INTRODUCTION TO SIGNALS AND SYSTEMS
(Professional Elective-I)

Course Code: 15EE1122

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Pre requisites:

Mathematics – I, II & III.

Course Outcomes:

At the end of the course, a student will be able to:

CO 1 Perform the basic operations on the signals and classify various types of signals

CO 2 Solve the convolution integral, convolution sum and represent the system via block diagrams.

CO 3 Apply Fourier series and Fourier Transform for signal analysis

CO 4 Apply sampling theorem to sample and reconstruct an analog signal.

CO 5 Analyze LTI systems using Z-transforms.

UNIT-I **(10 Lectures)**

SIGNALS:

Signal Definition, Continuous time , Discrete time and digital signals, Elementary continuous time signals, representation of DT signals, Elementary DT signals, Basic operations on signals, Classification of Signals, Problems.

UNIT-II **(10 Lectures)**

SYSTEMS:

The Representation of Signals in terms of Impulses, Continuous-Time LTI systems: The Convolution Integral, Discrete-Time LTI systems: The Convolution sum, Properties of Linear Time-Invariant

Systems, Systems Described by Differential and Difference Equations, Block-Diagram Representations of LTI systems described by differential equations and difference equation.

UNIT-III (10 Lectures)

FOURIER SERIES & FOURIER TRANSFORM:

Fourier series representation of continuous time periodic signals. Properties of Fourier series. Examples of continuous time filters described by differential equations.

Representation of periodic signals: The CT Fourier transform. The Fourier transform for periodic signals. Properties of continuous time Fourier transform.

UNIT-IV (10 Lectures)

SAMPLING:

Introduction, Representation of continuous time signals by its samples: The sampling theorem. Reconstruction of a signal from its samples using interpolation. The effect of under sampling: aliasing.

UNIT-V (10 Lectures)

THE Z-TRANSFORM & PROPERTIES:

Introduction, the Z-transform, The region of convergence for the Z-Transform, Some common Z-Transform pairs, analysis and characterization of linear time invariant systems using Z-transforms.

TEXT BOOKS:

1. Signals and Systems – P. Ramesh babu, R. Ananda Natrajan, 3rd Edition, SCITECH Publications. (UNIT – I)
2. Signals and systems – A.V.Oppenheim, A.S.Willsky and S.H.Nawab, PHI, 2nd Edition, 1997. (UNITS–II, III, IV, V)

REFERENCES:

1. Simon Haykin and Van veen, Wiley, *"Signals & Systems"*, 2nd Edition, 2002.
2. P.Rama Krishna Rao, *"Signals & Systems"*, 1st Edition, TMH, 2008.

3. Robert, *"Signals & Systems Analysis Using Transformation Methods & MATLAB"*, TMH, 2003.
4. C.L.Philips, J.M.Parr and Eve A.Riskin, *"Signals, Systems and Transforms"*, Pearson Education. 3rd Edition, 2004.
5. Sanjay Sharma, *"Signals and Systems with MATLAB programs"*, S.K.Publication, 5th Edition, 2005.