Subject Code		:

IA Marks		: 25

No. of Lecture Hrs/Week		: 04

Exam Hours		: 03

Total no. of Lecture Hrs.		: 52

Exam Marks		: 100

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.

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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

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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

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PART - B

Unit - 5

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

6 Hours

Unit - 6

FIR filter design: Introduction to FIR filters, design of FIR filters using - Rectangular, Hamming, Bartlet 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, 4th 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, 2nd Edition, 2004.

3. **Digital Signal Processing**, Lee Tan: Elsivier publications, 2007