

Seat No./Enrollment No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 4 –
EXAMINATION – SUMMER 2026

Subject Code: BE04009051

Date: 02/06/2026

Subject Name: Signals and Systems

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.**

Q.1

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|--|-----------|
| (a) Compare Static system and dynamic System. | 03 |
| (b) Explain periodic and Non-periodic signals with waveforms. | 04 |
| (c) Find Even & Odd components of following signals: | 07 |
| I. $x(t) = 1 + t + 3t^2 + 5t^3 + 9t^4$ | |
| II. $x(t) = (1 + t^3)\cos^3(10t)$ | |
| III. $x(t) = \cos(t) + \sin(t) + \sin(t)\cos(t)$ | |

Q.2

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|--|-----------|
| (a) Define the System and Give classification of systems. | 03 |
| (b) Explain the importance of linearity in the analysis of electrical systems. | 04 |
| (c) Determine whether the following systems are memoryless, causal, Stable, time invariant, linear/ and invertible. | 07 |
| I. $y(t) = e^t x(t)$ | |
| II. $y(t) = x(t/2)$ | |
| III. $y(t) = \cos[x(t)]$ | |

OR

Q.2

- (c) Convolute $x(n)$ and $h(n)$ using method of tabulation. 07
 $x(n) = \{1, 1, 0, 1, 1\}$ and
 $h(n) = \{1, -2, -3, 4\}$
 $\uparrow$
 $\uparrow$

Q.3

- (a) State the significance of impulse response in LTI system characterization. 03
 (b) Explain any two properties of convolution integral. 04
 (c) Explain causality, stability and invertibility properties of LTI-CT systems. 07

OR

Q.3

- (a) Write the response equation of a CT LTI system in terms of input and impulse response. 03
 (b) Differentiate between convolution sum and convolution integral. 04
 (c) Derive the convolution integral for CT systems & convolution sum for DT systems. 07

Q.4

- (a) State Dirichlet's conditions for Fourier Series existence. 03
 (b) Compare Fourier Series and Fourier Transform. 04
 (c) State and prove Time shifting and Duality properties of continuous time Fourier transform. 07

OR

Q.4

- (a) Write the formula for Fourier coefficients a_n , b_n and C_n . 03
 (b) Compare CTFS and DTFS with suitable mathematical expressions. 04
 (c) Give relationship between Fourier transform and Laplace transform. 07

Q.5

- (a) Define Laplace Transform of a continuous time signal. 03
 (b) State and prove the Sampling Theorem. 04
 (c) Explain the Region of Convergence of z-Transform with suitable examples. 07

OR

Q.5

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|---|-----------|
| (a) Define inverse Laplace Transform. | 03 |
| (b) Explain Aliasing and its effects and how to remove it. | 04 |
| (c) Explain the relationship between DTFT and z-Transform. | 07 |
