

Chapter 02 Test Bank: Semiconductors

1. Copper is a good conductor.

FALSE

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Bloom's: 2. Understand
Chapter: 02 Semiconductors
Difficulty: Easy
Section: 02.01 Conductors
Subtopic: Conductors
Topic: Semiconductors*

2. The valence orbit controls the electrical properties of the atom.

FALSE

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Chapter: 02 Semiconductors
Difficulty: Easy
Section: 02.01 Conductors
Subtopic: Conductors
Topic: Semiconductors*

3. The core of an atom consists of all the outer orbits.

FALSE

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Chapter: 02 Semiconductors
Difficulty: Easy
Section: 02.01 Conductors
Subtopic: Conductors
Topic: Semiconductors*

4. The valence electron is referred to as a free electron.

FALSE

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Chapter: 02 Semiconductors
Difficulty: Medium
Section: 02.01 Conductors
Subtopic: Conductors
Topic: Semiconductors*

5. A semiconductor is an element with electrical properties between those of a conductor and those of an insulator.

FALSE

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Chapter: 02 Semiconductors
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6. How many valence electrons are there in a germanium semiconductor?

- A. 1
- B. 2
- C. 4**
- D. None

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Difficulty: Medium
Section: 02.02 Semiconductors
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7. Other than germanium, what is another type of semiconductor material generally used?

- A. copper
- B. helium
- C. aluminum
- D. silicon**

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Section: 02.02 Semiconductors
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8. When silicon atoms combine to form a solid, they arrange themselves into an orderly pattern called

- A. an orbit.
- B. the valence shell.
- C. a crystal.**
- D. a conductor.

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Chapter: 02 Semiconductors
Difficulty: Easy
Section: 02.03 Silicon Crystals
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9. The term used to describe the sharing of valence electrons that gives a crystal solidity is

- A. covalent bonding.
- B. negative ion.
- C. saturation point.
- D. reverse bias.

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Section: 02.03 Silicon Crystals
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10. How many electrons are in the valence orbit of a silicon crystal?

- A. 2
- B. 4
- C. 8
- D. None

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11. The temperature of the surrounding air is called

- A. ambient.
- B. surround sound.
- C. atmospheric.
- D. Centigrade.

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12. When the departure of an electron creates a vacancy in the valence orbit, it is called a

- A. hole.
- B. vacant electron.
- C. polarized electron.
- D. negative ion.

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13. The merging of a free electron and a hole is referred to as a

- A. merger.
- B. combination.
- C. restoration.
- D.** recombination.

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14. The amount of time between the creation and disappearance of a free electron is called a

- A. light year.
- B. millisecond.
- C.** lifetime.
- D. work week.

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Section: 02.03 Silicon Crystals
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15. A pure semiconductor is also referred to as

- A. a clean room device.
- B.** intrinsic.
- C. extrinsic.
- D. transistor.

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Chapter: 02 Semiconductors
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Section: 02.04 Intrinsic Semiconductors
Subtopic: Intrinsic Semiconductors
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16. At room temperature, a silicon crystal acts like an insulator.

FALSE

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17. Intrinsic semiconductor has unequal number of free electrons and holes.

FALSE

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Section: 02.04 Intrinsic Semiconductors
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18. Thermal energy produces free electrons and holes in pairs.

FALSE

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Chapter: 02 Semiconductors
Difficulty: Medium
Section: 02.05 Two types of Flow
Subtopic: Two types of Flow
Topic: Semiconductors

19. Doping is a process of adding impurity atoms to an intrinsic crystal to alter its electrical conductivity.

FALSE

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Chapter: 02 Semiconductors
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Section: 02.06 Doping a Semiconductor
Subtopic: Doping a Semiconductor
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20. A doped semiconductor is called an intrinsic semiconductor.

FALSE

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Section: 02.06 Doping a Semiconductor
Subtopic: Doping a Semiconductor
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21. What type of atoms are added to molten silicon in order to increase the number of free electrons?

- A.** pentavalent
- B. trivalent
- C. covalent

D. positive

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22. What type of impurity is added to pure silicon to get an excess of holes?

- A. pentavalent
- B. trivalent**
- C. covalent
- D. positive

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23. A trivalent atom is also called

- A. an acceptor atom.**
- B. a donor atom.
- C. copper.
- D. a negative ion.

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24. What is the most popular and useful semiconductor material?

- A. silver
- B. copper
- C. aluminum
- D. silicon**

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25. Silicon that has been doped with a pentavalent impurity is called

- A. a p-type semiconductor.

- B.** an n-type semiconductor.
- C. a conductor.
- D. an insulator.

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Section: 02.07 Two types of Extrinsic Semiconductors
Subtopic: Two types of Extrinsic Semiconductors
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26. In an n-type semiconductor, the free electrons are called the

- A. minority carriers.
- B.** majority carriers.
- C. holes.
- D. ions.

