1. What is a discrete-time signal?

a) A signal that varies continuously over time
b) A signal that is continuous and non-linear
c) A signal that is sampled at discrete points in time
d) A signal that is continuous but time-invariant

Answer: c) A signal that is sampled at discrete points in time

Explanation: Discrete-time signals are sequences of values that are defined at discrete instants of time, typically obtained by sampling a continuous-time signal.

2. Which of the following best describes a discrete-time linear time-invariant (LTI) system?

a) A system whose input and output signals are both continuous
b) A system whose impulse response changes over time
c) A system that satisfies the properties of linearity and time-invariance
d) A system that is non-linear and time-varying

Answer: c) A system that satisfies the properties of linearity and time-invariance

Explanation: Discrete-time LTI systems exhibit properties of linearity and time-invariance, meaning their responses to inputs are consistent and additive, and their behavior does not change over time.

3. How are discrete-time systems commonly described mathematically?

a) By differential equations

b) By integral equations
c) By difference equations
d) By partial differential equations

Answer: c) By difference equations

Explanation: Difference equations describe the behavior of discrete-time systems by relating the current and past values of the input and output signals.

4. What is the solution of a difference equation?

a) A continuous function
b) A set of differential equations
c) A sequence of values that satisfies the equation
d) A non-linear relationship

Answer: c) A sequence of values that satisfies the equation

Explanation: The solution of a difference equation provides a sequence of values that, when substituted into the equation, satisfy it.

5. In the context of discrete-time systems, what does stability refer to?

a) The ability of a system to maintain its performance over time
b) The tendency of a system to oscillate
c) The boundedness of the system’s response to bounded inputs
d) The linearity of the system

Answer: c) The boundedness of the system’s response to bounded inputs

Explanation: Stability in discrete-time systems implies that the system’s response remains bounded when subjected to bounded inputs.

6. Which domain is commonly used to analyze discrete-time signals and systems?

a) Time domain
b) Frequency domain
c) Spatial domain
d) Temporal domain

Answer: b) Frequency domain

Explanation: Frequency domain analysis involves representing signals and systems in terms of their frequency components, which is commonly used for analyzing discrete-time signals and systems.

7. What property must a system exhibit to be causal?

a) Its output depends only on future input values
b) Its output depends only on past and present input values
c) Its output depends only on past input values
d) Its output depends only on present input values

Answer: c) Its output depends only on past input values

Explanation: Causality in systems implies that the current output depends only on past input values and not on future inputs.

8. Which of the following statements is true regarding the implementation of discrete-time systems?

a) They can only be implemented using analog circuits
b) They can be implemented using both analog and digital circuits
c) They can only be implemented using digital circuits
d) They cannot be implemented practically

Answer: b) They can be implemented using both analog and digital circuits

Explanation: Discrete-time systems can be implemented using both analog and digital circuits depending on the application and requirements.

9. What characteristic distinguishes a linear system from a non-linear system?

a) The linearity of its input-output relationship
b) The complexity of its equations
c) The presence of feedback
d) The system's stability

Answer: a) The linearity of its input-output relationship

Explanation: Linear systems exhibit a linear relationship between their inputs and outputs, meaning their responses are proportional to the inputs.

10. How are discrete-time signals different from continuous-time signals?

a) Discrete-time signals are continuous in nature
b) Continuous-time signals are only defined at discrete points
c) Discrete-time signals are sampled at discrete points
d) Continuous-time signals are discrete in nature

Answer: c) Discrete-time signals are sampled at discrete points

Explanation: Discrete-time signals are obtained by sampling continuous-time signals at discrete points in time, unlike continuous-time signals which are continuous functions of time.

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