

Seat No.: _____

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GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VII • EXAMINATION – SUMMER • 2014****Subject Code: 171704****Date: 29-05-2014****Subject Name: Digital Signals and Systems****Time: 02:30 pm - 05:00 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 periodic signal and fundamental period and Determine the signal $X(t) = 2 \cos(6\pi t - \pi/3) + 4 \sin(10\pi t)$ is periodic? If so find its fundamental period. **4**
- (b)** For a given discrete system, check whether they are **10**
- (1) Time variant / Time invariant
 - (2) Stable / Unstable
 - (3) Linear / Nonlinear
 - (4) Causal / Anti causal
 - (5) Static / dynamic
- $Y(n) = e^{x(n)}$
 - $Y(n) = X(-n-1)$
- Q-2 (a)** Prove time shifting properties of Z transform and find Z transform and ROC of following signal. **7**
- $x(n) = (-3)^n u(-n-1)$
- (b)** What is aliasing effect and how it can be eliminated? **7**
- OR**
- Q-2 (a)** Explain various properties of ROC. **7**
- (b)** Find the inverse Z transform of following **7**
1. $X(Z) = \frac{1-0.5Z^{-1}}{1-0.25Z^{-2}} \quad |Z| > 1/2$
 2. $\square(\square) = \frac{Z^2}{(Z-2)(Z-1)^2}$
- Q-3 (a)** Define auto-correlation and cross correlation and Compute the cross-correlation between $x(n) = \{1, 1, 0, 1\}$ and $y(n) = \{4, -3, -2, 1\}$ **7**
- (b)** Perform circular convolution of following signal $x_1(n) = \{1, 2, 3, 4, 5\}$ **7**
- $x_2(n) = \{1, 1, 2, 2\}$
- OR**
- Q-3** Find out the solution of second order difference equation **14**
- $Y[n] - 1.8Y[n-1] + 0.81Y[n-2] = 2^{-n} \quad ; n \geq 0$
- Q-4 (a)** Obtain Direct form I and II and cascade form realization of a system described by **7**
- $Y(n) - 3/4Y(n-1) + 1/8Y(n-2) = X(n) + 1/2X(n-1)$
- (b)** List out and prove properties of DFT. **7**
- OR**
- Q-4 (a)** Plot the magnitude and phase spectrum of the damped data sequence $\{2, 0, 0, 1\}$, which was obtaining using a sample frequency of 20 KHz. $N=4$. **7**
- (b)** Explain lattice structure of FIR filter **7**
- Q-5 (a)** Compute 4 point DFT of the given sequence $x[n] = \{1, 0, 1, 0\}$ **7**
- (b)** Explain notch filter. **7**
- OR**
- Q-5(a)** Draw the ideal characteristic of filters. Explain Bandpass filter. **7**
- (b)** Explain oversampling of D to A converter **7**
