Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–VIII EXAMINATION – SUMMER 2015

Subject Code: 182402 **Date:11/05/ 2015**

Subject Name: DIGITAL SIGNAL PROCESSING

Time:10.30AM-01.00PM **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)**	Check whether the following system functions are memory-less, stable, causal, linear and time-invariant or not. 1) y(n)= sign[x(n)] 2) y(n)= x(n)+nx(n+1)	**07**
	(b)	Define sampling. State and explain sampling theorem.	**07**
Q.2	**(a)**	Find the convolution of $h(n) = (1/2)^n u(n)$ and $x(n) = 2^n u(n)$	**07**
	(b)	Find the correlation of sequence x(n) = {$\underline{0}$,1,-2,3,-4} and y(n) = {1/2,1,$\underline{2}$,1,1/2}	**07**
		OR	
	(b)	Explain the interconnection of LTI systems.	**07**
Q.3	**(a)**	Determine and sketch the energy density spectrum $S_{xx}(w)$ of the signal $x(n)= a^n u(n)$, $-1< a <1$.	**07**
	(b)	State and prove the following properties of DTFT 1) Time reversal 2) Modulation theorem	**07**
		OR	
Q.3	**(a)**	Derive the relationship between Z-transform and Discrete Time Fourier Transform (DTFT).	**07**
	(b)	What is the importance of ROC in z transform? State the properties of Z-transform and ROC.	**07**
Q.4	**(a)**	Determine the z- transform of the signals 1) $x(n)= n a^n u(n)$ 2) $x(n)= (\cos w_o n) u(n)$	**07**
	(b)	Compute the DFT of the four-point sequence x(n) = {0, 1, 2, 3}.	**07**
		OR	
Q.4	**(a)**	State the properties of Discrete Fourier Transform (DFT) and prove the Circular time shift property of DFT.	**07**
	(b)	Explain Radix-2 FFT and DIT algorithm.	**07**
Q.5	**(a)**	Explain the structures for realization of FIR systems.	**07**
	(b)	Explain the following terms with respect to Digital Signal Processor: 1) Pipelining 2) MAC	**07**
		OR	
Q.5	**(a)**	Describe any one type of DSP architecture.	**07**
	(b)	Explain the structures for realization of IIR systems.	**07**

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