



UNIVERSITY MAY 8, 1945 GUELMA

TECHNICAL ENGLISH

UNIT 3: SEMICONDUCTORS

In This Unit:

- GAIN INSIGHT INTO THE ROLE OF SEMICONDUCTORS THROUGH READING.
- LEARN TECHNICAL VOCABULARY RELEVANT TO ELECTRICAL AND ELECTRONIC APPLICATIONS.
- MASTER THE ACTIVE AND PASSIVE VOICE STRUCTURES.
- REINFORCE LEARNING THROUGH PRACTICE EXERCISES.

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THE IMPORTANCE OF SEMICONDUCTORS IN MODERN TECHNOLOGY

Semiconductors play a fundamental role in shaping the landscape of modern technology. These materials, which include **silicon**, **gallium arsenide**, and **germanium**, have revolutionized the way we communicate, compute, and interact with the world around us. One of the key applications of semiconductors is in the field of electronics, where they serve as the building blocks for various devices such as **transistors**, **diodes**, and **integrated circuits**.

Transistors, for example, are semiconductor devices that act as **switches** or **amplifiers** in electronic circuits. They enable the control and modulation of electrical signals, allowing for the creation of complex digital systems such as computers, smartphones, and telecommunication networks. Without transistors, the rapid advancements in computing and telecommunications that define the modern era would not have been possible.

Diodes, another essential semiconductor component, are used to regulate the flow of electrical currents in electronic circuits. They are commonly found in **power supplies**, **rectifiers**, and **light-emitting diodes (LEDs)**. Diodes allow for the conversion of **alternating current (AC)** to **direct current (DC)**, ensuring the efficient operation of electronic devices and systems.

Furthermore, **integrated circuits (ICs)**, also known as **microchips** or **chips**, are semiconductor devices that contain thousands to billions of transistors and other electronic components. These **miniature** circuits form the **backbone** of modern electronics, powering everything from smartphones and laptops to medical devices and automotive systems.

THE IMPORTANCE OF SEMICONDUCTORS IN MODERN TECHNOLOGY

The importance of semiconductors extends beyond consumer electronics to other critical areas such as renewable energy, healthcare, and transportation. In renewable energy systems, semiconductor-based devices like **solar cells** and wind turbine controllers help harness and manage clean energy sources. In healthcare, semiconductor sensors and imaging devices enable accurate diagnostics and treatment monitoring. In transportation, semiconductor-based systems enhance safety, efficiency, and automation in vehicles, aircraft, and infrastructure.

In conclusion, semiconductors are the foundation of modern technology, enabling innovation and progress across various industries. Their versatility, reliability, and scalability make them indispensable in the digital age, driving advancements that continue to shape our world.

VOCABULARY

Semiconductors

a solid substance that conducts electricity in particular conditions, better than [insulators](#) but not as well as [conductors](#)

Silicon

A chemical element . Silicon exists as a grey solid or as a brown powder and is found in rocks and sand. It is used in making glass and [transistors](#).

Gallium arsenide

a compound semiconductor composed of gallium and arsenic elements, known for its high electron mobility

Germanium

a chemical element, germanium is a shiny grey element used as a semiconductor in electronics.

Transistor

a small electronic device with three terminals used in computers, radios, televisions, etc. to control the flow of electric current as it passes along a [circuit](#)

Solar cell

a device that receives light and heat energy from the sun and changes it into electricity

Diode

an electronic device with two terminals in which the electric current passes in one direction only

Integrated circuit (IC)

a small [microchip](#) that contains a large number of electrical connections and performs the same function as a larger [circuit](#) made from separate parts

Switch

allows electric current to flow when closed (switched on), and stops current flowing when opened (switched off).

Amplifier

amplifies an electric current - that is, increases the amplitude (wave height) of the current.

power supply

a device that converts electrical energy from one form to another to provide power to electronic devices.

Rectifier

a device or component used to convert alternating current (AC) to direct current (DC) by allowing current flow in one direction only.

VOCABULARY

Direct current (DC)

an electric current that flows continuously in one direction, without reversing its direction over time.

Alternating current (AC)

an electric current that periodically reverses direction, flowing first in one direction and then in the opposite direction, typically following a sinusoidal waveform.

Light-emitting diodes (LEDs)

Light-emitting diodes (LEDs) are semiconductor devices that emit light when an electric current passes through them.

Antenna

receives or transmits (sends) radio signals

Cell

an electrical storage device, containing chemicals, which supplies a direct current

Battery

several cells connected together

Capacitor

consists of two conductors which are separated by a dielectric (insulating) material – allows a certain of electrical charge to be stored.

Fuse

a thin conductors which burns and breaks at a certain amount of amperage, to protect a circuit.

