Probabilistic Reliability Engineering Gnedenko E Forum

Reliability theory is of fundamental importance for engineers and managers involved in the manufacture of high-quality products and the design of reliable systems. In order to make sense of the theory, however, and to apply it to real systems, an understanding of the basic stochastic processes is indispensable. As well as providing readers with useful reliability studies and applications, Stochastic Processes also gives a basic treatment of such stochastic processes as: the Poisson process, the renewal process, the Markov chain, the Markov process, and the Markov renewal process. Many examples are cited from reliability models to show the reader how to apply stochastic processes. Furthermore, Stochastic Processes gives a simple introduction to other stochastic processes such as the cumulative process, the Wiener process, the Brownian motion and reliability applications. Stochastic Processes is suitable for use as a reliability textbook by advanced undergraduate and graduate students. It is also of interest to researchers, engineers and managers who study or practise reliability and maintenance.

Unique in its approach, Models of Network Reliability: Analysis, Combinatorics, and Monte Carlo provides a brief introduction to Monte Carlo methods along with a concise exposition of reliability theory ideas. From there, the text investigates a collection of principal network reliability models, such as terminal connectivity for networks with unreliable edges and/or nodes, network lifetime distribution in the process of its destruction, network stationary behavior for renewable components, importance measures of network elements, reliability gradient, and network optimal reliability synthesis. Solutions to most principal network reliability problems—including medium-sized computer networks—are presented in the form of efficient Monte Carlo algorithms and illustrated with numerical examples and tables. Written by reliability experts with significant teaching experience, this reader-friendly text is an excellent resource for software engineering, operations research, industrial engineering, and reliability engineering students, researchers, and engineers. Stressing intuitive explanations and providing detailed proofs of difficult statements, this self-contained resource includes a wealth of end-of-chapter exercises, numerical examples, tables, and offers a solutions manual—making it ideal for self-study and practical use.

This book is intended for systems analysts, designers, developers, users, experts, as well as those involved in quality, risk, safety and security management, and, of course, scientists and students. The various sets of original and traditional probabilistic models and interesting results of their applications to the research of different systems are presented. The models are understandable and applicable for solving system engineering problems: to optimize system requirements, compare different processes, rationale technical decisions, carry out tests, adjust technological parameters, and predict and analyze quality and risks. The engineering decisions, scientifically proven by the proposed models and software tools, can provide purposeful, essential improvement of quality and mitigation of risks, and reduce the expense of operating systems. Models, methods, and software tools can also be used in education for system analysis and mathematical modeling on specializations, for example "systems engineering," "operations research," "enterprise management," "project management," "risk management," "quality of systems," "safety and security," "smart systems," "system of systems," etc.

The authors investigate the effects that different representations of epistemic uncertainty have on practical risk assessment problems. Two different application problems are considered: 1. the estimation of component importance measures in the presence of epistemic uncertainties; 2. the propagation of uncertainties through a risk flooding model. The focus is on the epistemic uncertainty affecting the parameters of the models that describe the components' failures due to incomplete knowledge of their values. This epistemic uncertainty is represented using probability distributions when sufficient data is available for statistical analysis, and by possibility distributions when the information available to define the parameters' values comes from experts, in the form of imprecise quantitative statements or judgments. Three case studies of increasing complexity are presented: a pedagogical example of importance measure assessment on a three-component system from the literature; assessment of importance measures for the auxiliary feed water system of a nuclear pressurized water reactor; an application in environmental modelling, with an analysis of uncertainty propagation in a hydraulic model for the risk-based design of a flood protection dike.

Springer Handbook of Engineering Statistics

Fault Tree Handbook

A Practical Guide, Second Edition

Modern Statistical and Mathematical Methods in Reliability

Advances in System Reliability Engineering

Power system reliability is the focus of intensive study due to its critical role in providing energy supply to modern society. This comprehensive book describes application of some new specific techniques: universal generating function method and its combination with Monte Carlo simulation and with random processes methods, Semi-Markov and Markov reward models and genetic algorithm. The book can be considered as complementary to power system reliability textbooks.

