Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII • EXAMINATION – SUMMER 2014

Subject Code: 182402 **Date: 31-05-2014**

Subject Name: Digital Signal Processing

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.**

Q.1	**(a)**	Define 1) Signal 2) System 3) Sampling	**04**
	(b)	Find the fundamental period of 1) x(t) = 2cos(10t+1) – sin(4t-1) 2) $x(n) = 1 + e^{j4\pi n/7} - e^{j2\pi n/7}$	**04**
	(c)	Sketch the following signals/sequence: 1) u(n+2) u(-n+3) 2) x(n) = u(n+4) - u(n-2) 3) x(n) = {3, 7, 2, 0, 2, 5, 8}	**06**
Q.2	**(a)**	Find the convolution of $x(n) = (1/2)^n u(n)$ and h(n) = u(n) - u(n-10)	**07**
	(b)	State only, the properties of z transform and ROC. Also explain the importance of ROC in z transform.	**07**
		OR	
	(b)	State and prove Final Value theorem for Z-transform.	**07**
Q.3	**(a)**	Find the correlation of sequence x(n) = {-1, 2, 1} and y(n) = {5, 1, 1}	**07**
	(b)	Derive the relationship between Z-transform and Discrete Time Fourier Transform (DTFT).	**07**
		OR	
Q.3	**(a)**	State and prove Parseval's relation for DTFT.	**07**
	(b)	Explain the interconnection of LTI systems.	**07**
Q.4	**(a)**	Explain the architecture of general purpose DSP processors.	**08**
	(b)	Find the Z-transform of $x(n) = (1/2)^n u(n) * (1/4)^n u(n)$ using convolution property of Z-transforms.	**06**
		OR	
Q.4	**(a)**	Find the inverse Z-transform of $x(z) = \frac{z^{-1}}{3-4z^{-1}+z^{-2}}$; ROC: $\lvert z \rvert > 1$ by partial fraction expansion method.	**06**
Q.4	**(b)**	Explain the following terms with respect to Digital Signal Processor: 1) Pipelining 2) MAC	 **05** **03**
Q.5	**(a)**	State the properties of Discrete Fourier Transform (DFT) and prove the Time Reversal property of DFT.	**07**
	(b)	Explain the structures for realization of IIR systems.	**07**
		OR	
Q.5	**(a)**	Explain the structures for realization of FIR systems.	**07**
	(b)	Explain Radix-2 FFT and DIT algorithm.	**07**

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