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**Telecommunications have underpinned social interaction and economic activity since the 19th century and have been increasingly reliant on optical fibers since their initial commercial deployment by BT in 1983. Today, mobile phone networks, data centers, and broadband services that facilitate our entertainment, commerce, and increasingly health provision are built on hidden optical fiber networks. However, recently it emerged that the fiber network is**

**beginning to fill up, leading to the talk of a capacity crunch where the capacity still grows but struggles to keep up with the increasing demand. This book, featuring contributions by the suppliers of widely deployed simulation software and academic authors, illustrates the origins of the limited performance of an optical fiber from the engineering, physics, and information theoretic viewpoints. Solutions are then discussed by pioneers in each of the respective fields, with near-term solutions discussed by industrially based authors, and more speculative high-potential solutions discussed by leading academic groups. Describes the mechanisms of major components, such as fibers, cables, emission sources, detectors, modulators, repeaters, & system network designs. Includes a section on industrial automation & process control systems. This book highlights the fundamental principles of optical fiber technology required for understanding modern high-capacity lightwave telecom networks. Such networks have become an indispensable part of society with applications ranging from simple web browsing to critical healthcare diagnosis and cloud computing. Since users expect these services to always be available, careful engineering is required in all technologies ranging from component development to network operations. To achieve this understanding, this book first presents a comprehensive treatment of various optical fiber structures and diverse photonic components used in optical fiber networks. Following this discussion is the**

**fundamental design principles of digital and analog optical fiber transmission links. The concluding chapters present the architectures and performance characteristics of optical networks. Developed as an introductory course, this up-to-date text discusses the major building blocks of present-day fiber-optic systems and presents their use in communications and sensing. Starting with easy-to-understand ray propagation in optical fibers, the book progresses towards the more complex topics of wave propagation in planar and cylindrical waveguides. Special emphasis has been given to the treatment of single-mode fibers the backbone of present-day optical communication systems. It also offers a detailed treatment of the theory behind optoelectronic sources (LEDs and injection laser diodes), detectors, modulators, and optical amplifiers. Contemporary in terms of technology, it presents topics such as erbium-doped fiber amplifiers (EDFAs) and wavelength-division multiplexing (WDM) along with dense WDM. Building upon these fundamental principles, the book introduces the reader to system design considerations for analog and digital fiber-optic communications. Emphasis has also been given to fiber-optic sensors and laser-based systems along with their industrial and other applications. This student-friendly text would be very useful to undergraduate students pursuing instrumentation, electronics, and communication engineering. It would also prove to be a good text for postgraduate students of physics. Fiber-**

**optic communication systems have advanced dramatically over the last four decades, since the era of copper cables, resulting in low-cost and high-bandwidth transmission. Fiber optics is now the backbone of the internet and long-distance telecommunication. Without it we would not enjoy the benefits of high-speed internet, or low-rate international telephone calls. This book introduces the basic concepts of fiber-optic communication in a pedagogical way. The important mathematical results are derived by first principles rather than citing research articles. In addition, physical interpretations and real-world analogies are provided to help students grasp the fundamental concepts. Key Features: Lucid explanation of key topics such as fibers, lasers, and photodetectors. Includes recent developments such as coherent communication and digital signal processing. Comprehensive treatment of fiber nonlinear transmission. Worked examples, exercises, and answers. Accompanying website with PowerPoint slides and numerical experiments in MATLAB. Intended primarily for senior undergraduates and graduates studying fiber-optic communications, the book is also suitable as a professional resource for researchers working in the field of fiber-optic communications. The first comprehensive applied book in years on this rapidly-changing area of telecommunications, here is the only resource capable of bringing you fully up to speed on the latest developments in fiber optic communication systems (FOCS). Designed to help you**

