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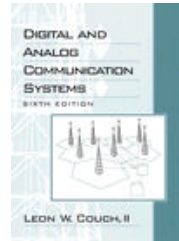
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Digital and Analog Communication Systems, 6/E



Leon W. Couch, II., Professor Emeritus, University of Florida, Gainesville

ISBN: 0-13-081223-4
 Publisher: Prentice Hall
 Copyright: 2001
 Format: Cloth; 758 pp
 Published: 05/24/2000
 Status: Instock

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[Description](#)

For junior/senior introductory communication systems courses for engineering students or an introductory graduate course.

Exceptionally up-to-date, this text provides balanced coverage of both digital and analog communication systems with an emphasis on the design of digital communication systems. It provides students with a working knowledge of both classical mathematical and personal computer methods to analyze, design, and simulate modern communication systems. MATLAB is integrated throughout.

Table of Contents

(NOTE: Each chapter concludes with Summary, Study-Aid Examples, and Problems.)

1. Introduction.

Historical Perspective. Digital and Analog Sources and Systems. Deterministic and Random Waveforms. Organization of the Book. Use of a Personal Computer and MATLAB. Block Diagram of a Communication System. Frequency Allocations. Propagation of Electromagnetic Waves. Information Measure. Channel Capacity and Ideal Communication Systems. Coding.

2. Signals and Spectra.

Properties of Signals and Noise. Fourier Transform and Spectra. Power Spectral Density and Autocorrelation Function. Orthogonal Series Representation of Signals and Noise. Fourier Series. Review of Linear Systems. Bandlimited Signals and Noise. Discrete Fourier Transform. Bandwidth of Signals.

3. Baseband Pulse and Digital Signaling.

Introduction. Pulse Amplitude Modulation. Pulse Code Modulation. Digital Signaling. Line Codes and Spectra. Intersymbol Interference. Differential Pulse Code Modulation. Delta Modulation. Time-Division Multiplexing. Packet Transmission System. Pulse Time Modulation: Pulse Width Modulation and Pulse Position Modulation.

4. Bandpass Signaling Principles and Circuits.

Complex Envelope Representation of Bandpass Waveforms. Representation of Modulated Signals. Spectrum of Bandpass Signals. Evaluation of Power. Bandpass Filtering and Linear Distortion. Bandpass Sampling Theorem. Received Signal Plus Noise. Classification of Filters and Amplifiers. Nonlinear Distortion. Limiters. Mixers, Up Converters, and Down Converters. Frequency Multipliers. Detector Circuits. Phase-Locked Loops and Frequency Synthesizers. Direct Digital Synthesis. Transmitters and Receivers. Software Radios.

5. AM, FM and Digital Modulated Systems.

Amplitude Modulation. AM Broadcast Technical Standards. Double-Sideband Suppressed Carrier. Costas Loop and Squaring Loop. Asymmetric Sideband Signals. Phase Modulation and Frequency Modulation. Frequency-Division Multiplexing and FM Stereo. FM Broadcast Technical Standards. Binary Modulated Bandpass Signaling. Multilevel Modulated Bandpass Signaling. Minimum-Shift Keying (MSK) and GMSK. Orthogonal Frequency Division Multiplexing (OFDM). Spread Spectrum Systems.

6. Random Processes and Spectral Analysis.

Some Basic Definitions. Power Spectral Density. Dc and Rms Values for Ergodic Random Processes. Linear Systems. Bandwidth Measures. The Gaussian Random Process. Bandpass Processes. Matched Filters. Appendix: Proof of Schwarz's Inequality.

7. Performance of Communication Systems Corrupted by Noise.

Error Probabilities for Binary Signaling. Performance of Baseband Binary Systems. Coherent Detection of Bandpass Binary Signals. Noncoherent Detection of Bandpass Binary Signals. Quadrature Phase-Shift Keying and Minimum-Shift Keying. Comparison of Digital Signaling Systems. Output Signal-to-Noise Ratio for PCM Systems. Output Signal-to-Noise Ratios for Analog Systems. Comparison of Analog Signaling Systems.

8. Wire and Wireless Communication Systems.

The Explosive Growth of Telecommunications. Telephone Systems. Digital Subscriber Lines (DSL). Capacities of Public Switched Telephone Networks. Satellite Communication Systems. Link Budget Analysis. Fiber Optic Systems. Cellular Telephone Systems. Television.

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Appendix C: Standards and Terminology for Computer Communications.

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Appendix D: Using MATLAB.

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Fourier Transform Theorems. Fourier Transform Pairs. $Q(z)$ Function.



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