Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE SEMESTER– 7th EXAMINATION – SUMMER 2015

Subject code: 170706 **Date: 06/05/2015**

Subject Name: Computer Signal Processing

Time:02.30PM-05.00PM **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)**	Draw the block diagram of a typical digital signal processing system. Explain the functioning of each block.	**07**
	(b)	What are the properties of Linear Time Invariant (LTI) Systems ? Give examples of LTI systems.	**07**
Q.2	**(a)**	Discuss the properties of z-transform.	**07**
	(b)	Determine the z-transform of the following: (i) $x(n) = (-1/3)^n u(n) - (-1/2)^n u(-n-1)$ (ii) $x(n) = a^n$, $0 \leq n \leq N-1$	**07**
		OR	
	(b)	Discuss the aliasing effects in sampling a continuous time signal. What is the solution to nullify this effect?	**07**
Q.3	**(a)**	Determine the inverse z-transform of the following: (i)$X(z) = (1+z^{-1})^2 / (1-(1/2)z^{-1})(1-z^{-1})$, $\|z\| > 1$ (ii)$X(z)=\log(1+az^{-1})$, $\|z\| > \|a\|$	**07**
	(b)	Derive the expression of reconstruction of a bandlimited signal from its samples.	**07**
		OR	
Q.3	**(a)**	What is a linear phase system? Discuss different types of FIR linear phase systems.	**07**
	(b)	Discuss the following structures to implement the discrete time systems:Direct form – I, Direct form – II.,Cascade,Parallel form	**07**
Q.4	**(a)**	Compare linear convolution with circular convolution of sequences with suitable examples.	**07**
	(b)	Discuss the effects of coefficient Quantization in IIR systems	**07**
		OR	
Q.4	**(a)**	Discuss the design of Discrete-time IIR filters with following transformations: (i)Bilinear transformation (ii)Impulse invariance method	**07**
	(b)	What is windowing in FIR filter design?Discuss various windows.	**07**
Q.5	**(a)**	Discuss the Goertzel's algorithm.	**07**
	(b)	Discuss the properties of DFT.	**07**
		OR	
Q.5	**(a)**	Discuss decimation-in-time FFT algorithm.	**07**
	(b)	What are the key architectural features of a typical Digital Signal Processor ? Discuss with any suitable Digital Signal Processor currently available.	**07**

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