Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V • EXAMINATION – WINTER • 2014

Subject Code: 150303 **Date: 03-12-2014**

Subject Name: Signals and Systems

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)**	Give classification of signals with examples	**07**
	(b)	(i) Find Energy of $X(t)=2e^{-t} - 6e^{-2t}$, t>0 signal	**03**
		(ii) Sketch the signal F(t)= u(t) + u(t-1) - 2r(t-2) + 2r(t-3)	**04**
Q.2	**(a)**	(i) Evaluate x = $\int_{-5}^{5}(t^3 + 4t - 1)[\delta(t-2)]dt$	**04**
		(ii) If x(t) = u(t+1) + 2u(t) - u(t-1) – 2u(t-2) sketch x(-t)	**03**
	(b)	The impulse response of the system is $5e^{-10t}$ find its step response.	**07**
		OR	
	(b)	Find whether following system is linear/non-linear, time variant/invariant, memory/memoryless or causal/anticausal with justification. Y(t) = 4sin(x(t)) + 5cos(x(t))	**07**
Q.3	**(a)**	Find convolution of $x(t)=e^{-2t}$ u(t) and $h(t)=e^{-t}$ u(t).	**07**
	(b)	Explain following Fourier Transform properties: (i) symmetry (ii) Time shifting (iii) Scaling	**07**
		OR	
Q.3	**(a)**	Find the zero-state response of a stable LTIC system with frequency response H(s) = 1/(S+2) and the input is $x(t) = e^{-t}$ u(t)	**07**
	(b)	Write down the advantages of digital signal processing.	**07**
Q.4	**(a)**	Explain any seven properties of Z-transform in brief.	**07**
	(b)	Find the response of system with input x[n] =u[n] and system function $H[z] = \frac{4z}{z-0.5}$	**07**
		OR	
Q.4	**(a)**	Find z transform of the following functions (i) u[n] (ii) $\delta[n]$ (iii) a^n u[n]	**07**
	(b)	Let $(4)^n u[n] \leftrightarrow X(z)$. Find the signals F(n) and G(n) if $F(z) = x^2(z)$ and G(z) = x(2z).	**07**
Q.5	**(a)**	Explain Sampling Theorem.	**07**
	(b)	Derive the transfer function and necessary condition for distortionless transmission.	**07**
		OR	
Q.5	**(a)**	Write a note on correlation and its application in signal detection.	**07**
	(b)	Enlist the properties of DFT with explanation.	**07**

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