Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – WINTER • 2013

Subject code: 1710422 **Date: 02-01-2014**

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)**	Explain various basic elements of a DSP system. Compare it with ASP. State various application of DSP.	**07**
	(b)	Explain important of Z transform in DSP. Determine the Z-transform of $X(n) = 2^n$ n<0, $= (1/2)^n$ for n=0,2,4….. $= (1/3)^n$ for n=1,3,5,…..	**07**
Q.2	**(a)**	Compare DFT & Z-transform. Find DFT of sequence x(n)={1,1,0,0} & check the validity of your answer by calculating its Inverse DFT.	**07**
	(b)	Explain various types of discrete time signals and discrete time systems with example.	**07**
		OR	
	(b)	Determine whether following systems are (i) causal (ii) time invariant (iii) linear (i) y(n)= x(-n); (ii) y(n) = Ax(n)+ B; (iii) $y(n)= e^{ax(n)}$	**07**
Q.3	**(a)**	Explain impulse response. Determine the transfer function & impulse response of a discrete time LTI system describe as y(n)= 1/2y(n-1)+x(n)+1/3x(n-1)	**07**
	(b)	What are different types of structures for IIR system realizations. Draw the direct form I realization structure of any 3rd order system.	**07**
		OR	
Q.3	**(a)**	What is the effect of windowing? State various windows. Explain hamming windows & obtain its frequency domain characteristics.	**07**
	(b)	Give advantages & disadvantages of digital filter. Explain impulse invariant method of Filter design with example	**07**
Q.4	**(a)**	Write short note on Multi rate DSP	**07**
	(b)	Differentiate between parametric & non parametric spectral estimation. Explain any one non-parametric methods of power spectrum estimation	**07**
		OR	
Q.4	**(a)**	Write short note on " Important features of a DSP processor	**07**
Q.4	**(b)**	Determine 8 point DFT of the sequence x(n)={1/2,1/2,1/2,1/2,0,0,0,0} using Redix-2 decimation in Time FFT algorithm	**07**
Q.5	**(a)**	Explain time reversal & circular frequency shift property of DFT. Find DFT of the sequence which is expressed as x(n) = ¼, 0<=n<=2 = 0 otherwise	**07**
	(b)	Explain (i) relationship of s plane to z plane (ii) canonic & non canonic structure (iii)stability criteria for Discrete time LTI system	**07**
		OR	
Q.5	**(a)**	Write short note on Finite word length effect in digital filter	**07**
	(b)	Explain (i) difference between dsp processor & general purpose processor (ii) any one application of DSP	**07**

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