

***Electronics - Principles and Applications 9th edition
Schuler Test Bank***

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Electronics: Principles and Applications, 9e (Schuler)
Chapter 2 Semiconductors

1) All materials are made from atoms.

Answer: TRUE

Difficulty: 1 Easy Page Ref: 20

Learning Objective: 02-01 Identify some common electronic materials as conductors or semiconductors.

Bloom's: Understand

Accessibility: Keyboard Navigation

2) In the atom, the orbit closest to the nucleus is called the valence orbit.

Answer: FALSE

Difficulty: 1 Easy Page Ref: 20

Learning Objective: 02-01 Identify some common electronic materials as conductors or semiconductors.

Bloom's: Understand

Accessibility: Keyboard Navigation

3) The valence electron is important because it acts as a current carrier.

Answer: TRUE

Difficulty: 1 Easy Page Ref: 21

Learning Objective: 02-01 Identify some common electronic materials as conductors or semiconductors.

Bloom's: Understand

Accessibility: Keyboard Navigation

4) Aluminum is the most widely applied conductor in electronics.

Answer: FALSE

Explanation: Most wire used in electronics and the foil used in printed circuits are made from copper.

Difficulty: 2 Medium Page Ref: 21

Learning Objective: 02-01 Identify some common electronic materials as conductors or semiconductors.

Bloom's: Remember

Accessibility: Keyboard Navigation

5) A material that does not conduct electricity is called an insulator.

Answer: TRUE

Explanation: Some widely used insulators include: rubber, plastic, Mylar, ceramic, Teflon, and polystyrene.

Difficulty: 1 Easy Page Ref: 22

Learning Objective: 02-01 Identify some common electronic materials as conductors or semiconductors.

Bloom's: Remember

Accessibility: Keyboard Navigation

6) A mixture is a combination of two or more different kinds of atoms.

Answer: FALSE

Difficulty: 3 Hard Page Ref: 22

Learning Objective: 02-01 Identify some common electronic materials as conductors or semiconductors.

Bloom's: Remember

Accessibility: Keyboard Navigation

7) Semiconductors allow current to flow as easily as conductors do.

Answer: FALSE

Difficulty: 1 Easy Page Ref: 23

Learning Objective: 02-02 Predict the effect of temperature on conductors.

Bloom's: Understand

Accessibility: Keyboard Navigation

8) Silicon is the most widely used semiconductor material.

Answer: TRUE

Difficulty: 2 Medium Page Ref: 23

Learning Objective: 02-02 Predict the effect of temperature on conductors.

Bloom's: Remember

Accessibility: Keyboard Navigation

9) The process of sharing valence electrons is called covalent bonding.

Answer: TRUE

Difficulty: 2 Medium Page Ref: 24

Learning Objective: 02-02 Predict the effect of temperature on conductors.

Bloom's: Understand

Accessibility: Keyboard Navigation

10) Impure silicon is sometimes called intrinsic silicon.

Answer: FALSE

Difficulty: 3 Hard Page Ref: 24

Learning Objective: 02-02 Predict the effect of temperature on conductors.

Bloom's: Understand

Accessibility: Keyboard Navigation

11) Compounds form the fundamental paths for electronic circuits.

Answer: FALSE

Difficulty: 1 Easy Page Ref: 21

Learning Objective: 02-01 Identify some common electronic materials as conductors or semiconductors.

Bloom's: Remember

Accessibility: Keyboard Navigation

12) Pure silicon crystals behave like insulators.

Answer: TRUE

Difficulty: 3 Hard Page Ref: 24

Learning Objective: 02-02 Predict the effect of temperature on conductors.

Bloom's: Understand

Accessibility: Keyboard Navigation

13) The semiconductor material silicon has

- A) a positive temperature coefficient
- B) a negative temperature coefficient
- C) three valence electrons
- D) one valence electron

Answer: B

Explanation: As temperature increases, resistance decreases in silicon.

Difficulty: 3 Hard Page Ref: 24

Learning Objective: 02-02 Predict the effect of temperature on conductors.

Bloom's: Understand

Accessibility: Keyboard Navigation

14) Historically, the first transistors were all made of

- A) silicon
- B) germanium
- C) boron
- D) antimony

Answer: B

Explanation: The first silicon transistor was not developed until 1954.

Difficulty: 3 Hard Page Ref: 25

Learning Objective: 02-02 Predict the effect of temperature on conductors.

