

Digital Signal Processing (RP 4.2.21)

Sampling , A/D & D/A converters: Sampling and reconstruction of LP, HP and Band pass signal, analog to digital conversion: analysis of quantization errors, oversampling A/D converters, Digital to analog conversions, first order hold, linear interpolation with delay oversampling D/A converters (3)

Implementation of discrete time systems: Structures of FIR and IIR systems: Direct Cascade, Parallel, Lattice structures State space system analysis and structures: state space description of systems, solution of state space equations, state space analysis in z domain Representation of numbers: fixed and floating point representations, error resulting from rounding and truncation, quantization of filter coefficient, analysis of sensitivity Round off effects in digital filters: limit cycle, scaling, statistical characterization of quantization effect in fixed point realization of digital filters. (7)

Multirate digital signal processing: Decimation, Interpolation, sampling rate conversion, polyphase decompositions, Nyquist filters, two channel QMF banks, perfect reconstruction, L channel QMF bank, Cosine modulated L channel filter banks. (6)

Linear prediction and optimum linear filters: Representation of stationary random process, AR process, MA process, ARMA process, relationship between filter parameters and auto correlation sequence, forward and backward linear prediction, Levinson Durbin algorithm, linear prediction filters, minimum and maximum phase, Wiener filters for filtering and prediction, equiripple linear phase FIR filters (7)

Power spectrum estimation: Computation of energy density spectrum, estimation of the auto-correlation and power spectrum of random signals- Periodogram, non-parametric method for power spectrum estimation: Burtlett method, Blackman and Tukey method, parametric methods for power estimation, relationship between the auto-correlation and model parameters, Yule –Wakler method MA an ARMA model for power estimation. (7)