

# Digital Signal Processing

## PART - A

### UNIT - 1

Discrete Fourier Transforms (DFT): Frequency domain sampling and reconstruction of discrete time signals. DFT as a linear transformation, its relationship with other transforms.

**7 Hours**

### UNIT - 2

Properties of DFT, multiplication of two DFTs- the circular convolution, additional DFT properties, use of DFT in linear filtering, overlap-save and overlap-add method.

**6 Hours**

### UNIT - 3

Fast-Fourier-Transform (FFT) algorithms: Direct computation of DFT, need for efficient computation of the DFT (FFT algorithms).

**8 Hours**

### UNIT - 4

Radix-2 FFT algorithm for the computation of DFT and IDFT—decimation-in-time and decimation-in-frequency algorithms. Goertzel algorithm, and chirp-z transform

**6 Hours**

## PART - B

### UNIT - 5

IIR filter design: Characteristics of commonly used analog filters – Butterworth and Chebyshev filters, analog to analog frequency transformations.

**6 Hours**

### UNIT - 6

FIR filter design: Introduction to FIR filters, design of FIR filters using - Rectangular, Hamming, Bartlett and Kaiser windows, FIR filter design using frequency sampling technique

**6 Hours**

## **UNIT - 7**

Design of IIR filters from analog filters (Butterworth and Chebyshev) - impulse invariance method. Mapping of transfer functions: Approximation of derivative (backward difference and bilinear transformation) method, Matched z transforms, Verification for stability and linearity during mapping

**7 Hours**

## **UNIT - 8**

Implementation of discrete-time systems: Structures for IIR and FIR systems-direct form I and direct form II systems, cascade, lattice and parallel realization.

**6 Hours**

### **TEXT BOOK:**

**Digital signal processing – Principles Algorithms & Applications**, Proakis & Monalakis, Pearson education, 4<sup>th</sup> Edition, New Delhi, 2007.

### **REFERENCE BOOKS:**

1. **Discrete Time Signal Processing**, Oppenheim & Schaffer, PHI, 2003.
2. **Digital Signal Processing**, S. K. Mitra, Tata Mc-Graw Hill, 2<sup>nd</sup> Edition, 2004.
3. **Digital Signal Processing**, Lee Tan: Elsevier publications, 2007