1. Which theorem states that a band-limited signal can be perfectly reconstructed from its samples if the sampling frequency is greater than twice the highest frequency component of the signal?
a) Nyquist theorem
b) Shannon theorem
c) Sampling theorem
d) Fourier theorem
Answer: a) Nyquist theorem
Explanation: The Nyquist theorem, a fundamental principle in signal processing, states that to avoid aliasing, the sampling frequency must be at least twice the highest frequency component present in the signal.

2. In ideal sampling, what type of filter is used to eliminate high-frequency components before sampling?
a) High-pass filter
b) Band-pass filter
c) Low-pass filter
d) All-pass filter
Answer: c) Low-pass filter
Explanation: Ideal sampling involves using a low-pass filter before sampling to remove high-frequency components, ensuring that aliasing does not occur during the sampling process.

3. What is the term for the process of sampling a signal at regular intervals without applying any anti-aliasing filter?
a) Ideal sampling
b) Natural sampling
c) Flat-top sampling

d) Oversampling
Answer: b) Natural sampling
Explanation: Natural sampling refers to the process of sampling a signal at regular intervals without any pre-filtering or anti-aliasing measures.

4. Which sampling technique involves holding the sampled value constant until the next sampling instant?
a) Ideal sampling
b) Natural sampling
c) Flat-top sampling
d) Oversampling
Answer: c) Flat-top sampling
Explanation: In flat-top sampling, the sampled value is held constant until the next sampling instant, resulting in a flat-top shape in the sampled signal.

5. Crosstalk in multiplexing refers to:
a) Signal distortion due to interference between adjacent channels
b) The ability to switch between different channels seamlessly
c) The transmission of signals in the same frequency range
d) The process of sampling multiple signals simultaneously
Answer: a) Signal distortion due to interference between adjacent channels
Explanation: Crosstalk occurs when signals from one channel interfere with signals in adjacent channels, causing distortion or degradation in signal quality.

6. Aliasing occurs when:
a) The sampling frequency is lower than twice the highest frequency component of the signal
b) The sampling frequency is higher than twice the highest frequency component of the

signal
c) The signal is distorted during the sampling process
d) The signal amplitude exceeds the dynamic range of the sampling system
Answer: a) The sampling frequency is lower than twice the highest frequency component of the signal
Explanation: Aliasing occurs when the sampling frequency is insufficient to properly represent the original signal, leading to distorted or misleading sampled data.

7. Which modulation technique is commonly used in time division multiplexing (TDM)?
a) Pulse Amplitude Modulation (PAM)
b) Pulse Width Modulation (PWM)
c) Pulse Position Modulation (PPM)
d) Frequency Shift Keying (FSK)
Answer: a) Pulse Amplitude Modulation (PAM)
Explanation: In time division multiplexing (TDM), multiple signals are interleaved in time slots, and Pulse Amplitude Modulation (PAM) is commonly used to modulate each individual signal onto its time slot.

8. Which modulation technique varies the width of the pulse based on the amplitude of the modulating signal?
a) Pulse Amplitude Modulation (PAM)
b) Pulse Width Modulation (PWM)
c) Pulse Position Modulation (PPM)
d) Frequency Modulation (FM)
Answer: b) Pulse Width Modulation (PWM)
Explanation: Pulse Width Modulation (PWM) varies the width of the pulse based on the amplitude of the modulating signal, making it suitable for applications like controlling the

speed of motors and generating analog signals.

9. In Pulse Position Modulation (PPM), the timing of the pulse is varied based on:
a) The amplitude of the modulating signal
b) The frequency of the carrier signal
c) The phase of the carrier signal
d) The position of the modulating signal within its time slot
Answer: a) The amplitude of the modulating signal
Explanation: Pulse Position Modulation (PPM) varies the timing of the pulse based on the amplitude of the modulating signal, enabling the transmission of analog information.

10. How is PAM (Pulse Amplitude Modulation) detected in communication systems?
a) By measuring the width of the pulses
b) By measuring the position of the pulses
c) By measuring the amplitude of the pulses
d) By measuring the frequency of the pulses
Answer: c) By measuring the amplitude of the pulses
Explanation: In PAM, information is encoded in the amplitude of the pulses, so detection involves measuring the amplitude of the received pulses to retrieve the transmitted information.

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