1. What is a signal in the context of signals and systems?

a) Any form of communication
b) A variable representing information
c) A type of noise
d) An electrical device

Answer: b) A variable representing information

Explanation: In the context of signals and systems, a signal is a function that conveys information about a phenomenon.

2. Which of the following is not a classification of signals?

a) Even/Odd
b) Deterministic/Random
c) Analog/Digital
d) Periodic/Aperiodic

Answer: c) Analog/Digital

Explanation: While analog and digital signals are indeed classifications, they are not listed as one of the options here.

3. What distinguishes a periodic signal from an aperiodic signal?

a) Periodic signals repeat over time, while aperiodic signals do not.
b) Aperiodic signals have a fixed frequency, while periodic signals do not.

c) Periodic signals have infinite energy, while aperiodic signals have finite energy.
d) Aperiodic signals have a fixed phase, while periodic signals do not.

Answer: a) Periodic signals repeat over time, while aperiodic signals do not.

Explanation: Periodic signals exhibit a repetitive pattern over time, whereas aperiodic signals do not repeat.

4. Which property distinguishes between energy and power signals?

a) Duration
b) Amplitude
c) Frequency
d) Energy content

Answer: a) Duration

Explanation: Energy signals have finite duration, while power signals are typically infinite or continuous in duration.

5. Which type of signal can be represented by a single value at each point in time?

a) Continuous-time signals
b) Discrete-time signals
c) Multidimensional signals
d) Random signals

Answer: b) Discrete-time signals

Explanation: Discrete-time signals are defined at discrete points in time, represented by a single value at each point.

6. What operation combines two signals in the time domain by adding their respective values at each instant?

a) Convolution
b) Differentiation
c) Integration
d) Addition

Answer: d) Addition

Explanation: Addition combines two signals by adding their respective values at each time instant.

7. Which of the following is a transformation of independent variables for signals?

a) Scaling
b) Shifting
c) Differentiation
d) Integration

Answer: b) Shifting

Explanation: Shifting involves changing the time reference of a signal without altering its shape.

8. What defines a linear system?

a) Its output is directly proportional to its input.
b) It operates on only discrete signals.
c) It cannot handle complex numbers.
d) It exhibits a non-linear response to inputs.

Answer: a) Its output is directly proportional to its input.

Explanation: A linear system follows the principles of superposition and homogeneity, where its response to a sum of inputs equals the sum of its responses to individual inputs.

9. What distinguishes a causal system from a non-causal system?

a) A causal system has outputs dependent only on past and present inputs, while a non-causal system can have outputs dependent on future inputs.
b) A causal system has outputs dependent only on future inputs, while a non-causal system can have outputs dependent on past and present inputs.
c) A causal system has outputs dependent only on future inputs, while a non-causal system has outputs dependent only on past and present inputs.
d) There is no distinction between causal and non-causal systems.

Answer: a) A causal system has outputs dependent only on past and present inputs, while a non-causal system can have outputs dependent on future inputs.

Explanation: Causal systems produce outputs only after receiving inputs, depending solely on past and present inputs.

10. Which property ensures that the system’s output is not dependent on when the input is applied?

a) Linearity
b) Causality
c) Shift-invariance
d) Stability

Answer: c) Shift-invariance

Explanation: Shift-invariance means that if the input signal is delayed or advanced in time, the output signal is also delayed or advanced by the same amount.

11. What is a key characteristic of a stable system?

a) It produces bounded output for bounded input.
b) Its output grows indefinitely for bounded input.
c) It is sensitive to small changes in input.
d) It oscillates continuously.

Answer: a) It produces bounded output for bounded input.

Explanation: A stable system ensures that its output remains bounded for any bounded input.

12. Which property ensures that a system can be implemented physically?

a) Realizability
b) Linearity

c) Shift-invariance
d) Stability

Answer: a) Realizability

Explanation: Realizability implies that a system can be implemented using physical components without violating any fundamental principles.

13. What type of system exhibits the property of additivity?

a) Non-linear systems
b) Linear systems
c) Variant systems
d) Causal systems

Answer: b) Linear systems

Explanation: Additivity means that the response to a sum of inputs equals the sum of the responses to individual inputs, a characteristic of linear systems.

14. Which property characterizes a system that remains unchanged over time?

a) Variant
b) Non-linear
c) Invariant
d) Causal

Answer: c) Invariant

Explanation: An invariant system maintains its behavior or properties despite changes in time or other variables.

15. What defines a dynamic system?

a) Its behavior changes over time.
b) It has a fixed response to inputs.
c) It only operates in the frequency domain.
d) It cannot handle complex numbers.

Answer: a) Its behavior changes over time.

Explanation: Dynamic systems exhibit behavior that varies over time, unlike static systems.

16. Which type of system can produce output based on future inputs?

a) Causal system
b) Non-causal system
c) Linear system
d) Variant system

Answer: b) Non-causal system

Explanation: Non-causal systems can produce outputs dependent on future inputs, which violates the principle of causality.

17. What type of interconnection involves connecting systems in a sequence, where the output of one system becomes the input of another?

a) Series connection
b) Parallel connection
c) Feedback connection
d) Cascade connection

Answer: a) Series connection

Explanation: In a series connection, the output of one system serves as the input to the next system in sequence.

18. Which property ensures that the system’s response is the same regardless of the time origin?

a) Linearity
b) Causality
c) Shift-invariance
d) Stability

Answer: c) Shift-invariance

Explanation: Shift-invariance means that the system’s response remains unchanged when the input signal is shifted in time.

19. What distinguishes a multidimensional signal from a one-dimensional signal?

a) One-dimensional signals have multiple independent variables.
b) Multidimensional signals have only one independent variable.
c) One-dimensional signals can vary along multiple dimensions.

d) Multidimensional signals have multiple independent variables.

Answer: d) Multidimensional signals have multiple independent variables.

Explanation: Multidimensional signals have variations in multiple independent variables, whereas one-dimensional signals have only one independent variable.

20. Which property ensures that the system’s output depends only on the current and past inputs, not future inputs?

a) Realizability
b) Stability
c) Causality
d) Invariance

Answer: c) Causality

Explanation: Causality ensures that the system’s output at any given time depends only on the input up to that time, not on future inputs.