Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER– I (OLD course)• EXAMINATION – SUMMER 2015

Subject Code: 710422 **Date:16/05/2015**

Subject Name: **Digital Signal Processing and Applications**

Time: 10:30 am to 1:00 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)**	List the Properties of Z-Transform and Explain (1) Time Shifting and (2) Convolution Property of Z-Transform	**07**
	(b)	Derive the formula of Convolution Sum. Find linear and Circular Convolution of two sequences X(n) = {1,2,3,4} and h(n) = {1, 1, 1}. Explain the difference between linear and circular convolution.	**07**
Q.2	**(a)**	Find DFT of sequence x(n) = {1,2,3,4,5,6} using DIT ï FFT Algorithm	**07**
	(b)	Explain DIT FFT algorithm in detail.	**07**
		OR	
	(b)	Explain DIF FFT algorithm in detail.	**07**
Q.3	**(a)**	Find Z- Transform along with ROC of 1. $x(n) = (\frac{1}{2})^n u(n)$ 2. $x(n) = (\frac{1}{2})^n (u(n) - u(n-10))$	**07**
	(b)	Determine whether the unit step signal is an energy or power signal.	**07**
		OR	
Q.3	**(a)**	List out properties of DFT. Explain any two property of DFT.	**07**
	(b)	Explain concept of windowing in the design of FIR filter. List various window functions along with their expressions	**07**
Q.4	**(a)**	A analog butterworth IIR low pass filter transfer function is give as $0.8 \le h(e^{jw}) \le 1 \quad 0 \le w \le 0.2\pi$ $h(e^{jw}) \le 0.2 \quad 0.6\pi \le w \le \pi$ So determine digital butterworth IIR filter using Bilinear Transformation. Assume T = 1 second.	**07**
	(b)	Derive Expressions of Symmetric and Anti-symmetric FIR filter	**07**
		OR	
Q.4	**(a)**	Explain Bilinear Transformation Technique for IIR filter Designing. Explain its limitation and solution.	**07**
	(b)	Find H(z) from H(s) using Impulse Invariant Method $H(s) = \frac{b}{(s+a)^2 + b^2}$	**07**
Q.5	**(a)**	Difference between fixed point and floating point DSP processor	**07**
	(b)	Explain the concept of Sample Rate Conversion.	**07**
		OR	
Q.5	**(a)**	List out applications of Digital Signal Processing and Explain how Digital signal processing is used in RADAR signal processing.	**07**
	(b)	List types of signals. Explain 1. Even and Odd signals 2. Deterministic and Random Signals 3. Multichannel and Multidimensional Signals	**07**