Course Code: **EEL DC203**	Course Title: **Signals & Systems**
Semester: 2024-25 (Odd)	Date of Issue: 09-08-2024
Course Coordinator	Dr Vipan Kakkar
Co Faculty / Instructor	

Teaching & Evaluation Scheme

L	T	S/P	C	Minor Duration	Major Duration	Assignment	Quiz	Midterm Marks	Major Marks	Total Marks
3	1	0	4	1.5 Hours	3.0 Hours	20	20	20	40	100

Significance and Objectives of the Course:

This course aims to expose students to:
1. basic concepts of Signals and systems
2. concepts of continuous and discrete systems.
3. System analysis in time and frequency domain

Course Outcomes:

After successful completion of this course, students shall be able to;
1. Understand the concepts of continuous time systems.
2. Understand the concepts of discrete time systems.
3. Understand sampling and signal transform and its implications.
4. Understand systems and analysis in time and frequency domain.

COURSE CONTENTS

Unit I: Introduction and basic properties of signals, Signal properties: periodicity, absolute integrability, determinism, Special signals and classification of signals. Continuous and discrete time signals, continuous and discrete amplitude signals. Linearity: additivity and homogeneity. Shift-invariance, causality, stability, and realizability. Examples of systems with these properties.

Unit II: Impulse response and step response. Causality and stability of LTI systems, State-space representation of systems. Complex Sinusoids, System recursion, Properties of Convolution, Discrete-Time Systems Described by Difference Equations; Implementation of Discrete-Time Systems, Solved problems for revision

Unit III: Various methods for Fourier series representation of periodic signals, Waveform symmetries and calculation of Fourier coefficients, Fourier Transform: convolution/multiplication in the frequency domain. Magnitude and phase response, Fourier domain duality. Introduction to DTFT and DFT. Parseval's theorem and its applications..

Unit IV: The Sampling Theorem and its implications, Aliasing and its effects. Relation between continuous and discrete time systems. Filters. Difference equations, Filtering techniques and realizations of filters. Introduction to the z-Transform. z-domain analysis and solving difference equations.

Recommended Books::

1. A. V. Oppenheim, A. S. Willsky and S. H. Nawab, "Signals and systems", Prentice Hall India, 1997.
2. J. G. Proakis and D. G. Manolakis, "Digital Signal Processing: Principles, Algorithms, and Applications", Pearson, 2006.
3. H. P. Hsu, "Signals and systems", Schaum's series, McGraw Hill Education, 2010.
4. S. Haykin and B. V. Veen, "Signals and Systems", John Wiley and Sons, 2007.
5. M. J. Robert "Fundamentals of Signals and Systems", McGraw Hill Education, 2007.
6. B. P. Lathi, "Linear Systems and Signals", Oxford University Press, 2009.

Signal & Systems (EEL DC203)

Subject Name	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Signal & Systems (EEL DC203)	CO1	H	M	L	M	M	M	M	L	M	M	L	H
	CO2	H	M	H	M	M	M	M	L	M	M	L	H
	CO3	H	M	M	H	L	M	M	L	M	M	L	H
	CO4	H	M	H	H	L	H	H	M	H	M	L	H
	CO5	H	M	H	H	L	M	M	M	H	M	L	H
	H	5	0	3	3	0	1	1	0	2	0	0	5
	M	0	5	1	2	2	4	4	2	3	5	0	0
	L	0	0	1	0	3	0	0	3	0	0	5	0
	Total	45	35	38	41	26	37	37	26	39	35	20	45
	Strength	0.9	0.7	0.76	0.82	0.52	0.74	0.74	0.52	0.78	0.7	0.4	0.9

LECTURE PLAN

	Unit / Topic / Lecture Contents	STATUS*
Week	**Lecture topic**	
1st	**Unit I:** Introduction and basic properties of signals, Signal properties: periodicity, absolute integrability, determinism	Completed
2nd	Special signals and classification of signals. Continuous and discrete time signals, continuous and discrete amplitude signals	Completed
3rd	Linearity: additivity and homogeneity. Shift-invariance, causality, stability, and realizability. Examples of systems with these properties.	Completed
4th	Impulse response and step response. Causality and stability of LTI systems	Completed
5th	State-space representation of systems. Properties of Convolution, Causal LTI Systems, Stability of LTI Systems	Completed
6th	Discrete-Time Systems Described by Difference Equations; Implementation of Discrete-Time Systems, Solved problems for revision	Completed
7th	Solved problems for revision	Completed
8th	Various methods for Fourier series representation of periodic signals.	Completed
9th	**Midterm Exam**	Completed
10th	Various methods for Fourier series representation of periodic signals, Waveform symmetries and calculation of Fourier coefficients.	Completed
11th	Fourier Transform: convolution/multiplication in the frequency domain. Magnitude and phase response, Fourier domain duality.	Completed
12th	Introduction to DTFT. Parseval's theorem and its applications..	Completed
13th	The Sampling Theorem and its implications, Aliasing and its effects.	Completed

14th	Relation between continuous and discrete time systems. Filters	Completed
15th	Difference equations, Filtering techniques and realizations of filters	Completed
16th	Introduction to the z-Transform. z-domain analysis and solving difference equations.	Completed
17th	Revision Week	Completed
18th	**Major Exams**	Completed