Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII • EXAMINATION – WINTER • 2014

Subject Code: 171704 **Date: 27-11-2014**

Subject Name: Digital Signals and Systems

Time: 10:30 am - 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.**

Q.1	**(a)**	Give classification of signals with neat sketch and respective mathematical representation.	**07**
	(b)	Implicate the sampling theorem for removal of aliasing problem.	**07**
Q.2	**(a)**	Calculate the auto correlation of sequence x(n) = {1,2,1,1}	**07**
	(b)	Determine zero input response of system described by homogeneous second order difference equation y(n) - 3 y(n-1) - 4 y(n-2) = 0.	**07**
		OR	
	(b)	Give the properties of auto correlation and cross correlation.	**07**
Q.3	**(a)**	List out the properties of Z transformation with suitable detail.	**07**
	(b)	Derive the Z transformation for $x(n) = a^n (\sin w_0 n)\, u(n)$	**07**
		OR	
Q.3	**(a)**	Determine inverse Z transformation by power series expansion method. $X(z) = 1/(1 - 1.5 z^{-1} + 0.5 z^{-2})$ For ROC $\lvert z\rvert > 1$ and ROC $\lvert z\rvert < 0.5$	**07**
	(b)	Derive symmetry properties of fourier transform for real, real odd, real even and purely imaginary signals.	**07**
Q.4	**(a)**	Explain digital resonator in detail with neat sketch.	**07**
	(b)	Explain all pass filter with frequency domain analysis in detail.	**07**
		OR	
Q.4	**(a)**	Explain digital to analog converter with neat sketch and logical explanation.	**07**
	(b)	Explain over sampling of analog to digital converter with neat sketch and logical explanation.	**07**
Q.5	**(a)**	Narrate the properties of DFT.	**07**
	(b)	Narrate forward DCT with respective derivation.	**07**
		OR	
Q.5	**(a)**	Perform the circular convolution of two sequence $x_1(n) = \{1,3,5,3\}$ and $x_2(n) = \{2,3,1,1\}$	**07**
	(b)	Explain lattice structure for IIR system with necessary sketch and derivations.	**07**

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