Record Nr.	UNINA9910783441303321
Autore	Semmlow John L
Titolo	Circuits, signals, and systems for bioengineers [[electronic resource]] : a MATLAB-based introduction / / John Semmlow
Pubbl/distr/stampa	Oxford, : Academic, 2005
ISBN	1423708202 1-281-00808-7 9781423708202
	9786611008086
	1-4237-0820-2 0-08-047652-X
Descrizione fisica	1 online resource (461 n.)
	Riomodical Engineering
Disciplina	621.38102461
Soggetti	Biomedical engineering
	Electronics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di contenuto	Front Cover; Circuits, Systems, and Signals for Bioengineers: A Matlab- Based Introduction; Copyright Page; Contents; CHAPTER 1. BIOENGINEERING SIGNALS AND SYSTEMS; 1.1 Biological Systems; 1.2 Biosignals; 1.3 Linear Signal Analysis: Overview; 1.4 Noise and Variability; 1.5 Summary; Problems; CHAPTER 2. BASIC SIGNAL PROCESSING; 2.1 Basic Signals: The Sinusoidal Waveform; 2.2 Signal Properties: Basic Measurements; 2.3 Advanced Measurements: Correlations and Covariances; 2.4 MATLAB Implementation; 2.5 Summary; Problems; CHAPTER 3. FREQUENCY TRANSFORMATIONS 3.1 Useful Properties of the Sinusoidal Signal3.2 Fourier Series Analysis; 3.3 Frequency Representation; 3.4 Complex Representation; 3.5 The Continuous Fourier Transform; 3.6 Discrete Data: The Discrete Fourier Transform; 3.7 Power Spectrum; 3.8 Signal Bandwidth; 3.9 MATLAB Implementation; 3.10 Summary; Problems; CHAPTER 4. CIRCUIT AND ANALOG ANALYSIS IN SINUSOIDAL STEADY STATE; 4.1 Circuits and Analog Systems; 4.2 System Variables and Elements; 4.3 Phasor Analysis; 4.4 Mechanical Elements; 4.5 Summary; Problems; CHAPTER

1.

5.1 Conservation Laws: Kirchhoff's Voltage Law5.2 Conservation Laws: Kirchhoff's Current Law?Nodal Analysis; 5.3 Conservation Laws: Newton's Law-Mechanical Systems; 5.4 Summary; Problems; CHAPTER 6. FREQUENCY CHARACTERISTICS OF CIRCUITS AND ANALOG PROCESSES: THE TRANSFER FUNCTION; 6.1 The Circuit or Mechanical System as a Process: 6.2 Transfer Function Frequency Plots: The Bode Plot: 6.3 Filters: 6.4 MATLAB Implementation: 6.5 Summary: Problems: CHAPTER 7. RELATIONSHIPS BETWEEN ANALOG ELEMENTS; 7.1 System Simplifications: Passive Network Reduction; 7.2 Ideal and Real Sources 7.3 Thevenin and Norton Theorems: Network Reduction with Sources7. 4 Measurement Loading; 7.5 Mechanical Systems; 7.6 Multiple Sources: Revisited; 7.7 Summary; Problems; CHAPTER 8. THE ANALYSIS OF TRANSIENTS: THE LAPLACE TRANSFORM; 8.1 The Laplace Transform; 8.2 Laplace Analysis: The Laplace Transfer Function; 8.3 Nonzero Initial Conditions: 8.4 Initial and Final Value Theorems: 8.5 The Laplace Domain and the Frequency Domain; 8.6 Summary; Problems; CHAPTER 9. SYSTEM MODELS AND BEHAVIOR; 9.1 The System Model; 9.2 The Convolution Integral; 9.3 Resonance; 9.4 Summary; Problems CHAPTER 10. BASIC ANALOG ELECTRONICS: OPERATIONAL AMPLIFIERS10.1 The Amplifier; 10.2 The Operational Amplifier; 10.3 The Noninverting Amplifier; 10.4 The Inverting Amplifier; 10.5 Practical Operational Amplifiers; 10.6 Power Supply; 10.7 Operational Amplifier Circuits, or 101 Things to Do with an Operational Amplifier; 10.8 Summary; Problems; APPENDIX A; A.1 Derivation of Euler's Formula; A.2 Confirmation of the Fourier Series: A.3 Derivation of the Transfer Function of a Second-Order Op Amp Filter; A.4 Derivation of the Transfer Function of an Instrumentation Amplifier **APPENDIX B. Laplace Transforms** Approaches such as the Transfer Function and the Fourier and the Sommario/riassunto Laplace transforms are important tools for bioengineers that often considered borrowed from electrical engineering. This text allows bioengineering students and bioengineers the ability to foster a sense of ownership of these tools by providing them with a solid foundation in the concepts of linear systems analysis. Circuits, Signals and Systems

for Bioengineers guides readers through the basic engineering concepts that underlie biological systems, medical devices, biocontrol, and biosignal analysis. Material impo