

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

SLOT: G1+TG1

Programme Name & Branch : B.Tech, ECE
Course Code and Course Name : BECE313L - Information Theory and Coding
Faculty Name(s) : Sanjay Kumar Singh, Sultan Mahmood Chowdhury
Class Number(s) : VL2024250103633, VL2024250103635
Date of Examination : 19-10-2024
Exam Duration : 90 minutes **Maximum Marks: 50**

General instruction(s):

- Answer All Questions
- M - Max mark; CO - Course Outcome; BL - Blooms Taxonomy Level (1 - Remember, 2 - Understand, 3 - Apply, 4 - Analyse, 5 - Evaluate, 6 - Create)
- Course Outcomes (Type the CO statements covered in this question paper. Use the CO number as per the syllabus copy)
 1. **CO3:** Implement various types of source coding algorithms and analyze their performance.
 2. **CO5:** Design linear block codes and cyclic codes (encoding and decoding).

Q. No	Question	M	CO	BL										
1.	A source produces 9 symbols $\{x_1, x_2, \dots, x_9\}$ with probabilities $P = \{0.11, 0.11, 0.11, 0.11, 0.11, 0.11, 0.11, 0.11, 0.11\}$. Construct a ternary and quaternary Huffman code of minimum variance. Compute the efficiency and variance of the code.	10	CO3	BL3										
2.	Consider a received sequence: 3, 1, 4, 6, 7, 4, 2, 1, 2, 5, 10, 6, 11, 13, 6. Determine the LZW decoded message. Initial dictionary <table><tr><th>Index</th><th>String</th></tr><tr><td>1</td><td>a</td></tr><tr><td>2</td><td>e</td></tr><tr><td>3</td><td>r</td></tr><tr><td>4</td><td>t</td></tr></table>	Index	String	1	a	2	e	3	r	4	t	10	CO3	BL3
Index	String													
1	a													
2	e													
3	r													
4	t													
3.	a) Consider a source with symbols and their probability of occurrence as given below $e = 0.3, m = 0.25, n = 0.1, o = 0.2$ and $y = 0.15$. Determine the arithmetic code for the word "money". b) Construct the Shanon-Fano Elias code for the above source.	5 5	CO3	BL2										
4.	Construct the adaptive Huffman code for the following word: "engine"	10	CO3	BL3										

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		CO5	BL3
5.	The syndrome bits of a (7,3) linear block code are given below: $s_1 = y_1 + y_3 + y_4$ $s_2 = y_1 + y_2 + y_3 + y_5$ $s_3 = y_1 + y_2 + y_6$ $s_4 = y_2 + y_3 + y_7$ where $Y = \{y_1, y_2, y_3, y_4, y_5, y_6, y_7\}$ and $S = \{s_1, s_2, s_3, s_4\}$ are the received bits and syndrome bits respectively. a) Determine the generator and parity-check matrices. b) Draw the encoder circuit. c) Determine the minimum distance, error detection and error correction capability. d) Find the possible transmitted codeword if the codeword received is 1011011.	10	
