

Advanced Electrical Engineering Fundamentals

Electrical Engineering · Answer Key · 20 Questions

1. Which material exhibits a negative temperature coefficient of resistance?

- A) Copper
- B) Aluminum
- C) Carbon**
- D) Silver

2. In a three-phase power system, what is the phase difference between each of the voltages?

- A) 45 degrees
- B) 90 degrees
- C) 120 degrees**
- D) 180 degrees

3. Which law states that the total current entering a junction or node must equal the current leaving it?

- A) Kirchhoff's Current Law**
- B) Ohm's Law
- C) Faraday's Law
- D) Lenz's Law

4. What is the unit of measurement for magnetic flux density in the SI system?

- A) Henry
- B) Weber
- C) Tesla**
- D) Gauss

5. In a bipolar junction transistor (BJT), what does the 'Ebers-Moll' model primarily describe?

- A) Thermal noise
- B) Carrier concentrations
- C) Static DC characteristics**
- D) High-frequency response

6. What is the primary function of a 'varistor' in an electrical circuit?

- A) Voltage stabilization
- B) Frequency modulation
- C) Current amplification
- D) Overvoltage protection**

7. Which parameter is defined as the ratio of real power to apparent power in an AC circuit?

- A) Impedance
- B) Power factor**
- C) Admittance
- D) Susceptance

8. What is the purpose of a 'commutator' in a DC machine?

- A) To increase voltage
- B) To convert AC to DC**
- C) To reduce friction
- D) To prevent sparking

9. Which configuration of an operational amplifier provides infinite input impedance and zero output impedance in an ideal model?

- A) Non-inverting**
- B) Inverting
- C) Integrator
- D) Differential

10. What defines the 'skin effect' in electrical conductors?

- A) Increased resistance due to heat
- B) Concentration of current at the surface**
- C) Reduced capacitance in cables
- D) Magnetic saturation of the core

11. Which material is commonly used as the dielectric in a high-voltage ceramic capacitor?

- A) Barium Titanate**
- B) Polypropylene
- C) Tantalum
- D) Mica

12. In signal processing, what is the Nyquist rate defined as?

- A) Twice the signal bandwidth**
- B) Equal to the carrier frequency
- C) Half the sampling frequency
- D) The inverse of the signal period

13. What is the primary advantage of a 'delta-star' transformer connection in power distribution?

- A) Eliminating harmonics
- B) Providing a neutral point**
- C) Increasing efficiency
- D) Reducing iron loss

14. What phenomenon occurs when a circuit's inductive reactance equals its capacitive reactance?

- A) Saturation
- B) Resonance**
- C) Hysteresis
- D) Breakdown

15. Which standard specifies the requirements for the 'Ethernet' protocol?

- A) IEEE 802.11
- B) IEEE 802.3**
- C) ISO 9001
- D) ANSI C63.4

16. What is the SI derived unit of electrical conductance?

- A) Ohm
- B) Siemens**
- C) Farad
- D) Coulomb

17. In an induction motor, what is 'slip' defined as?

- A) The ratio of rotor speed to stator speed
- B) The difference between synchronous and rotor speed**
- C) The magnetic flux leakage
- D) The frictional loss in bearings

18. What does the 'Q factor' of a resonant circuit signify?

- A) Quality of insulation
- B) Ratio of energy stored to energy dissipated**
- C) Quantity of charge stored
- D) Quickness of response

19. Which logic gate implements the Boolean function $Y = A \text{ XOR } B$?

- A) AND
- B) NAND
- C) XOR**
- D) NOR

20. What is the Curie temperature of a ferromagnetic material?

- A) The boiling point
- B) Temperature where magnetism is lost**
- C) Melting point of the core
- D) The freezing point