Resistor

produces a precise amount of resistance

Potentiometer

a variable resistor with three connections

Inductor

a coil which is used to produce electromagnetic induction

Transformer

A set-up transformer increases voltage and reduces amperage, and a step-down transformer reduces voltage and increase amperage

[Consult the Oxford Learner's Dictionary for definitions and pronunciation of words.](#)

COMPREHENSION QUESTIONS

1. What are some examples of semiconductors mentioned in the text?

Silicon, gallium arsenide, and germanium are examples of semiconductors mentioned in the text.

2. How do transistors contribute to the advancements in computing and telecommunications?

Transistors contribute to advancements in computing and telecommunications by serving as switches or amplifiers in electronic circuits, allowing for the control and modulation of electrical signals.

COMPREHENSION QUESTIONS

3. What is the function of diodes in electronic circuits?

Diodes regulate the flow of electrical currents in electronic circuits and are commonly found in power supplies, rectifiers, and light-emitting diodes (LEDs).

4. What are integrated circuits (ICs) and how are they used in modern electronics?

Integrated circuits (ICs) are semiconductor devices that contain thousands to billions of transistors and other electronic components, forming the backbone of modern electronics. They power devices such as smartphones, laptops, medical devices, and automotive systems.

COMPREHENSION QUESTIONS

5. Besides consumer electronics, in what other areas are semiconductors important?

Semiconductors play a crucial role not only in consumer electronics but also in other critical sectors such as renewable energy, healthcare, and transportation.

6. What role do semiconductor-based devices play in healthcare?

Semiconductor-based devices in healthcare enable accurate diagnostics and treatment monitoring through sensors and imaging devices.

COMPREHENSION QUESTIONS

7. How do semiconductor-based systems enhance safety, efficiency, and automation in transportation?

Semiconductor-based systems enhance safety, efficiency, and automation in transportation by powering vehicles, aircraft, and infrastructure with advanced electronics.

8. Why are semiconductors considered indispensable in the digital age?

Semiconductors are considered indispensable in the digital age due to their versatility, reliability, and scalability, which drive advancements across various industries.

EXERCISE 1 [\(CLICK ON THIS LINK TO ACCESS EXERCISE 1\)](#)

Fill in the blanks with the appropriate words or phrases from the list below.

In recent years, advancements in _____ technology have led to the development of faster and more efficient electronic devices.

The _____ of semiconductors has transformed various industries, including telecommunications, healthcare, and renewable energy.

Transistors are semiconductor devices that can amplify or switch electronic signals, making them essential components in _____.

Diodes are used to control the direction of electrical currents in electronic circuits, ensuring the proper functioning of _____ devices.

Integrated circuits, also known as microchips, contain millions of transistors and other electronic components, allowing for the creation of _____ electronics.

The widespread adoption of semiconductor-based technologies has significantly increased the _____ of electronic devices and systems.

Semiconductor materials such as silicon and gallium arsenide have unique electrical properties that make them ideal for use in _____ applications.

Semiconductor manufacturing processes require precise control over temperature, pressure, and chemical composition to produce _____ devices.

The development of nanotechnology has opened up new possibilities for creating smaller and more powerful semiconductor _____.

(a) Telecommunications, (b) efficiency, (c) semiconductor, (d) consumer electronics, (e) integrated, (f) advanced, (g) devices, (h) electronics, (k) revolutionization

EXERCISE 2 [\(CLICK ON THIS LINK TO ACCESS EXERCISE 2\)](#)

Match the terms on the left with their corresponding definitions on the right

- | | |
|----------------------------|---|
| 1. Semiconductor | A. a device that regulates the flow of electrical current in one direction. |
| 2. Transistor | B. a material with conductivity between that of a conductor and an insulator. |
| 3. Diode | C. a solid-state electronic device used to amplify or switch electronic signals. |
| 4. Integrated circuit (IC) | D. a circuit containing multiple interconnected electronic components on a single chip. |
| 5. Gallium arsenide | E. a substance commonly used in the manufacture of semiconductors. |
| 6. Germanium | F. a type of energy derived from naturally replenished sources. |
| 7. Power supply | G. a component that provides electrical power to an electronic system. |
| 8. Renewable energy | H. a chemical element commonly used in early semiconductor devices. |

LANGUAGE STUDY : ACTIVE AND PASSIVE VOICE

- **Compare the following sentences:**

- Engineers develop innovative semiconductor technologies.
- Innovative semiconductor technologies are developed by engineers.

In the first sentence the verb is in the active voice. In the second sentence the verb is in the passive voice.

- ✓ A verb is in the active voice when its form shows (as in **sentence 1**) that the person or thing denoted by the subject does something; or, in other words, is the doer of the action.
- ✓ A verb is in the passive voice when its form shows (as in **sentence 2**) that something is done to the person or thing denoted by the subject.

