16EE201 LINEAR SYSTEMS AND SIGNAL ANALASYS

Hours Per Week :

L	T	P	C
3	1	-	4

Total Hours :

L	T	P
45	15	-

WA/RA	SSH/HSH	CS	SA	S	BS
10	30	-	8	5	5

Course Description and Objectives:

This course deals with the fundamentals of linear systems, their properties and analyzing methods. The objective of this course is to make the student to understand concepts of Signals, Systems and apply the tools like transform analysis, convolution etc. to analyze the behavior of linear systems.

Course Outcomes:

The student will be able to:

- understand the classification of various signals and systems.
- model linear continuous-time systems.
- understand the limitaions of different representations and modelling approaches.
- apply Laplace and z transforms to determine the response of linear systems.
- understand the importance of linear systems analysis in Signal Processing systems.

SKILLS:

- ü *Simulate the test signals using MATLAB.*
- ü *Analyze non-sinusoidal signals using fourier representation.*
- ü *Identify system stability using impulse response.*
- ü *Analyze the harmonic content in a given signal.*
- ü *Analyze the system for application in signal processing.*

UNIT - 1 **L- 10, T-3**

SIGNALS IN NATURAL DOMAIN: Introduction to signals and systems, Description of signals, Description of systems, Properties of systems, Signal classification, Basic signals in detail, Representation of continuous and discrete time signals, Shifting and scaling operations.

UNIT - 2 **L-8, T-3**

SYSTEMS AND PROPERTIES: Description of systems, Properties of systems, Impulse representation, Linear time invariant systems, Properties of systems - Causality, Time invariance, Linearity, Systems with memory; LTI Continuous time systems, Convolution representation.

UNIT - 3 **L-9, T-3**

SIGNALS IN FREQUENCY DOMAIN: Introduction to transformations, Fourier series representation of periodic signals, Convergence of fourier series and Gibb's phenomenon, Fourier transform, Fourier transform of periodic signals and properties, Convolution theorem, Periodic convolution and Parseval's theorem.

UNIT - 4 **L-9, T-3**

LAPLACE TRANSFORM: Laplace transform, Properties of laplace transform, Inverse laplace transform, Rational system functions, Inverse laplace transform of rational functions, Analysis of LTI systems with rational system functions.

UNIT - 5 **L-9, T-3**

Z TRANSFORM : Z transform, Properties of Z transform, Inverse Z transform, Rational system functions, Inverse Z transform of rational functions, Analysis of LTI discrete systems with rational system functions, Sampling theorem.

TEXT BOOKS:

1. A.V. Oppenheim, A.S. Willsky and S.H. Nawab, "Signals and Systems", 2nd edition, Prentice Hall of India, 1997.
2. B.P.Lathi, "Linear Systems and Signals", 2nd edition, Oxford University Press, 2009.

REFERENCE BOOKS:

1. B.P. Lathi, "Signals,Systems & Communications", John Wiley, 1st edition, 2005.
2. Simon Haykin and Van Veen,Wiley, "An Introduction to Signals and Systems", 2nd edition, 2002.
3. John Alan Stuller, "An Introduction to Signals & Systems", 1st edition,Thomson, 2007.
4. H. PHsu "Signals & Systems", 2nd edition, Tata Mc-Graw-Hill Schaum's Outlines, 1995.

ACTIVITIES:

- *Choose an example system and define its properties and comment on stability.*
- *Choose a waveform represent in continuous domain and frequency domain.*
- *Choose a periodic waveform write a Fourier series representation analyze the harmonic contents.*
- *Choose a system find the impulse response of system.*
- *Choose a system find.*