

Branch Name:	Electrical Engineering
Program Code:	ET109
Course Name:	Signals and Systems
Course Code:	1ET1090504
Pre-requisite Course:	Mathematics (basic knowledge of difference, differential and integral equations), Electrical Circuits and Networks

Course Objectives:

1. This course provides strong foundation on signals and systems which is the base of communication and signal processing.
2. The students will learn basic Continuous Time and Discrete Time Signals and Systems.
3. Student will understand application of various transforms for analysis of Signals and Systems for both Continuous Time and Discrete Time.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)								
Lecture	Tutorial	Practical	Credit	Theory				Practical				Total
				University Assessment		Continuous Assessment		University Assessment		Continuous Assessment		
				Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
3	-	-	3	28	70	12	30	-	-	-	-	100

Course Contents:

Sr. No.	Topic	Total Hours	Weightage (%)
1	Basic definitions, Classification of signals and systems. Signal operations and properties. Basic Continuous Time Signals, Signal sampling and quantization, Discretization of Continuous Time signals, Discrete Time Signals. Basic system properties, Representation of Digital Signals.	08	20
2	Impulse response characterization and convolution integral for CT- LTI system, signal responses to CT-LTI system, properties of convolution, LTI system response properties from impulse response.	08	20
3	Impulse response characterization and convolution sum, Causal signal response to DT-LTI systems. Properties of convolution summation, Impulse response of DT-LTI system. DT-LTI system properties from Impulse response. System analysis from difference equation model.	09	25
4	Representation of periodic functions, Fourier series, Frequency spectrum of Aperiodic signals, Fourier Transform, Relation between Laplace Transform and Fourier transform and its properties, Introduction to DTFT and DFT.	08	20
5	The z-Transform, Convergence of z-Transform, Basic z-Transform, Properties of z-Transform, Inverse z-Transform and Solving difference equations using z-Transform.	08	15

Reference Books:

1. Signals and Systems by Alan V. Oppenheim, Alan S. Willsky and Nawab, Prentice Hall, 2006.
2. Signal and Systems By Anand Kumar, 3rd Edition, PHI, 2013.
3. Signals and Systems by K. Gopalan, Cengage Learning (India Edition), 2017.
4. Signals and Systems by Michal J. Roberts and Govind Sharma, Tata Mc-Graw Hill Publications, 2012.
5. Signals and Systems by Simon Haykin and Bary Van Veen, Wiley- India Publications, 2005.
6. Signal, Systems and Transforms by Charles L. Philips, J. M. Parr and E. A. Riskin, Pearson Education, 2007.

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Understand about various types of signals, classify them, analyze them, and perform various operations on them.	2 Understanding
CLO2	Understand about various types of systems, classify them, analyze them and understand their response.	2 Understanding
CLO3	Use of Fourier and Laplace's transforms in analysis of Signals and System.	3 Applying
CLO4	Identify Signals and Systems for observing effects of applying various properties and operations.	1 Remembering 3 Applying
CLO5	Analyze z-Transform.	4 Analyze
CLO6	Applying difference equations using z-Transform.	3 Applying

Mapping of CLOs with POs & PSOs

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes(PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CLO1		L			M						L				L	
CLO2			L				H		M	L		L		L		L
CLO3	M			L		L		L							L	
CLO4			L		L								L			
CLO5		M					L					M		L	L	
CLO6			H							M	M					L

H: High, M: Medium, L: Low