

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER-VII (NEW) EXAMINATION – WINTER 2024

Subject Code:3171615

Date:19-11-2024

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 Data Compression. Discuss the role of data compression in communication. **03**
- (b) Describe Entropy. Calculate the first order entropy of the message - “1 2 3 2 3 4 5 4 5 6 7 8 9 8 9 10”. **04**
- (c) What is Data Modeling? Explain different types of Models used for data compression. **07**
- Q.2**
- (a) What are the application areas of Huffman code? **03**
- (b) Write short note on Golomb Code. **04**
- (c) Describe UDC and Prefix Code. Check whether the following codes are UDC or Prefix or Both. **07**
- (1) {0,10,101,111}, (2) {0,01,001,00011}, (3) {1,01,001,0001},
(4) {11,010,101,0110}, (5) {0,11,101,1110}
- OR**
- (c) Discuss the significance of Adaptive Huffman Algorithm. Apply Adaptive Huffman on the input string “a a r d v a r k” and show the updated huffman tree for each input character. **07**
- Q.3**
- (a) Explain “Compression ratio” with example. **03**
- (b) Compare and contrast Lossy and Lossless Compression techniques. **04**
- (c) What is Arithmetic Coding? Compare it with Huffman coding. Also discuss the significance of each. **07**
- OR**
- Q.3**
- (a) Describe procedure for decoding the tag generated by Arithmetic encoding. **03**
- (b) What is dictionary in dictionary based compression techniques? Differentiate the static and adaptive dictionary schemes. **04**
- (c) Explain Sliding Window Compression with the help of suitable example. **07**
- Q.4**
- (a) Encode the string “SATATASACITASA” using LZ78 technique. **03**
- (b) Explain Tunstall Code with example. **04**
- (c) Discuss Burrows-Wheeler Transform with example. **07**
- OR**
- Q.4**
- (a) Define the terms: (i) SNR, (ii) Conditional Entropy **03**
- (b) Write a short note on Rice Code. **04**

6	3	4		5	2	3	1	6	2	9	11	16	12	14	4	20	10	8	23	13
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The initial dictionary for LZW algorithm is

Index	Entry
1	a
2	\$
3	h
4	i
5	s
6	t

- Q.5** (a) Define RLE. Explain its characteristics. **03**
(b) Write a short note on CALIC. **04**
(c) What is image compression? How JPEG compression is used for image compression? **07**

OR

- Q.5** (a) Describe Diagram Coding with example. **03**
(b) What is Vector Quantization? Write advantages of Vector Quantization over Scalar Quantization. **04**
(c) Explain ppm (prediction with partial match) with example. **07**
