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Introduction to System Reliability Theory **Building Secure and Reliable Systems** *Systems Reliability and Failure Prevention* **System Software Reliability** Complex System Reliability **Site Reliability Engineering** **Concise Reliability for Engineers** **Reliability Evaluation of Engineering Systems** *Advances in System Reliability Engineering* *Advances in Reliability and System Engineering* **Repairable Systems Reliability Analysis** **Systems Reliability Engineering** *Reliability Engineering* Recent Advances in System Reliability System Signatures and their Applications in Engineering Reliability Systems Engineering Software Reliability Control Systems Safety Evaluation and Reliability Reliability Growth **Systems Reliability and Risk Analysis** **Structural and System Reliability** **Reliability and Risk Analysis in Engineering and Medicine** *System Reliability Theory* *Software Reliability Methods* *Multi-State System Reliability* Reliability of Safety-Critical Systems *Design for Reliability* *Reliable Computer Systems* Reliability, Maintainability and Risk **Reliability Engineering** Mathematical Models for the Study of the Reliability of Systems Reliability and Maintainability of Electronic Systems *Multi-state System Reliability Analysis and Optimization for Engineers and Industrial Managers* Practical Applications in Reliability Engineering **Ensuring Software Reliability** **Reliability and Optimal Maintenance** The Reliability, Availability and Productiveness of Systems **Computer System Reliability** Reliability of Computer Systems and Networks **Reliability Design of Mechanical Systems**

This book is intended to serve a wide variety of users. This updated third edition provides the detailed background necessary to understand how to meet important new safety regulations and reliability engineering topics. Professional control system designers will learn to properly evaluate control system components, various system architectures, how to better communicate with vendors, and how to increase accuracy of life-cycle cost estimates. The book is also an excellent text for college courses due to its detailed explanations, practical presentation, and discussion of the difference between theory and real-world application. It provides a basic foundation of material, including probability, statistics, reliability theory definitions, and basic reliability modeling techniques, as well as advanced topics relevant to safety instrumented and control systems. Each chapter contains exercises to assist the reader in applying the theories presented with their practical implementation. 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 provides an application-oriented framework for reliability modeling and analysis of repairable systems in conjunction with the procurement process of weapon systems and throughput analysis for industries. Most of the reliability literature is directed towards non-repairable systems, that is, systems that fail are discarded or replaced. This book is mainly dedicated towards providing coverage to the reliability modeling and analysis of repairable systems that undergo failure-repair cycles. This unique book provides a comprehensive framework for the modeling and analysis of repairable systems considering both the non-parametric and parametric approaches to deal with their failure data. The book presents MCF based non-parametric approach with several illustrative examples and the generalized renewal process (GRP) based arithmetic reduction of age (ARA) models along with its applications to the systems failure data from the aviation industry. A complete chapter on an integrated framework for procurement process is devoted by utilizing the concepts of multi-criteria decision-making (MCDM) techniques which will of a great assistance to the readers in enhancing the potential of their respective organizations. This book also presents FMEA methods tailored for GRP based repairs. This text has primarily emerged from the industrial experience and research work of the authors. A number of illustrations have been included to make the subject lucid and vivid even to the readers who are relatively new to this area. Besides, various examples have been provided to display the applicability of presented models and methodologies to assist the readers in applying the concepts presented in this book. A comprehensive introduction to reliability analysis. The first section provides a thorough but elementary prologue to reliability theory. The latter half comprises more advanced analytical tools including Markov processes, renewal theory, life data analysis, accelerated life testing and Bayesian reliability analysis. Features numerous worked examples. Each chapter concludes with a selection of problems plus additional material on applications. Reliability, Maintainability and Risk: Practical Methods for Engineers, Eighth Edition, discusses tools and techniques for reliable and safe engineering, and for optimizing maintenance strategies. It emphasizes the importance of using reliability techniques to identify and eliminate potential failures early in the design cycle. The focus is on techniques known as RAMS (reliability, availability, maintainability, and safety-integrity). The book is organized into five parts. Part 1 on reliability parameters and costs traces the history of reliability and safety technology and presents a cost-effective approach to quality, reliability, and safety. Part 2 deals with the interpretation of failure rates, while Part 3 focuses on the prediction of reliability and risk. Part 4 discusses design and assurance techniques; review and testing techniques; reliability growth modeling; field data collection and feedback; predicting and demonstrating repair times; quantified reliability maintenance; and systematic failures. Part 5 deals with legal, management and safety issues, such as project management, product liability, and safety legislation. 8th edition of this core reference for engineers who deal with the design or operation of any safety critical systems, processes or operations Answers the question: how can a defect that costs less than \$1000 dollars to identify at the process design stage be prevented from escalating to a \$100,000 field defect, or a \$1m+ catastrophe Revised throughout, with new examples, and standards, including must have material on the new edition of global functional safety standard IEC 61508, which launches in 2010 Based on the authors' research, Reliability and Optimal Maintenance presents the latest theories and methods of