**master the mathematics and statistics needed to create high-performance FOCS, Fiber Optic Communications offers you current, in-depth coverage of: optical amplification and the operational characteristics of optical amplifiers; several types of optical detectors - including a uniquely rigorous treatment of quantum noise, receiver noise, and noise in optical amplifiers; wave-division multiplexing - which greatly increases the data rate capability of optical fibers; optical heterodyne detection (OHD) systems - including system performance and proven methods for dealing with phase noise; pros and cons of OHD receivers versus direct detection receivers - one of the hottest debates in fiber optics; and design and performance of a proposed OHD system that features much greater detector sensitivity than present systems. Market\_Desc: Although written primarily for graduate students, the book can also be used for an undergraduate course at the senior level with an appropriate selection of topics. The potential readership is likely to consist of senior undergraduate students, graduate students enrolled in the M. S. and Ph.D. degree programs, engineers and technicians involved with the telecommunications industry, and scientists working in the fields of fiber optics and optical communications. Special Features: · The third edition of a proven best seller · The book is accompanied by a Solutions Manual · A comprehensive, up to date account of fiber-optic communication systems · Book is accompanied by CD-**



**ROM providing applications based on text About The Book: This book is intended to fulfill the requirements of a graduate-level textbook in the field of optical communications. An attempt is made to include as much recent material as possible so that students are exposed to the recent advances in this exciting field. The book can also serve as a reference text for researchers already engaged in or wishing to enter the field of optical fiber communications. The reference list at the end of each chapter is more elaborate than what is common for a typical textbook. The listing of recent research papers should be useful for researchers using this book as a reference. At the same time, students can benefit from it if they are assigned problems requiring reading of original research papers. A set of problems is included at the end of each chapter to help both teacher and student. This book is the most up-to-date and fully comprehensive resource available to professionals and students in the field of fiber optic communications. Balancing concepts, experiments, and actual hands-on practice, the authors provide readers with all the knowledge and working tools necessary to engage competently in this exploding technology. The book describes the state-of-the-art in optical fiber communications, including transmission media and systems, sources and detectors, optical cables and passive devices, and integrated optics. CSELT is the central research laboratory for one of the most active communications manufacturing and operations**

**organizations in Europe. Optoelectronic devices and fibre optics are the basis of cutting-edge communication systems. This monograph deals with the various components of these systems, including lasers, amplifiers, modulators, converters, filters, sensors, and more. Introductory book for undergraduate Electrical Engineering and Electronics Technology courses covering Fiber Optics. This new and revised Fifth Edition of Fiber Optic Communications incorporates coverage of significant advances made in the fiber industry in recent years to present a comprehensive and in-depth introduction to the basics of communicating using optical fiber transmission lines. Students will learn system design as well as operating principles, characteristics, and application of the components that comprise fiber-optic systems. Textbook on the physical principles of optical fibers - for advanced undergraduates and graduates in physics or electrical engineering. This book covers the recent progress in fiber-optic communication systems with a main focus on the impact of fiber nonlinearities on the system performance. Over the past few years, there has been significant progress in coherent communication systems mainly because of the advances in digital signal processing techniques. This has led to renewed interest in fiber linear and nonlinear impairments and techniques to mitigate them in electrical domain. In this book, the reader will find all the important topics of fiber optic communication systems in one place with**

**in-depth coverage by the experts of each subtopics. Pioneers from each of the sub-topics have been invited to contribute. Each chapter will have a section on fundamentals, review of literature survey and the recent developments. The reader will benefit from this approach since many of the conference proceedings and journal articles mainly focus on the authors' research work without spending space on preliminaries. "Discusses several dispersion-management schemes that restore amplified signal to its original state"-- This unique practical handbook is the only one of its kind to provide the conceptual framework and troubleshooting tactics related to the manufacturing, selection, and installation of modern photonic networks, including optical fiber plants, optical transceivers, test and measurement equipment, and network architecture of SDH, OTN, IP/MPLS, FTTx networks, and PON. This resource includes the latest technological advancements and industry applications while covering the entire fiber ecosystem from installation to troubleshooting. This book presents the use of common tools like LPM (laser source and power meter) to overcome common issues related to optical patching and fiber plants and also discusses the use of specialized tools including the optical time domain reflectometer (OTDR) for issues with fiber plants and locating fiber breaks. Readers gain an understanding of the architecture of core TDM, IP, and Optical Access Networks including PON. Specific methodologies are explored for assessing OTN, DWDM, IT/MPLS, Optical**

