Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER– III EXAMINATION – SUMMER 2026

Subject Code:BE03000171 Date:22-06-2026

Subject Name:Signals and Systems

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**

			MARKS
Q.1	**(a)**	Find even and odd part of x(t) = u(-t).	**03**
	(b)	Obtain relationship between Laplace and Fourier Transform.	**04**
	(c)	Write the properties of ROC of Z-Transform.	**07**
Q.2	**(a)**	Define periodic and aperiodic signal. Also check whether $\sin(5\pi t)$ is periodic or not.	**03**
	(b)	Compare Energy and Power signals with example.	**04**
	(c)	Explain Aliasing and its effects.	**07**
		OR	
	(c)	Explain in detail Sampling Theorem.	**07**
Q.3	**(a)**	Prove Associative property of Convolution sum.	**03**
	(b)	Determine whether the following system with impulse response $h(t) = e^{-5t}u(t)$ is stable or not.	**04**
	(c)	Derive Fourier co-efficients of the Trigonometric Fourier series of an even symmetry periodic signal.	**07**
		OR	
Q.3	**(a)**	Prove Commutative property of convolution sum.	**03**
	(b)	State and prove time differentiation property of Z-Transform.	**04**
	(c)	Compute y(t) = x(t)*h(t) if x(t) = u(t) and h(t) = u(t+3).	**07**
Q.4	**(a)**	Obtain Z-Transform of unit step signal.	**03**
	(b)	State and prove time scaling and time shifting property of Fourier transform	**04**
	(c)	Obtain linear convolution of two discrete time signals given as : $x[n] = u[n]$ and $h[n] = a^n u[n]$, $a < 1$.	**07**
		OR	
Q.4	**(a)**	Obtain Fourier Transform of unit step signal.	**03**
	(b)	Prove the duality theorem of Fourier Transform.	**04**
	(c)	Determine z Transform of following sequences. Also draw the ROC: (1) $x[n] = u(n+2)$ (2) $x[n] = 4^n u[n] + 5^n u[-n-1]$	**07**
Q.5	**(a)**	Compute DFT of the sequence x[n] = {2,0,3,1}	**03**
	(b)	State & prove a condition for a discrete time LTI system to be stable.	**04**
	(c)	Determine the following system described by y(t)= cos[x(t-2)] is memory less, causal, linear, time-invariance or stable?	**07**
		OR	
Q.5	**(a)**	Compute DFT of the sequence x[n] = {-2,3,-3,-1}	**03**
	(b)	Prove that DT LTI system is causal if and only if h(n) = 0 for n < 0.	**04**
	(c)	Explain following property for the system y(t) = 3x(-t) - 14. (i) Linearity (ii) Time-invariance (iii) Causality (iv) Dynamicity	**07**

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