

## EC 225 SIGNALS & SYSTEMS

*Class: II/IV B.Tech. II Semester.*

*Branch: ECE, EIE, EEE*

*Duration of University Examination: 3 hours*

*Lectures:3,Tutorials:1*

*University Examination: 100 marks*

*Sessionals: 50 marks*

### UNIT-I

**Signals – Signals and their representation**, classification of signals, singularity functions – Impulse, step, ramp functions, representation of signals with singularity functions, exponential functions.

**Systems:** Definition, Classification of Systems, Convolution integral, graphical convolution.

**Signal Approximation** – Approximation of a function by a set of mutually orthogonal functions, mean square error, complete set of orthogonal functions orthogonality in complex functions, Trigonometric and exponential Fourier series, representation of periodic functions by Fourier series, complex Fourier spectrum.

### UNIT-II

**Fourier Transforms and their applications to systems** – Fourier transform definition, properties of F.Ts, energy spectral density, Parseval's theorem, power spectral density, Hilbert transforms and properties.

**Linear Systems** – impulse response, response of a linear system, linear time invariant system, linear time variant system, transfer function of LTI system.

### UNIT-III

**Random Variables & Processes** – Probability, Joint Probability, Statistical independence, Random Variables, cumulative distribution function, probability density function, relation between probability & probability density, joint commutative distribution, average value of random variables, variance of a random variable, Chebyshev's inequality, the Gaussian probability density, the error function, Rayleigh probability density, mean & variance of the sum of random variables, correlation between random variables, central limit theorem.

### UNIT-IV

**Discrete Time Signals & Systems:** Discrete time signals, representation, operations on sequences, Discrete time systems and classification, LTI systems, Linear Convolution, Difference equations.

**Z-Transforms:** ROC, properties of Z-Transforms Inverse Z-Transforms, Causality and stability.

**Realization of Discrete Systems:** Structural realization of discrete systems – Direct form – I, Direct form-II, Cascade and parallel forms.

#### TEXT BOOKS:

1. Simon & Haykins, Signals & Systems, Wiley Eastern Ltd.,
2. Zeimer, Signals & Systems, PHI.
3. Proakis, Digital Signal Processing: Principles, Algorithms and Applications.(PHI)
4. Simon & Haykin – “ Signals & Circuits” – John Willey

#### REFERENCE BOOKS:

1. Oppenheim, Willsky & Young; Signals and Systems PHI, EEE, New Delhi.
2. P-Z Peebles – Probabilities, Random Variables and Random Signal Principles – TMH.
3. B.P. Lathi, Signals & Systems and Communication – BSP.