ECE220:SIGNAL AND SYSTEMS

L:3 T:1 P:0 Credits:4

Course Outcomes: Through this course students should be able to

CO1 :: understand the basic operations and signal properties for continuous and discrete time signals

CO2 :: determine the response of LTI systems and their properties.

CO3 :: analyze the frequency domain characteristics of signals through Fourier series and Fourier transform.

CO4 :: apply sampling theorem to convert continuous time signals to discrete time signals

CO5 :: develop the solution of differential equations using Laplace transforms

CO6 :: create the solution of difference equations using Z transforms

Unit I

Introduction to Signals : Continuous time and discrete time signals : energy and power signals, Transformations of the independent variable : periodic signals, even and odd signals, Exponential and sinusoidal signals, The unit impulse and unit step functions, Operations on signals, Software Simulation of Basic Operations on Elementary Signals

Unit II

Linear time-invariant systems : Introduction, discrete time LTI systems: the convolution sum, Continuous time and discrete time systems, Basic system properties, Continuous time LTI systems: the convolution integral, Properties of linear time invariant systems, Causal LTI systems described by differential and difference equations, Software simulation of convolution and correlation

Unit III

Fourier series representation of periodic signals : Introduction, fourier series representation of continuous time periodic signals, Convergence of the fourier series, Properties of continuous time fourier series, Software simulation of frequency spectrum of periodic signals

Unit IV

The Continuous Time Fourier Transform : Introduction, representation of aperiodic signals: the continuous time fourier transform, The fourier transform for periodic signals, Software simulation of frequency spectrum of real world signals, Properties of continuous time fourier transform

Sampling : Introduction, representation of continuous time signal by its samples: sampling theorem, Reconstruction of a signal from its samples using interpolation, The effect of undersampling: aliasing, Software simulation of effect of undersampling

Unit V

The laplace transform : Introduction, the laplace transform, the region of convergence for laplace transforms, The inverse laplace transform, Geometric evaluation of the fourier transform from the pole zero plot, Properties of the laplace transform, Analysis and characterisation of LTI systems using the laplace transforms, Software simulation of system representation and pole zero analysis

Unit VI

The Z- transform : Introduction, the z-transform, The region of convergence for the z transform, Properties of the z -transform, The inverse z transform, Analysis and characterisation of LTI systems using z-transforms, Software simulation of system representation and pole zero analysis

Text Books:

1. SIGNALS AND SYSTEMS by A ANAND KUMAR, PHI Learning Pvt Ltd

References:

1. SIGNALS AND SYSTEMS by TARUN KUMAR RAWAT, Oxford Higher Education
2. SIGNALS AND SYSTEMS by ALAN.V.OPPENHEIM, PRENTICE HALL
3. SIGNAL AND SYTEMS by SIMON HAYKIN, WILEY