

Branch Name:	Signal Processing and Communication
Program Code:	ET214
Course Name:	Signal Analysis and Transforms
Course Code:	2ET2140102T
Pre-requisite Course:	Signals and System and Calculus

Course Objectives:

1. Understand the basic concepts of various systems and signal processing and the way the signals interact with the physical systems.
2. To study basics of continuous time and discrete time signals and systems.
3. Understand application of various transforms for analysis of signals and systems both continuous time and discrete time.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								Total (Marks)
					Theory (Marks)				Practical (Marks)				
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
3	3	-	-	3	24	60	16	40		-	-	-	100

Subject Contents				
Sr. No	Topic	Total Hours	Weight (%)	
1	Signal Transformation: Need of Transformation, Fourier series–Trigonometric and Exponential Fourier series, Fourier transformation of continuous and discrete time signals and their properties. Laplace transformation–analysis with examples and properties. Relation between Laplace Transform and Fourier Transform, Parseval's theorem; Convolution in time (both discrete and continuous) and frequency domains with magnitude and phase response of LTI systems	08	20	
2	Z-Transform: The direct Z T, Region of convergence, Z-plane and S plane correspondence. Inverse ZT, Properties of Z-transforms, Solution to linear difference equations, System Transfer function. Discrete Fourier series, Sampling the z-transform	08	20	
3	Discrete Time Fourier Transform (DTFT): Definition, properties of DTFT, Discrete Fourier Transform (DFT), properties of DFT, Linear convolution using DFT. Linear filtering methods based on the DFT, Fast Fourier Transform, applications of FFT algorithms, Linear filtering, Approach for computation of the DFT, quantization effects in the computation of DFT, Linear Convolution: Graphical interpretation, properties of convolution, Correlation: Auto And Cross correlation, graphical interpretation, properties of correlation.	08	20	
4	Definition, properties, examples of Fourier Cosine Transform, Fourier Sine Transform, Discrete Cosine Transform, Discrete Sine Transform. Walsh Transform, Hadamard Transform, Haar Transform, Slant Transform	08	20	

5	Definition,spectra,propertiesandexamplesofHartleyTransform,HilbertTransform,RadonTransform,HankelTransform	07	20
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List of Text Book:

1. “Digital Signal Processing – Principles, Algorithms and Application”, John G. Proakis, Dimitris G. Manolakis, PHI Publication.
2. “Signal Analysis”, Athanasios Papoulis, McGraw Hill, New York, 1977.
3. “Transform and Application Handbook”, Alexander D. Poularikas, CRC Press, Taylor and Francis Group.
4. “Digital Image Processing”, S. Jayaraman, S. Esakkirajan, T. Veerakumar, Tata McGraw Hill Education.
5. “Digital Image Processing”, Rafael C. Gonzalez, Richard E. Woods, Pearson Publication

List of Reference Books:

1. “Modern Digital and Analog Communication Systems”, B. P. Lathi, Zhi Ding, International Fourth Edition, Oxford University Press
2. “Signals and Systems”, A. V. Oppenheim, A. S. Willsky and Nawab, Prentice Hall
3. “Signals and Systems”, Simon Haykin, B. V. Veen, Wiley-India Publication

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 signal Transform, classify them, analyze them, and perform various operations on them.	2 Understanding 4 Analyze
CLO2	Understand about Z-transform and their response behavior.	2 Understanding
CLO3	Appreciate use of transforms in analysis of signals and system.	2 Applying 4 Analyze
CLO4	Carry simulation on signals and systems for observing effects of applying various properties and operations.	3 Applying
CLO5	Learn the concept of Hartley Transform, Hilbert Transform, Radon Transform, Hankel Transform	2 Understanding
CLO6	Create strong foundation of communication and signal processing	6 Create

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						H	H	M	L	
CLO2		H	M	M	L					L		H		M	L	
CLO3		M	H		L									H		L
CLO4		M	H		L			L					L		M	H
CLO5	H	M	H		L				L			H	L		M	H
CLO6	H	M	H		L							M	L		M	H

H:High, M:Medium, L:Low