Tools to Proactively Predict Failure The prediction of failures involves uncertainty, and problems associated with failures are inherently probabilistic. Their solution requires optimal tools to analyze strength of evidence and understand failure events and processes to gauge confidence in a design's reliability. Reliability Engineering and Risk Analysis: A Practical Guide, Second Edition has already introduced a generation of engineers to the practical methods and techniques used in reliability and risk studies applicable to numerous disciplines. Written for both practicing professionals and engineering students, this comprehensive overview of reliability and risk analysis techniques has been fully updated, expanded, and revised to meet current needs. It concentrates on reliability analysis of complex systems and their components and also presents basic risk analysis techniques. Since reliability analysis is a multi-disciplinary subject, the scope of this book applies to most engineering disciplines, and its content is primarily based on the materials used in undergraduate and graduate-level courses at the University of Maryland. This book has greatly benefited from its authors' industrial experience. It balances a mixture of basic theory and applications and presents a large number of examples to illustrate various technical subjects. A proven educational tool, this bestselling classic will serve anyone working on real-life failure analysis and prediction problems.

This book shows how to build in and assess reliability, availability, maintainability, and safety (RAMS) of components, equipment, and systems. It presents the state of the art of reliability (RAMS) engineering, in theory & practice, and is based on over 30 years author's experience in this field, half in industry and half as Professor of Reliability Engineering at the ETH, Zurich. The book structure allows rapid access to practical results. Methods & tools are given in a way that they can be tailored to cover different RAMS requirement levels. Thanks to Appendices A6 - A8 the book is mathematically self-contained, and can be used as a textbook or as a desktop reference with a large number of tables (60), figures (210), and examples / exercises^ 10,000 per year since 2013) were the motivation for this final edition, the 13th since 1985, including German editions. Extended and carefully reviewed to improve accuracy, it represents the continuous improvement effort to satisfy reader's needs and confidence. New are an introduction to risk management with structurally new models based on semi-Markov processes & to the concept of mean time to accident, reliability & availability of a k-out-of-n redundancy with arbitrary repair rate for n - k=2, 10 new homework problems, and refinements, in particular, on multiple failure mechanisms, approximate expressions, incomplete coverage, data analysis, and comments on ë, MTBF, MTTF, MTTR, R, PA.

Recent Advances in System Reliability Engineering describes and evaluates the latest tools, techniques, strategies, and methods in this topic for a variety of applications. Special emphasis is put on simulation and modelling technology which is growing in influence in industry, and presents challenges as well as opportunities to reliability and systems engineers. Several manufacturing engineering applications are addressed, making this a particularly valuable reference for readers in that sector. Contains comprehensive discussions on state-of-the-art tools, techniques, and strategies from industry Connects the latest academic research to applications in industry including system reliability, safety assessment, and preventive maintenance Gives an in-depth analysis of the benefits and applications of modelling and simulation to reliability

Reliability and Maintenance of Complex Systems

Reliability Engineering

System Engineering Management

THE ENGINEERING ECONOMIST

Statistical Models and Methods for Reliability and Survival Analysis

This book contains extended versions of carefully selected and reviewed papers presented at the Third International Conference on Mathematical Methods in Reliability, held in Norway in 2002. It provides an overview of current research activities in reliability theory. The authors are all leading experts in the field. Readership: Graduate students, academics and professionals in probability & statistics, reliability analysis, survival analysis, industrial engineering, software engineering, operations research and applied mathematics research.

