



C. U. SHAH UNIVERSITY
Wadhwan City

FACULTY OF: - Technology & Engineering
DEPARTMENT OF: -Electrical Engineering
BRANCH: Electrical& Electronics Engineering
SEMESTER: - VIII
CODE: - 4TE08DSP1
NAME – Digital Signal Processing

Teaching & Evaluation Scheme

Subject Code	Name of the Subject	Teaching Scheme (Hours)				Credits	Evaluation Scheme							
		Th	Tu	Pr	Total		Theory				Practical (Marks)			Total
							Sessional Exam		University Exam		Internal		University	
							Marks	Hrs	Marks	Hrs	Pr/Viva	TW	Pr	
4TE08DSP1	Digital Signal Processing	4	0	2	6	5	30	1.5	70	3	--	20	30	150

OBJECTIVES:

- To make student understand fundamentals of digital signal processing and its relative advantages.
- To make students to realize, analysis and synthesize various discrete signal processing systems and digital filters.

PREREQUISITES:

- Fundamentals of LTI Signals and Systems, Z-Transform, Fourier Transform and concepts of Sampling.

Course Outlines

Sr. No.	Course Contents	Hours
1	Introduction Discrete Time Systems : Z-transform, LTI systems. Description by difference equations, System Function, Impulse response and frequency response.	4
2	Transform Analysis of Linear Time-Invariant System: Frequency response of LTI system, System functions for systems with linear constant-coefficient difference equations, Freq. response of rational system functions relationship between magnitude & phase, All pass systems, Minimum/Maximum phase systems, Linear system with generalized.	8
3	Structures for Discrete Time Systems: Block Diagram representation of Linear Constant-Coefficient Difference equations,	8

	Basic Structures of IIR Systems, Transposed forms Basic Structures for FIR Systems, Overview of finite-precision Numerical effects, Effects of Co-efficient quantization, Effect of roundoff noise in digital filters, Zero input limit cycles in Fixed-point realization of IIR filters, Lattice structures.	
4	Filter Design Techniques: Design of Discrete-Time IIR filters from Continuous-Time filters, Design of FIR filters by windowing Optimum approximations of FIR filters, FIR equiripple approximations.	8
5	Discrete-Fourier Transform: Representation of Periodic sequences: The discrete Fourier series, Properties of discrete Fourier Series, Fourier Transform of Periodic Signals, Sampling the Fourier Transform, The Discrete-Fourier Transform, Properties of DFT, Linear Convolution using DFT.	8
6	Computation of Discrete-Fourier Transform: Efficient Computation of DFT, Goertzel Algorithm, Decimation-in-Time FFT Algorithms, Decimation-in-Frequency FFT Algorithm.	8
7	Multirate Digital Signal Processing: Poly-phase decomposition, multistage decimators and interpolators, Digital filter Banks, Adaptive filtering, minimum mean square error criterion, Wiener filter, LMB adaptive algorithm.	6
8	Applications: DSP applications in Voice processing, Radar, Image Processing, Electrical Systems	6

Learning Outcomes

The students will be able to understand various concepts of Digital Signal Processing and realization of digital systems and filter along with its applications in various fields.

Books Recommended:

1. "Discrete Time Signal Processing", Oppenheim, Schaffer, Buck Pearson education publication, 2nd Edition, 2003.
2. "Digital Signal Processing: Principles, Algorithm & Application", Proakis, Manolakis, PHI, 2003, 3rd Edition.
3. "Digital Signal Processing: A Computer Based approach", Sanjit Mitra McGraw Hill