SARDAR RAJA COLLEGES

SARDAR RAJA COLLEGE OF ENGINEERING ALANGULAM

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

MICRO LESSON PLAN

SUBJECT NAME	**: SIGNALS AND SYSTEMS**
SUBJECT CODE	**: EC6303**
SEMESTER	**: III**
YEAR	**: II**

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Asst,Prof./ ECE Dept.,

SUBJECT DESCRIPTION AND OBJECTIVES

DESCRIPTION:

This subject introduces analyse characteristics of continuous, discrete signals and systems. Topics include signals and systems, signal: "A detectable physical quantity or impulse (as a voltage, current, or magnetic field strength) by which messages or information can be transmitted." or “A signal is a function of independent variables that carry some information.""A signal is a physical quantity that varies with time, space or any other independent variable by which information can be conveyed"

Signal: a function representing some variable that contains some information about the behavior of a natural or artificial system. Signals are one part of the whole. Signals are meaningless without systems to interpret them, and systems are useless without signals to process.eg. The energy (a traveling wave) that carries some information, an electrical circuit signal may represent a time-varying voltage measured across a resistor.

A signal can be represented as a function x (t) of an independent variable t which usually represents time. If t is a continuous variable, x (t) is a continuous-time signal, and if t is a discrete variable, defined only at discrete values of t, then x (t) is a discrete-time signal. A discrete-time signal is often identified as a sequence of numbers, denoted by x[n], where n is an integer.

A system takes some input and produces some output. It performs some operations on the signals.

OBJECTIVE

- To understand the basic properties of signal & systems and the various methods of classification
- To learn Laplace Transform &Fourier transform and their properties
- To know Z transform & DTFT and their properties
- To characterize LTI systems in the Time domain and various Transform domains

EC6303 SIGNALS AND SYSTEMS L T P C 3 1 0 4

UNIT I CLASSIFICATION OF SIGNALS AND SYSTEMS 9

Continuous time signals (CT signals) - Discrete time signals (DT signals) - Step, Ramp, Pulse, Impulse, Sinusoidal, Exponential, Classification of CT and DT signals - Periodic & Aperiodic signals, Deterministic & Random signals, Energy & Power signals - CT systems and DT systems- Classification of systems – Static & Dynamic, Linear & Nonlinear, Time-variant & Time-invariant, Causal & Noncausal, Stable & Unstable.

UNIT II ANALYSIS OF CONTINUOUS TIME SIGNALS 9

Fourier series analysis-spectrum of Continuous Time (CT) signals- Fourier and Laplace Transforms in CT Signal Analysis - Properties.

UNIT III LINEAR TIME INVARIANT- CONTINUOUS TIME SYSTEMS 9

Differential Equation-Block diagram representation-impulse response, convolution integrals-Fourier and Laplace transforms in Analysis of CT systems

UNIT IV ANALYSIS OF DISCRETE TIME SIGNALS 9

Baseband Sampling - DTFT – Properties of DTFT - Z Transform – Properties of Z Transform

UNIT V LINEAR TIME INVARIANT-DISCRETE TIME SYSTEMS 9

Difference Equations-Block diagram representation-Impulse response - Convolution sum- Discrete Fourier and Z Transform Analysis of Recursive & Non-Recursive systems

TOTAL (L: 45+T: 15): 60 PERIODS

OUTCOMES: Upon the completion of the course, students will be able to:

- Analyze the properties of signals & systems
- Apply Laplace transform, Fourier transform, Z transform and DTFT in signal analysis
- Analyze continuous time LTI systems using Fourier and Laplace Transforms
- Analyze discrete time LTI systems using Z transform and DTFT

TEXT BOOK:

1. Allan V.Oppenheim, S.Wilsky and S.H.Nawab, “Signals and Systems”, Pearson, 2007.

REFERENCES:

1. B. P. Lathi, “Principles of Linear Systems and Signals”, Second Edition, Oxford, 2009.
2. R.E.Zeimer, W.H.Tranter and R.D.Fannin, “Signals & Systems - Continuous and Discrete”, Pearson, 2007.
3. John Alan Stuller, “An Introduction to Signals and Systems”, Thomson, 2007.
4. M.J.Roberts, “Signals & Systems Analysis using Transform Methods & MATLAB”, Tata McGraw Hill, 2007.

MICRO LESSON PLAN

Week	Hours	LECTURE TOPICS	READING
UNIT I CLASSIFICATION OF SIGNALS AND SYSTEMS			
I	01	Continuous time signals (CT signals)	T1
	02	Discrete time signals (DT signals) - Step, Ramp, Pulse.	
	03	Impulse, Sinusoidal, Exponential,	
	04	Classification of CT and DT signals - Periodic & Aperiodic signals.	
	05	Deterministic & Random signals, Energy & Power signals.	
	06	CT systems and DT systems- Classification of systems.	
II	07		
	08	Static & Dynamic, Linear & Nonlinear,	
	09		
	10	Time-variant & Time-invariant,	
	11		
	12	Causal & Noncausal, Stable & Unstable.	
UNIT II ANALYSIS OF CONTINUOUS TIME SIGNALS			
III	13	Fourier series analysis-spectrum of Continuous Time (CT) signals.	T1
	14		
	15	Problem on Fourier series analysis-spectrum of Continuous Time (CT) signals	
	16		
	17		
	18	Fourier and Laplace Transforms in CT Signal Analysis - Properties.	
IV	19		
	20		
	21	Problem on Fourier and Laplace Transforms in CT Signal Analysis.	
	22		
	23		
	24		
UNIT III LINEAR TIME INVARIANT- CONTINUOUS TIME SYSTEMS			
V	25	Differential Equation	T1
	26		
	27	Block diagram representation-	

V	28	impulse response,	T1
	29		
	30	convolution integrals-	
VI	31		
	32		
	33	Fourier and Laplace transforms in Analysis of CT systems	
	34		
	35		
	36		
UNIT IV ANALYSIS OF DISCRETE TIME SIGNALS			
VII	37	Baseband Sampling	T1
	38		
	39	DTFT	
	40		
	41	Properties of DTFT	
	42		
VIII	43		
	44	Z Transform	
	45		
	46	Properties of Z Transform	
	47		
	48		
UNIT V- LINEAR TIME INVARIANT-DISCRETE TIME SYSTEMS			
IX	49	Difference Equations-	T1
	50	Block diagram representation-	
	51	Impulse response -	
	52		
	53	Convolution sum-	
	54	Discrete Fourier Transform Analysis of Recursive & Non-Recursive systems	
X	55		
	56		
	57	Z Transform Analysis of Recursive & Non-Recursive systems	
	58		
	59		
	60		