reliability and maintenance with an emphasis on multi-component systems, while also considering current hot topics in reliability and maintenance including: imperfect repair, economic dependence and opportunistic maintenance, and correlated failure and repair. Software reliability and maintenance cost, and warranty cost considerations are also considered. Annotation This timely resource offers engineers and managers a comprehensive, unified treatment of the techniques and practice of systems reliability and failure prevention, without the use of advanced mathematics. The overwhelming majority of a software system's lifespan is spent in use, not in design or implementation. So, why does conventional wisdom insist that software engineers focus primarily on the design and development of large-scale computing systems? In this collection of essays and articles, key members of Google's Site Reliability Team explain how and why their commitment to the entire lifecycle has enabled the company to successfully build, deploy, monitor, and maintain some of the largest software systems in the world. You'll learn the principles and practices that enable Google engineers to make systems more scalable, reliable, and efficient—lessons directly applicable to your organization. This book is divided into four sections: Introduction—Learn what site reliability engineering is and why it differs from conventional IT industry practices Principles—Examine the patterns, behaviors, and areas of concern that influence the work of a site reliability engineer (SRE) Practices—Understand the theory and practice of an SRE's day-to-day work: building and operating large distributed computing systems Management—Explore Google's best practices for training, communication, and meetings that your organization can use This graduate textbook imparts the fundamentals of reliability and risk that can be connected mathematically and applied to problems in engineering and medical science and practice. The book is divided into eight chapters, the first three of which deal with basic fundamentals of probability theory and reliability methods. The fourth chapter illustrates simulation methods needed to solve complex problems. Chapters 5-7 explain reliability codes and system reliability (which uses the component reliabilities discussed in previous chapters). The book concludes in chapter 8 with an examination of applications of reliability within engineering and medical fields. Presenting a highly relevant competency for graduates entering product research and development, or facilities operations sectors, this text includes many examples and end of chapter study questions to maximize student comprehension. Explains concepts of reliability and risk estimation techniques in the context of medicine and engineering; Elucidates the interplay between reliability and risk from design to operation phases; Uses real world examples from engineering structures and medical devices and protocols; Adopts a lucid yet rigorous presentation of reliability and risk calculations; Reinforces students understanding of concepts covered with end-of-chapter exercises. Based on material taught at the University of California, Berkeley, this textbook offers a modern, rigorous and comprehensive treatment of the methods of structural and system reliability analysis. It covers the first- and second-order reliability methods for components and systems, simulation methods, time- and space-variant reliability, and Bayesian parameter estimation and reliability updating. It also presents more advanced, state-of-the-art topics such as finite-element reliability methods, stochastic structural dynamics, reliability-based optimal design, and Bayesian networks. A wealth of well-designed examples connect theory with practice, with simple examples demonstrating mathematical concepts and larger examples demonstrating their applications. End-of-chapter homework problems are included throughout. Including all necessary background material from probability theory, and accompanied online by a solutions manual and PowerPoint slides for instructors, this is the ideal text for senior undergraduate and graduate students taking courses on structural and system reliability in departments of civil, environmental and mechanical engineering. In response to new developments in the field, practical teaching experience, and readers' suggestions, the authors of the warmly received Reliability Evaluation of Engineering Systems have updated and extended the work-providing extended coverage of fault trees and a more complete examination of probability distribution, among other things-without disturbing the original's concept, structure,

