Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII EXAMINATION – SUMMER 2016

Subject Code:182402 **Date:05/05/2016**

Subject Name:Digital Signal Processing

Time:10:30 AM to 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) Define 1) Signal 2) System 3) Sampling (4) Quantization Give example of each. **07**

(b) Explain why sampling is required before converting analog signal into digital? **07**
$x = \cos[2\pi(10)t] + 10\cos[2\pi(100)t] + 5\cos[\pi(1000)t]$

Q.2 (a) State elementary discrete time signals. Draw their graph and write mathematical expression. **07**

(b) Examine following system function are time-invariant, linear, causal, stable, memory-less or not. (1) $y(t) = x\left(\frac{t^2}{2}\right)$ (2) $y(t) = \frac{d}{dt}\left(\frac{x}{5}\right)$ **07**

OR

(b) Examine whether following systems are static, linear, time-invariant, causal, linear or not.) (1) $y(n) = \cos[x(n)]$ (2) $y(n) = x(-n+2)$ **07**

Q.3 (a) Determine impulse response for two cascaded LTI systems having impulse response **07**

(1) $h_1(n) = \left(\frac{1}{2}\right)^n u(n)$ (2) $h_2(n) = \left(\frac{1}{4}\right)^n u(n)$

(b) Define cross correlation and auto correlation. Find out correlation of sequences **07**
$x(n) = \{2, \ 1, \ 3, \ 7, \ \underset{\uparrow}{1}, \ 2, \ -3\}$, $y(n) = \{1, \ -1, \ 2, \ -2, \ \underset{\uparrow}{4}, \ 1, \ -2, 5\}$

OR

Q.3 (a) State the relationship between z-transform and discrete time Fourier transform. Prove the relationship. **07**

(b) State Parseval's relation for DTFT. Also prove it. **07**

Q.4 (a) Find the inverse Z-transform of $x(z) = \frac{z}{3z^2 - 4z + 1}$; ROC: $|z| > 1$. **07**

(b) Find the Z-transform of x(n) = $(1/2)^n$ u(n) * $(1/4)^n$ u(n) using convolution property of Z-transforms. **07**

OR

Q.4 (a) Explain the architecture of general purpose DSP processors. **07**

Q.4 (b) Explain pipelining and MAC with respect to Digital Signal Processor **07**

Q.5 (a) With neat diagram, explain the structures for realization of FIR systems. **07**

(b) With neat diagram, explain the structures for realization of IIR systems. **07**

OR

Q.5	**(a)**	Prove the Time Reversal property of DFT. Also state the properties of Discrete Fourier Transform (DFT)	**07**
	(b)	Explain following. (1) Radix-2 FFT algorithm (2) DIT algorithm.	**07**

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