Most books on reliability theory are devoted to traditional binary reliability models allowing for only two possible states for a system and its components: perfect functionality and complete failure. However, many real-world systems are composed of multi-state components, which have different performance levels and several failure modes with various effects on the entire system performance (degradation). Such systems are called Multi-State Systems (MSS). The examples of MSS are power systems where the component performance is characterized by the generating capacity, computer systems where the component performance is characterized by the data processing speed, communication systems, etc. This book is the first to be devoted to Multi-State System (MSS) reliability analysis and optimization. It provides a historical overview of the field, presents basic concepts of MSS, defines MSS reliability measures, and systematically describes the tools for MSS reliability assessment and optimization. Basic methods for MSS reliability assessment, such as a Boolean methods extension, basic random process methods (both Markov and semi-Markov) and universal generating function models, are systematically studied. A universal genetic algorithm optimization technique and all details of its application are described. All the methods are illustrated by numerical examples. The book also contains many examples of application of reliability assessment and optimization methods to real engineering problems. The aim of this book is to give a comprehensive, up-to-date presentation of MSS reliability theory based on modern advances in this field and provide a theoretical summary and examples of engineering applications to a variety of technical problems. From this point of view the book bridges the gap between theoretical advances and practical reliability engineering.

This book has been written with the intention to fill two big gaps in the reliability and risk literature: the risk-based reliability analysis as a powerful alternative to the traditional reliability analysis and the generic principles for reducing technical risk. An important theme in the book is the generic principles and techniques for reducing technical risk. These have been classified into three major categories: preventive (reducing the likelihood of failure), protective (reducing the consequences from failure) and dual (reducing both, the likelihood and the consequences from failure). Many of these principles (for example: avoiding clustering of events, deliberately introducing weak links, reducing sensitivity, introducing changes with opposite sign, etc.) are discussed in the reliability literature for the first time. Significant space has been allocated to component reliability. In the last chapter of the book, several applications are discussed of a powerful equation which constitutes the core of a new theory of locally initiated component failure by flaws whose number is a random variable. Offers a shift in the existing paradigm for conducting reliability analyses Covers risk-based reliability analysis and generic principles for reducing risk Provides a new measure of risk based on the distribution of the potential losses from failure as well as the basic principles for risk-based design Incorporates fast algorithms for system reliability analysis and discrete-event simulators Includes the probability of failure of a structure with complex shape expressed with a simple equation

This book is the sixth edition of a classic text that was first published in 1950 in the former Soviet Union. The clear presentation of the subject and extensive applications supported with real data helped establish the book as a standard for the field. To date, it has been published into more that ten languages and has gone through five editions. The sixth edition is a major revision over the fifth. It contains new material and results on the Local Limit Theorem, the Integral Law of Large Numbers, and Characteristic Functions. The new edition retains the feature of developing the subject from intuitive concepts and demonstrating techniques and theory through large numbers of examples. The author has, for the first time, included a brief history of probability and its development. Exercise problems and examples have been revised and new ones added.

Software Reliability

Theory and Practice

Uncertainty propagation and importance measure assessment

The Universal Generating Function in Reliability Analysis and Optimization

Mathematical and Statistical Methods in Reliability

Probabilistic Reliability EngineeringJohn Wiley & Sons

Many real systems are composed of multi-state components with different performance levels and several failure modes. These affect the whole system's performance. Most books on reliability theory cover binary models that allow a system only to function perfectly or fail completely. "The Universal Generating Function in Reliability Analysis and Optimization" is the first book that gives a comprehensive description of the universal generating function technique and its applications in binary and multi-state system reliability analysis. Features: - an introduction to basic tools of multi-state system reliability and optimization; - applications of the universal generating function to different systems in mechanical, industrial and software engineering. This monograph will be of value to anyone interested in system reliability, performance analysis and optimization in industrial, electrical and nuclear engineering.

Using the Kolmogorov model, this intermediate-level text discusses random variables, probability distributions, mathematical expectation, random processes, more. For advanced undergraduates students of science, engineering, or math. Includes problems with answers and six appendixes. 1965 edition.