Bloom's: Remember

Accessibility: Keyboard Navigation

15) Integrated circuits are made of

- A) silicon
- B) germanium
- C) boron
- D) antimony

Answer: A

Difficulty: 1 Easy Page Ref: 25

Learning Objective: 02-02 Predict the effect of temperature on conductors.

Bloom's: Understand

Accessibility: Keyboard Navigation

16) The process of adding other materials called impurities to the silicon crystal to change its electrical characteristics is called

- A) bonding
- B) ionizing
- C) doping
- D) crystallizing

Answer: C

Difficulty: 2 Medium Page Ref: 26

Learning Objective: 02-02 Predict the effect of temperature on conductors.

Bloom's: Understand

Accessibility: Keyboard Navigation

17) How many valence electrons does arsenic have?

- A) 1
- B) 3
- C) 4
- D) 5

Answer: D

Difficulty: 2 Medium Page Ref: 26

Learning Objective: 02-03 Predict the effect of temperature on semiconductors.

Bloom's: Remember

Accessibility: Keyboard Navigation

18) When arsenic is added to a silicon crystal

- A) an n-type semiconductor results
- B) a p-type semiconductor results
- C) a conductor results
- D) an insulator results

Answer: A

Difficulty: 2 Medium Page Ref: 26

Learning Objective: 02-03 Predict the effect of temperature on semiconductors.

Bloom's: Understand

Accessibility: Keyboard Navigation

19) In a p-type semiconductor material

- A) electrons are the current carriers
- B) holes are the current carriers
- C) current cannot flow
- D) arsenic was the impurity added

Answer: B

Difficulty: 2 Medium Page Ref: 27

Learning Objective: 02-04 Show the directions of electron and hole currents in semiconductors.

Bloom's: Understand

Accessibility: Keyboard Navigation

- 20) In an n-type semiconductor
A) holes are the majority carriers
B) holes are the minority carriers
C) electrons are the minority carriers
D) there are no carriers

Answer: B

Difficulty: 2 Medium Page Ref: 29

Learning Objective: 02-05 Identify the majority and minority carriers in N-type semiconductors.

Bloom's: Understand

Accessibility: Keyboard Navigation

- 21) Which of the following is not a compound semiconductor?
A) gallium arsenide
B) silicon dioxide
C) indium phosphide
D) cadmium sulphide

Answer: B

Explanation: Compound semiconductor offers advantages: at very high frequencies, in photonics, and in hostile environments.

Difficulty: 3 Hard Page Ref: 29

Learning Objective: 02-05 Identify the majority and minority carriers in N-type semiconductors.

Bloom's: Understand

Accessibility: Keyboard Navigation

- 22) Which of the following is not an advantage of organic semiconductors?
A) faster than silicon
B) more flexible than silicon
C) displays are brighter
D) much cheaper

Answer: A

Difficulty: 3 Hard Page Ref: 30

Learning Objective: 02-06 Identify the majority and minority carriers in P-type semiconductors.

Bloom's: Understand

Accessibility: Keyboard Navigation

23) Which of the following is the best conductor of electricity?

- A) copper
- B) aluminum
- C) silver
- D) gold

Answer: C

Difficulty: 1 Easy Page Ref: 22

Learning Objective: 02-01 Identify some common electronic materials as conductors or semiconductors.

Bloom's: Remember

Accessibility: Keyboard Navigation

24) The process of adding other materials called impurities to the silicon crystal to change its electrical characteristics is

- A) bonding
- B) mixing
- C) doping
- D) combining

Answer: C

Difficulty: 1 Easy Page Ref: 26

Learning Objective: 02-03 Predict the effect of temperature on semiconductors.

Bloom's: Remember

Accessibility: Keyboard Navigation

25) Boron is known as what type of impurity?

- A) donor
- B) acceptor
- C) covalent
- D) organic

Answer: B

Difficulty: 1 Easy Page Ref: 27

Learning Objective: 02-04 Show the directions of electron and hole currents in semiconductors.

Bloom's: Remember

Accessibility: Keyboard Navigation

26) Which of the following is not a compound semiconductor?

- A) Indium phosphide
- B) Mercury cadmium telluride
- C) Silicon carbide
- D) Cadmium arsenide

Answer: D

Difficulty: 3 Hard Page Ref: 29

Learning Objective: 02-05 Identify the majority and minority carriers in N-type semiconductors.

