Question Paper Code	13484

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2025
Fifth Semester

Computer Science and Engineering (Cyber Security)
20SCPC502 - FUNDAMENTALS OF QUANTIZATION

Duration: 3 Hours   Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)
Answer ALL Questions

		Marks	K–Level	CO
1.	The quantization level (step size) is a function of ---------------- in PCM encoding (a) Amplitude (b) frequency (c) cube of amplitude (d) cube of frequency	1	K1	CO1
2.	Quantizing noise occurs in (a) PCM (b) TDM (c) FDM (d) PPM	1	K1	CO1
3.	What is quantization? (a) Converting a digital signal to an analog signal. (b) Mapping a continuous set of values to a finite set of levels. (c) Increasing the sampling rate of a signal. (d) Filtering out noise from a signal.	1	K1	CO2
4.	What does a quantizer do in a digital system? (a) Samples an analog signal at regular intervals. (b) Reduces the number of bits required to represent a signal. (c) Maps continuous amplitude values to discrete levels. (d) Amplifies the input signal.	1	K1	CO2
5.	What is the purpose of quantization in digital communication? (a) To increase data rate (b) To convert continuous values to discrete values (c) To reduce signal bandwidth (d) To amplify the signal	1	K1	CO3
6.	In quantization, reducing the number of quantization levels results in: (a) Increased signal accuracy (b) Increased quantization error (c) Decreased data rate (d) Improved signal-to-noise ratio	1	K1	CO3
7.	Quantization results in a loss of: (a) Amplitude (b) Time (c) Frequency (d) Information	1	K1	CO4
8.	What is the major disadvantage of uniform quantization? (a) Complexity (b) High quantization error for small amplitude signals (c) High computational power (d) Non-linearity	1	K1	CO4
9.	In uniform quantization, the step size is: (a) Variable (b) Constant (c) Adaptive (d) Non-linear	1	K1	CO5
10.	Which of the following is a key advantage of vector quantization? (a) Reduced complexity (b) Reduced data redundancy (c) Improved accuracy (d) Increased data entropy	1	K1	CO6

PART - B (12 × 2 = 24 Marks)
Answer ALL Questions

11.	Why quantization is considered a lossy process?	2	K2	CO1
12.	Explain the concept of dead zone in quantization.	2	K2	CO1

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create   **13484**

13. Explain how the choice of quantization levels affects the Signal-to-Quantization-Noise Ratio (SQNR).	2	K2	CO2
14. Describe the process of uniform quantization and its significance in digital signal processing.	2	K2	CO2
15. State the quantization related to signal-to-noise ratio (SNR).	2	K2	CO3
16. Define the quantization Error.	2	K2	CO3
17. State the Advanced Encryption Standard (AES) work.	2	K2	CO4
18. What is the purpose of the Secure Sockets Layer (SSL) protocol?	2	K2	CO4
19. Define public and private keys used in PKI.	2	K2	CO5
20. Define the digital signature with examples.	2	K2	CO5
21. Define Quantization Error, and how does it affect signals.	2	K2	CO6
22. Explain in detail the impact of Quantization on Model Accuracy in AI.	2	K2	CO6

PART - C (6 × 11 = 66 Marks)
Answer ALL Questions

23.	a)	Explain the process of quantization in detail. Discuss the differences between uniform and non-uniform quantization.	11	K2	CO1
		OR			
	b)	Explain in detail about the Signal-to-Quantization-Noise Ratio (SQNR). Derive the formula for SQNR in terms of the number of quantization levels, and explain its significance in digital signal processing.	11	K2	CO1
24.	a)	Derive the Signal-to-Quantization-Noise Ratio (SQNR) for a uniform quantizer. Explain the significance of SQNR in evaluating quantizer performance.	11	K3	CO2
		OR			
	b)	Discuss the impact of quantization on the frequency domain representation of a signal. How does quantization noise affect the spectral properties of the signal?	11	K3	CO2
25.	a)	Differentiate between uniform and non-uniform quantization. Provide examples.	11	K2	CO3
		OR			
	b)	Discuss the role of quantization noise in digital communication systems.	11	K2	CO3
26.	a)	Describe the RSA encryption algorithm.	11	K3	CO4
		OR			
	b)	Explain in detail about the SSL/TLS protocols and their importance in secure communication.	11	K3	CO4
27.	a)	Explain in detail about does a digital certificate contribute to secure communication in SSL/TLS.	11	K2	CO5
		OR			
	b)	Describe the main components of a digital certificate, and why are they important?	11	K2	CO5
28.	a)	Explain how quantization is applied in secure communications systems.	11	K3	CO6
		OR			
	b)	Describe the challenges of implementing quantization in machine learning for secure communications.	11	K3	CO6