Using clear language, this book shows you how to build in, evaluate, and demonstrate reliability and availability of components, equipment, and systems. It presents the state of the art in theory and practice, and is based on the author's 30 years' experience, half in industry and half as professor of reliability engineering at the ETH, Zurich. In this extended edition, new models and considerations have been added for reliability data analysis and fault tolerant reconfigurable repairable systems including reward and frequency / duration aspects. New design rules for imperfect switching, incomplete coverage, items with more than 2 states, and phased-mission systems, as well as a Monte Carlo approach useful for rare events are given. Trends in quality management are outlined. Methods and tools are given in such a way that they can be tailored to cover different reliability requirement levels and be used to investigate safety as well. The book contains a large number of tables, figures, and examples to support the practical aspects.

Theory of Probability

Cumulative Book Index

New Computational Methods in Power System Reliability

Modern Dynamic Reliability Analysis for Multi-state Systems

Multi-state System Reliability Analysis and Optimization for Engineers and Industrial Managers

Developed to serve as a text for the System Safety and Reliability Analysis course presented to Nuclear Regulatory Commission personnel and contractors. Codifies and systematizes the fault tree approach, a deductive failure analysis which focuses on one particular undesired event and provides a method for determining the causes of that event.

System engineering is the application of scientific and engineering efforts to transform a business need into a defined system configuration through the top-down process of requirements, definition, functional analysis, allocation synthesis, design optimization, test and evaluation.

This complete resource on the theory and applications of reliability engineering, probabilistic models and risk analysis consolidates all the latest research, presenting the most up-to-date developments in this field. With comprehensive coverage of the theoretical and practical issues of both classic and modern topics, it also provides a unique commemoration to the centennial of the birth of Boris Gnedenko, one of the most prominent reliability scientists of the twentieth century. Key features include: expert treatment of probabilistic models and statistical inference from leading scientists, researchers and practitioners in their respective reliability fields detailed coverage of multi-state system reliability, maintenance models, statistical inference in reliability, systemability, physics of failures and reliability demonstration many examples and engineering case studies to illustrate the theoretical results and their practical applications in industry Applied Reliability Engineering and Risk Analysis is one of the first works to treat the important areas of degradation analysis, multi-state system reliability, networks and large-scale systems in one comprehensive volume. It is an essential reference for engineers and scientists involved in reliability analysis, applied probability and statistics, reliability engineering and maintenance, logistics, and quality control. It is also a useful resource for graduate students specialising in reliability analysis and applied probability and statistics. Dedicated to the Centennial of the birth of Boris Gnedenko, renowned Russian mathematician and reliability theorist

A UNIQUE ENGINEERING AND STATISTICAL APPROACH TO OPTIMAL RESOURCE ALLOCATION Optimal Resource Allocation: With Practical Statistical Applications and Theory features the application of probabilistic and statistical methods used in reliability engineering during the different phases of life cycles of technical systems. Bridging the gap between reliability engineering and applied mathematics, the book outlines different approaches to optimal resource allocation and various applications of models and algorithms for solving real-world problems. In addition, the fundamental background on optimization theory and various illustrative numerical examples are provided. The book also features: An overview of various approaches to optimal resource allocation, from classical Lagrange methods to modern algorithms based on ideas of evolution in biology Numerous exercises and case studies from a variety of areas, including communications, transportation, energy transmission, and counterterrorism protection The applied methods of optimization with various methods of optimal redundancy problem solutions as well as the numerical examples and statistical methods needed to solve the problems Practical thoughts, opinions, and judgments on real-world applications of reliability theory and solves practical problems using mathematical models and algorithms Optimal Resource Allocation is a must-have guide for electrical, mechanical, and reliability engineers dealing with engineering design and optimal reliability problems. In addition, the book is excellent for graduate and PhD-level courses in reliability theory and optimization.

With Practical Statistical Applications and Theory

Handbook of Reliability Engineering

Journal of Applied Probability

Reliability Engineering and Risk Analysis

In today's global and highly competitive environment, continuous improvement in the processes and products of any field of engineering is essential for survival. This book gathers together the full range of statistical techniques required by engineers from all fields. It will assist them to gain sensible statistical feedback on how their processes or products are functioning and to give them realistic predictions of how these could be improved. The handbook will be essential reading for all engineers and engineering-connected managers who are serious about keeping their methods and products at the cutting edge of quality and competitiveness.

