Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject code:1710422 **Date: 05-12-2014**

Subject Name: Digital Signal Processing and Applications

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 properties of discrete time system with example.	**07**
	(b)	Determine the impulse response for the cascade of two linear time invariant systems having impulse responses when $h_1(n) = (1/2)^n u(n)$ and $h_2(n) = (1/4)^n u(n)$.	**07**
Q.2	**(a)**	Explain following terms with example. (i). Stability (ii). Aliasing (iii). Twiddle factor	**07**
	(b)	Explain the relationship $\omega = \Omega * T$ between frequency variable of continuous time and discrete time signals.	**07**
		OR	
	(b)	Find the z-transform of $x(n) = \cos \omega_0 n$ for $n \geq 0$.	**07**
Q.3	**(a)**	Explain the properties of Z transform.	**07**
	(b)	Find inverse Z-transform of $X(z) = \log [1 / (1 - az^{-1})]$, $\lvert Z \rvert > \lvert a \rvert$	**07**
		OR	
Q.3	**(a)**	Find the 4-point DFT of the sequence $x(n) = \cos (n\pi/4)$.	**07**
	(b)	Explain Decimation-In-Frequency Algorithm.	**07**
Q.4	**(a)**	Determine the direct forms I and II for the second order filter given by $y(n) = 2b\cos \omega_0 y(n-1) - b^2 y(n-2) + x(n) - b\cos\omega_0 x(n-1)$	**07**
	(b)	Compare IIR & FIR filter. Also, explain window method.	**07**
		OR	
Q.4	**(a)**	Write short note on effect of finite word length in FIR filter design.	**07**
	(b)	What is multi rate digital signal processing? Explain need of it. Give examples and state various advantages of it.	**07**
Q.5	**(a)**	What are the non-parametric methods of power spectrum estimation? How DFT is useful in power spectral estimation?	**07**
	(b)	Describe modified Harvard Architecture. What are the different stages in pipelining?	**07**
		OR	
Q.5	**(a)**	Discuss DSP applications to radar engineering.	**07**
	(b)	Write the desirable features of DSP processors and compare the following: (i) DSP processor and General purpose microprocessor architecture. (ii) Fixed point and floating point arithmetic for DSP Processors.	**07**

****