or style. Recent Advances in System Reliability discusses developments in modern reliability theory such as signatures, multi-state systems and statistical inference. It describes the latest achievements in these fields, and covers the application of these achievements to reliability engineering practice. The chapters cover a wide range of new theoretical subjects and have been written by leading experts in reliability theory and its applications. The topics include: concepts and different definitions of signatures (D-spectra), their properties and applications to reliability of coherent systems and network-type structures; LZ-transform of Markov stochastic process and its application to multi-state system reliability analysis; methods for cost-reliability and cost-availability analysis of multi-state systems; optimal replacement and protection strategy; and statistical inference. Recent Advances in System Reliability presents many examples to illustrate the theoretical results. Real world multi-state systems, such as power generation and transmission, refrigeration, and production systems, are considered in the form of case studies, making the book a useful resource for researchers and postgraduate students. Explains how software reliability can be applied to software programs of all sizes, functions and languages, and businesses. This text provides real-life examples from industries such as defence engineering, and finance. It is aimed at software and quality assurance engineers and graduate students. Computer systems have become an important element of the world economy, with billions of dollars spent each year on development, manufacture, operation, and maintenance. Combining coverage of computer system reliability, safety, usability, and other related topics into a single volume, Computer System Reliability: Safety and Usability eliminates th

Since the introduction of system signatures in Francisco Samaniego's 1985 paper, the properties of this technical concept have been examined, tested and proven in a wide variety of systems applications. Based on the practical and research success in building reliability into systems with system signatures, this is the first book treatment of the approach. Its purpose is to provide guidance on how reliability problems might be structured, modeled and solved. A substantial amount of research has been conducted on consecutive k-out-of-n and related reliability systems over the past four decades. These systems have been used to model various engineering systems such as the microwave stations of telecoms network, oil pipeline systems, and vacuum systems in an electron accelerator. As such, studies of reliability properties of consecutive k-out-of-n structures have attracted significant attention from both theoretical and practical approaches. In the modern era of technology, the redundancies are employed in the various industrial systems to prevent them from failure/sudden failure or to recover from failures. This book is meant to provide knowledge and help engineers and academicians in understanding reliability engineering by using k-out-of-n structures. The material is also targeted at postgraduate or senior undergraduate students pursuing reliability engineering. This book presents original studies describing the latest research and developments in the area of reliability and systems engineering. It helps the reader identifying gaps in the current knowledge and presents fruitful areas for further research in the field. Among others, this book covers reliability measures, reliability assessment of multi-state systems, optimization of multi-state systems, continuous multi-state systems, new computational techniques applied to multi-state systems and probabilistic and non-probabilistic safety assessment. This book presents the state-of-the-art of reliability engineering, both in theory and practice. It provides design guidelines for reliability, maintainability, and software quality. This is a textbook establishing a link between theory and practice, with a large number of tables, figures, and examples to support the practical aspects. This allows rapid access to practical results. The book is based on over 30 years of industrial and academic experience. Complex System Reliability presents a state-of-the-art treatment of complex multi-channel system reliability assessment and provides the requisite tools, techniques and algorithms required for designing, evaluating and optimizing ultra-reliable redundant systems. Critical topics that make Complex System Reliability a unique and definitive resource include:

- redundant system analysis for k-out-of-n systems (including complex systems with embedded k-out-of-n structures) involving both perfect and imperfect fault

