4th Semester	RCS4G002	Digital Signal Processing	L-T-P 3-0-0	3 CREDITS

Module – I (08 Hrs)

Discrete Time System: Basic Discrete Time Signals and their classifications, Discrete times systems and their classifications, Stability of discrete time system, Analysis and response (convolution sum) of discrete - time linear LTI system, Recursive and Non-recursive discrete time system, impulse response of LTI system, Correlation of discrete time Signal.

Module –II (08 Hrs)

Z-Transform and Its Application to the Analysis of LTI Systems: Z-Transform, Direct Z-Transform, Properties of the Z- Transform, Inverse Z-Transform, Inversion Z-Transform by Power Series Expansion, Inversion of the Z-Transform by Partial-Fraction Expansion, Analysis of Linear Time-Invariant Systems in the z-Domain.

Module –III (12 Hrs)

Discrete Fourier Transform: Frequency-Domain Sampling and Reconstruction of Discrete-Time Signals, Discrete Fourier Transform, DFT as a Linear Transformation, Relationship of DFT to other Transforms, Properties of DFT: Periodicity, Linearity, and Symmetry Properties, Multiplication of Two DFTs and Circular Convolution, Use of DFT in Linear Filtering, Filtering of Long Data Sequences.
Efficient Computation of DFT: FFT Algorithms, Direct Computation of the DFT, Radix-2 FFT Algorithms, Decimation-In-Time (DIT), Decimation-In-Time (DIF).

Module – IV (10 Hrs)

Structure and Implementation of FIR and IIR Filter: Structure for the Realization of Discrete-Time Systems, Structure of FIR Systems: Direct- Form Structure, Cascade-Form Structure, Frequency-Sampling Structure, Design of FIR Filters: Symmetric and Antisymmetric FIR Filters, Design of Linear-Phase FIR Filters by using Windows, Design of Linear-Phase FIR Filters by Frequency-Sampling Method. Structure for IIR Systems: Direct-Form Structure, Signal Flow Graphs and Transposed Structure, Cascade-Form Structure, Parallel-Form Structure. Design of IIR Filters from

Module – V (07 Hrs)

Analog Filters: IIR Filter Design by Impulse Invariance, IIR Filter Design by the Bilinear Transformation.
Basic adaptive filter: Structure of Adaptive FIR filter, System Modeling and Inverse Modeling,Matlab realization of DFT, FFT, Z-transform, IIR, FIR and adaptive filter.
Books:

- Digital Signal Processing – Principles, Algorithms and Applications by J. G. Proakis and D. G. Manolakis, Pearson.
- Digital Signal Processing: Tarun Kumar Rawat, Oxford University Press.

- Digital Signal Processing – S. Salivahan, A. Vallavraj and C. Gnanapriya, Tata McGrawHill.
- Digital Signal Processing – Manson H. Hayes (Schaum's Outlines) Adapted by Subrata Bhattacharya, Tata McGraw Hill.