This volume contains extended versions of 28 carefully selected and reviewed papers presented at The Fourth International Conference on Mathematical Methods in Reliability in Santa Fe, New Mexico, June 21OCo25, 2004, the leading conference in reliability research. The meeting serves as a forum for discussing fundamental issues on mathematical methods in reliability theory and its applications. A broad overview of current research activities in reliability theory and its applications is provided with coverage on reliability modeling, network and system reliability, Bayesian methods, survival analysis, degradation and maintenance modeling, and software reliability. The contributors are all leading experts in the field and include the plenary session speakers, Tim Bedford, Thierry Duchesne, Henry Wynn, Vicki Bier, Edsel Pena, Michael Hamada, and Todd Graves."

Complex high-technology devices are in growing use in industry, service sectors, and everyday life. Their reliability and maintenance is of utmost importance in view of their cost and critical functions. This book focuses on this theme and is intended to serve as a graduate-level textbook and reference book for scientists and academics in the field. The chapters are grouped into five complementary parts that cover the most important aspects of reliability and maintenance: stochastic models of reliability and maintenance, decision models involving optimal replacement and repair, stochastic methods in software engineering, computational methods and simulation, and maintenance management systems. This wide range of topics provides the reader with a complete picture in a self-contained volume.

Proven statistical reliability analysis methods-available for the first time to engineers in the West While probabilistic methods of system reliability analysis have reached an unparalleled degree of refinement, Russian engineers have concentrated on developing more advanced statistical methods. Over the past several decades, their efforts have yielded highly evolved statistical models that have proven to be especially valuable in the estimation of reliability based upon tests of individual units of systems. Now Statistical Reliability Engineering affords engineers a unique opportunity to learn both the theory behind and applications of those statistical methods. Written by three leading innovators in the field, Statistical Reliability Engineering: * Covers all mathematical models for statistical reliability analysis, including Bayesian estimation, accelerated testing, and Monte Carlo simulation * Focuses on the estimation of various measures of system reliability based on the testing of individual units * Contains new theoretical results available for the first time in print * Features numerous examples demonstrating practical applications of the theory presented Statistical Reliability Engineering is an important professional resource for reliability and design engineers, especially those in the telecommunications and electronics industries. It is also an excellent course text for advanced courses in reliability engineering.

Concepts of Probability Theory

InTech

Stochastic Processes

Assessment, Optimization and Applications

Probabilistic Models and Statistical Inference

With the growing complexity of engineered systems, reliability hasincreased in importance throughout the twentieth century. Initiallydeveloped to meet practical needs, reliability theory has become anapplied mathematical discipline that permits a priori evaluationsof various reliability indices at the design stages. Theseevaluations help engineers choose an optimal system structure,improve methods of maintenance, and estimate the reliability on thebasis of special testing. Probabilistic Reliability Engineeringfocuses on the creation of mathematical models for solving problemsof system design. Broad and authoritative in its content, Probabilistic ReliabilityEngineering covers all mathematical models associated withprobabilistic methods of reliability analysis, including--unique tothis book--maintenance and cost analysis, as well as many newresults of probabilistic testing. To provide readers with all necessary background material, thistext incorporates a thorough review of the fundamentals ofprobability theory and the theory of stochastic processes. Itoffers clear and detailed treatment of reliability indices, thestructure function, load-strength reliability models, distributionswith monotone intensity functions, repairable systems, the Markovmodels, analysis of performance effectiveness, two-pole networks,optimal redundancy, optimal technical diagnosis, and heuristicmethods in reliability. Throughout the text, an abundance of realworld examples and case studies illustrate and illuminate thetheoretical points under consideration. For engineers in design, operations research, and maintenance, aswell as cost analysts and R&D managers, ProbabilisticReliability Engineering offers the most lucid, comprehensivetreatment of the subject available anywhere. About the editor JAMES A. FALK is Professor and Chairman of the Department ofOperations Research at George Washington University. In addition tohis numerous publications, Dr. Falk has lectured internationally asa Fulbright Lecturer. Of related interest... The reliability-testing "bible" for three generations of EasternEuropean scientists, adapted for Western scientists andengineers... HANDBOOK OF RELIABILITY ENGINEERING Originally published in the USSR, Handbook of ReliabilityEngineering set the standard for the reliability testing oftechnical systems for nearly three generations of appliedscientists and engineers. Authored by a group of prominent Sovietspecialists in reliability, it provides professionals and studentswith a comprehensive reference covering mathematical formulas andtechniques for incorporating reliability into engineering designsand testing procedures. Divided into twenty-four self-containedchapters, the Handbook details reliability fundamentals, examinescommon reliability problems and solutions, provides a collection ofcomputation formulas, and illustrates practical applications. The Handbook's Russian editor and internationally recognized expertIgor A. Ushakov has joined with American engineering professionalsto bring this indispensable resource to English-speaking engineersand scientists. 1994 (0-471-57173-3) 663 pp.

