20CYS111	DIGITAL SIGNAL PROCESSING	L-T-P-C: 2-1-0-3

Pre-Requisite(s): Nil

Course Objectives

- To introduce the frequency domain concepts and filter design in signal processing applications.
- To develop knowledge in efficient transforms for signal analysis.
- To provide knowledge in designing and developing signal processing systems suitable for various applications.

Course Outcomes

CO1: To understand the concepts of signals and systems.

CO2: To analyze the frequency domain characteristics of discrete time signals and systems

CO3: To comprehend realization structures for filters.

CO4: To develop a digital signal processing system for different applications.

CO-PO Mapping

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2										2	2	
CO2	3	2	3									2	2	
CO3	3	2		2								2	2	
CO4	3	2	3	2								2	2	2

Syllabus

Unit 1

Basic signals: unit step, unit impulse, sinusoidal and complex exponential signals - Types of signals- Basic operations on signals - system properties -Time Domain characterization of continuous time and discrete time LTI system-Convolution Integral - Convolution sum- Analysis of LTI system described by differential and difference equations.

Unit 2

Discrete Fourier transforms: Fourier Transform, Fourier analysis of discrete time signals and systems: Discrete Time Fourier series – Discrete Time Fourier Transform - properties of DTFT – Introduction to DFT- properties of DFT – linear filtering methods based on DFT – FFT algorithms.

Unit 3

Digital filters: Introduction, specifications of practical filters, Characteristics of commonly used analog filters – IIR filters: design by approximation of derivatives – impulse invariance and bilinear transformation – Butterworth filter- frequency transformations for analog and digital filters, Structures for IIR systems. FIR filters: symmetric and anti-symmetric FIR filters – design of linear phase FIR filter using windows –Structures for FIR systems – direct form structures, Linear phase, and cascade form structures. Brief introduction to Wavelets and Wavelet transform.

Textbook

Simon Haykin, Barry Van Veen, Signals and Systems, Second Edition, John Wiley and Sons, 2007.

Reference(s)

1. *Alan V. Oppenheim, Alan S. Wilsky, S, Hamid Nawab, Signals and Systems, Prentice Hall India private Limited, Second Edition, 1997.*

2. *John G Proakis, G. Manolakis, Digital Signals Processing Principles, Algorithms, Applications, Prentice Hall India Private Limited, Fourth Edition, 2007.*

3. *Sanjit K. Mitra, Digital Signal Processing: A computer-based approach, Tata McGraw Hill Publishing Company Limited, Fourth Edition,2010.*

4. *Allen V. Oppenheim, Ronald W. Schafer, Discrete time Signal processing, Prentice Hall India Private Limited, Third Edition, 2013.*

Evaluation Pattern

Assessment	Internal	External
Periodical 1	15	
Periodical 2	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA – Can be Quizzes, Assignment, Projects, and Reports.