coverage; • imperfect fault coverage analysis techniques, including algorithms for assessing the reliability of redundant systems in which each element is subject to a given coverage value (element level coverage) or in which the system uses voting to avoid the effects of a failed element (fault level coverage); and • state-of-the-art binary decision diagram analysis techniques, including the latest and most efficient algorithms for the reliability assessment of large, complex redundant systems. This practical presentation includes numerous fully worked examples that provide detailed explanations of both the underlying design principles and the techniques (such as combinatorial, recursive and binary decision diagram algorithms) used to obtain quantitative results. Many of the worked examples are based on the design of modern digital fly-by-wire control system technology. Complex System Reliability provides in-depth coverage of systems subject to either perfect or imperfect fault coverage and also the most recent techniques for correctly assessing the reliability of redundant systems that use mid-value-select voting as their primary means of redundancy management. It is a valuable resource for those involved in the design and reliability assessment of highly reliable systems, particularly in the aerospace and automotive sectors. This book is about the measurement and prediction of the reliability behaviour of systems of physical items. It is not specifically concerned with human factors with safety analysis as such, although some of the techniques discussed are adaptable to these purposes. A machine or an electronic circuit exemplifies a system. Each machine or circuit may also be treated as an item in a larger system. However, this does not reduce it suddenly to basic component status; it remains complex and can only be treated as unitary under definable restrictions. In particular, the effects of maintenance and component renewal must be considered most carefully. Previous books on system reliability have concentrated on one or two only of the six principal techniques available to the analyst. These are: 1. probability theory; 2. distributional statistics; 3. markov methods (matrix algebra); 4. fault and event trees (Boolean logic); 5. theory of renewal processes; 6. directional graph theory (di-graphs). This book relates these methods to one another and to their applications. The authors feel that previous books which concentrated upon one technique and the contortions necessary to use it in every possible situation may have misled readers into believing that there were no other methods and that some real problems were intractable or more difficult to solve than need be. For example, several results which are proved in other books for items with exponentially distributed times to/between failures are shown to be independent of distribution. Can a system be considered truly reliable if it isn't fundamentally secure? Or can it be considered secure if it's unreliable? Security is crucial to the design and operation of scalable systems in production, as it plays an important part in product quality, performance, and availability. In this book, experts from Google share best practices to help your organization design scalable and reliable systems that are fundamentally secure. Two previous O'Reilly books from Google—Site Reliability Engineering and The Site Reliability Workbook—demonstrated how and why a commitment to the entire service lifecycle enables organizations to successfully build, deploy, monitor, and maintain software systems. In this latest guide, the authors offer insights into system design, implementation, and maintenance from practitioners who specialize in security and reliability. They also discuss how building and adopting their recommended best practices requires a culture that's supportive of such change. You'll learn about secure and reliable systems through: Design strategies Recommendations for coding, testing, and debugging practices Strategies to prepare for, respond to, and recover from incidents Cultural best practices that help teams across your organization collaborate effectively Deals constructively with recognized software problems. Focuses on the unreliability of computer programs and offers state-of-the-art solutions. Covers—software development, software testing, structured programming, composite design, language design, proofs of program correctness, and mathematical reliability models. Written in an informal style for anyone whose work is affected by the unreliability of software. Examples illustrate key ideas, over 180 references. A newly revised and updated edition that details both the theoretical foundations and practical applications of reliability engineering

Reliability is one of the most important quality characteristics of components, products, and large and complex systems—but it takes a significant amount of time and resources to bring reliability to fruition. Thoroughly classroom- and industry-tested, this book helps ensure that engineers see reliability success with every product they design, test, and manufacture. Divided into three parts, Reliability Engineering, Second Edition handily describes the theories and their practical uses while presenting readers with real-world examples and problems to solve. Part I focuses on system reliability estimation for time independent and failure dependent models, helping engineers create a reliable design. Part II aids the reader in assembling necessary components and configuring them to achieve desired reliability objectives, conducting reliability tests on components, and using field data from similar components. Part III follows what happens once a product is produced and sold, how the manufacturer must ensure its reliability objectives by providing preventive and scheduled maintenance and warranty policies. This Second Edition includes in-depth and enhanced chapter coverage of: Reliability and Hazard Functions System Reliability Evaluation Time- and Failure-Dependent Reliability Estimation Methods of the Parameters of Failure-Time Distributions Parametric Reliability Models Models for Accelerated Life Testing Renewal Processes and Expected Number of Failures Preventive Maintenance and Inspection Warranty Models Case Studies A comprehensive reference for practitioners and professionals in quality and reliability engineering, Reliability Engineering can also be used for senior undergraduate or graduate courses in industrial and systems, mechanical, and electrical engineering programs. Computer software reliability has never been so important. Computers are used in areas as diverse as air traffic control, nuclear reactors, real-time military, industrial process control, security system control, biometric scan-systems, automotive, mechanical and safety control, and hospital patient monitoring systems. Many of these applications require critical functionality as software applications increase in size and complexity. This book is an introduction to software reliability engineering and a survey of the state-of-the-art techniques, methodologies and tools used to assess the reliability of software and combined software-hardware systems. Current research results are reported and future directions are signposted. This text will interest: graduate students as a course textbook introducing reliability engineering software; reliability engineers as a broad, up-to-date survey of the field; and researchers and lecturers in universities and research institutions as a one-volume reference. This book describes basic reliability concepts – parametric ALT plan, failure mechanism and design, and reliability testing with acceleration factor and sample size equation. A generalized life-stress failure model with a new effort concept has been derived and recommended to calculate the acceleration factor of the mechanical system. The new sample size equation with the acceleration factor has also been derived to carry out the parametric ALT. This new parametric ALT should help a mechanical/civil engineer to uncover the design parameters affecting reliability during the design process of the mechanical system. Consequently, it should help companies to improve product reliability and avoid recalls due to the product/structure failures in the field. As the improper or missing design parameters in the design phase are experimentally identified by this new reliability design method - parametric ALT, the mechanical/civil engineering system might improve in reliability by the increase in lifetime and the reduction in failure rate. Enhance your hardware/software reliability

