

Electrical Engineering and Human Health Facts

Electrical Engineering · Answer Key · 10 Questions

1. What is the approximate electrical resistance of intact human skin under dry conditions?

- A) 1,000 ohms
- B) 10,000 ohms
- C) 100,000 ohms
- D) 1,000,000 ohms**

2. Which physiological effect is primarily responsible for the disruptive impact of electric current on the heart's rhythm?

- A) Thermal burns
- B) Muscle tetanus
- C) Electrolysis of blood
- D) Ventricular fibrillation**

3. What is the standard unit of electrical current used to measure the flow of charge that can cause harm to the human body?

- A) Volt (V)
- B) Ohm (Ω)
- C) Watt (W)
- D) Ampere (A)**

4. In medical imaging, what electrical engineering principle is fundamental to the operation of an MRI scanner?

- A) Capacitive coupling
- B) Electromagnetic induction**
- C) Piezoelectric effect
- D) Hall effect

5. What is the typical minimum current, in milliamperes (mA), that can cause an involuntary muscle contraction (e.g., inability to let go) in humans?

- A) 0.1 mA
- B) 1 mA
- C) 5-10 mA**
- D) 50 mA

6. The electrical activity of the brain is measured and recorded using an Electroencephalogram (EEG). What type of electrodes are typically used to pick up these faint electrical signals?

- A) Inductive sensors
- B) Capacitive electrodes
- C) Conductive gel-based electrodes**
- D) Resistive probes

7. What electrical engineering concept is crucial for ensuring the safety of pacemakers and other implanted medical devices by preventing interference?

- A) Power factor correction
- B) Electromagnetic compatibility (EMC)**
- C) Harmonic distortion mitigation
- D) Signal-to-noise ratio optimization

8. The human body, due to its water content, can be considered a conductor. At very high frequencies, what phenomenon can cause electrical current to flow more on the surface of a conductor, including the body?

- A) Skin effect**
- B) Proximity effect
- C) Eddy currents
- D) Dielectric breakdown

9. When an electrical current passes through the human body, it generates heat. This phenomenon is a direct application of which electrical law?

- A) Ohm's Law
- B) Coulomb's Law
- C) Joule's Law (I^2R heating)**
- D) Ampère's Law

10. What electrical engineering parameter is a primary factor in determining the severity of an electric shock, alongside resistance and duration?

- A) Frequency**
- B) Inductance
- C) Capacitance
- D) Power