

Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-IV (NEW) EXAMINATION – SUMMER 2024

Subject Code:2141005

Date:08-07-2024

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.

		MARKS
Q.1	(a) Which signal is better analog or digital? Why? Give example.	03
	(b) Graphically & mathematically represent the unit step signal. Find out its energy and power.	04
	(c) What is LTI system? Explain the commutative, associative and distributive properties of linear convolution with example.	07
Q.2	(a) What is BIBO stability? Is $y[n] - 0.9y[n-1] = x[n]$ stable?	03
	(b) What is aliasing effect? Describe it with diagram.	04
	(c) Find $y[n]=x[n] * h[n]$. Use graphical and tabular method both $x[n]=[1,1,1]$ and $h[n]=[1,0,1]$.	07
	↑ ↑	
	OR	
	(c) Explain the CT LTI integral convolution for the output of a system $y(t)$ from input $x(t)$ and system response $h(t)$.	07
Q.3	(a) Compare CTS and DTS.	03
	(b) What is a periodic signal? Find the period of : (1) $x(t) = e^{j\omega t}$ (2) $x[n] = (-1)^n$	04
	(c) What is difference between time-shifting and time scaling properties of signal? Explain with suitable example.	07
	OR	
Q.3	(a) What is odd signal and even signal? Find odd and even signal for $x(t) = -2t$.	03
	(b) What is causal system? State whether the following systems are causal, linear and time varying or not. (1) $y(t) = \sin(2\omega t)$ (2) $y(n) = x[n-3]$	04
	(c) If $y(t)$ is as shown in figure 1, draw $y(-t)$, $2y(t)$, $y(2t)$, $y(t/2)$, $y(3t-1)$ and $y(t-3)$.	07
Q.4	(a) State final value theorem.	03
	(b) Explain the properties of Fourier transform: Linearity, Differentiation, Integration and Duality.	04
	(c) Describe the relationship from Fourier series to Fourier transform with necessary equations.	07

OR

- Q.4** (a) Enlist the various applications of DFT and briefly explain. **03**
(b) Explain the properties of Fourier transform: Time Shifting, Time scaling and convolution. **04**
(c) Compare the Fourier transform of CT and DT for the Aperiodic signals. **07**

- Q.5** (a) What is difference between Laplace transform and Fourier transform? **03**
(b) Find the z-transform of the $x(n) = \{1, 0, 2, 4, 0, 5, 6\}$ **04**
(c) Define inverse z-transform. Find the Inverse Z transform of : **07**
(1) $X(z) = 2 + \frac{4z}{z-1} - \frac{z}{z-0.5}$
(2) $X(z) = \frac{10z}{z^2 - z + 1}$

OR

- Q.5** (a) Find the Fourier transform of the unit impulse function. **03**
(b) Define: ROC & Z transform. Enlist its properties. **04**
(c) Find the z-transform of : **07**
(1) $a^n u(n)$
(2) $10 \sin(0.25\pi n) u(n)$
(3) $e^{-0.1n} \cos(0.25\pi n) u(n)$

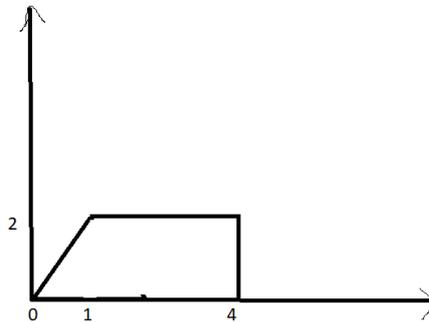


Figure 1
