Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (OLD) - EXAMINATION – SUMMER 2017

Subject Code: 170804 **Date: 06/05/2017**

Subject Name: Discrete Time Signal Processing

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.**

Q.1	**(a)**	What are different types of operations on a discrete sequence? Explain time shifting and time scaling.	**07**
	(b)	Distinguish between: (i) Causal and non-causal signals (ii) Even and odd signals (iii) Energy and power signals.	**07**
Q.2	**(a)**	Explain the following: (i) Static and dynamic systems (ii) Linear and non- linear systems (iii) Shift- invariant and shift- varying systems.	**07**
	(b)	Test the causality and stability of the following system: $y(n) = x(n) – x(- n - 1) + x(n - 1)$.	**07**
		OR	
	(b)	Differentiate between finite impulse response (FIR) and infinite impulse response (IIR) systems.	**07**
Q.3	**(a)**	What is convolution? Explain linear convolution sum of two sequences.	**07**
	(b)	Determine the convolution sum of two sequences: $X(n)$; {**4**, 2,1,3} and $h(n)$ = {1, **2**, 2,1}.	**07**
		OR	
Q.3	**(a)**	What are different types of interconnections of LTI systems? Explain with suitable block diagram.	**07**
	(b)	Determine the convolution sum of two sequences: $x(n) = 3\delta(n + 1) – 2\delta (n) + \delta (n - 1) + 4 \delta(n-2)$ and $h(n) = 2\delta(n - 1) + 5\delta (n-2) + 3\delta (n - 3)$.	**07**
Q.4	**(a)**	Write properties of ROC of Z – transform.	**07**
	(b)	Prove that for causal sequences, the ROC is the exterior of a circle of radius r.	**07**
		OR	
Q.4	**(a)**	Write properties of Z – transform.	**07**
	(b)	Prove that for Non - causal sequences, the ROC is the interior of a circle of radius r.	**07**
Q.5	**(a)**	Explain the following properties of discrete time Fourier transform: (i) Frequency shifting (ii) Differentiation in frequency domain (iii) Time shifting	**07**
	(b)	Differentiate between discrete Fourier transform (DFT) and fast Fourier transforms (FFT).	**07**
		OR	
Q.5	**(a)**	Describe different methods of IIR filter design.	**07**
	(b)	Explain methods of designing FIR filter using different window techniques.	**07**

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