

Electrical Engineering History and Constants

Electrical Engineering · Answer Key · 25 Questions

1. In what year did Heinrich Hertz experimentally demonstrate the existence of electromagnetic waves, confirming Maxwell's equations?

- A) 1865
- B) 1887**
- C) 1892
- D) 1901

2. The base unit of magnetic flux, the Weber, is named after Wilhelm Eduard Weber. What is the value of 1 Weber expressed in terms of Maxwells (the CGS unit of magnetic flux)?

- A) 10^2
- B) 10^4
- C) 10^6
- D) 10^8**

3. What is the exact value of the elementary charge (e) in Coulombs, as defined by the 2019 redefinition of SI base units?

- A) $1.602176634 \times 10^{-19} \text{ C}$**
- B) $1.602176570 \times 10^{-19} \text{ C}$
- C) $1.602176487 \times 10^{-19} \text{ C}$
- D) $1.602176620 \times 10^{-19} \text{ C}$

4. The 'War of the Currents' between AC and DC reached a definitive turning point in 1893 when which company was awarded the contract to light the World's Columbian Exposition using Westinghouse's AC system?

- A) Edison General Electric
- B) General Electric
- C) Westinghouse Electric**
- D) Thomson-Houston Electric

5. Who is credited with the 1827 publication of the treatise 'Die galvanische Kette, mathematisch bearbeitet', which established the fundamental law of electrical circuits known as Ohm's Law?

- A) Gustav Kirchhoff
- B) Georg Simon Ohm**
- C) Andre-Marie Ampere
- D) James Prescott Joule

6. In the year 1831, Michael Faraday discovered electromagnetic induction. Which scientist independently discovered the same phenomenon around the same time but published his results later?

- A) Joseph Henry**
- B) William Sturgeon
- C) Nikola Tesla
- D) Charles Wheatstone

7. The 'Zener diode' is named after Clarence Zener. In what year did he publish the theoretical work describing the quantum mechanical tunneling effect that bears his name?

- A) 1928
- B) 1934**
- C) 1942
- D) 1947

8. What is the standard frequency in Hertz used for the electrical power grid in Australia?

- A) 50 Hz**
- B) 60 Hz
- C) 25 Hz
- D) 40 Hz

9. Who filed the first patent for the 'Electric Motor' in 1837?

- A) Thomas Davenport**
- B) Moritz von Jacobi
- C) Werner von Siemens
- D) Frank Sprague

10. The 'Nyquist-Shannon sampling theorem' establishes the minimum sampling rate to avoid aliasing. Who was the Bell Labs engineer who co-authored this theorem in 1948?

- A) Claude Shannon**
- B) Ralph Hartley
- C) Harry Nyquist
- D) John Pierce

11. How many turns of wire are typically used in the primary winding of a standard 120V to 12V step-down transformer if the secondary winding has exactly 50 turns and losses are neglected?

- A) 250
- B) 500
- C) 600**
- D) 1200

12. In what year did John Bardeen, Walter Brattain, and William Shockley invent the point-contact transistor at Bell Labs?

- A) 1945
- B) 1947**
- C) 1949
- D) 1951

13. The 'Steinmetz constant' (?) relates to which electrical engineering phenomenon introduced by Charles Proteus Steinmetz in 1892?

- A) Hysteresis loss**
- B) Eddy current resistance
- C) Capacitive reactance
- D) Skin effect depth

14. What is the value of the vacuum permittivity (ϵ_0) in Farads per meter (F/m)?

- A) 8.854×10^{-12}**
- B) 8.987×10^{-9}
- C) 9.109×10^{-31}
- D) 6.626×10^{-34}

15. The Intel 4004, released in 1971, was the first commercially available microprocessor. How many bits was its data bus?

- A) 4-bit**
- B) 8-bit
- C) 16-bit
- D) 32-bit

16. Who formulated the four partial differential equations that describe the behavior of electric and magnetic fields in 1864?

- A) James Clerk Maxwell**
- B) Oliver Heaviside
- C) Heinrich Hertz
- D) Michael Faraday

17. In a three-phase power system, what is the phase shift in degrees between each of the three voltages?

- A) 60
- B) 90
- C) 120**
- D) 180

18. The 'Bode Plot' is named after Hendrik Wade Bode. At which company did he develop his work on feedback amplifiers and control theory?

- A) AT&T Bell Labs**
- B) General Electric
- C) MIT Radiation Lab
- D) Westinghouse

19. What is the approximate speed of an electromagnetic wave in a vacuum, commonly denoted by 'c', in meters per second?

- A) 299,792,458**
- B) 300,000,000
- C) 289,500,000
- D) 295,800,000

20. In 1899, which inventor successfully demonstrated wireless telegraphy across the English Channel?

- A) Guglielmo Marconi**
- B) Alexander Popov
- C) Reginald Fessenden
- D) Lee de Forest

21. The 'Barkhausen effect', discovered in 1919, provides evidence for the existence of what in ferromagnetic materials?

- A) Magnetic domains**
- B) Electron spin
- C) Superconductivity
- D) Hysteresis loops

22. What is the approximate voltage (in Volts) across a standard PN-junction silicon diode when it is forward-biased?

- A) 0.3V
- B) 0.7V**
- C) 1.2V
- D) 2.1V

23. The first practical incandescent light bulb that could last for more than a few hours was patented by Edison in 1879. What filament material did he finally settle on after months of testing?

A) Carbonized bamboo

B) Platinum wire

C) Tungsten

D) Graphite

24. What is the unit of measure for electrical conductance?

A) Siemens

B) Henry

C) Weber

D) Tesla

25. In 1960, who demonstrated the first working laser, the ruby laser, at Hughes Research Laboratories?

A) Theodore Maiman

B) Charles Townes

C) Arthur Schawlow

D) Gordon Gould