SWARNANDHRA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

Narsapur, West Godavari District, A.P. 534280

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

TEACHING PLAN

Course Code	CourseTitle	Semester	Branches	Contact Periods /Week	Academic Year	Date of commencement of Semester
23EC3T01	Signals & Systems (R23)	III	ECE-A, B, C, D&E	5	2025-2026	09/07/2025

COURSE OUTCOMES: After completion of the course students are able to	
1	Differentiate the various classifications of signals and systems (K3)
2	Analyze the frequency domain representation of signals using Fourier concepts (K4)
3	Classify different LTI Systems along with explanation on sampling process and various types of sampling techniques.(K2)
4	Apply Lap lace and z-transforms to analyze signals and Systems (continuous & discrete) (K3)

UNIT	Out Comes / Bloom's Level	Topic No.	Topics/Activity	Text Book / Reference	Contact Hour	Delivery Method
		UNIT-1: INTRODUCTION TO SIGNALS AND SYSTEMS				
I	CO1:Differentiate the various classifications of signals and systems (K3)	1.1	Definition of Signals and Systems, Classification of Signals	T1, T2	1	Chalk & Talk, Smart Board, PPT and Tutorial
		1.2	Classification of Systems	T1, T2	1	
		1.3	Operations on signals: time-shifting, time-scaling, amplitude-shifting, amplitude-scaling . Related problems.	T1, T2	1	
		1.4	Problems on classification and characteristics of Signals and Systems.	T1, T2	1	
		1.5	Complex exponential and sinusoidal signals,	T1, T2	1	
		1.6	Singularity functions and related functions: impulse function and ramp function.	T1, T2	1	
		1.7	step function and signum function	T1, T2	1	
		1.8	Analogy between vectors and signals, orthogonal signal space	T1, T2	1	
		1.9	Signal approximation using orthogonal functions	T1, T2	1	
		1.10	Mean square error	T1, T2	1	
		1.11	closed or complete set of orthogonal functions	T1, T2	1	
		1.12	Orthogonality in complex functions	T1, T2	1	
		1.13	Related problems	T1, T2	1	
		Total			13	

		UNIT- 2				
II	CO2:Analyze the frequency domain representation of signals using Fourier concepts (K4)	2.1	Fourier series representation of continuous time periodic signals, Dirichlet's conditions	T1	1	Chalk & Talk, Smart Board, PPT and Tutorial
		2.2	properties of Fourier series	T1	1	
		2.3	Trigonometric Fourier series and Exponential Fourier series,	T1	1	
		2.4	Relation between Trigonometric and Exponential Fourier series, Complex Fourier spectrum.	T1	1	
		2.5	Deriving Fourier transform from Fourier series	T1	1	
		2.6	Fourier transform of arbitrary signal	T1	1	
		2.7	Fourier transform of standard signals	T1	1	
		2.8	Fourier transform of periodic signals, problems.	T1	1	
		2.9	properties of Fourier transforms	T1	1	
		2.10	Fourier transforms involving impulse function and Signum function.	T1	1	
		2.11	Introduction to Hilbert Transform	T1	1	
		2.12	Problems on Fourier series	T1	1	
		2.13	Problems on Fourier Transforms	T1	1	
Total					**13**	

		UNIT-3				
III	CO3:Classify different LTI Systems along with explanation on sampling process and various types of sampling techniques.(K2)	3.1	Introduction, Linear system	T1	1	Chalk & Talk, Smart Board, PPT and Tutorial
		3.2	Impulse response	T1	1	
		3.3	Response of a linear system	T1	1	
		3.4	Linear time invariant (LTI) system, Linear time variant(LTV) system.	T1	1	
		3.5	Concept of convolution in time domain and frequency domain	T1	1	
		3.6	Graphical representation of convolution	T1	1	
		3.7	Transfer function of a LTI system, Related problems.	T1	1	
		3.8	Filter characteristics of linear systems.	T1	1	
		3.9	Distortion less transmission through a system, Signal bandwidth, system bandwidth	T1	1	
		3.10	Ideal LPF, HPF and BPF characteristics	T1	1	
		3.11	Causality and Poly-Wiener criterion for physical realization	T1	1	

