JUNCTION FIELD-EFFECT TRANSISTORS

10.1. Vocabulary

Ex. 1. *Match the words with their definitions.*

1. model	a. in a way that is usual, typical, or expected.
2. normally	b. a regular beat or rhythm, often used to describe the heartbeat.
3. control (v)	c. an automatic response to a stimulus without conscious thought.
4. chaos	d. a three-dimensional shape with a polygonal base and triangular sides that meet at a point.
5. orbit	e. a category or class of things that share common characteristics.
6. synchronous	f. related to algebra, which involves symbols and letters to represent numbers in mathematical expressions.
7. pyramid	g. the way in which something is shared out among a group or spread over an area.
8. sinusoidal vibrations	h. a smooth, wave-like curve that describes a repetitive oscillation.
9. pulse	i. to have power over something or to direct how it happens.
10. reflex	j. able to move easily from one place to another.
11. distribution	k. the curved path that an object takes as it moves around another object in space.
12. sinusoid	l. a representation of an object or system that helps to understand its structure or function.
13. mobile	m. movements that follow the pattern of a sine wave, often seen in sound waves.
14. algebraic	n. a state of complete disorder and confusion where things are unpredictable.
15. type	o. occurring at the same time or

	operating in unison with something else.

Ex. 2. *Complete the sentences with the given words.*

chaos, orbit, Normally, pyramid, pulse, Synchronous, model, reflex, Sinusoidal, distribution, Mobile, control, types, Algebraic, sinusoid

Engineers can _____(1) the flow of electricity in junction field-effect transistors with precision.

The _____(2) used for this experiment helps us understand how these transistors work.

_____(3), junction field-effect transistors are used in many electronic devices we rely on daily.

_____(4) applications often use junction field-effect transistors to improve their performance and efficiency.

_____(5) equations are important for calculating the properties of junction field-effect transistors.

A _____(6) can represent the current waveform through a junction field-effect transistor during operation.

_____(7) vibrations can affect the signal integrity of junction field-effect transistors in certain conditions.

The _____(8) of applying voltage across a junction field-effect transistor is critical in its switching action.

The _____(9) of charge carriers in a junction field-effect transistor determines its functionality.

If there is _____(10) in the circuit, it could lead to the malfunctioning of the transistor.

The _____(11) created by the junction field-effect transistor influences the overall circuit performance.

_____(12) devices often incorporate junction field-effect transistors to maintain timing accuracy.

Satellites move in an _____(13) that can be controlled by circuits using junction field-effect transistors.

The shape of a _____(14) can be similar to the way layers in a junction field-effect transistor are arranged.

There are several _____(15) of junction field-effect transistors, each designed for different applications.

10.2. Word Formation

Ex. 1. *Change the form of the words to complete the sentences.*

1. The … (reduce) of power consumption in junction field-effect transistors is important for efficiency.

2. The principles of physics are … (apply) to improve the performance of junction field-effect transistors.

3. Junction field-effect transistors are … (construct) using advanced semiconductor materials for better functionality.

4. The … (contribute) of new technologies has greatly enhanced the capabilities of junction field-effect transistors.

5. … (reverse) processes can occur in junction field-effect transistors, affecting their overall performance.

10.3. Reading

Ex. 1. *Read the text.*

Junction Field-Effect Transistors (JFETs) are crucial components in modern electronics due to their unique ability to control electrical current. Unlike bipolar junction transistors, JFETs operate through the voltage applied to the gate terminal, which modulates the conductivity of a channel between the drain and source terminals. This voltage-based control results in high input impedance and low noise levels, making JFETs ideal for applications like amplifiers and switches.

The construction of a JFET involves a semiconductor channel—usually made of silicon—whose conductivity is influenced by the gate voltage. When a positive or negative voltage is applied to the gate, it either depletes or enhances the charge carriers in the channel, thereby controlling the current flow. This principle enables precise manipulation of electronic signals, which is essential in analog circuitry.

JFETs come in two main types: n-channel and p-channel, determined by the type of charge carriers that flow through the channel. In n-channel JFETs, electrons serve as the charge carriers, whereas in p-channel

JFETs, holes are the primary carriers. Each type has its respective advantages and applications, depending largely on the desired characteristics of the electronic circuit.

Understanding the functioning and applications of JFETs is fundamental for anyone delving into advanced electronics, given their versatile role in controlling electronic signals with high precision.

Ex. 2. *Answer the questions.*

1. How do JFETs differ from bipolar junction transistors in terms of operation?

2. What is the role of the gate terminal in controlling the conductivity of a JFET?

3. Why are JFETs considered ideal for applications like amplifiers and switches?

4. What material is commonly used to create the semiconductor channel in a JFET?

5. How does applying a positive or negative voltage to the gate affect the current flow in a JFET?

6. What are the two main types of JFETs based on the type of charge carriers that flow through the channel?

7. Why is it important to understand the functioning and applications of JFETs in advanced electronics?

10.4. Communication

Ex. 1. *Make sentences using the following words.*

1. Junction/field-effect/transistors
2. They/high/output
3. JFETs/amplification/applications
4. Transistors/voltage-controlled/devices
5. Three/gate/source
6. Depletion/enhancement/mode
7. Junction/bipolar/transistors
8. JFETs/radio/applications
9. Advantages/using/audio
10. Worked/junction/transistors