

K L UNIVERSITY
SIGNAL PROCESSING (13-ES 205)

Pre – requisite: 13-BS102

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3	0	2	4

REPRESENTATION OF SIGNALS: Continuous and discrete time signals: Classification of Signals - Periodic aperiodic even - odd - energy and power signals - Deterministic and random signals - complex exponential and sinusoidal signals – periodicity. Observations of signals in daily life like voice, speech and audio, and electrical, mechanical, thermal, hydraulic, bio-medical signals and systems. **SAMPLING AND CONVOLUTION:** Sampling theorem, impulse sampling, Natural and flat top sampling, reconstruction of signals from its samples, effect of under sampling-Aliasing introduction to band pass sampling, Spectra of sampled signals. Parseval’s theorem, power density spectrum, Convolution of continuous and discrete time signals in time and frequency domain, graphical representation of Convolution, convolution Property and Multiplication property. Comparison of circular convolution and linear convolution. **TRANSFORMS FOR SIGNAL PROCESSING APPLICATIONS:** A review of Fourier and Laplace transforms and continuous wavelet transform for signal processing and system analysis. **FILTERS AND DFT, FFT:** Ideal LPF, HPF and BPF characteristics, causality and Paley-wiener criterion for physical realization. Discrete Fourier Transform, Properties of DFT, FFT Introduction, DIT-FFT, DIF-FFT, and Computation of Inverse DFT, Introduction to Discrete wavelet transform. **DIGITAL FILTER-IIR DESIGN:** Introduction, properties of IIR filters, Design of Digital Butterworth and Chebyshev filters using Bilinear transformation, Impulse invariance transformation methods, Design of digital filters using frequency transform method. **DIGITAL FILTER-FIR DESIGN:** Introduction, Characteristics of Linear Phase FIR filters, frequency Response, Designing FIR filters using Windowing Methods, Comparison of IIR & FIR Filters.

TEXT BOOKS

1. Alan V Oppenheim, Alan S Willsky, S Hamid Nawab, “Signals and Systems,” Second Edition, PHI, 2006.
2. B.P.Lathi, “Signals, systems and communications” BSP, 2003.
3. John G Proakis, Dimtris G Manolakis, “Digital Signal Processing: Principles, Algorithms and Applications”, Pearson Education, 2007.
4. Kumar, A. Anand, “Digital Signal Processing,” PHI.
5. Raghuveer rao and Ajit S.Bopardikar, Wavelet transforms: Introduction, Theory and applications, Pearson Education Asia, 2000