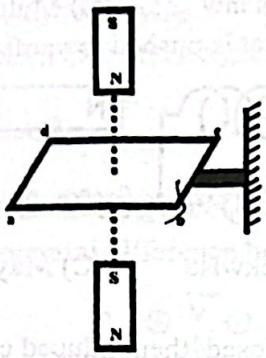
Fully Solved Original ECAT MCQs-2014

1. In the figure given below, the upper end of the ring will behave as _____ when the switch is closed.



(A) North pole✓ (B) A non-magnetic ring
(C) South pole (D) Both A and B are possible

A rectangular loop is held horizontal with the help of some non-conducting support as shown in fig. If a bar magnet is dropped from upper side then the direction of induced current viewed from above in the loop will be when bar magnet is in upper region.



(A) Abcda✓ (B) Adcba (C) Zero (D) None of these

The coil placed in the battery circuit of mutual induction process is called
(A) Primary coil✓ (B) Secondary coil (C) General coil (D) Battery coil

To improve flux linkage between primary and secondary coil, we use cores for coils made of
(A) Copper (B) Aluminium (C) Brass (D) Soft iron✓

If due to a current of 1A in the primary coil, flux linking the secondary coil of 10 turns is 10 Wb, then mutual inductance of two coils is
(A) 10 Henry (B) 1 Henry (C) 100 Henry✓ (D) 1000 Henry

1 Henry =
(A) $1V \times \frac{A}{s}$ (B) $1V \times \frac{s}{A}$✓ (C) $1V \times A$ (D) $\frac{1A}{1V} \times s$

Fully Solved Original ECAT MCQs-2015

If the current passing through a coil of inductance 5 H decreases at the rate of 2A/s, the induced emf in the coil is
(A) 2.5 V (B) 10 V✓ (C) 4.5 V (D) 6.5 V

Two inductors each of inductance L are joined in parallel. What is the equivalent inductance?
(A) 2L (B) L (C) $\frac{L}{2}$✓ (D) Zero

Fully Solved Original ECAT MCQs-2016

Non-inductive wire wound eliminates
(A) Self induction✓ (B) Mutual induction (C) Both *(A)* and (B) (D) Eddy currents

An air core solenoid has 1000 turns and is one meter long. Its cross-sectional area is 10 cm^2. Its self inductance is
(A) $4\pi \times 10^{-3}$ Henry (B) $4\pi \times 10^{-4}$ Henry✓ (C) $4\pi \times 10^{-2}$ Henry (D) $4\pi \times 10^{-5}$ Henry

The energy stored in an inductor is
(A) Electrostatic (B) Electromagnetic (C) Magnetic✓ (D) Mechanical

If a current of 2 A is passing through a solenoid of inductance 2H, then energy stored in it is
(A) 2J (B) 4J✓ (C) 3J (D) 8J

A coil offering total opposition of 10Ω and L = 5 H is connected to a 100 V battery, then energy stored is
(A) 100 J (B) 400 J (C) 250 J✓ (D) 500 J

If current in a solenoid is doubled then energy stored in its magnetic field is

(A) Doubled (B) Halved
(C) Increased by four times✓ (D) Decreased by four times

Fully Solved Original ECAT MCQs-2017

1. Maximum emf produced in the coil of acc generator is
(A) NAB (B) NAf B (C) NA 2π f B✓ (D) N f B
2. If a generator coil of 10^4 turns and $1m^2$ area is rotated in a magnetic field of 0.1 tesla with angular velocity of 1 rad/sec then maximum emf induced in the coil will be
(A) 10^4 volt (B) 10^3 volt✓ (C) 10^2 volt (D) 10^6 volt
3. AC produced by generator reverse its direction _____ times per second
(A) f✓ (B) f/2 (C) 2f (D) 1/f
4. Alternating current can not be used for
(A) Magnetizing (B) Electroplating
(C) Producing heat and light (D) Both (a) and (b) ✓
5. In AC generator, if both number of turns and angular velocity of coil are doubled then induced emf is
(A) Doubled (B) Halved (C) Unchanged
(D) Increased by four times✓

Fully Solved Original ECAT MCQs-2018

1. Split ring generator output is
(A) AC (B) DC (C) Pulsating DC✓ (D) Zero
2. A generator running in reverse may be called as
(A) Transformer (B) Motor✓ (C) Rectifier (D) Inductor
3. Torque on a current carrying coil placed in a magnetic field is the principle of:
(A) Motor✓ (B) Generator (C) Transformer (D) All of these
4. The function of commutator (split ring) in DC motor is
(A) To produce unidirectional torque (B) To produce smooth torque
(C) Conversion of AC to DC✓ (D) All of these