Bloom's: Remember

Accessibility: Keyboard Navigation

27) The energy difference between the top of the valence band and the bottom of the conduction band is called the

- A) band gap
- B) photon gap
- C) wafer gap
- D) organic gap

Answer: A

Difficulty: 3 Hard Page Ref: 30

Learning Objective: 02-07 Explain the term band gap.

Bloom's: Remember

Accessibility: Keyboard Navigation

28) All materials are made from _____.

Answer: atoms

Difficulty: 1 Easy Page Ref: 20

Learning Objective: 02-01 Identify some common electronic materials as conductors or semiconductors.

Bloom's: Understand

Accessibility: Keyboard Navigation

29) Around the atom's nucleus are orbiting _____ that are negative particles.

Answer: electrons

Explanation: Electrons are negative particles.

Difficulty: 1 Easy Page Ref: 20

Learning Objective: 02-01 Identify some common electronic materials as conductors or semiconductors.

Bloom's: Understand

Accessibility: Keyboard Navigation

30) If a conductor becomes hotter, conducts less, and its resistance increases, it has a _____ temperature coefficient.

Answer: positive

Difficulty: 2 Medium Page Ref: 21

Learning Objective: 02-01 Identify some common electronic materials as conductors or semiconductors.

Bloom's: Remember

Accessibility: Keyboard Navigation

31) _____ is the most widely applied conductor in electronics.

Answer: Copper

Difficulty: 1 Easy Page Ref: 21

Learning Objective: 02-01 Identify some common electronic materials as conductors or semiconductors.

Bloom's: Remember

Accessibility: Keyboard Navigation

32) In a(n) _____ little or no current flows when a voltage is applied.

Answer: insulator

Explanation: In an insulator, the valence electrons are tightly bound to their parent atoms.

Difficulty: 1 Easy Page Ref: 22

Learning Objective: 02-01 Identify some common electronic materials as conductors or semiconductors.

Bloom's: Remember

Accessibility: Keyboard Navigation

33) A(n) _____ is a combination of two or more different kinds of atoms.

Answer: compound

Difficulty: 3 Hard Page Ref: 22

Learning Objective: 02-01 Identify some common electronic materials as conductors or semiconductors.

Bloom's: Remember

Accessibility: Keyboard Navigation

34) _____ is the most widely used semiconductor material.

Answer: Silicon

Explanation: Silicon is used to make diodes, transistors, and ICs.

Difficulty: 2 Medium Page Ref: 23

Learning Objective: 02-02 Predict the effect of temperature on conductors.

Bloom's: Remember

Accessibility: Keyboard Navigation

35) The process of sharing valence electrons is called _____ bonding.

Answer: covalent

Difficulty: 2 Medium Page Ref: 24

Learning Objective: 02-02 Predict the effect of temperature on conductors.

Bloom's: Understand

Accessibility: Keyboard Navigation

36) _____ is the process of adding other materials called impurities to the silicon crystal to change its electrical characteristics.

Answer: Doping

Difficulty: 2 Medium Page Ref: 26

Learning Objective: 02-03 Predict the effect of temperature on semiconductors.

Bloom's: Understand

Accessibility: Keyboard Navigation

37) The material boron has _____ valence electrons.

Answer: three

Explanation: Each boron atom in a crystal will create a hole that is capable of accepting an electron.

Difficulty: 2 Medium Page Ref: 27

Learning Objective: 02-04 Show the directions of electron and hole currents in semiconductors.

Bloom's: Remember

Accessibility: Keyboard Navigation

38) As temperature increases, resistance _____ in silicon.

Answer: decreases

Difficulty: 2 Medium Page Ref: 24

Learning Objective: 02-02 Predict the effect of temperature on conductors.

Bloom's: Understand

Accessibility: Keyboard Navigation

39) _____ started the solid-state revolution in electronics.

Answer: Germanium

Difficulty: 1 Easy Page Ref: 25

Learning Objective: 02-02 Predict the effect of temperature on conductors.

Bloom's: Remember

Accessibility: Keyboard Navigation

40) Minority carriers will be _____ for N-type material.

Answer: holes

Difficulty: 2 Medium Page Ref: 29

Learning Objective: 02-05 Identify the majority and minority carriers in N-type semiconductors.

Bloom's: Remember

Accessibility: Keyboard Navigation