Practical Approaches to Reliability Theory in Cutting-EdgeApplications Probabilistic Reliability Models helps readers understandand properly use statistical methods and optimal resource allocation to solve engineeringproblems. The author supplies engineers with a deeper understanding ofmathematical models while also equipping mathematically oriented readers with a fundamentalknowledge of the engineeringrelated applications at the center of model building. The book showcasesthe use of probability theory and mathematical statistics to solve common, real-worldreliability problems. Following an introduction to the topic, subsequent chapters explore keysystems and models including: • Unrecoverable objects and recoverable systems • Methods of direct enumeration • Markov models and heuristic models • Performance effectiveness • Time redundancy • System survivability • Aging units and their related systems • Multistate systems Detailed case studies illustrate the relevance of the discussedmethods to real-world technical projects including software failure avalanches, gas pipelineswith underground storage, and intercontinental ballistic missile (ICBM) control systems.Numerical examples and detailed explanations accompany each topic, and exercises throughoutallow readers to test their comprehension of the presented material. Probabilistic Reliability Models is an excellent book forstatistics, engineering, and operations research courses on applied probability at theupper-undergraduate and graduate levels. The book is also a valuable reference for professionals andresearchers working in industry who would like a mathematical review of reliability models and therelevant applications.

Providing a general introduction to software reliability engineering, this book presents detailed analytical models, state-of-the-art techniques, methodologies, and tools used to assess the reliability of software systems. It also explores new directions of research in the field of software reliability engineering, including fault tolerant software and a new software reliability model that includes environmental factors.

Multi-state System Reliability Analysis and Optimization for Engineers and Industrial Managers presents a comprehensive, up-to-date description of multi-state system (MSS) reliability as a natural extension of classical binary-state reliability. It presents all essential theoretical achievements in the field, but is also practically oriented. New theoretical issues are described, including: • combined Markov and semi-Markov processes methods, and universal generating function techniques; • statistical data processing for MSSs; • reliability analysis of aging MSSs; • methods for cost-reliability and cost-availability analysis of MSSs; and • main definitions and concepts of fuzzy MSS. Multi-state System Reliability Analysis and Optimization for Engineers and Industrial Managers also discusses life cycle cost analysis and practical optimal decision making for real world MSSs. Numerous examples are included in each section in order to illustrate mathematical tools. Besides these examples, real world MSSs (such as power generating and transmission systems, air-conditioning systems, production systems, etc.) are considered as case studies. Multi-state System Reliability Analysis and Optimization for Engineers and Industrial Managers also describes basic concepts of MSS, MSS reliability measures and tools for MSS reliability assessment and optimization. It is a self-contained study resource and does not require prior knowledge from its readers, making the book attractive for researchers as well as for practical engineers and industrial managers.

