

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:3162414

Date:30-05-2024

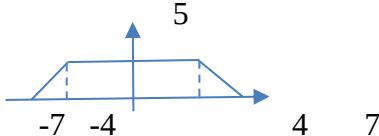
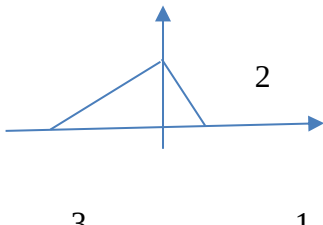
Subject Name:Digital signal Processing for Power Electronics

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) Explain sampling theorem in brief.	03
	(b) Define the following elementary signals in discrete domain with necessary diagrams. (a) Unit step function. (b) Unit ramp function. (c) Unit parabolic function. (d) Unit impulse function.	04
	(c) Explain the following signal in the form of unit ramp signal.	07
		
Q.2	(a) Compare Fixed Point and Floating Point number representation.	03
	(b) Define energy and power signals.	04
	(c) State and prove linearity property of Z transform.	07
	OR (c) State and prove time shifting property of Z transform.	07
Q.3	(a) Describe various components on DSP IC chips required for power electronics applications	03
	(b) Derive the relation between Z transform and Fourier transform.	04
	(c) Evaluate the even and odd parts of the following signal.	07
		
	OR	
Q.3	(a) Give difference between linear and circular convolution.	03
	(b) List the properties of Discrete time Fourier Transform.	04
	(c) Find out convolution sum of $x(n) = \{1, 2, 0, -1\}$ and $h(n) = \{-2, 1, 1\}$ with graphical method.	07

- Q.4** (a) Find the DTFT of $x(n) = \{1, -2, 2, 3\}$ **03**
 (b) Find the DTFT of rectangular pulse sequence $x(n) = \begin{cases} A, & |n| \leq N \\ 0, & |n| > N \end{cases}$ **04**
 (c) Prove that for causal sequences, the ROC is the exterior of a circle of radius r . **07**
- OR**
- Q.4** (a) Find IDFT of $X(\omega) = 2 + e^{-j\omega} + 3e^{-j3\omega} + 4e^{-j4\omega}$ **03**
 (b) Find the Z transform of $n^2 * u(n)$. **04**
 (c) Discuss and compare Block Diagram & Signal Flow graph representation of discrete time systems with suitable example. **07**
- Q.5** (a) Compare FIR & IIR system realization. **03**
 (b) Describe the concept of pipelining in DSP processors along with its basic operational phases. **04**
 (c) Give comparison of Harvard and Von-Neumann architecture. **07**
- OR**
- Q.5** (a) State various applications of DSP processors with respect to power electronics converters. **03**
 (b) Realize the system with transfer function $H(s) = \frac{s+5}{s^2+2s+4}$ in direct form-I structure. **04**
 (c) Describe various components on DSP IC chips required for power electronics applications **07**
