

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VII (NEW) EXAMINATION – SUMMER 2022****Subject Code:3171615****Date:14/06/2022****Subject Name:Data Compression****Time:02:30 PM TO 05:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		<b>MARKS</b>
<b>Q.1</b>	(a) Define Data Compression and Data Decompression. Explain their needs in practical applications.	<b>03</b>
	(b) Explain different compression techniques with example.	<b>04</b>
	(c) Explain Modeling and Coding with suitable example.	<b>07</b>
<b>Q.2</b>	(a) Define ‘Compression Ratio’ with example.	<b>03</b>
	(b) Write short note on Uniquely Decodable Code (UDC) with example.	<b>04</b>
	(c) Encode the following sequence using LZW algorithm. “wabba\$wabba\$wabba\$wabba\$woo\$woo\$woo”	<b>07</b>
<b>OR</b>		
<b>Q.3</b>	(c) Given an alphabet $A = \{a_1, a_2, a_3, a_4\}$ , find the first-order entropy in the following cases:	<b>07</b>
	(a) $P(a_1) = P(a_2) = P(a_3) = P(a_4) = 1/4$	
	(b) $P(a_1) = 1/2, P(a_2) = 1/4, P(a_3) = P(a_4) = 1/8$	
	(c) $P(a_1) = 0.505, P(a_2) = 1/4, P(a_3) = 1/8, P(a_4) = 0.12$	
<b>Q.3</b>	(a) Explain different approaches to build mathematical models.	<b>03</b>
	(b) Write short note on Context Based Compression.	<b>04</b>
	(c) Find minimum variance Huffman code for the alphabet $A = \{a_1, a_2, a_3, a_4, a_5\}$ where $P(a_1) = P(a_3) = 0.2, P(a_2) = 0.4, P(a_5) = 0.1$ .	<b>07</b>
<b>OR</b>		
<b>Q.3</b>	(a) Write procedure to decode Arithmetic Coding Tag.	<b>03</b>
	(b) What is Golomb Code? Find Golomb code for $n=0,1,\dots,15$ and $m=5$ .	<b>04</b>
	(c) Compare and contrast Arithmetic coding and Huffman Coding.	<b>07</b>
<b>Q.4</b>	(a) Discuss applications of Huffman Coding.	<b>03</b>
	(b) Define ‘Dictionary’ in dictionary techniques. Write the difference between static and adaptive dictionary schemes.	<b>04</b>
	(c) When Adaptive Huffman coding is required? Discuss ‘Update’ procedure of Adaptive Huffman coding with example.	<b>07</b>
<b>OR</b>		
<b>Q.4</b>	(a) Write advantages of Vector Quantization over Scalar Quantization.	<b>03</b>
	(b) What is Quantization Problem? Differentiate Uniform and Non-Uniform Quantization.	<b>04</b>
	(c) Describe CALIC with example.	<b>07</b>
<b>Q.5</b>	(a) Discuss Diagram Coding with example.	<b>03</b>
	(b) Write short note on JPEG standard.	<b>04</b>

- (c) How adaptive quantization is different from uniform quantization? **07**  
Explain two approaches - forward adaptive approach and backward adaptive approach for adapting the quantizer parameter.

**OR**

- Q.5** (a) Define the term : (i) SNR, (ii) Conditional Entropy **03**  
(b) Explain ppm (prediction with partial match) with example. **04**  
(c) Discuss LZ77 algorithm and justify – the size of window affects the performance of LZ77 algorithm. **07**

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