Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – SUMMER • 2013

Subject code: 710422N **Date: 11-06-2013**

Subject Name: Digital Signal Processing and Applications

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)**	Check (1) Stability (2) Causality (3) Linearity and (4) Time Variancy for following systems (i) T(x[n]) = g[n] x[n] (ii) T(x[n]) = ax[n] + b.	**07**
	(b)	Explain the relationship ɤ = ɥ*T between frequency variable of continuous time and discrete time signals.	**07**
Q.2	**(a)**	Explain with block diagram various component of DSP processors.	**07**
	(b)	Differentiate between DTFT and DFT with the help of mathematical Expressions.	**07**
		OR	
	(b)	Explain following terms with example (i) Finite word length effect (ii) Quantization effect and (iii) Linear phase filter.	**07**
Q.3	**(a)**	The input to a causal LTI system is $x[n]=u[-n-1]+(1/2)^n u(n)$. The z transform of the output of this system is $Y(z) = -0.5z^{-1} / (1-0.5z^{-1}) (1+ z^{-1})$. Determine (i) H(z) (ii) y(n) (iii) ROC of Y(z).	**07**
	(b)	Enlist different properties of z- transform. Explain any two in detail with necessary proof.	**07**
		OR	
Q.3	**(a)**	Determine z ï transform of the signal $x(n) = -a^n u(-n-1)$. Comment on ROC.	**07**
	(b)	Determine the inverse z- transform of $x(z) = z^2/(z-1)(z-0.2)$.	**07**
Q.4	**(a)**	Discuss direct form I realization of IIR filter with necessary diagrams.	**07**
	(b)	Differentiate between DIT & DIF. Draw Decimation in Frequency FFT algorithm.	**07**
		OR	
Q.4	**(a)**	Write short note on Multi rate digital signal processing.	**07**
	(b)	Compare IIR and FIR digital filters in detail.	**07**
Q.5	**(a)**	Discuss DSP applications to radar engineering	**07**
	(b)	Convert the analog filter with system function $H_a(s) = 36/(s+0.1)^2+36$ into a digital IIR filter by means of the bilinear transformation where the digital filter is with a resonant frequency of $ɤ_r = 0.2´$.	**07**
		OR	
Q.5	**(a)**	Compare linear and circular convolution.	**07**
	(b)	Describe windowing methods for FIR filters with necessary mathematical steps.	**07**

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