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27. Silicon that has been doped with a trivalent impurity is called a (an)

- A. n-type semiconductor.
- B.** p-type semiconductor.
- C. pn junction.
- D. covalent bond.

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28. The border between p-type and n-type crystal is called the

- A.** pn junction.
- B. p-type border.
- C. n-type margin.
- D. p junction.

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Chapter: 02 Semiconductors
Difficulty: Easy
Section: 02.08 The Unbiased Diode
Subtopic: The Unbiased Diode
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29. What is another name for pn crystal?

- A. junction diode
- B. bipolar transistor
- C. dipole
- D. field effect device

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30. When a free electron enters the p region of a junction diode, it becomes a

- A. majority carrier.
- B. minority carrier.**
- C. hole.
- D. depletion carrier.

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31. Each time an electron diffuses across a pn junction, it creates a pair of ions.

FALSE

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32. Each pair of positive and negative ions at the pn junction is called a dipole.

FALSE

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33. As dipoles build up, the region near the pn junction is void of all charges and is called the restoration layer.

FALSE

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34. Reverse bias is achieved when the negative source terminal is connected to the n-type material, and the positive terminal is connected to the p-type material.

FALSE

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35. Current flows easily in a forward-biased diode.

FALSE

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Subtopic: Forward Bias
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36. A silicon diode will allow a continuous current in the forward direction, if the source voltage is

- A.** greater than 0.7 V.
- B. equal to 7.7 V.
- C. less than 0.7 V.
- D. zero.

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37. What results when the negative battery terminal is connected to the p side of a pn junction, and the positive battery terminal to the n side?

- A. forward bias
- B.** reverse bias
- C. avalanche breakdown
- D. a short circuit

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Section: 02.10 Reverse Bias

Subtopic: Reverse Bias

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38. When reverse bias is increased

- A. forward current increases.
- B. depletion layer widens.**
- C. depletion layer becomes smaller.
- D. the diode becomes polarized.

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Section: 02.10 Reverse Bias

Subtopic: Reverse Bias

Topic: Semiconductors

39. What is the approximate current level in a reverse-biased diode?

- A. 0.7 mA
- B. 0.7 A
- C. 1.7 A
- D. zero**

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Chapter: 02 Semiconductors

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Section: 02.10 Reverse Bias

Subtopic: Reverse Bias

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40. The limit to how much reverse voltage a diode can withstand before it is destroyed is called

- A. forward bias.
- B. reverse bias.
- C. breakup current.
- D. breakdown voltage.**

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Difficulty: Easy

Section: 02.11 Breakdown

Subtopic: Breakdown

Topic: Semiconductors

41. In a Light-emitting diode (LED), what lifts the electrons to higher energy levels?

- A. constant current source
- B. applied voltage**

- C. valence electrons
- D. light

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Section: 02.12 Energy Levels
Subtopic: Energy Levels
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42. In a semiconductor, thermal energy produces free electrons that go to the next higher-energy band called the

- A. radiation band.
- B. conduction band.**
- C. electron band.
- D. valence band.

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Subtopic: Energy Levels
Topic: Semiconductors

43. The depletion layer does not exist

- A. in pn junction diodes.
- B. when a diode is first sold.
- C. when a diode is first formed.**
- D. until the holes are injected.

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44. What type of bias gives free electrons more energy?

- A. reverse
- B. forward**
- C. negative
- D. positive

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45. When free electrons fall from the conduction band to the valence band, excess energy

- A. is radiated in the form of heat and light.
- B. is lost due to valence electrons.
- C. is radiated in the form of sound.
- D. is gained due to hole flow.

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46. What is the term for the temperature inside a diode, right at the pn junction?

- A. ambient temperature
- B. diode temperature
- C. pn temperature
- D. junction temperature

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Section: 02.13 Barrier Potential and Temperature
Subtopic: Barrier Potential and Temperature
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47. When the reverse voltage increases, holes and electrons

- A. recombine.
- B. move away from the junction.
- C. move toward the junction.
- D. remain stationary.

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Section: 02.14 Reverse-biased Diode
Subtopic: Reverse-biased Diode
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48. In a silicon atom, what is the distance between the valence band and the conduction band called?

- A. energy gap
- B. depletion layer
- C. pn junction
- D. intrinsic

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Chapter: 02 Semiconductors
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Section: 02.14 Reverse-biased Diode

Subtopic: Reverse-biased Diode
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49. What is a disadvantage of a germanium device that prevents its prevalent use in modern computers, consumer electronics, and communication circuits?

- A. cost
- B. weight
- C. excessive reverse current**
- D. excessive forward current

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Section: 02.14 Reverse-biased Diode
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50. What is the term for reverse current on the surface of a crystal?

- A. crystal current
- B. reverse current
- C. surface-leakage current**
- D. avalanche breakdown current

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