GUJARAT TECHNOLOGICAL UNIVERSITY

M.E. Semester: I

Signal Processing and VLSI Technology(EC)

Subject Name: **Digital Signal Processing Algorithms and Processor Architecture**

Sr.No	Course content
1.	**Introduction:** Discrete time systems, Analysis of Discrete-time Linear time invariant systems, Frequency analysis of Discrete time signals and Fourier Transform properties, Frequency Response of LTI system, The Z-transforms, Inverse Z-transforms, stability, The Schur-Cohn stability test.
2.	**Implementation of Discrete time systems:** Structures for FIR,IIR Systems, Quantization of Filter Co-efficients, Round-off Effects in Digital Filters
3.	**Discrete Fourier Transform and its applications:** Frequency domain Sampling, Properties of DFT, Circular Convolution, Linear Filtering Methods Based on the DFT, The discrete Cosine Transform, frequency analysis of signals using the DFT.
4.	**Fast Fourier Transform:** Efficient computation of DFT (FFT Algorithms-DIT and DIF), Application of FFT Algorithms, The Goertzel Algorithm, The Chirp-z Algorithm, Quantization Effects in the Computation of DFT.
5.	**Design of Digital Filters:** Design Techniques of FIR Filters – Windowing methods, frequency sampling method ,Optimum Equiripple Linear Phase Filters, FIR differentiators,Hilbert Transformers;design techniques of IIR filters : Impulse invariance. Bilinear transformation, finite difference, frequency sampling method,Frequency Transformations
6.	**Discrete Wavelet Transform** : Introduction and applications
7.	**Power Spectrum Estimation:** Estimation of spectra from finite duration signals, Periodogram Nonparametric methods - Bartlett, Welch and Blackman-Tukey methods, Parametric methods – ARMA, AR and MA model based spectral estimation

8.	**Introduction to Computer Architecture for Signal Processing**: General Purpose and Special Purpose Digital Signal Processors
9.	**Introduction to Computer Architecture for Signal Processing:** General Purpose and Special Purpose Digital Signal Processors
10.	**Tms320c5x Dsp Processors:** Architecture – Assembly language syntax - Addressing modes – Assembly language Instructions - Pipeline structure, Operation – Block Diagram of DSP starter kit – Application Programs for processing real time signals**.**
11.	**Advanced Processors:** Architecture of TMS320C54X: Pipe line operation, Code Composer studio - Architecture of TMS320C6X - Architecture of Motorola DSP563XX – Comparison of the features of DSP family processors
12.	**Adsp Processors:** Architecture of ADSP-21XX and ADSP-210XX series of DSP processors- Addressing modes and assembly language instructions – Application programs –Filter design, FFT calculation
13.	**Applications Of DSP:**

Reference Books:

1. J.G. Proakis and D.G. Manolakis - Digital Signal Processing: Principles Algorithms and Applications,4th Edition Pearson Education, 2007
2. B.Venkataramani and M.Bhaskar, "Digital Signal Processors – Architecture,Programming and Applications" –TMH ,2003
3. S.K. Mitra - Digital Signal Processing: A computer based approach, TMH, 2001
4. A.V. Oppenheim, R.W. Schafer - Digital Signal Processing, Pearson Education, 2004
5. Thomas J. Cavicchi, Digital Signal Processing,Wiley India
6. Emmanuel Ifeachor,Barry Jervis Digital Signal Processing, 2nd Edition,Pearson Education, 2002
7. Li Tan , Digital Signal Processing fundamentals and applications,Elsevier
8. User guides Texas Instrumentation, Analog Devices, Motorola.
9. C. Sidney Burrus, Fast Fourier Transforms, Connexions, 2009 http://cnx.org/content/col10550/
10. C. Sidney Burrus, Digital Signal Processing and Digital Filter Design,
11. Connexions, 2009 http://cnx.org/content/col10598/