Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII(OLD) • EXAMINATION – WINTER 2016

Subject Code: 171704 Date: 25/11/2016

Subject Name: Digital Signals & Systems

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.

Q.1	**(a)**	What are the basic elements of Digital Signal Processing of the system? State advantages of Digital over analog signal processing.	**07**
	(b)	Explain classification of discrete time signals in detail.	**07**
Q.2	**(a)**	Perform the circular convolution of the two sequences $x_1(n)=\{2,1,2,1\}$ and $x_2(n)=\{1,2,3,4\}$	**07**
	(b)	Determine the autocorrelation sequence $x(n)=\{1,2,1,1\}$.	**07**
		OR	
	(b)	Explain direct form structure for FIR systems.	**07**
Q.3	**(a)**	For a given discrete time systems, check whether they are: (1) Static or dynamic (2) Linear or non-linear (3) Shift invariant or shift-varying (4) Causal or non-causal (5) Stable or unstable. Explain with reasons: (i) $x(n)u(n)$ (ii) $x(n)+nx(n+1)$ (iii) $x(-n)$	**14**
		OR	
Q.3	**(a)**	The impulse response of a linear time-invariant system is $h(n)=\{1,2,1,-1\}$ ↑ Determine the response of the system to the input signal using convolution with graphical method. $x(n)=\{1,2,3,1\}$ ↑	**14**
Q.4	**(a)**	Determine the z-transform of the signal: $x(n)=(\cos\omega_0 n)u(n)$	**07**
	(b)	Determine the inverse z-transform of $X(z)=1/1-1.5z^{-1}+0.5z^{-2}$ When (a) ROC: $\lvert z\rvert>1$and (b)ROC: $\lvert z\rvert< 0.5$ using power series expansion	**07**
		OR	
Q.4	**(a)**	Determine the z-transform of the signal : $x(n)=na^nu(n)$	**07**
	(b)	Determine the inverse z-transform of $X(z)= 1/1-1.5z^{-1}+0.5z^{-2}$ if (a) ROC: $\lvert z\rvert>1$ and (b) ROC: $0.5<\lvert z\rvert<1$ using partial fraction expansion.	**07**
Q.5	**(a)**	Explain notch filter.	**07**
	(b)	Explain oversampling D/A Converters.	**07**
		OR	
Q.5	**(a)**	Determine the sequence y(n) using four-point DFT for impulse response $h(n)=\{1,2,3\}$ and input sequence $x(n)=\{1,2,2,1\}$	**07**
	(b)	List out the properties of the fourier transform for Discrete time signals	**07**

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