INTRODUCTION TO SIGNALS AND SYSTEMS

Course Code:13EE1107

L	T	P	C
4	0	0	3

Pre requisites: Mathematics – I, II & III.

Course Outcomes:

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

CO 1 Classify various types of signals and systems, represent and manipulate signals .

CO 2 Apply Fourier series and Fourier Transform for signal analysis .

CO 3 Apply sampling theorem to sample and reconstruct an analog signal.

CO 4 Illustrate what happens when signals pass through linear systems.

CO 5 Analyze LTI systems using Z-transforms.

UNIT-I (12 Lectures)

SIGNALS AND SYSTEMS:

Introduction, Signals, Transformations of the Independent Variable, Basic continuous-Time Signals, Basic Discrete – Time Signals, Systems, Properties of Systems.

The Representation of Signals in terms of Impulses, Discrete-Time LTI systems: The Convolution sum, Continuous-Time LTI systems: The Convolution Integral, Properties of Linear Time-Invariant Systems, Systems Described by Differential and Difference Equations, Block-Diagram Representations of LTI systems described by Differential Equations.

UNIT-II (12 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-III (12 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-IV (12 Lectures)

SIGNAL TRANSMISSION THROUGH LINEAR SYSTEMS:

Linear system, impulse response, response of a linear system, linear time invariant(LTI) system, Transfer function of LTI system, filter characteristics of linear systems, Distortion less transmission through a system, Signal bandwidth, Ideal LPF,HPF and BPF characteristics, Causality and Poly-wiener criterion for physical realization.

UNIT-V (12 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, Block diagram representations

TEXT BOOKS:

1. Signals and systems – A.V.Oppenheim, A.S.Willsky and S.H.Nawab, PHI, 2nd Edition, 1997. (UNITS – I, II, III, V)
2. Communications Systems – B.P.Lathi, BS Publications. (UNIT – IV)

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.