Subject Code : P8IE10

DIGITAL SIGNAL PROCESSING

Unit I: Theory of discrete time systems.

Z-transforms: definition – properties – Inverse Z-transforms and its evaluation- solution of difference equations using one sided Z-transform- Discrete Hilberts transform.

Discrete time systems:

Introduction- sequences – representation of arbitrary sequences- linear time invariant systems- Causality and stability – difference equation – frequency response – frequency response of the first order systems – frequency response of the second order systems.

Unit II: Finite duration Impulse response filters.

Digital Filters: Magnitude response and phase response of digital filters.
FIR filters : Design techniques – Window techniques – rectangular window Function- Hamming window function- Hamming window function - Hanning window function – Blackman window function – Bartlet window function – Kaiser window – Design using Kaiser window function
Basic structures: Basic realization block diagram and the signal flow graph Direct forms, Cascade form and linear phase form realization.

Unit III : Infinite duration impulse response filters.

IIR filters : Introduction – I.I.R. filler design by approximation of derivatives, Impulse invariant method, Bilinear transformation - Butter worth filters – Chesby shw filters – frequency transformation (analog and digital) Basic structures : Direct forms, Cascade form and linear phase form realization.

Unit IV : Effects of finite word length in digital filters

Introduction – rounding and truncation errors - Quantization Effects in Analog to digital conversion of signals – out put noise Power from a digital system – Coefficient quantization effects in Direct form realization of I I R and FIR filters – Limit cycle oscillations – product quantization – scaling – quantization Errors in the computation of DFT .

Unit V : Spectral analysis

Statistical techniques : Introduction – Energy density spectrum–Estimation of auto Correlation and power spectrum of random signals –DFT in spectral estimation–Power–spectral estimation–non –parametric methods. Bartlet Welch, Blackman and turkey methods – Quality of power spectrum estimators – parametric methods – Basics of AR, MA and ARMA models - Power spectrum estimation by AR, MA and ARMA models .

FFT technique : Introduction to radix 2 FFTs – some properties of radix 2 – Decimation in time FFT – data shuffling and bit refusal – ecimation in frequency algorithm.

Books for study :

(1) Theory and application of Digital signal processing Signal processing L.R.Raliner and B.Gold Prentice Hall of India, New Delhi–2003

(2) Digital Signal processing Tata McGraw Hill publishing Company, New Delhi – 2004

Books for Reference:

- Digital Signal Processing : Allan V.Oppenheim and Ronald W Schafer Prenlice Hall of India – New Delhi 2000
- Architecture of Digital Signal processing – Peter Pirsoh John Wiley – 1998
- Introduction to Digital signal processing – Johny – R.Johnson PHI, Publication, New Delhi, year -1994
- Digital signal processing K.S.Srinivasan. Anuradha agencies 2003 Kumbakonam