GUJARAT TECHNOLOGICAL UNIVERSITY

Electronics Engineering / Electronics & Communication Engineering /Electronics & Telecommunication Engineering

B. E. SEMESTER: VII

Subject Name: **Digital Signal Processing**
Subject Code: **171003**

Teaching Scheme				Evaluation Scheme			
Theory	Tutorial	Practical	Total	University Exam (E)		Mid Sem Exam (Theory) (M)	Practical (Internal)
				Theory	Practical		
4	0	2	6	70	30	30	20

Sr. No	Course Content	Total Hrs.
1.	**Introduction:** Signals, systems and signal processing, classification of signals, elements of digital signal processing system, concept of frequency in continuous and discrete time signals, Periodic Sampling, Frequency domain representation of sampling, Reconstructions of band limited signals from its samples, general applications of DSP	5
2.	**Discrete-Time Signals and Systems:** Discrete-Time Signals, Discrete-Time Systems, LTI Systems, Properties of LTI Systems, linear convolution and its properties, Linear Constant Co-efficient Difference equations,. Frequency domain representation of Discrete-Time Signals & Systems, Representation of sequences by discrete time Fourier Transform, (DTFT), Properties of discrete time Fourier Transform, and correlation of signals, Fourier Transform Theorems.	10
3.	**The Z- Transform and Analysis Linear Time-of Invariant System:** Z-Transform, Properties of ROC for Z-transform, the inverse Z-transform methods, Z- transforms properties, Analysis of LTI systems in time domain and stability considerations. 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, inverse systems, Minimum/Maximum phase systems, systems with linear phase.	10

4.	**Structures for Discrete Time Systems:** Block Diagram and signal flow diagram representations of Linear Constant-Coefficient Difference equations, Basic Structures of IIR Systems, Transposed forms, Direct and cascade form Structures for FIR Systems, Effects of Co-efficient quantization.	5
5.	**Filter Design Techniques:** Design of Discrete-Time IIR filters from Continuous-Time filters-Approximation by derivatives, Impulse invariance and Bilinear Transformation methods; Design of FIR filters by windowing techniques, Illustrative design examples of IIR and filters.	9
6.	**Discrete-Fourier Transform:** Representation of Periodic sequences: The discrete Fourier Series and its Properties Fourier Transform of Periodic Signals, Sampling the Fourier Transform, The Discrete-Fourier Transform, Properties of DFT, Linear Convolution using DFT.	9
7.	**Fast Fourier Transform:** FFT-Efficient Computation of DFT, Goertzel Algorithm, radix2 and radix 4 Decimation-in-Time and Decimation-in-Frequency FFT Algorithms.	6
8.	**Architecture of DSP Processors- :** Harward architecture, pipelining, Multiplier-accumulator (MAC) hardware, architectures of fixed and floating point (TMSC6000) DSP processors.	6

Text Books:

1. "Digital Signal Processing: Principles, Algorithm & Application",4th edition,Proakis, Manolakis, Proakis, Manolakis, Pearson
2. "Discrete Time Signal Processing":Oppeheim, Schafer, Buck Pearson education publication, 2nd Edition, 2003.

Reference Books:

1. Digital Signal Processing fundamentals and applications, Li Tan , Elsevier
2. Fundamentals of digital Signal Processing –Lonnie c.Ludeman, Wiley
3. Digital Signal processing-A Practical Approach ,second edition, Emmanuel Ifeacher, and Barrie W..Jervis, Pearson Education.
4. Digital Signal Processing, S.Salivahanan, A.Vallavaraj, C.Gnapriya TMH
5. Digital Signal Processors, Architecture, programming and applications by B. Venkatramani, M Bhaskar, Mc-Graw Hill