		3.12	Relationship between bandwidth and rise time	T1,T2	1	
		3.13	Related problems		1	
		Total			**13**	

		UNIT - 4 CONVOLUTION AND CORRELATION				
IV	CO3:Classify different LTI Systems along with explanation on sampling process and various types of sampling techniques.(K2)	4.1	**CORRELATION:** Auto-correlation and cross-correlation of functions, properties of correlation function	T1	1	Chalk & Talk, Smart Board, PPT and Tutorial
		4.2	Energy density spectrum, Parseval's theorem, Power density spectrum,	T1	1	
		4.3	Relation between Convolution and correlation,	T1	1	
		4.4	Detection of periodic signals in the presence of noise by correlation,	T1	1	
		4.5	Extraction of signal from noise by filtering.	T1	1	
		4.6	**SAMPLING THEOREM:** Graphical and analytical proof for Band Limited Signals		1	
		4.7	Impulse sampling	T1	1	
		4.8	Natural Sampling, Flat top Sampling	T1, T2	1	
		4.9	Reconstruction of signal from its samples , Effect of under sampling –Aliasing	T1, T2	1	
		4.10	Introduction to Band Pass sampling, Related problems	T1, T2	1	
		4.11	Related problems		1	
		Total			**11**	

		UNIT – 5:				
V		5.1	**LAPLACE TRANSFORMS:** Introduction, Concept of region of convergence (ROC) for Laplace transforms	T2	1	
		5.2	Constraints on ROC for various classes of signals	T2	1	

	CO4:Apply Lap lace and z-transforms to analyze signals and Systems (continuous & discrete) (K3)	5.3	Properties of L.T's	T2	1	Chalk & Talk, Smart Board and PPT
		5.4	Inverse Laplace transform,	T2	1	
		5.5	Relation between L.T's, and F.T. of a signal.	T2	1	
		5.6	Laplace transform of certain signals using waveform synthesis.	T2	1	
		5.7	**Z–TRANSFORMS:** Concept of Z-Transform of a discrete sequence.	T2	1	
		5.8	Region of convergence in Z- Transform, constraints on ROC for various classes of signals,	T2	1	
		5.9	Inverse Z- transform,	T2	1	
		5.10	properties of Z-transforms.	T2	1	
		5.11	Distinction between Laplace, Fourier and Z transforms.	T2	1	
		5.12	Problems on Laplace Transforms	T2	1	
		5.13	Problems on Z- Transforms	T2	1	
Total					**13**	
Content beyond Syllabus (if needed)			Applications of signals and sampling in communication.	T1,T2	1	Chalk & Talk
			Filter design using Transform techniques.	T1,T2	1	
CUMULATIVE PROPOSED PERIODS					**65**	

Text Books:	
S.No.	**AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION**
1.	Signals, Systems&Communications-B.P.Lathi,BSPublications,2003.
2.	Signals and Systems-A.V. Oppenheim, A.S. Willsky and S.H. Nawab,PHI,2ndEdn,1997
3.	Signals &Systems-Simon Haykinand VanVeen,Wiley,2nd Edition,2007
Reference Books:	
S.No.	**AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION**
1.	Simon Haykin and Barry Van Veen, Signals and Systems, 2nd Edition, Wiley India (P) Ltd, 2021.
2.	John G. Proakis and Manolakis, Digital Signal Processing, Principles, Algorithms and Applications, 4th Edition, Pearson Education, 2016.
Web Details:	
1.	https://nptel.ac.in/courses/117/101/117101055/
2.	https://www.tutorialspoint.com/signals_and_systems/signals_and_systems_overview.htm
3.	https://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/

		Name	Signature with Date
i.	Faculty I	Dr. B.S. Rao	
ii.	Faculty II (for common Course)	Dr. B. Ramana Kumar	
iii.	Faculty III (for common Course)	Dr. M. Koteswara Rao	
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