

Advanced Electromagnetism Concepts

Physics · Answer Key · 10 Questions

1. Which specific material is most commonly used as a core in a high-efficiency electromagnet to intensify the magnetic field?

- A) Copper
- B) Soft iron**
- C) Aluminum
- D) Glass

2. According to Lenz's Law, the direction of an induced electric current is always such that it:

- A) Increases the magnetic flux
- B) Opposes the change that produced it**
- C) Stays constant regardless of motion
- D) Doubles the voltage output

3. In a simple DC electric motor, what is the specific function of the commutator?

- A) To increase the battery voltage
- B) To prevent the motor from overheating
- C) To reverse the direction of current every half-turn**
- D) To convert alternating current into direct current

4. Which phenomenon describes the creation of an electromotive force (EMF) in a conductor exposed to a time-varying magnetic field?

- A) Electromagnetic induction**
- B) Thermal conductivity
- C) Static discharge
- D) Ohmic heating

5. What happens to the magnetic field strength inside a solenoid when the number of turns of wire per unit length is increased while maintaining the same current?

- A) It remains constant
- B) It decreases linearly
- C) It increases**
- D) It fluctuates randomly

6. What is the primary factor that determines the direction of the magnetic field surrounding a straight current-carrying wire?

- A) The mass of the wire
- B) The direction of the electron flow**
- C) The insulation material of the wire
- D) The presence of an external gravitational field

7. When a magnet is moved rapidly into and out of a wire coil, what is the primary factor that increases the magnitude of the induced current?

- A) The color of the wire insulation
- B) The speed of the magnet's movement**
- C) The chemical composition of the air
- D) The weight of the magnet

8. Which fundamental law states that the force between two point charges is inversely proportional to the square of the distance between them?

- A) Faraday's Law
- B) Coulomb's Law**
- C) Newton's Third Law
- D) Ampere's Law

9. In an electromagnetic relay, how does the input circuit control the output circuit without a direct electrical connection?

- A) Through a high-pressure gas seal
- B) By using a light sensor
- C) By using the magnetic field to move a mechanical switch**
- D) By transferring heat energy

10. What occurs to the magnetic field of an electromagnet if the direction of the current through the coil is reversed?

- A) The field strength triples
- B) The north and south poles are swapped**
- C) The magnetic field disappears entirely
- D) The field becomes non-directional