IC260: Signals and System

Credit: 2.5-0.5-0-3

Course content:

- **Introduction to Signals & Systems:** Classification of signals, useful signal operations, Exponential and sinusoidal signals, Unit step and unit step functions, Basic system properties [5 Lectures]
- **Time-domain analysis of continuous time systems & discrete-time systems:** Zero-input and zero-state response, unit impulse response, convolution, Graphical method for convolution, stability of systems, Response time and Rise time of system. [5 Lectures]
- **Fourier series representation of periodic signals:** Linear time invariant systems to complex exponential signals, Fourier series representation of continuous-time periodic signals, Convergence and properties of continuous-time Fourier series, Discrete time Fourier series and its properties [7 Lectures]
- **Continuous-time Fourier transform:** Representation of a periodic signal, Fourier transform and its properties, Fourier transform of some useful signals, Generalized Fourier series: signals vs vectors, Modulation, System characterization. [5 Lectures]
- **Discrete-time Fourier transform:** Representation of aperiodic signal, Discrete-time Fourier transform and its properties, Sampling, Duality in discrete-time Fourier series [5 Lectures]
- Laplace transform, ROC, Inverse Laplace transform, Filter design by placements of poles and zeros of system functions, properties of Laplace transform, analysis and characterization of LTI systems using Laplace transform, unilateral Laplace transform. [5 Lectures]
- Z-transform, properties of z-transform, Frequency response from pole-zero location, analysis and characterization of LTI systems using z-transform**,** unilateral z-transform. [4 Lectures]

No. of Tutorials: 5

References

V. Oppenheim A. S. Willsky and S. H. Nawab, ``Signals and Systems'', New Delhi: Prentice Hall of India, 2004

P. Lathi, ``Principle of Linear Systems and Signals``, Oxford, University Press, 2010