GUJARAT TECHNOLOGICAL UNIVERSITY BE – SEMESTER – V (NEW) EXAMINATION – WINTER 2015

Subject Name: Digital Signal Processing Time: 10:30am to 1:00pmTotal Marks: 70Instructions:1. Attempt all questions.2. Make suitable assumptions wherever necessary.3. Figures to the right indicate full marks.Q.1 (a) What is signal processing? Explain the advantages and disadvantages of Digital signal processing over Analog signal processing.07(b) For the following system, determine whether the system is stable, causal, linear, time-invariant, memoryless: $n+n_0$ 07Q.2 (a) Discuss aliasing in discrete time systems. $k = n-n_0$ 07(b) Determine the particular solution of the difference equation $y(n) = (5/6) y(n-1) - (1/6) y(n-2) + x(n)$ When the forcing function is $x(n) = 2^n u(n)$. OR07(b) Let $X(e^w)$ denote the fourier transform of the signal $x(n)$ $Perform the following calculations without explicitly evaluatingX(e^w):x(n) = \{-1, 0, 1, 2, 1, 0, 1, 2, 1, 0, -1\}111111111111111111107Q.3 (a) Discuss alias the properties of the Region of Convergence of z-transform isH(z) = (1 + z^1)/(1 - (1/2) z^1) (1 + (1/4) z^1)(1)What is the region of convergence of H(z) ?(1)11111111111107Q.3 (a) Discuss the Direct form -1, Direct form -11, Cascade andParallel structures to implement the discrete time systems.11111111111111111111111111111$	Subje Subje		Date:10/12/ 2015	
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OR		(b)		07
			OR	

Q.4	(a)	Design a single-pole low pass digital filter with a 3-dB bandwidth of 0.2 π , using the bilinear transformation applied to the analog filter Ha(s) = $\Omega c / (1 + (s / \Omega c))$		
	(b)	Consider the real finite-length sequence $x(n)$.		
		$x(n) = \{ 4, 3, 2, 1 \}$		
		(i)Sketch the finite length sequence $y(n)$ whose six-point		
		DFT is $Y(k) = W_6^{4k} X(k)$, Where X(k) is the six-point DFT		
		of x(n). (ii) Sketch the finite length sequence w(n) whose six-point		
		DFT is $W(k) = Re\{X(k)\}$		
		(iii) Sketch the finite length sequence $q(n)$ whose three-		
Q.5	(a)	point DFT is $Q(k) = X(2k)$, $k=0,1,2$ Determine $y(n)$ for	07	
Q.J	(a)	$x(n) = \{ 4, 3, 2, 1 \}, h(n) = \{ 1, 2, 3 \}$	07	
		$\uparrow \qquad \qquad \uparrow$		
		using 4-point DFT.Justify the corruption in the result.		
	(b)	Discuss the decimation-in-time FFT algorithm.	07	
~ -		OR	~ -	
Q.5	(a)	Enlist the applications of DSP. Explain any one application in brief.	07	
	(b)	•	07	
		Processors.		
