

Part F

Applicatio

Part F Applications in Engineering Statistics

47 Risks and Assets Pricing

Charles S. Tapiero, Brooklyn, USA

48 Statistical Management and Modeling for Demand of Spare Parts

Emilio Ferrari, Bologna, Italy
Arrigo Pareschi, Bologna, Italy
Alberto Regattieri, Bologna, Italy
Alessandro Persona, Vicenza, Italy

49 Arithmetic and Geometric Processes

Kit-Nam F. Leung, Kowloon Tong, Hong Kong

50 Six Sigma

Fugee Tsung, Kowloon, Hong Kong

51 Multivariate Modeling with Copulas and Engineering Applications

Jun Yan, Iowa City, USA

52 Queuing Theory Applications to Communication Systems: Control of Traffic Flows and Load Balancing

Panlop Zeephongsekul, Melbourne, Australia
Anthony Bedford, Bundoora, Australia
James Broberg, Melbourne, Australia
Peter Dimopoulos, Melbourne, Australia
Zahir Tari, Melbourne, Australia

53 Support Vector Machines for Data Modeling with Software Engineering Applications

Hojung Lim, Seongnam-Si, Korea
Amrit L. Goel, Syracuse, USA

54 Optimal System Design

Suprasad V. Amari, Greensburg, USA

Part F contains eight chapters and focuses on applications in engineering statistics. The first chapter in this part, Chapt. 47, introduces the essential mathematical techniques and financial economic concepts that are used to assess the risks of and deal with asset pricing, and the maximum-entropy approach for calculating an approximate risk-neutral distribution. Chapter 48 concentrates on demand-forecasting problems and their applications in industry. It also reviews various common forecasting methods and discusses models that are used to obtain the optimal stock level for spare parts based on some industrial applications. Chapter 49 introduces various approaches including arithmetic and geometric processes to model sequential data with and without trends as alternative ways to model maintenance problems better. The chapter also introduces repair-replacement models for a deteriorating system based on an arithmetico-geometric process. Chapter 50 focuses on Six Sigma and highlights several methodologies and techniques for product development and service design as well as the core methodologies of Six Sigma. The chapter also includes a real case study on printed circuit boards to illustrate the application of Six Sigma.

Chapter 51 discusses multivariate modeling with copulas and its applications in engineering. The chapter describes the concept and classes of copulas, such as elliptical and Archimedean copulas, and statistical inferences of copula-based connections to multivariate distributions given by the data. Chapter 52 focuses on the application of queuing theory to communication systems. The chapter details theoretical and practical aspects of analyzing the traffic-flow control and load-balancing problems in order to reduce congestion and improve load balancing in modern communication systems. Chapter 53 describes the basic principles of support-vector machines for constructing classification and the development of nonlinear regression prediction models for data modeling using support-vector machine algorithms. Finally, Chapt. 54 focuses on the presentation of various spares-optimization models and the importance of optimal system design. The chapter describes the detailed formulation of cost-effective models for repairable and nonrepairable systems and the solution techniques and algorithms used for obtaining optimal design solutions.