Enhancement of system reliability has been a major concern of computer users and designers and this major revision of the 1982 classic meets users' continuing need for practical information on this pressing topic. Included are case studies of reliable systems from manufacturers such as Tandem, Stratus, IBM, and Digital, as well as coverage of special systems such as the Galileo Orbiter fault protection system and AT&T telephone switching processors. Ernst G. Frankel This book has its origin in lecture notes developed over several years for use in a course in Systems Reliability for engineers concerned with the design of physical systems such as civil structures, power plants, and transport vehicles of all types. Increasing public concern with the reliability of systems for reasons of human safety, environmental protection, and acceptable investment risk

limitations has resulted in an increasing interest by engineers in the formal application of reliability theory to engineering design. At the same time there is a demand for more effective approaches to the design of procedures for the operation and use of man-made systems and more meaningful assessment of the risks introduced and use of such a system poses both when operating as designed and when operating at below design performance. The purpose of the book is to provide a sound, yet practical, introduction to reliability analysis and risk assessment which can be used by professionals in engineering, planning, management, and economics to improve the design, operation, and risk assessment of systems of interest. The text should be useful for students in many disciplines and is designed for fourth-year undergraduates or first-year graduate students. I would like to acknowledge the help of many of my graduate students who contributed to the development of this book by offering comments and criticism. Similarly I would like to thank Mrs. This textbook provides the tools for a modern post-graduate introductory course on system reliability theory. It focuses on probabilistic aspects of the theory, including recent results based on signatures, stochastic orders, aging classes, copulas and distortion (or aggregation) functions. The reader requires on an introductory knowledge on probability theory and mathematics. The book serves both for graduate students in mathematics and for engineering students in various disciplines as well as students learning survival analysis, network reliability or simple game theory. Included also are brief introductions to the basic aspects of lifetime modelling, stochastic comparisons, aging classes, mixtures and copula theory. The book develops this knowledge with worked examples and supplies code for the program R so that students can explore its lessons and techniques. 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. Reliability is one of the fundamental criteria in engineering systems. Design and maintenance serve to support it throughout the systems life. As such, maintenance acts in parallel to production and can have a great impact on the availability and capacity of production and the quality of the products. The authors describe current and innovative methods useful to industry and society. This book compiles and examines advanced technologies in the field of reliability and risk analysis. It presents comprehensive methodologies and up-to-date software along with examples of practical case studies from industrial areas to provide a realistic and authentic platform for readers. With computers becoming embedded as controllers in everything from network servers to the routing of subway schedules to NASA missions, there is a critical need to ensure that systems continue to function even when a component fails. In this book, bestselling author Martin Shooman draws on his expertise in reliability engineering and software engineering to provide a complete and authoritative look at fault tolerant computing. He clearly explains all fundamentals, including how to use redundant elements in system design to ensure the

