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## GUJARAT TECHNOLOGICAL UNIVERSITY

**BE - SEMESTER-VII • EXAMINATION - WINTER 2013** 

Subject Code: 171704			Date: 28-11-2013	
•	: 10:	ame: Digital Signals and Systems 30 TO 01:00 Total Marks: 7	<b>'</b> 0	
	1. A 2. N	Attempt all questions. Make suitable assumptions wherever necessary. Figures to the right indicate full marks.		
Q.1	(a)	Determine the z-transform and sketch the ROC of	07	
	<b>(b)</b>	$x(n) = \{a^n cos\omega_0 n\} u(n)$ Explain continuous-time, discrete time, continuous valued, discrete valued signals.	07	
Q.2	(a) (b)	What is aliasing effect and how it can be eliminated? Determine the homogenous solution of the system described by $y(n) - 3y(n-1) - 4y(n-2) = x(n)$	07 07	
	<b>(b)</b>	Determine the z-transform and sketch the ROC of $x(n) = (1/2)n\{u(n)-u(n-10)\}$	07	
Q.3		For a given discrete time systems, check whether they are:  (1) Static or dynamic (2) Linear or non-linear (3) Shift invariant or shift-varying (4) Causal or non-causal (5) Stable or unstable Explain with reasons: (i) nx(n) (ii) x(n²) (iii) x²(n)	14	
Q.3		OR Using graphical method, obtain a 5-point circular convolution of two DT signals defined as, $x(n)=(1.5)n,\ 0\leq n\leq 2\\ y(n)=2n-3,\ 0\leq n\leq 3$	14	
Q.4	(a)	Obtain Z-inverse of the following and comment on ROC. $X(Z) = \underbrace{1}_{1-1.5Z^{-1} + 0.5Z^{-2}}.$	07	
	<b>(b)</b>	when (a) ROC: $ z  > 1$ (b) ROC: $ z  < 0.5$ List out the properties of z-transform.	07	
Q.4	(a) (b)		07 07	
Q.5	(a) (b)	Determine auto-correlation of the following signal: $x(n) = \{1, 2, 1, 1\}$ Explain inverse DCT with necessary equations. OR	07 07	
Q.5	(a) (b)	Derive the lattice structures of FIR filters.  Draw parallel realization of IIR filter having transfer function $H(Z) = \underbrace{1 - Z^{-1}}_{1 - 0.2Z^{-1} - 0.15Z^{-2}}.$ **********************************	07 07	