**Access Networks- PON/GPON or FTTx networks. Key parameters that influence the choice of fiber based on the network and application type are discussed. This book also provides an overview of the current and future developments in optical fibers, interfaces, transceivers and backbone networks. This book describes in a comprehensive manner the components and systems of fiber optic communications and networks. The first section explains the theory of multimode and single-mode fibers, then the technological features, including manufacturing, cabling, and connecting. The second section describes the various components (passive and active optical components, integrated optics, opto-electronic transmitters and receivers, and optical amplifiers) used in fiber optic systems. Finally, the optical transmission system design is explained, and applications to optical networks and fiber optic sensors are detailed, including the most recent developments in switched networks, high bit-rate systems, and FTTH or radio over fiber. A GUIDE TO THE FUNDAMENTAL THEORY AND PRACTICE OF OPTICAL COMMUNICATION Fiber Optic and Atmospheric Optical Communication offers a much needed guide to characterizing and overcoming the drawbacks associated with optical communication links that suffer from various types of fading when optical signals with information traverse these wireless (atmospheric) or wired (fiber optic) channels. The authors—noted experts on the topic—present material**

that aids in predicting the capacity, data rate, spectral efficiency, and bit-error-rate associated with a channel that experiences fading. They review modulation techniques and methods of coding and decoding that are useful when implementing communications systems. The book also discusses how to model the channels, including treating distortion due to the various fading phenomena. Light waves and their similarity to radio waves are explored, and the way light propagates through the atmosphere, through materials, and through the boundary between two materials is explained. This important book:

Characterizes principal optical sources and detectors, including descriptions of their advantages and disadvantages, to show how to design systems from start to finish Provides a new method of predicting and dealing with the dispersive properties of fiber optic cables and other optical guiding structures in order to increase data stream capacity Highlights effects of material and multimode (multi-ray) dispersion during propagation of optical signals with data through fiber optic channels Presents modulation techniques and methods of coding and decoding that are useful when implementing communications systems Written for professionals dealing with optical and electro-optical communications, *Fiber Optic and Atmospheric Optical Communication* explores the theory and practice of optical communication both when the optical signal is propagating through the atmosphere and when it is propagating through an optical fiber. Since

**publication of the 1st edition in 2002, there has been a deep evolution of the global communication network with the entry of submarine cables in the Terabit era. Thanks to optical technologies, the transmission on a single fiber can achieve 1 billion simultaneous phone calls across the ocean! Modern submarine optical cables are fueling the global internet backbone, surpassing by far all alternative techniques. This new edition of Undersea Fiber Communication Systems provides a detailed explanation of all technical aspects of undersea communications systems, with an emphasis on the most recent breakthroughs of optical submarine cable technologies. This fully updated new edition is the best resource for demystifying enabling optical technologies, equipment, operations, up to marine installations, and is an essential reference for those in contact with this field. Each chapter of the book is written by key experts of their domain. The book assembles in a complementary way the contributions of authors from key suppliers acting in the domain, such as Alcatel-Lucent, Ciena, NEC, TE-Subcom, Xtera, from consultant and operators such as Axiom, OSI, Orange, and from University and organization references such as TelecomParisTech, and Suboptic. This has ensured that the overall topics of submarine telecommunications is treated in a quite ecumenical, complete and un-biased approach. Features new content on: Ultra-long haul submarine transmission technologies for telecommunications  
Alternative submarine cable applications, such as**

scientific or oil and gas Addresses the development of high-speed networks for multiplying Internet and broadband services with: Coherent optical technology for 100Gbit/s channels or above Wet plant optical networking and configurability Provides a full overview of the evolution of the field conveys the strategic importance of large undersea projects with: Technical and organizational life cycle of a submarine network Upgrades of amplified submarine cables by coherent technology Fiber-optic communication systems have advanced dramatically over the last four decades, since the era of copper cables, resulting in low-cost and high-bandwidth transmission. Fiber optics is now the backbone of the internet and long-distance telecommunication. Without it we would not enjoy the benefits of high-speed internet, or low-rate international telephone calls. This book introduces the basic concepts of fiber-optic communication in a pedagogical way. The important mathematical results are derived by first principles rather than citing research articles. In addition, physical interpretations and real-world analogies are provided to help students grasp the fundamental concepts. Key Features: Lucid explanation of key topics such as fibers, lasers, and photodetectors. Includes recent developments such as coherent communication and digital signal processing. Comprehensive treatment of fiber nonlinear transmission. Worked examples, exercises, and answers. Accompanying website with PowerPoint slides and numerical experiments in MATLAB. Intended

