Name.....

Reg. No.....

FOURTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2K SCHEME] EXAMINATION, APRIL 2013

EC/AI/IC 2K 403/EC 2K 403—SIGNALS AND SYSTEMS

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *question.*
Each question carries 5 *marks.*

I. (a) Define the following terms with an example for each :

(i) Discrete signal. (ii) Analog signal.

(iii) Random signal. (iv) Energy signal.

(v) Power Signal.

(b) What is a linear time invariant system ? Give an example of such a system. Justify your answer.

(c) Explain, with suitable examples, correlation of deterministic signals.

(d) Explain sampling theories.

(e) Define discrete Fourier transform and Laplace transform.

(f) Discuss on the stability of a discrete time LTI system.

(g) Explain about the unit circle on complex z-plane.

(h) Find the z-transform of $n^2 u(n)$.

(8 × 5 = 40 marks)

Part B

Answer **all** *question.*
Each question carries 15 *marks.*

II. (a) Check for the stability of the following systems :—

(i) $y(n) = \cos[x(n)]$.

(ii) $y(nT) = 2x(nT) + x(nT - T) + 2y(nT - T)$.

Or

(b) Find the impulse response of a system described by the different

$$\tau_0 \frac{dy(t)}{dt} + y(t) = x(t), -\infty < t < \infty.$$

Turn over

III. (a) Define Hilbert transform. State and prove its properties.

Or

(b) (i) Write notes on power spectral density of a signal.

(ii) Discuss the condition for distortionless transmission through an LTI system.

IV. (a) Derive the DFT of the sample data sequence $\{1, 1, 2, 2, 3, 3\}$ and compute the corresponding amplitude and phase spectrum.

Or

(b) Use Convolution, to find the :

(i) Inverse Laplace transform of $\frac{1}{s(s+1)}$.

(ii) Discuss on the frequency response of a system using s-plane.

V. (a) Find the inverse z-transform of :

(i) $H(z) = \frac{-4 + 8z^{-1}}{1 + 6z^{-1} + 8z^{-2}}$.

(ii) State and prove any 4 properties of z-transform.

Or

(b) Discuss about the frequency response of a system using z-plane.

(4 × 15 = 60 marks)