Proceedings of VETOMAC X 2014, held at the University of Manchester, UK, September 9-11, 2014

Probabilistic Modeling in System Engineering

Stochastic Processes and the Lz-Transform

Vibration Engineering and Technology of Machinery

Analysis, Combinatorics, and Monte Carlo

Statistical Models and Methods for Reliability and Survival Analysis brings together contributions by specialists in statistical theory as they discuss their applications providing up-to-date developments in methods used in survival analysis, statistical goodness of fit, stochastic processes for system reliability, amongst others. Many of these are related to the work of Professor M. Nikulin in statistics over the past 30 years. The authors gather together various contributions with a broad array of techniques and results, divided into three parts - Statistical Models and Methods, Statistical Models and Methods in Survival Analysis, and Reliability and Maintenance. The book is intended for researchers interested in statistical methodology and models useful in survival analysis, system reliability and statistical testing for censored and non-censored data.

Handbook for the computation and empirical estimation of reliability. Introduces an incomparable volume of easily applicable, cutting-edge results originated by prominent Russian reliability specialists. Completely covers probabilistic reliability, statistical reliability and optimization with simple, step-by-step, numerical examples. Offers a broad range of applications in engineering, operations research, cost analysis and project management. Explores reliability software extensively. Includes appendices with summary reviews of mathematical and statistical fundamentals.

The VETOMAC-X Conference covered a holistic plethora of relevant topics in vibration and engineering technology including condition monitoring, machinery and structural dynamics, rotor dynamics, experimental techniques, finite element model updating, industrial case studies, vibration control and energy harvesting, and signal processing. These proceedings contain not only all of the nearly one-hundred peer-reviewed presentations from authors representing more than twenty countries, but also include six invited lectures from renowned experts: Professor K. Gupta, Mr W. Hahn, Professor A.W. Lees, Professor John Mottershead, Professor J.S. Rao, and Dr P. Russhard. This work is of interest to researchers and practitioners alike, and is an essential book for most of libraries of higher academic institutes.

This book discusses recent developments in dynamic reliability in multi-state systems (MSS), addressing such important issues as reliability and availability analysis of aging MSS, the impact of initial conditions on MSS reliability and availability, changing importance of components over time in MSS with aging components, and the determination of age-replacement policies. It also describes modifications of traditional methods, such as Markov processes with rewards, as well as a modern mathematical method based on the extended universal generating function technique, the Lz-transform, presenting various successful applications and demonstrating their use in real-world problems. This book provides theoretical insights, information on practical applications, and real-world case studies that are of interest to engineers and industrial managers as well as researchers. It also serves as a textbook or supporting text for graduate and postgraduate courses in industrial, electrical, and mechanical engineering.

Multi-State System Reliability

Probabilistic Reliability Engineering

Case studies

with Applications to Reliability Theory

Models of Network Reliability

Mathematical Methods of Reliability Theory discusses fundamental concepts of probability theory, mathematical statistics, and an exposition of the relationships among the fundamental quantitative characteristics encountered in the theory. The book deals with the set-theoretic approach to reliability theory and the central concepts of set theory to the phenomena. It also presents methods of finding estimates for reliability parameters based on observations and methods of testing reliability hypotheses. Based on mathematical statistics, the book also explains formulation of some selected results. It presents a method that increases the reliability of manufactured articles—redundancy. An important part of product quality control is the standards of acceptance-sampling plans which require simplicity, wide content for flexibility, comprehensive characteristics, and variability. The book also tackles economical and rational methods of sampling inspections, highlighting the need for a correct evaluation of environmental conditions—the factors which predetermine the choice of the inspection method. The book then explains how to estimate the efficiency of the operation of the sampling plan after its selection. The book can be helpful for engineers, mathematicians, economists, or industrial managers, as well as for other professionals who work in the technological, political, research, structural, and physico-chemical areas.

