K. K. Wagh Institute of Engineering Education & Research, Nashik

(An Autonomous Institute From A.Y. 2022-23)

WINTER-2025	
Exam Seat No.:	
Academic Year:2025-2026	Semester:V
Class:TY	Program:B.Tech
Branch Code:INT	Pattern:2023
Name of Course:Data Communication	Course Code:2308309
Max. Marks:60	Duration:2.30 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains _02_page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

		Marks	CO
Question No. 1			
1a)	A Discrete Memoryless Source (DMS) emits five symbols A, B, C, D, and E with probabilities P(A) = 0.30, P(B) = 0.25, P(C) = 0.20, P(D) = 0.15, and P(E) = 0.10. a) Construct the Huffman code for the source. b) Find the codewords for symbols B and E. c) Compute the Entropy H(X) of the source.	(6)	CO1
Question No. 2			
2a)	State and explain the fundamental characteristics of Data Communication. Why are these characteristics important for reliable data transfer?	(6)	CO2
Question No. 3			
3a)	What is a Unipolar Line Coding Scheme? Draw its waveform for the bit sequence 1011001 and mention two advantages and two disadvantages.	(5)	CO3
	OR		
3b)	Define Line Coding. Explain the encoding and decoding process with a block diagram and state the difference between a Data element and a Signal element.	(5)	CO3
3c)	State the Nyquist Sampling Theorem.	(5)	CO3
	OR		
3d)	What is Delta Modulation (DM)? Mention its main advantage.	(5)	CO3
3e)	Draw and explain the block diagram of a PCM system. Mention sources of noise in PCM.	(6)	CO3
	OR		
3f)	What is the difference between Analog Modulation and Digital Modulation?	(6)	CO3
Question No. 4			
4a)	List out the Types of Errors with suitable example. Explain methods of error correction.	(5)	CO4
	OR		

4b)	With neat diagrams, explain Linear Block Code generation and parity-check matrix.	(5)	CO4
4c)	Determine the minimum Hamming distance required to detect up to 2 errors and correct 1 error.	(5)	CO4

OR

4d)	Write short notes on: Single-bit and Burst Error Detection.	(5)	CO4
4e)	For a given dataword 1011 and generator polynomial $G(x) = x^3 + x + 1$, find the CRC codeword.	(6)	CO4

OR

4f)	Design a (7,4) Hamming code, show its encoding process, and demonstrate how it corrects a single-bit error.	(6)	CO4

Question No. 5

5a)	With a neat diagram, explain the basic components of a cryptosystem.	(5)	CO5

OR

5b)	Compare Caesar Cipher and Transposition Cipher in terms of working and security.	(5)	CO5
5c)	Discuss the advantages and disadvantages of symmetric and asymmetric cryptography.	(5)	CO5

OR

5d)	Write a short note on the importance of keys in cryptographic systems.	(5)	CO5
5e)	Describe the process of encryption and decryption in RSA with an example.	(6)	CO5

OR

5f)	Define the following terms: a) Plain text b) Cipher text c) Encryption d) Decryption e) Key	(6)	CO5

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