reliability of computer systems and networks. Market: Systems and Networking Engineers, Computer Programmers, IT Professionals. Mathematical Models for the Study of the Reliability of Systems 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 This book presents current methods for dealing with software reliability, illustrating the advantages and disadvantages of each method. The description of the techniques is intended for a non-expert audience with some minimal technical background. It also describes some advanced techniques, aimed at researchers and practitioners in software engineering. This reference will serve as an introduction to formal methods and techniques and will be a source for learning about various ways to enhance software reliability. Various projects and exercises give readers hands-on experience with the various formal methods and tools. Presents the theory and methodology for reliability assessments of safety-critical functions through examples from a wide range of applications Reliability of Safety-Critical Systems: Theory and Applications provides a comprehensive introduction to reliability assessments of safety-related systems based on electrical, electronic, and programmable electronic (E/E/PE) technology. With a focus on the design and development phases of safety-critical systems, the book presents theory and methods required to document compliance with IEC 61508 and the associated sector-specific standards. Combining theory and practical applications, Reliability of Safety-Critical Systems: Theory and Applications implements key safety-related strategies and methods to meet quantitative safety integrity requirements. In addition, the book details a variety of reliability analysis methods that are needed during all stages of a safety-critical system, beginning with specification and design and advancing to operations, maintenance, and modification control. The key categories of safety life-cycle phases are featured, including strategies for the allocation of reliability performance requirements; assessment methods in relation to design; and reliability quantification in relation to operation and maintenance. Issues and benefits that arise from complex modern technology developments are featured, as well as: Real-world examples from large industry facilities with major accident potential and products owned by the general public such as cars and tools Plentiful worked examples throughout that provide readers with a deeper understanding of the core concepts and aid in the analysis and solution of common issues when assessing all facets of safety-critical systems Approaches that work on a wide scope of applications and can be applied to the analysis of any safety-critical system A brief appendix of probability theory for reference With an emphasis on how safety-critical functions are introduced into systems and facilities to prevent or mitigate the impact of an accident, this book is an excellent guide for professionals, consultants, and operators of safety-critical systems who carry out practical, risk, and reliability assessments of safety-critical systems. Reliability of Safety-Critical Systems: Theory and Applications is also a useful textbook for courses in reliability assessment of safety-critical systems and reliability engineering at the graduate-level, as well as for consulting companies offering short courses in reliability assessment of safety-critical systems. System reliability, availability and robustness are often not well understood by system architects, engineers and developers. They often don't understand what drives customer's availability expectations, how to frame verifiable availability/robustness requirements, how to manage and budget availability/robustness, how to methodically architect and design systems that meet robustness requirements, and so on. The book takes a very pragmatic approach of framing reliability and robustness as a functional

aspect of a system so that architects, designers, developers and testers can address it as a concrete, functional attribute of a system, rather than an abstract, non-functional notion. A high percentage of defense systems fail to meet their reliability requirements. This is a serious problem for the U.S. Department of Defense (DOD), as well as the nation. Those systems are not only less likely to successfully carry out their intended missions, but they also could endanger the lives of the operators. Furthermore, reliability failures discovered after deployment can result in costly and strategic delays and the need for expensive redesign, which often limits the tactical situations in which the system can be used. Finally, systems that fail to meet their reliability requirements are much more likely to need additional scheduled and unscheduled maintenance and to need more spare parts and possibly replacement systems, all of which can substantially increase the life-cycle costs of a system. Beginning in 2008, DOD undertook a concerted effort to raise the priority of reliability through greater use of design for reliability techniques, reliability growth testing, and formal reliability growth modeling, by both the contractors and DOD units. To this end, handbooks, guidances, and formal memoranda were revised or newly issued to reduce the frequency of reliability deficiencies for defense systems in operational testing and the effects of those deficiencies. "Reliability Growth" evaluates these recent changes and, more generally, assesses how current DOD principles and practices could be modified to increase the likelihood that defense systems will satisfy their reliability requirements. This report examines changes to the reliability requirements for proposed systems; defines modern design and testing for reliability; discusses the contractor's role in reliability testing; and summarizes the current state of formal reliability growth modeling. The recommendations of "Reliability Growth" will improve the reliability of defense systems and protect the health of the valuable personnel who operate them. Our life is strongly influenced by the reliability of the things we use, as well as of processes and services. Failures cause losses in the industry and society. Methods for reliability assessment and optimization are thus very important. This book explains the fundamental concepts and tools. It is divided into two parts. Chapters 1 to 10 explain the basic terms and methods for the determination of reliability characteristics, which create the base for any reliability evaluation. In the second part (Chapters 11 to 23) advanced methods are explained, such as Failure Modes and Effects Analysis and Fault Tree Analysis, Load-Resistance interference method, the Monte Carlo simulation technique, cost-based reliability optimization, reliability testing, and methods based on Bayesian approach or fuzzy logic for processing of vague information. The book is written in a readable way and practical examples help to understand the topics. It is complemented with references and a list of standards, software and sources of information on reliability. Good, No Highlights, No Markup, all pages are intact, Slight Shelfwear, may have the corners slightly dented, may have slight color changes/slightly damaged spine.

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