

Semiconductors Quiz Answer Key PDF

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Which device allows current to flow in only one direction?

- A. Transistor
- B. Resistor
- C. Diode ✓**
- D. Capacitor

What is the process of adding impurities to a semiconductor to change its electrical properties called?

- A. Etching
- B. Doping ✓**
- C. Deposition
- D. Lithography

What is the term for the process by which electrons and holes recombine in a semiconductor?

- A. Generation
- B. Recombination ✓**
- C. Ionization
- D. Polarization

What is the primary material used in the manufacturing of most semiconductor devices?

- A. Germanium
- B. Silicon ✓**
- C. Gallium Arsenide
- D. Copper

Which type of semiconductor is created by adding impurities to increase the number of free electrons?

- A. Intrinsic
- B. P-type
- C. N-type ✓**
- D. Insulator

What are the challenges faced in the miniaturization of semiconductor devices?

Key challenges include managing quantum tunneling effects at smaller scales, ensuring effective heat dissipation, achieving high manufacturing precision, and overcoming limitations in current semiconductor materials.

Discuss the significance of the band gap in determining the properties of a semiconductor.

The significance of the band gap in a semiconductor lies in its role in controlling the material's electrical conductivity; a smaller band gap allows for easier electron excitation, leading to higher conductivity, while a larger band gap results in lower conductivity.

What is the energy difference between the valence band and the conduction band in a semiconductor called?

- A. Energy Level
- B. Band Gap ✓**
- C. Conductivity
- D. Electron Volt

Describe the role of doping in modifying the electrical properties of semiconductors.

Doping modifies the electrical properties of semiconductors by introducing impurities that increase the number of charge carriers, either electrons in n-type semiconductors or holes in p-type semiconductors, thereby enhancing their conductivity.

What are the primary charge carriers in semiconductors? (Select all that apply)

- A. Electrons ✓**
- B. Holes ✓**

- C. Neutrons
- D. Protons

Which of the following are common semiconductor materials? (Select all that apply)

- A. Silicon ✓**
- B. Germanium ✓**
- C. Gallium Arsenide ✓**
- D. Copper

Who is credited with the invention of the first transistor?

- A. Nikola Tesla
- B. Thomas Edison
- C. John Bardeen ✓**
- D. Alexander Graham Bell

What advancements are being explored in semiconductor materials? (Select all that apply)

- A. Graphene ✓**
- B. Silicon Carbide ✓**
- C. Iron
- D. Plastic

Explain the difference between intrinsic and extrinsic semiconductors.

Intrinsic semiconductors are made of pure semiconductor material, such as silicon or germanium, and have a balanced number of electrons and holes. In contrast, extrinsic semiconductors are created by doping intrinsic semiconductors with specific impurities (n-type or p-type) to increase the number of charge carriers, thus improving conductivity.

Which processes are involved in semiconductor fabrication? (Select all that apply)

- A. Photolithography ✓**
- B. Etching ✓**
- C. Soldering

D. Deposition ✓

How have semiconductors impacted the field of electronics and technology as a whole?

Semiconductors have significantly impacted electronics and technology by allowing for the creation of smaller, faster, and more efficient devices, which are foundational to modern computing, telecommunications, and a wide range of consumer electronics.

Which devices are considered semiconductor devices? (Select all that apply)

A. Diode ✓

B. Transistor ✓

C. Resistor

D. Integrated Circuit ✓

How does Moore's Law relate to the development of semiconductor technology?

Moore's Law relates to the development of semiconductor technology by indicating that the number of transistors on a chip will double approximately every two years, which has historically led to increased performance and reduced costs in electronic devices.

Which type of transistor is commonly used in digital circuits?

A. Bipolar Junction Transistor (BJT)

B. Field-Effect Transistor (FET) ✓

C. Vacuum Tube

D. Light-Emitting Diode (LED)

Which of the following are applications of semiconductors? (Select all that apply)

A. Microprocessors ✓

B. Solar Cells ✓

C. Mechanical Gears

D. Photodetectors ✓