

Name

## Understanding Diodes and Semiconductors

Total questions: 15

Worksheet time: 8mins

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Class

Date

1. What are the main types of diodes?

- a) Standard Diodes, Zener Diodes, Schottky Diodes, Light Emitting Diodes (LEDs), Photodiodes, Varactor Diodes, Tunnel Diodes
- b) Inductor Diodes
- c) Capacitor Diodes
- d) Rectifier Diodes

2. Describe the IV characteristics of a diode.

- a) The IV characteristics of a diode are constant with no change in current for any voltage.
- b) The IV characteristics of a diode show exponential current increase in forward bias and minimal current in reverse bias until breakdown.
- c) Diodes conduct current equally in both directions regardless of bias.
- d) The IV characteristics of a diode show linear current increase in both forward and reverse bias.

3. What is the function of a rectifier circuit?

- a) The function of a rectifier circuit is to convert AC to DC.
- b) To amplify weak signals
- c) To store electrical energy
- d) To filter out noise from a signal

4. Name three common semiconductor materials.

- a) Silicon, Germanium, Gallium Arsenide
- b) Aluminum
- c) Copper
- d) Iron

5. How does a Zener diode differ from a regular diode?
- a) A regular diode can conduct in both directions.
  - b) Zener diodes are used for high-frequency applications.
  - c) A Zener diode allows reverse current at a specific voltage, while a regular diode only allows forward current.
  - d) A Zener diode can only conduct in the reverse direction.
6. What is the significance of the forward voltage drop in a diode?
- a) It indicates the maximum voltage a diode can withstand without breaking.
  - b) The forward voltage drop is significant as it determines the minimum voltage needed for a diode to conduct, impacting circuit efficiency and performance.
  - c) It determines the reverse current flow in a diode.
  - d) The forward voltage drop is irrelevant to diode operation.
7. Explain the concept of reverse bias in diodes.
- a) In reverse bias, the diode conducts electricity freely without resistance.
  - b) Reverse bias allows maximum current flow through the diode.
  - c) Reverse bias in diodes is a condition where the diode blocks current flow by widening the depletion region, allowing only a small leakage current.
  - d) Reverse bias reduces the depletion region, increasing current flow.
8. What is the role of a diode in a rectifier circuit?
- a) The role of a diode in a rectifier circuit is to convert AC to DC by allowing current to flow in one direction only.
  - b) To increase the voltage of the AC signal.
  - c) To amplify the AC signal before rectification.
  - d) To store energy for later use in the circuit.
9. How does temperature affect the performance of semiconductors?
- a) Temperature only affects the physical size of semiconductors.
  - b) Higher temperatures always improve mobility in semiconductors.
  - c) Temperature has no effect on semiconductor performance.
  - d) Temperature increases carrier concentration but can reduce mobility, affecting overall performance.

10. What is the purpose of a Schottky diode?
- a) To increase the voltage in a circuit.
  - b) To act as a current amplifier.
  - c) The purpose of a Schottky diode is to provide fast switching and low voltage drop in electronic circuits.
  - d) To store electrical energy efficiently.
11. Describe the switching behavior of a diode.
- a) A diode only blocks current and does not conduct at all.
  - b) A diode conducts current in one direction (forward bias) and blocks it in the opposite direction (reverse bias).
  - c) A diode can switch between conducting and blocking states rapidly without any bias.
  - d) A diode conducts current in both directions equally.
12. What is the difference between a half-wave and full-wave rectifier?
- a) A half-wave rectifier uses only one half of the AC signal, while a full-wave rectifier uses both halves.
  - b) A half-wave rectifier is more efficient than a full-wave rectifier.
  - c) A half-wave rectifier converts AC to DC, while a full-wave rectifier does not.
  - d) A half-wave rectifier requires a transformer, while a full-wave rectifier does not.
13. How do diodes protect circuits from voltage spikes?
- a) Diodes store excess voltage for later use in the circuit.
  - b) Diodes amplify voltage spikes to enhance circuit performance.
  - c) Diodes protect circuits from voltage spikes by redirecting excess voltage away from sensitive components.
  - d) Diodes convert voltage spikes into heat to protect components.
14. What are the applications of light-emitting diodes (LEDs)?
- a) LEDs are only used in high-end audio equipment.
  - b) LEDs are mainly found in traditional incandescent bulbs.
  - c) LEDs are primarily used for solar energy generation.
  - d) LEDs are used in general lighting, display screens, indicator lights, automotive lighting, traffic signals, and decorative lighting.

15. Explain the term 'breakdown voltage' in the context of diodes.

- a) Breakdown voltage is the reverse voltage at which a diode begins to conduct significantly in reverse.
- b) Breakdown voltage is the voltage at which a diode becomes permanently damaged.
- c) Breakdown voltage refers to the voltage at which a diode stops conducting.
- d) Breakdown voltage is the maximum forward voltage a diode can handle.

