GUJARAT TECHNOLOGICAL UNIVERSITY BE - SEMESTER-VII EXAMINATION – WINTER 2015 Subject Code: 171704 Date:16/12/2015 Subject Name: Digital Signals and Systems			
Time: 1	Time: 10:30am to 1:00pm Total Marks: 70		
Instruction 1. 2. 3.	<ol> <li>Attempt all questions.</li> <li>Make suitable assumptions wherever necessary.</li> <li>Figures to the right indicate full marks.</li> </ol>		
Q.1	<b>(a)</b>	Determine the z-transform and sketch the ROC of $x(n) = \{a^n \sin \omega_n \} u(n)$	07
	(b)	What is aliasing? How it can be eliminated? State and explain the theorem related to this problem.	07
Q.2	(a) (b)	Give classification of signals in detail. Determine the zero state response of second order system described as difference equation $y(n) - 3y(n - 1) - 4 y(n-2) = x(n) + 2x(n - 1)$ , where $x(n) = 4^n u(n)$ OR	07 07
	(b)	A LTI system is characterized by system function $H(z) = \frac{3 - 4z^{-1}}{1 - 3.5 z^{-1} + 1.5 z^{-2}}$ Determine ROC and h(n) for 1. stable 2. causal 3. anticausal condition	07
Q.3		<ul> <li>For a given discrete time systems, check whether they are:</li> <li>(1) Static or dynamic</li> <li>(2) Linear or non-linear</li> <li>(3) Shift invariant or shift-varying</li> <li>(4) Causal or non-causal</li> <li>(5) Stable or unstable</li> <li>Explain with reasons:</li> <li>(i) e<sup>x(n)</sup> (ii) x(2n) (iii) Trunc[x(n)]</li> </ul>	14
Q.3		Obtain the linear convolution by graphical method of following sequences. $x(n) = \{5, 4, 3, 2, 1\}$ and $h(n) = \{1, 2, 2, 1, 1\}$	14
Q.4	(a)	Obtain Z-inverse of the following for ROC $z > 1$ and $z < 0.5$ . $X(Z) = 1$	07
	<b>(b)</b>	List out the symmetry properties of DTFT. OR	07
Q.4	(a) (b)	Explain Notch filters with respective waveform. Explain oversampling D/A Converters.	07 07
Q.5	(a) (b)	Explain the properties of Fourier transform in short. Explain forward DCT with necessary equations.	07 07
Q.5	(a) (b)	Derive the frequency sampling structures of IIR filters. Determine the lattice coefficient corresponding to FIR filter with system function $H(Z) = 1 + 13/24 Z^{-1} + 5/8 Z^{-2} + 1/3 Z^{-3}$	07 07

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