Seat No.: _____ Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – WINTER • 2014

Subject code: 1720702 **Date: 03-12-2014**

Subject Name: Digital Signal Processing

Time: 02:30 pm - 05:00 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 elements of DSP system. Compare DSP with ASP. Explain any one application of DSP.	**07**
	(b)	Explain following terms (i) Time Invariant system (ii) Causal system (iii) Difference equation	**07**
Q.2	**(a)**	Find discrete time Fourier transform(DTFT) of $x(n)=\mathbf{a}^{\lvert n\rvert}$. Explain any one property of DTFT.	**07**
	(b)	Explain ROC. Find Z-Transform of $x(n)=\text{Cos}w_0n$ for nÓ0.	**07**
		OR	
	(b)	Explain advantages & disadvantages of digital filter. Compare FIR and IIR Filter	**07**
Q.3	**(a)**	Explain frequency shifting property of DFT. Determine the DFT of four point sequence x(n)={0,1,2,3}	**07**
	(b)	Write short note on DSP Processor.	**07**
		OR	
Q.3	**(a)**	Write short note on Finite World Length Effects in digital filter	**07**
	(b)	Find circular convolution of given two four point sequence x(n)={0,1,2,3} & h(n)={2,1,1,2}	**07**
Q.4	**(a)**	Write short note on multi rate digital signal processing	**07**
	(b)	Explain any one non-parametric method of power spectrum estimation.	**07**
		OR	
Q.4	**(a)**	Explain following with example (i) Time shifting properties (ii) Energy Signal (iii) Unit step function	**07**
Q.4	**(b)**	Compare DFT & FFT. Draw decimation in Frequency 8 point FFT diagram.	**07**
Q.5	**(a)**	Design a second order digital Butterworth filter with pass band of 300Hz to 500Hz and sampling frequency of 1500Hz using BLT method, given prototype LPF with transfer function $H(s)=Ý_c/(s+Ý_c)$	**07**
	(b)	Consider a causal LTI system with system function $H(z)=(1+0.2z^{-1})/(1-0.5z^{-1}+1/3z^{-2})(1+0.25z^{-1})$ Draw the signal flow graph and transposed structure , direct II structure for implementation of the system.	**07**
		OR	

Q.5	**(a)**	Compare (i) Impulse invariance method with bilinear transformation method & (ii) DTFT & DFT	**07**
	(b)	List and explain different window methods for FIR filter Design. What are the advantages and disadvantages of Window method?	**07**

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