

NAME OF THE SCHOOL
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2024-2025

SLOT: G2 +TG2

Programme Name & Branch	: B.Tech., ECE	
Course Code and Course Name	: BECE313L, Information Theory and Coding	
Faculty Name(s)	: Sanjay Kumar Singh	
Class Number(s)	: VL2024250103634/36	
Date of Examination	: 19/10/2024	
Exam Duration	: 90 minutes	Maximum Marks: 50

Answer All Questions

Q. No	Question	M	CO	BL														
1.	Design the maximum variance ternary Huffman code for the source symbols and their probabilities given as follows: Symbols = {$s_1, s_2, s_3, s_4, s_5, s_6, s_7, s_8$} Probabilities = {0.4, 0.2, 0.15, 0.1, 0.05, 0.05, 0.03, 0.02} Compute the efficiency of coding, variance of the coded message and hence, draw the ternary Huffman code-tree.	10	3	2														
2.	Encode the message "<i>vitontop</i>" using adaptive Huffman coding scheme. Clearly show the updated tree structure at every step.	10	3	2														
3.	Construct an arithmetic code for the message "<i>super*</i>" with probabilities as follows: <table border="1"><tr><td>Message</td><td>s</td><td>u</td><td>p</td><td>e</td><td>r</td><td>*</td></tr><tr><td>Probabilities</td><td>0.1</td><td>0.2</td><td>0.3</td><td>0.2</td><td>0.1</td><td>0.1</td></tr></table> Find the average codeword length and entropy of the message. Also, show that the average codeword length satisfies the lower and upper bound of the entropy.	Message	s	u	p	e	r	*	Probabilities	0.1	0.2	0.3	0.2	0.1	0.1	10	3	3
Message	s	u	p	e	r	*												
Probabilities	0.1	0.2	0.3	0.2	0.1	0.1												
4.	Encode and decode the sequence: <i>a b c d e f g a b c r d e f a b c</i> using LZW method.	10	4	2														
5.	For a systematic (7,3) linear block code, the parity matrix P is given by $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 1 \end{bmatrix}$ Find the syndrome to detect and correct errors with respect to the received vector, $R = [1 \ 1 \ 0 \ 1 \ 1 \ 0 \ 1]$. Also, draw the syndrome calculation circuit.	10	5	3														