Fully Solved Original ECAT MCQs-2019

1. Which of the following functions like a motor?
(A) Ammeter (B) Voltmeter (C) Galvanometer (D) All of these ✓
2. Back torque at no load in generator is
(A) Zero ✓ (B) Variable (C) Maximum
(D) Neither maximum nor zero
3. The starting current for motor is
(A) Zero (B) Small (C) Medium (D) Large✓
4. Back emf at starting of DC motor is
(A) Zero✓ (B) Maximum (C) Variable (D) Minimum
5. When overloaded, back emf in DC motor
(A) Increases (B) Decreases✓ (C) Remains unchanged
(D) Increases then decreases

Fully Solved Original ECAT MCQs-2021

1. When motor is at maximum speed, then back emf is
(A) Zero (B) Variable (C) Maximum✓ (D) Constant
2. If V is the emf applied to motor and ε is the back emf developed in the motor then net emf in the circuit is

(A) $V + \varepsilon$ (B) $V - \varepsilon$ ✓ (C) $\frac{V}{\varepsilon}$ (D) $V \times \varepsilon$

3. If 100 volt emf is applied to coil of a motor of resistance 10 ohm and back emf is 90 volt, then current in the coil of motor is
(A) 1 A✓ (B) 2 A (C) 3 A (D) 4 A

4. When back emf in motor is zero, it draws
(A) Maximum current✓ (B) Zero current (C) Variable current (D) Current of intermediate value

5. Transformer obeys law of conservation of
(A) Momentum (B) Flux (C) Emf (D) Power✓

6. _____ uses electrical energy and does not convert into any other form
(A) Ac generator (B) DC generator (C) Transformer✓ (D) DC motor

Fully Solved Original ECAT MCQs-2022

1. The primary winding of transformer has 500 turns whereas its secondary has 5000 turns. The primary is connected to an AC supply of 20 V, 50 Hz. The secondary winding output will be
(A) 200V, 50 Hz✓ (B) 2V, 50 Hz (C) 200 V, 500 Hz (D) 2V , 5 Hz

2. For transformer, if $\frac{N_s}{N_p} = 2:1$ then $\frac{I_p}{I_s} =$
(A) 1 : 2 (B) 2 : 1✓ (C) 4 : 1 (D) 1 : 1

3. If number of secondary turns are greater than that of primary then transformer is
(A) Step-up✓ (B) Step-down (C) Distributor (D) Distribution

4. Eddy current losses in transformer is reduced by using
(A) Pure copper coils (B) Soft iron core
(C) Laminated iron core sheets✓ (D) Thick copper coils

5. Core loss (Eddy current and hysteresis loss) in transformer is reduced by
(A) Laminated iron core sheets (B) Soft iron core (C) Both (A) and (B) ✓ (D) Hard Steel

Fully Solved Original ECAT MCQs-2023

1. Line losses are reduced by using
(A) Step down transformer (B) Step up transformer✓ (C) Motor (D) Generator

2. When a transformer is connected to 120-volt ac, it supplies 3000 volts to a device. The current through the secondary winding then is 0.06 ampere and the current through the primary is 2 amperes. The number of turns in the primary is 400. The efficiency of the transformer is
(A) 80% (B) 85% (C) 75%✓ (D) 90%

3. An auto-transformer is cheaper than an ordinary two-winding transformer because it uses
(A) Air core (B) Only one winding✓ (C) Cheap aluminium wire (D) Less turns of wire

4. An auto-transformer consists of 100 turns winding connected to 100V AC supply mains. For getting 24 V output, the winding should be tapped at turn number
(A) 12 (B) 24 ✓ (C) 36 (D) 48

5. Radio frequency (RF) transformers often employ air core coils in order to
(A) Reduce coil weight (B) Reduce cost (C) Reduce core loss ✓ (D) All of these

6. The ultimate advantage of using an iron core rather than an air core in a transformer is that
(A) Mutual inductance is increased (B) Less leakage of flux
(C) Less reluctance of flux
(D) Greater amount of energy is transferred to secondary ✓

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ALTERNATING CURRENT

MCQs from Previous Papers

Fully Solved Original ECAT MCQs-2008

1. Which one is more dangerous?
(A) 220 V A.C✓ (B) 220 V D.C (C) Both are equally dangerous
(D) Data is insufficient to predict danger

2. The frequency of domestic AC supply in Pakistan is
(A) 50 Hz ✓ (B) 100 Hz (C) 150 Hz (D) 75 Hz

3. If peak alternating current is $\sqrt{2}$ A, then rms value of current is
(A) $\sqrt{2}$A (B) $\frac{1}{\sqrt{2}}$A (C) 1A ✓ (D) $\sqrt{3}$A

