Kadi Sarva Vishwavidyalaya

Faculty of Engineering & Technology

Third Year Bachelor of Engineering (EE)

(With effect from: Academic Year 2019-20)

Subject Code: EE506-N	Subject Title: Signals and Systems
Pre-requisite	

Course Objective:

This course aims to give an intermediate level of fluency with signals and systems in both continuous time and discrete time, in preparation for more advanced subjects in digital signal processing (including audio, image and video processing), communication theory, and system theory, control, and robotics.

Teaching scheme				Total Credit	Evaluation Scheme					
L	T	P	Total		Theory		IE Marks	CIA Marks	Pract. Marks	Total Marks
Hrs	Hrs	Hrs	Hrs		Hrs	Marks				
03	00	00	03	03	03	70	30	20	00	120

Outline of the Course:

Sr. No	Title of the Unit	Minimum Hours
1	Introduction to Signal and System.	9
2	Linear Time Invariant (LTI) System	6
3	Fourier Series Representation of Periodic signals	6
4	Fourier Transforms	6
5	Discrete Fourier Transform and Fast Fourier Transform	6
6	Laplace Transforms	6
7	Z-Transforms	6

Total Hours (Theory): 45
Total Hours (Lab): 00
Total Hours: 45

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Detailed Syllabus

Sr. No	Topic	Lecture Hours	Weightage(%)
1	**Introduction Signal and System.** Introduction, Classification of Signals, Multichannel and Multidimensional signal, Continuous time and discrete time signals, continuous valued and discrete valued signals, Deterministic and random signals, symmetrical and anti-symmetrical (odd) signals, Energy signal and power signal, characteristics of continuous time and discrete time signal, discrete time signal representation, standard test signals, operating upon signals, Classification of Systems, static and dynamic systems, Time invariant/ time invariant systems, Linear and non-linear system, Casual and non-casual system, stable and unstable system, inevitability, symbols used in discrete time system for block schematic representation.	**9**	**20**
2	**Linear time invariant (LTI) System** Introduction, Convolution sum, tabulation method, Commutative Law, Associative Law, Distributive Law, Stability criteria for Linear time invariant system, causality criteria for LTI system.	**6**	**15**
3	**Fourier Series representation of Periodic signals:** Introduction, Representation of Fourier series, existence of Fourier series, trigonometric form of Fourier series, cosine representation, wave symmetry, exponential Fourier series, Fourier spectrum, power representation using the Fourier series, Gibbs phenomena, properties of continuous time Fourier series.	**6**	**10**
4	**Fourier Transforms :** Introduction, Fourier transform representation of Non-periodic functions, Magnitude and phase representation of Fourier transforms, Existence of Fourier transforms, Fourier transforms of standard signals, Properties of continuous time Fourier transforms, Fourier transforms of a periodic signals, system analysis of a periodic signals, system analysis with Fourier transforms, introduction to Hilbert transforms, inverse Fourier transform.	**6**	**15**
5	**Discrete Fourier Transform and Fast Fourier Transform:** Discrete Fourier Transform (DFT), its properties; DFT-errors and their minimization; Fast Fourier Transform (FFT), FFT algorithm (Radix-2), Decimation in Time and Decimation in Frequency, Related problems.	**6**	**10**
6	**Laplace Transforms:** Introduction, Region of convergence, Existence of Laplace transform, advantages and limitations of Laplace transforms, Relation between Fourier transforms and Laplace transforms, Properties and theorems of Laplace transforms, inverse Laplace transforms.	**6**	**15**
7	**Z-Transforms:** Introduction, relation between DTFT and Z-transforms, Z-transforms of some common equation, Z-transforms and ROC of finite duration sequences, Properties of ROC, Properties of Z-transforms, Inverse Z-transforms, Transfer analysis of LTI systems, stability and causality, solution of difference equation using Z-Transforms.	**6**	**15**
	Total	**45**	**100**

Learning Outcome

On successful completion of the course

- Understand the concept of a signal and a system; evaluate the periodicity of a signal; Identify properties of continuous-time systems such as linearity, time-invariance, and causality.
- Compute convolution of continuous-time functions.
- Linear system, its use to describe the input/output relationship. Compute the Fourier series representation of a periodic function; evaluate the response of a linear time-invariant system to periodic inputs. Evaluate the Fourier transform of a continuous function, and be familiar with its basic properties.
- Understand DFT and FFT.

Text Book:

- Signals and Systems by A.Anand Kumar, PHI Publication.
- N. G. Palan, "Digital Signal Processing", Tech Max Publication.

Reference Books:

- J. Nagrath, S. N. Sharan, " Signals and Systems" , Tata Mc Graw Hill Publication
- Alan V Oppenheim, Alan S Willsky and A Hamid Nawab, "Signal and Systems", Pearson Education Asia/ PHI.
- Ganesh Rao and Satish Tunga, "Signals and Systems", Sanguine Technical Publishers.
- Electronics Devices and circuits by David A.Ball by Oxford publishing.
- A. G. Phadke, "Power System Relaying".
- B. P. Lathi, "Linear Systems and Signals", Oxford University Press.