**primarily for senior undergraduates and graduates studying fiber-optic communications, the book is also suitable as a professional resource for researchers working in the field of fiber-optic communications. This book is a MUST for everyone in and around the optics community! Fiber Optic Essentials provides professionals and students new to the field of fiber optics with a high-level knowledge of principles, theories and applications. This primer can also be used as a succinct overview of optics for those with some engineering and physics background. Individuals involved with optics in non-traditional capacities such as in marketing and legal departments will find this volume introduces basic concepts completely in an easy to read format. Casimer and Carolyn DeCusatis have provided a concise resource with compact chapters and minimal equations conveying this complex topic in a straightforward and clear-cut style. Included in this book are chapters on fibers, cables, connectors, transmitters, modulators, noise, and optical link design. Concluding this reference are three indispensable appendices covering extensive definitions, acronyms (including initials and commonly used slang), measurement conversions and physical constants. This author team has produced a book that has truly shed light on this difficult subject. Comprehensively covers basic fiber optic 'facts' Explains how optics relate to everyday life Details fiber optic communication standards Chapter included on medical applications Timeline traces the history of**



**optics with major milestones This book is an important reference source for today's communications professionals. The book offers an overview of data communication using both fiber optics and optoelectronics. In addition, the book offers guidance regarding all the industry standards, gives a complete list of sites on the Internet and World Wide Web for more data online, and interprets professional opportunities in fiber optics. There has never been a Fiber-optic communication Guide like this. It contains 49 answers, much more than you can imagine; comprehensive answers and extensive details and references, with insights that have never before been offered in print. Get the information you need--fast! This all-embracing guide offers a thorough view of key knowledge and detailed insight. This Guide introduces what you want to know about Fiber-optic communication. A quick look inside of some of the subjects covered: Wireless - Photophone, Internet access - Technologies, Optical fiber - Optical fiber communication, Fiber to the premises, Optical communications repeater, Mach-Zehnder interferometer - Introduction, Optical fiber - Further reading, List of Google products - Services, Charles K. Kao - Fiber optics and communications, Single-mode optical fiber, Telecommunications in North America, Computer networking - Network links, Optical communication - Optical fiber, Optical telecommunication - Forms, Fiber-optic communication - Bandwidth-distance product,**

**Telephone - Details of operation, Indium gallium arsenide - Bandgap energy, FiOS, Optical communication - Photophone, Optical telecommunication - Photophone, FiOS - History, Dense WDM - WDM systems, Fiber-optic communication - Amplifiers, Phonograph - Volta's early challenge, Alexander Graham Bell, Fiber to the x - Fiber to the premises, Vodafone - Vodafone Group plc: 2000 to present, Fiber-optic communication - History, National Broadband Network - Fibre to the premises, Optical communication - Citations, Fiber-optic communication - Applications, Computer network - Network links, Hollow-core photonic crystal fiber, Fiber-optic communication - Technology, Last mile - Economies of scale, 2013 mass surveillance disclosures - August, Electro-absorption modulator, and much more... Introduction to Fiber-Optic Communications provides students with the most up-to-date, comprehensive coverage of modern optical fiber communications and applications, striking a fine balance between theory and practice that avoids excessive mathematics and derivations. Unlike other textbooks currently available, this book covers all of the important recent technologies and developments in the field, including electro-optic modulators, coherent optical systems, and silicon integrated photonic circuits. Filled with practical, relevant worked examples and exercise problems, the book presents complete coverage of the topics that optical and communications engineering students need to be**

successful. From principles of optical and optoelectronic components, to optical transmission system design, and from conventional optical fiber links, to more useful optical communication systems with advanced modulation formats and high-speed DSP, this book covers the necessities on the topic, even including today's important application areas of passive optical networks, datacenters and optical interconnections. Covers fiber-optic communication system fundamentals, design rules and terminologies Provides students with an understanding of the physical principles and characteristics of passive and active fiber-optic components Teaches students how to perform fiber-optic system design, performance evaluation and troubleshooting Includes modern advances in modulation and decoding strategies The development of new highly nonlinear fibers - referred to as microstructured fibers, holey fibers and photonic crystal fibers - is the next generation technology for all-optical signal processing and biomedical applications. This new edition has been thoroughly updated to incorporate these key technology developments. The book presents sound coverage of the fundamentals of lightwave technology, along with material on pulse compression techniques and rare-earth-doped fiber amplifiers and lasers. The extensively revised chapters include information on fiber-optic communication systems and the ultrafast signal processing techniques that make use of nonlinear phenomena in optical fibers. New material focuses on the applications of