4. If AC is measured by dc ammeter, then its reading will show
(A) rms value (B) Mean square value (C) Zero✓ (D) Peak value

5. If time period of alternating current is 10 ms (millisecond) then current reverses its direction after every
(A) 10 ms (B) 15 ms (C) 5 ms✓ (D) 20 ms

6. In the equation of AC, $I = I_0 \text{Sin}\omega t$, the current amplitude and angular frequency will respectively be:
(A) $I_0, \frac{\omega}{2\pi}$ (B) $\frac{I_0}{2}, \frac{\omega}{2\pi}$ (C) $I_{rms}, \frac{\omega}{2\pi}$ (D) I_0, ω ✓

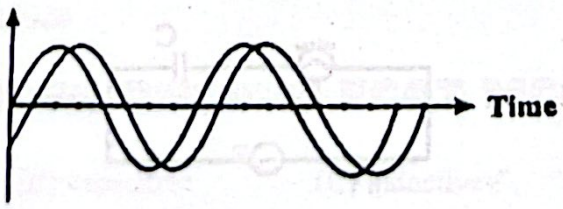
Fully Solved Original ECAT MCQs-2009

1. What will be the equation of alternating current of frequency 75 Hz if its r.m.s value is 20 ampere?
(A) $I = 20\text{Sin}150\pi t$ (B) $I = 20\sqrt{2}\text{Sin}(150\pi t)$ ✓ (C) $I = \frac{20}{\sqrt{2}}\text{Sin}(150\pi t)$
(D) $I = 20\sqrt{2}\text{Sin}(75\pi t)$

2. A bulb is connected to a supply of 50 Hz. It shows maximum glow
(A) 50 times per second (B) 100 times per second✓
(C) 150 times per second (D) 200 times per second

3. AC is zero at phase angle
(A) 0 rad (B) π rad (C) 2π rad (D) All of these ✓

4. The diagram shows two oscillations. What is the phase difference between the oscillations?



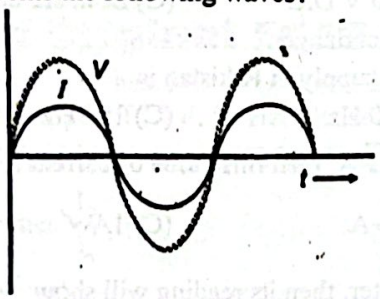
(A) $\frac{\pi}{4}$rad ✓ (B) $\frac{\pi}{2}$rad (C) $\frac{3}{4}\pi$ rad (D) π rad

Fully Solved Original ECAT MCQs-2010

1. The basic circuit element in a DC circuit is
(A) Resistor✓ (B) Capacitor (C) Inductor (D) All of these
2. AC voltage and current are in phase in
(A) Pure inductive circuit (B) Pure capacitive circuit
(C) Pure resistive circuit✓ (D) RLC circuit
3. Which circuit element is short circuit (R = 0) for AC ?
(A) Resistor (B) Inductor (C) Capacitor (D) None of these ✓
4. Which circuit element is open circuit (R = ∞) for AC ?
(A) Resistor (B) Inductor (C) Capacitor (D) None of these✓

Fully Solved Original ECAT MCQs-2011

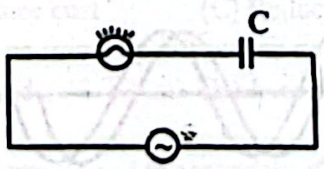
1. Which of these circuits represents the following waves?



(A) Pure resistive circuit ✓ (B) Pure inductive circuit
(C) Pure capacitive circuit (D) None of these
2. AC voltage lags the current by 90° in
(A) Pure inductive circuit (B) Pure capacitive circuit ✓
(C) Pure resistive circuit (D) RL circuit
3. At high frequency of AC supply, the reactance of capacitor will be
(A) Low ✓ (B) Variable (C) Large (D) Zero
4. If a capacitor of capacitance $\frac{1}{2\pi}$ Farad is connected to an AC supply of 50 Hz, then its reactance is
(A) 0.02 Ω ✓ (B) 0.2 Ω (C) 2 Ω (D) 0.002 Ω
5. Slope of q-t graph represents
(A) Voltage (B) Current ✓ (C) Resistance (D) Electromotive force

Fully Solved Original ECAT MCQs-2012

1. AC voltage leads the current by 90° in
(A) Pure capacitive circuit (B) Pure inductive circuit✓ (C) Pure resistive circuit (D) RL circuit
2. [illegible] and a capacitor are connected to an A.C source as shown in Fig. If the frequency of A.C is increased then brightness of bulb will:



(A) Increase✓ (B) Decrease (C) Remain same (D) Data incomplete
3. At low frequency of AC supply, the reactance of inductor is