

Advanced Electrical Engineering Fundamentals

Electrical Engineering · Answer Key · 10 Questions

1. Which specific law of electromagnetic induction states that the direction of the induced electromotive force is such that it opposes the change in magnetic flux that produced it?

- A) Faraday's Law
- B) Lenz's Law**
- C) Ampere's Law
- D) Gauss's Law

2. In a three-phase induction motor, what is the term for the difference between the synchronous speed and the actual rotor speed, expressed as a fraction of the synchronous speed?

- A) Commutation factor
- B) Slip**
- C) Reactance ratio
- D) Torque constant

3. What is the primary function of a Buchholz relay in a power transformer?

- A) Protection against voltage surges
- B) Prevention of overheating
- C) Detection of incipient faults through gas accumulation**
- D) Measurement of reactive power

4. In the context of power systems, what is the definition of the 'skin effect' in a conductor?

- A) Increased resistance due to surface oxidation
- B) Tendency of AC to flow mostly near the outer surface**
- C) The heating of insulation due to high current
- D) The loss of magnetism at high temperatures

5. Which semiconductor device is characterized by a four-layer p-n-p-n structure and is primarily used for high-power switching applications?

- A) MOSFET
- B) IGBT
- C) Thyristor (SCR)**
- D) Zener Diode

6. What is the unit of magnetic flux density in the International System of Units (SI)?

A) Weber

B) Tesla

C) Henry

D) Gauss

7. In signal processing, what is the name of the theorem that specifies the minimum sampling rate required to avoid aliasing?

A) Nyquist-Shannon sampling theorem

B) Parseval's theorem

C) Thevenin's theorem

D) Norton's theorem

8. Which parameter of a transmission line is calculated as the square root of the ratio of the series impedance to the shunt admittance?

A) Propagation constant

B) Characteristic impedance

C) Reflection coefficient

D) Attenuation constant

9. In an operational amplifier, what term describes the ability of the device to reject common-mode signals at both inputs?

A) Slew rate

B) Open-loop gain

C) Common-mode rejection ratio (CMRR)

D) Input bias current

10. Which of the following materials is classified as a ferrimagnetic material commonly used for high-frequency transformer cores?

A) Aluminum

B) Copper

C) Ferrite

D) Brass