

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER – I • EXAMINATION – WINTER • 2014****Subject code: 2714107****Date: 09-01-2015****Subject Name: Signal Analysis and Transform****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) Determine if the systems described by the following input-output equations are linear or nonlinear. 07

(I) $y(n) = x(n^2)$

(II) $y(n) = x^2(n)$

- (b) (I) State and Prove: Scaling Property of Z-Transform. 07
 (II) List the properties of DFT and explain any one.

- Q.2 (a) Compute Discrete Fourier Transform(DFT) of sequence: $X[n] = \{1, 0, 0, 1\}$ 07

- (b) Find the Inverse Z-Transform of the following using Partial Fraction Expansion (PEF) Method. 07

$$X[z] = \frac{1}{(1 - \frac{1}{3}Z^{-1})(1 - \frac{1}{6}Z^{-1})} \quad |Z| > \frac{1}{3}$$

OR

- (b) What is FFT? Explain Radix-2 Fast Fourier Transform (FFT) algorithm Fundamentally with necessary diagrams and equations. 07

- Q.3 (a) Write Short Note on: Discrete Cosine Transform 07
 (b) With necessary equations explain Continuous Wavelet Transform fundamentally 07

OR

- Q.3 (a) Explain Hilbert Transform fundamentally with necessary equations. 07
 (b) Write Short Note on: Multi Wavelet 07

- Q.4 (a) What is Signal Transform? Explain Walsh Transform with necessary equations. 07
 (b) With necessary equations explain Discrete Wavelet Transform fundamentally 07

OR

- Q.4 (a) Write Short note on: Properties of Eigen values and Eigen vectors of Hermitian matrices. 07
 (b) Write Short Note on: Haar Transform 07

- Q.5 (a) Find the Z-Transform for (1) $x(n)=na^n u(n)$ and (2) $x(n)=[3(2^n)-4(3^n)]u(n)$ 07
(b) Explain Linear Filtering approach to computation of the DFT with necessary equation and sketch. 07

OR

- Q.5 (a) Write note on: Stability of Linear Time-Invariant systems 07
(b) What do you understand by the term "Correlation of Discrete time signals"? 07
Explain the correlation of periodic sequences with necessary equations.
