Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII • EXAMINATION – SUMMER • 2014

Subject Code: 171704 **Date: 29-05-2014**

Subject Name: Digital Signals and Systems

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)	Define periodic signal and fundamental period and Determine the signal $X(t) = 2\cos(6\pi t - \pi/3) + 4\sin(10\pi t)$ is periodic ? If so find its fundamental period.	**4**
(b)	For a given discrete system, check whether they are (1) Time variant / Time invariant (2) Stable / Unstable (3) Linear / Nonlinear (4) Causal / Anti causal (5) Static / dynamic • $Y(n) = e^{x(n)}$ • $Y(n) = X(-n-1)$	**10**
Q-2 (a)	Prove time shifting properties of Z transform and find Z transform and ROC of following signal. $x(n) = (-3)^n u(-n-1)$	**7**
(b)	What is aliasing effect and how it can be eliminated?	**7**
	OR	
Q-2 (a)	Explain various properties of ROC.	**7**
(b)	Find the inverse Z transform of following 1. $X(Z) = \frac{1-0.5Z^{-1}}{1-0.25Z^{-2}}$ $\lvert z \rvert > 1/2$ 2. $\square(\square) = \frac{Z^2}{(Z-2)(Z-1)^2}$	**7**
Q-3 (a)	Define auto-correlation and cross correlation and Compute the cross-correlation between $x(n)=\{1,1,0,1\}$ and $y(n)=\{4,-3,-2,1\}$	**7**
(b)	Perform circular convolution of following signal $x1(n)=\{1,2,3,4,5\}$,$x2(n)=\{1,1,2,2\}$	**7**
	OR	
Q-3	Find out the solution of second order difference equation $Y[n] - 1.8\,Y[n-1] + 0.81\,y[n-2] = 2^{-\square}$; $n \geq 0$	**14**
Q-4 (a)	Obtain Direct form I and II and cascade form realization of a system described by $Y(n) - 3/4Y(n-1) + 1/8\,Y(n-2) = X(n) + 1/2\,X(n-1)$	**7**
(b)	Listout and prove properties of DFT.	**7**
	OR	
Q-4 (a)	Plot the magnitude and phase spectrum of the dampled data sequence {2,0,0,1}, which was obtaining using a sample frequency of 20 KHz. N=4.	**7**
(b)	Explain lattice structure of FIR filter	**7**
Q-5 (a)	Compute 4 point DFT of the given sequence $x[n]=\{1,0,1,0\}$	**7**
(b)	Explain notch filter.	**7**
	OR	
Q-5(a)	Draw the ideal characteristic of filters. Explain Bandpass filter.	**7**
(b)	Explain oversampling of D to A converter	**7**

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