

(EE516) ADVANCED DIGITAL SIGNAL PROCESSING

(ELECTIVE - IV)

Objective of the course:

The objective is to establish fundamental concepts of signal processing on multirate processing parametric modelling linear prediction theory, modern spectral estimation and high resolution techniques.

UNIT - I

Multi rate Signal Processing: Introduction, sampling an signal reconstruction, sampling Rate Conversion, Decimation by an Integer Factor, Interpolation by an Integer Factor, Sampling Rate Conversion by a Rational Factor, Sampling Rate Converter as a Time Variant system, Practical Systems for Decimators and Interpolators, Direct Form and Poly-Phase FIR Structures with Time varying Coefficients.

UNIT - II

Multi rate FIR filter design: Design of FIR Filters for Sampling Rate Conversion, Multistage Implementation of Sampling Rate Conversion, Applications of Interpolation and Decimation in Signal Processing Operations, Low-Pass and Band-Pass Filters

UNIT - III

Filter Bank implementation, Sub-Band Processing, Decimated Filter Banks, Two Channel Filter Banks, Tree structured Filter Banks, Octave-Band Filter Banks, Uniform DFT Filter Banks.

UNIT - IV

Estimation of Spectra from Finite Duration Observations of a Signal, the Period gram, Use DFT in power Spectral Estimation, Bartlett, Welch and Blackman, Turkey methods, Comparison of performance of Non-Parametric Power Spectrum Estimation Methods.

UNIT - V

Parametric Methods for power spectrum estimation, Relationship between Auto -Correlation and Model Parameters, AR(Auto-Regressive) Process and Linear prediction, Yule-Walker, Burg and Unconstrained Least Squares Methods, Sequential Estimation, Moving Average(MA) and ARMA Models Minimum Variance Method, Pisarcenko's Harmonic Decomposition Method, MUSIC Method.

REFERENCE BOOKS:

1. Proakis JG and Manolakis DG Digital Signal Processing Principles, Algorithms and applications, PHI
2. Openheim AV & Schafer RW, Discrete Time Signal Processing PHI.
3. Orfanadis S, Introduction to Digital Signal Processing PHI
4. Orfanadis S Optimum Signal Processing PHI