

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VII (NEW) EXAMINATION – WINTER 2021****Subject Code:3171615****Date:17/12/2021****Subject Name:Data Compression****Time:10:30 AM TO 01:00 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.

		MARKS
Q.1	(a) Define the following terms: (1) Compression Ratio (2) Rate (3) Distortion Measure	03
	(b) What is data compression. Distinguish Lossy and Lossless compression.	04
	(c) Explain Modeling and Coding with suitable example.	07
Q.2	(a) List out applications of data compression.	03
	(b) Differentiate traditional Huffman and minimum variance Huffman algorithms.	04
	(c) Consider an alphabet $A=\{a_1,a_2,a_3,a_4,a_5\}$ with probabilities $P(a_1)=0.15$, $P(a_2)=0.04$, $P(a_3)=0.26$, $P(a_4)=0.05$ and $P(a_5)=0.50$. (a) Calculate the entropy of this source. (b) Find a Huffman code for this source. (c) Find the average length of the code in (b) and its redundancy.	07
OR		
	(c) Describe uniquely decodable code with example. Determine whether the following codes are uniquely decodable or not. 1. {0,01,11,111} 2. {0,01,110,111} 3. {0,10,110,111} 4. {1,10,110,111}	07
Q.3	(a) Compare Arithmetic and Huffman Coding.	03
	(b) What is Golomb Code? Find Golomb code for $n=0,1,\dots,15$ and $m=5$.	04
	(c) What is adaptive Huffman encoding? Explain its update and encoding procedure with example.	07
OR		
Q.3	(a) Define a term: Context Based Compression.	03
	(b) Consider an alphabet $A=\{a_1,a_2,a_3\}$ with the probabilities $P(a_1)=0.2$, $P(a_2)=0.3$, $P(a_3)=0.5$. Find the real valued tag for the sequence “a ₁ a ₁ a ₃ a ₂ a ₃ a ₁ ”	04
	(c) What is LZW compression? Explain with the help of an example.	07
Q.4	(a) Differentiate static and adaptive dictionary coding scheme.	03
	(b) Explain Burrows-Wheeler Transform with example.	04
	(c) Encode a string “cabracadabrrarrad” using LZ77 algorithm. Also show its decoding.	07
OR		
Q.4	(a) Explain Quantization problem with example.	03
	(b) Differentiate Uniform Quantization and Non-Uniform Quantization.	04
	(c) Describe ppm (prediction with partial match) with example.	07

- Q.5** (a) Discuss Laplacian Distribution. **03**
(b) What is Adaptive Quantization? Explain various approaches of Adaptive Quantization. **04**
(c) Explain Vector Quantization? Write down the procedure of Vector Quantization. **07**

OR

- Q.5** (a) Discuss advantages of Vector Quantization over Scalar Quantization. **03**
(b) Write a note on JPEG-LS. **04**
(c) Explain CALIC in detail. **07**