Pronouns	
Subject	Object
I	Me
We	Us
You	You
He	Him
She	Her
It	It
They	Them

IMPORTANT RULES

- The tense form of the verb should not change. If the **Verb** in the **Active Voice** is in the **Present Tense**, in the **Passive Voice** also the **Verb** is in the **Present Tense**. The same applies to the **Past Tense**.
- When converting from **Active** to **Passive Voice**, the structure follows the pattern of **Object + to be** (in the tense used in the active voice) + past participle of the **Verb + Subject**.
- ✓ If in the **Active Voice**, the **Verb** is in the **Present Tense**, in the **Passive Voice**, the **Verb** = **am, is, are**. I **am**, He **is**, They **are**. (is = singular, are = plural)
- ✓ If in the **Active Voice** the **Verb** is in the **Past Tense**, in the **Passive Voice**, the **Verb** = **was or were**. (was = singular, were = plural)
- The **Verb** must agree with the **Subject** in **person** and **number**.

First Person Singular	I am or I was
First Person Plural	We are or We were
Second Person	You are or you were
Third Person Singular	He is or he was She is or she was It is or it was
Third Person Plural	They are or They were

IMPORTANT RULES

- To get the **Subject 'S'** ask the question '**who**' before the verb.
- To get the **Object 'O'** ask the question '**what**' or '**whom**' after the verb; '**What**' for things and '**Whom**' for persons.
- To get **O.W. (Other Words)** ask the question **when, where** or **how**.
 - ✓ '**when**' for **time**
 - ✓ '**where**' for **place**
 - ✓ '**how**' for **manner**

RULE I

- **Active Voice** = **S** + **V** + **O** + **O.W.**
- **Passive Voice** = **O** + appropriate form of "**to be**" (conjugated to match the tense of the active voice) + **Past Participle** of the main verb + **by** + **S** + **O.W.**

(**S** = Subject, **V** = Verb, **O** = Object, **O.W.** = Other Words)

EXAMPLES

1. Researchers **study** the properties of different semiconductor materials.
The properties of different semiconductor materials **are studied** by researchers.
2. I **know** you.
You **are known** to me.

Note

Please = I **request you**

Active Voice : **Please** come early.

Passive Voice : You **are requested** to come early

RULE I (PASSIVE TO ACTIVE)

- **Passive Voice** = O + V + Past Participle + by + S + (O.W.)
- **Active Voice** = S + V + O + (O.W)

EXAMPLES

1. A letter **was written** by him.

He **wrote** a letter.

2. good English **is spoken** by him.

He **speaks** good English.

RULE II

- **Active Voice** = **S** + **can, could** etc. + **Vb (Present)** + **O** + **O.W.**
- **Passive Voice** = **O** + **can, could** etc. + **be** + **Past Participle** + **by** + **S** + **O.W.**

"**Vb (Present)**" refers to the **Base Form** of the **Verb**, also known as the **Infinitive Form**, used in the **Present Tense**.

EXAMPLES

1. She **can drive** a car.

A car **can be driven** by her.

3. You **should do** your duty.

Your duty **should be done** by you

7. The team **may design** innovative semiconductor devices.

Innovative semiconductor devices **may be designed** by the team.

RULE III

- **Active Voice** = V + O + (O.W.)
- **Passive Voice** = Let + O + be + Past Participle + O.W.

EXAMPLES

1. **Do** this work.

Let this work **be done**.

2. **Speak** the truth.

Let the truth **be spoken**.

3. **Discuss** the semiconductor manufacturing process in detail.

Let the semiconductor manufacturing process **be discussed** in detail.

RULE IV

- Active Voice = - ing
- Passive Voice = being
- Active Voice = S + V + (V+ing) + O + O.W.
- Passive Voice = O + V + being + Past Participle + by + S + O.W.

EXAMPLES

1. Aicha is buying a car.

A car is being bought by Aicha.

2. He was writing letters.

Letters were being written by him

RULE V

- **Active Voice** = S + has, have, had + Past Participle + O + O.W.
- **Passive Voice** = O + has, have, had + been + Past Participle + by + S + O.W.

EXAMPLES

1. They **have done** it.

It **has been done** by them.

2. She **has taught** programming skills to junior developers.

Programming skills **have been taught** to junior developers by her.

3. He **has flown** drones for aerial surveys.

Drones for aerial surveys **have been flown** by him.

RULE VI

- Active Voice = Who?
- Passive Voice = By whom?

EXAMPLES

1. Who wrote this letter?

By whom was this letter written?

5. Who ran the experiments in the lab?

By whom were the experiments in the lab run?

3. How can you do it?

How can it be done by you?