Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER I (NEW) EXAMINATION – SUMMER 2017

Subject Code:2712910 Date: 11/05/2017

Subject Name: Discrete Time Signal Processing

Time:02:30 p.m. to 05:00 p.m. Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Notation/Symbols have used meaning.**

Q.1	**(a)**	(i) Draw low-pass filter magnitude characteristics with all necessary tolerance limits. (ii) Define and explain aliasing. Describe remedies for the same.	**08**
	(b)	Describe any one type of DSP architecture.	**06**
Q.2	**(a)**	An LTI system has impulse response $h(n) = 5\ (-1/2)^n\ u(n)$. Determine Fourier Transform to find the output of this system when the input is $x(n) = (1/3)^n\ u(n)$.	**07**
	(b)	Describe the Kaiser window filter design procedure for a high pass filter.	**07**
		OR	
	(b)	Design an IIR filter from continues time filter.	**07**
Q.3	**(a)**	Obtain relation between z- transform and discrete Fourier transform.	**07**
	(b)	Discuss the reconstruction of a band -limited signal from its samples.	**07**
		OR	
Q.3	**(a)**	Obtain z- transform for (i) $x_1(n) = (1/2)^n\ u(n) + (-1/3)^n\ u(n)$ (ii) $x_2(n) = -a^n\ u(-n-1)$. Plot pole –zero diagram and state ROC for both.	**07**
	(b)	Explain the changing of the sampling rate using discrete time processing.	**07**
Q.4	**(a)**	Discuss all pass & minimum phase systems in detail.	**07**
	(b)	Discuss various properties of ROC for Z- Transform.	**07**
		OR	
Q.4	**(a)**	With help of signal flow graph, discuss structure of Linear phase FIR system.	**07**
	(b)	If $H(w) = 1;\ w \le w_o$ $= 0;\ \|w_o\| < w \le \pi$, Find h(n).	**07**
Q.5	**(a)**	State and prove various properties of DFT.	**07**
	(b)	Find the IDFT of the sequence $x(k) = \{\underline{\mathbf{1}},0,1,0\}$.	**07**
		OR	
Q.5	**(a)**	Explain DIF- FFT Algorithm using signal flow graphs for N=4.	**07**
	(b)	Why circular convolution is performed? Perform the linear convolution of the two sequences $x_1(n) = \{\underline{\mathbf{1}}, 2\}$ and $x_2(n) = \{\underline{\mathbf{3}}, 4\}$.	**07**

****