SIGNALS AND SYSTEMS (THEORY) EE-230

Pre-requisite: Circuit analysis-I, Linear algebra
Credit Hours 03
Contact Hours 48

RECOMMENDED BOOKS

- Signals & Systems by Alan V. Oppenheim, Prentice Hall

REFERENCE BOOKS

- Signals, Systems, and Transforms by Charles L. Phillips
- Signal and System by Nigoor A Kani

OBJECTIVE OF COURSE

The objective of this course is to familiarize with fundamental principles of signals and systems. Understand the representation and implementation of continuous time and discrete time signals and systems. Understand different type of continuous time and discrete time systems. Apply different techniques, like convolution, Fourier series etc. to continuous and discrete time signals. Apply Fourier principles for time to frequency domain conversion. Implement and process different type of signals and systems through MATLAB.

S.NO	CLO/PLOs MAPPING	DOMAIN	PLO
01	**Apply** the knowledge of mathematics and engineering to **analyze** continuous and discrete time signals.	C3, C4	01
02	**Identify**, formulate and solve problems related to signals and systems.	C1	02
03	**Apply** the principles to solve continuous and discrete time convolution problems, and perform time and frequency domain conversion.	C3	02
04	**Utilize** MATLAB tools to analyze and process continuous and discrete time signals and systems.	C4	05

COURSE CONTENTS

Fundamental Concepts of Signals & Systems

- Introduction
- Signals and Their Classification
- Basic Continuous and Discrete Time Signals
- Operations on Signals
- Systems and Classification of Systems
- Interconnections of Systems

Linear Time Invariant Systems

- Response of a Continuous Time LTI System and Convolution Integral
- Properties of Continuous and Discrete Time LTI System
- Response of a Discrete Time LTI System and Convolution Sum
- Eigen function of Continuous and Discrete Time LTI System
- Properties of Convolution
- Systems Described by Difference and Differential Equations

Laplace Transform and Continuous Time LTI Systems

- The Laplace Transform
- Laplace Transform of Some Common Signals
- Properties of Laplace Transform
- The Inverse Laplace Transform
- The System Function
- The Unilateral The Laplace Transform
- Solving Differential Equations by Using Laplace Transform

The z-Transform and Discrete Time LTI Systems

- The z-Transform
- z-Transform of some Common Signals
- Properties of z-Transform
- The Inverse z-Transform
- The System Function of Discrete Time LTI System
- The Unilateral z-Transform
- Solving Difference Equations by Using z-Transform

Fourier Analysis of Continuous Time Signals and Systems

- Fourier Series Representations of Periodic Signals
- The Fourier Transform
- Properties of Continuous time Fourier Transform
- The Frequency Response of Continuous Time LTI Systems
- Filtering and Bandwidth
- Modulation
- Sampling Theorem

Fourier Analysis of Discrete Time Signals and Systems

- Discrete Fourier Series
- Discrete Time Fourier Transform (DTFT)
- Properties of Discrete Time Fourier Transform
- The Frequency Response of Discrete time LTI Systems
- Discrete Fourier Transform (DFT)
- Properties of Discrete Fourier Transform (DFT)

- Circular Convolution
- Fast Fourier Transform (FFT)