

Seat No./Enrollment No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BACHELOR OF ENGINEERING – SEMESTER 7 – EXAMINATION – SUMMER 2026

Subject Code: 3171615

Date: 20/05/2026

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.**

- Q.1**
- (a) Define data compression and explain its necessity in digital systems. **03**
 - (b) Differentiate between Lossless and Lossy Compression with suitable examples. **04**
 - (c) Explain Modeling and Coding with suitable example. **07**
- Q.2**
- (a) Explain Uniform Quantization with suitable example. **03**
 - (b) Define Rice Coding and explain its working principle with example. **04**
 - (c) Explain LZ77 Algorithm in detail. **07**
- OR
- Q.2**
- (c) Explain LZ78 Algorithm in detail. **07**
- Q.3**
- (a) Explain Minimum Variance Huffman Code **03**
 - (b) Write a short note on Golomb Code. **04**
 - (c) Explain Arithmetic Coding with suitable example. Compare it with Huffman coding. **07**
- OR
- Q.3**
- (a) List and explain applications of Huffman Coding. **03**
 - (b) Write a short note on Tunstall Codes. **04**
 - (c) Explain Adaptive Huffman Coding with neat flow of update, encoding, and decoding procedures. **07**
- Q.4**
- (a) Define Prediction by Partial Matching (PPM) and explain its basic concept. **03**
 - (b) Explain the Burrows–Wheeler Transform (BWT) with suitable example. **04**
 - (c) Explain the Old JPEG Standard for image compression in detail with suitable block diagram. **07**
- OR
- Q.4**
- (a) Explain the role of the Escape Symbol in PPM compression. **03**
 - (b) Explain Move-to-Front (MTF) Coding used after the Burrows–Wheeler Transform with example. **04**
 - (c) Explain the CALIC (Context-Based, Adaptive, Lossless Image Coding) algorithm with its major stages and advantages. **07**
- Q.5**
- (a) Define distortion criteria and explain its significance in lossy compression. **03**
 - (b) Define Quantization and explain its role in lossy compression. **04**

(c) Explain the Linde–Buzo–Gray (LBG) Algorithm for Vector Quantization in detail. **07**

OR

Q.5 (a) Explain the concept of the Human Visual System (HVS) in lossy compression. **03**

(b) Differentiate between Forward Adaptive and Backward Adaptive Quantization. **04**

(c) Discuss Non-Uniform Quantization and its types. Explain PDF-Optimized Quantization and Companded Quantization with examples. **07**
