

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VII • EXAMINATION – WINTER • 2014

Subject Code: 171704

Date: 27-11-2014

Subject Name: Digital Signals and Systems

Time: 10:30 am - 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)** Give classification of signals with neat sketch and respective mathematical representation. **07**
- (b)** Implicate the sampling theorem for removal of aliasing problem. **07**
- Q.2 (a)** Calculate the auto correlation of sequence $x(n) = \{1, 2, 1, 1\}$ **07**
- (b)** Determine zero input response of system described by homogeneous second order difference equation $y(n) - 3y(n-1) - 4y(n-2) = 0$. **07**
- OR**
- (b)** Give the properties of auto correlation and cross correlation. **07**
- Q.3 (a)** List out the properties of Z transformation with suitable detail. **07**
- (b)** Derive the Z transformation for $x(n) = a^n (\sin \omega_0 n) u(n)$ **07**
- OR**
- Q.3 (a)** Determine inverse Z transformation by power series expansion method. **07**
- $X(z) = 1/(1 - 1.5z^{-1} + 0.5z^{-2})$
- For ROC $|z| > 1$ and ROC $|z| < 0.5$
- (b)** Derive symmetry properties of fourier transform for real, real odd, real even and purely imaginary signals. **07**
- Q.4 (a)** Explain digital resonator in detail with neat sketch. **07**
- (b)** Explain all pass filter with frequency domain analysis in detail. **07**
- OR**
- Q.4 (a)** Explain digital to analog converter with neat sketch and logical explanation. **07**
- (b)** Explain over sampling of analog to digital converter with neat sketch and logical explanation. **07**
- Q.5 (a)** Narrate the properties of DFT. **07**
- (b)** Narrate forward DCT with respective derivation. **07**
- OR**
- Q.5 (a)** Perform the circular convolution of two sequence $x_1(n) = \{1, 3, 5, 3\}$ and $x_2(n) = \{2, 3, 1, 1\}$ **07**
- (b)** Explain lattice structure for IIR system with necessary sketch and derivations. **07**
