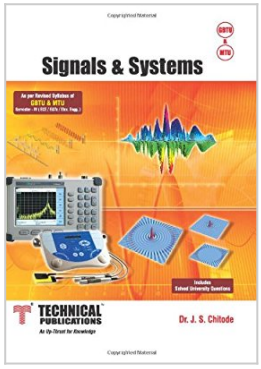

SIGNALS & SYSTEMS

By Dr J S Chitode

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Signals: Definition, Types of signals and their representations : Continuous-time/discrete-time, Periodic/non-periodic, Even/odd, Energy/power, Deterministic/random, One-dimensional/multi-dimensional. Commonly used signals (in continuous-time as well as in discrete-time): Unit impulse, Unit step, Unit ramp (and their inter-relationships), Exponential, Rectangular pulse, Sinusoidal; Operations on continuous-time and discrete-time signals (including transformations of independent variables). Laplace Transform (LT) and z-Transform (zT) : i) One-sided LT of some common signals, Important theorems and properties of LT, Inverse LT, Solutions of differential equations using LT, Bilateral LT, Region of convergence (ROC) ii) One sided and bilateral z-transforms, zT of some common signals, ROC, Properties and theorems, Solution of difference equations using one-sided zT, s- to z-plane mapping Fourier Transform (FT) : i) Definition, Conditions of existence of FT, Properties, Magnitude and phase spectra, Some important FT theorems, Parsevals theorem, Inverse FT, Relation between LT and FT ii) Discrete Time Fourier Transform (DTFT), Inverse DTFT, Convergence, Properties and theorems, Comparison between continuous time FT and DTFT. Systems : Classification, Linearity, Time-invariance and Causality, Impulse response, Characterization of Linear Time-Invariant (LTI) systems, Unit sample response, Convolution summation, Step response of discrete time systems, Stability. Convolution integral, Correlations, Signal energy and energy spectral density, Signal power and power spectral density, Properties of power spectral density. Time and Frequency Domain Analysis of Systems : Analysis of first order and second order systems, Continuous-time (CT) system analysis using LT, System functions of CT systems, Poles and zeros, Block diagram representations; Discrete-time system functions, Block diagram representation, Illustration of the concepts of system bandwidth and rise time through the analysis of a first order CT low pass filter.

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Editorial Review

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