An effective reliability programme is an essential component of every product's design, testing and efficient production. From the failure analysis of a microelectronic device to software fault tolerance and from the accelerated life testing of mechanical components to hardware verification, a common underlying philosophy of reliability applies. Defining both fundamental and applied work across the entire systems reliability arena, this state-of-the-art reference presents methodologies for quality, maintainability and dependability. Featuring: Contributions from 60 leading reliability experts in academia and industry giving comprehensive and authoritative coverage. A distinguished international Editorial Board ensuring clarity and precision throughout. Extensive references to the theoretical foundations, recent research and future directions described in each chapter. Comprehensive subject index providing maximum utility to the reader. Applications and examples across all branches of engineering including IT, power, automotive and aerospace sectors. The handbook's cross-disciplinary scope will ensure that it serves as an indispensable tool for researchers in industrial, electrical, electronics, computer, civil, mechanical and systems engineering. It will also aid professional engineers to find creative reliability solutions and management to evaluate systems reliability and to improve processes. For student research projects it will be the ideal starting point whether addressing basic questions in communications and electronics or learning advanced applications in micro-electro-mechanical systems (MEMS), manufacturing and high-assurance engineering systems.

Reliability engineering is a rapidly evolving discipline, whose purpose is to develop methods and tools to predict, evaluate, and demonstrate reliability, maintainability, and availability of components, equipment, and systems, as well as to support development and production engineers in building in reliability and maintainability. To be cost and time effective, reliability engineering has to be coordinated with quality assurance activities, in agreement with Total Quality Management (TQM) and Concurrent Engineering efforts. To build in reliability and maintainability into complex equipment or systems, failure rate and failure mode analyses have to be performed early in the development phase and be supported by design guidelines for reliability, maintainability, and software quality as well as by extensive design reviews. Before production, qualification tests on prototypes are necessary to ensure that quality and reliability targets have been met. In the production phase, processes need to be selected and monitored to assure the required quality level. For many systems, availability requirements have also to be satisfied. In these cases, stochastic processes can be used to investigate and optimize availability. including logistical support as well. Software often plays a dominant role, requiring specific quality assurance activities. This book presents the state-of-the-art of reliability engineering, both in theory and practice. It is based on over 25 years experience of the author in this field, half of which was in industry and half as Professor for reliability engineering at the ETH (Swiss Federal Institute of Technology Zurich).

A world list of books in the English language.

Introduction to Probability Models

Probabilistic Reliability Models

Statistical Reliability Engineering
Optimal Resource Allocation
Risk-Based Reliability Analysis and Generic Principles for Risk Reduction

Introduction to Probability Models, Tenth Edition, provides an introduction to elementary probability theory and stochastic processes. There are two approaches to the study of probability theory. One is heuristic and nonrigorous, and attempts to develop in students an intuitive feel for the subject that enables him or her to think probabilistically. The other approach attempts a rigorous development of probability by using the tools of measure theory. The first approach is employed in this text. The book begins by introducing basic concepts of probability theory, such as the random variable, conditional probability, and conditional expectation. This is followed by discussions of stochastic processes, including Markov chains and Poison processes. The remaining chapters cover queuing, reliability theory, Brownian motion, and simulation. Many examples are worked out throughout the text, along with exercises to be solved by students. This book will be particularly useful to those interested in learning how probability theory can be applied to the study of phenomena in fields such as engineering, computer science, management science, the physical and social sciences, and operations research. Ideally, this text would be used in a one-year course in probability models, or a one-semester course in introductory probability theory or a course in elementary stochastic processes. New to this Edition: 65% new chapter material including coverage of finite capacity queues, insurance risk models and Markov chains Contains compulsory material for new Exam 3 of the Society of Actuaries containing several sections in the new exams Updated data, and a list of commonly used notations and equations, a robust ancillary package, including a ISM, SSM, and test bank Includes SPSS PASW Modeler and SAS JMP software packages which are widely used in the field Hallmark features: Superior writing style Excellent exercises and examples covering the wide breadth of coverage of probability topics Real-world applications in engineering, science, business and economics
Mathematical Methods of Reliability Theory
Proceedings of the Fifth Berkeley Symposium on Mathematical Statistics and Probability
Applied Reliability Engineering and Risk Analysis
Second Revised Edition