**highly nonlinear fibers in areas ranging from wavelength laser tuning and nonlinear spectroscopy to biomedical imaging and frequency metrology. Technologies such as quantum cryptography, quantum computing, and quantum communications are also covered in a new chapter. This book will be an ideal reference for: R&D engineers working on developing next generation optical components; scientists involved with research on fiber amplifiers and lasers; graduate students and researchers working in the fields of optical communications and quantum information. The only book on how to develop nonlinear fiber optic applications Two new chapters on the latest developments; Highly Nonlinear Fibers and Quantum Applications Coverage of biomedical applications Introduction to Fiber-Optic Communications provides students with the most up-to-date, comprehensive coverage of modern optical fiber communications and applications, striking a fine balance between theory and practice that avoids excessive mathematics and derivations. Unlike other textbooks currently available, this book covers all of the important recent technologies and developments in the field, including electro-optic modulators, coherent optical systems, and silicon integrated photonic circuits. Filled with practical, relevant worked examples and exercise problems, the book presents complete coverage of the topics that optical and communications engineering students need to be successful. From principles of optical and**

optoelectronic components, to optical transmission system design, and from conventional optical fiber links, to more useful optical communication systems with advanced modulation formats and high-speed DSP, this book covers the necessities on the topic, even including today's important application areas of passive optical networks, datacenters and optical interconnections. Covers fiber-optic communication system fundamentals, design rules and terminologies Provides students with an understanding of the physical principles and characteristics of passive and active fiber-optic components Teaches students how to perform fiber-optic system design, performance evaluation and troubleshooting Includes modern advances in modulation and decoding strategies The Fiber Optic Reference Guide offers readers a solid understanding of the principles of fiber optic technology, especially as it relates to telecommunications, from its early days to developing future trends. Using a minimum of jargon and a wealth of illustrations, this book provides the underlying principles of fiber optics as well as essential practical applications. The third edition is updated to include expanded sections on light emitters, semiconductor optical amplifiers, Bragg gratings, and more systems design considerations. Fiber optics plays a key role in communications, as well as in broadcast and cable systems. Engineers working with fiber optics as well as newcomers to the industry will find the third edition of this reference guide invaluable. It will help the reader

**develop a solid understanding of the underlying principles of this rapidly changing technology as well as its essential practical applications. The text is thoroughly indexed and illustrated. This book discusses in detail fiber optic communications systems. It describes major components including fibers, cables, emission sources, detectors, modulators, and repeaters, as well as total system designs. This book highlights the fundamental principles of optical fiber technology required for understanding modern high-capacity lightwave telecom networks. Such networks have become an indispensable part of society with applications ranging from simple web browsing to critical healthcare diagnosis and cloud computing. Since users expect these services to always be available, careful engineering is required in all technologies ranging from component development to network operations. To achieve this understanding, this book first presents a comprehensive treatment of various optical fiber structures and diverse photonic components used in optical fiber networks. Following this discussion are the fundamental design principles of digital and analog optical fiber transmission links. The concluding chapters present the architectures and performance characteristics of optical networks. Fiber-optic communication systems have advanced dramatically over the last four decades, since the era of copper cables, resulting in low-cost and high-bandwidth transmission. Fiber optics is now the backbone of the**

**internet and long-distance telecommunication. Without it we would not enjoy the benefits of high-speed internet, or low-rate international telephone calls. This book introduces the basic concepts of fiber-optic communication in a pedagogical way. The important mathematical results are derived by first principles rather than citing research articles. In addition, physical interpretations and real-world analogies are provided to help students grasp the fundamental concepts. Key Features: Lucid explanation of key topics such as fibers, lasers, and photodetectors. Includes recent developments such as coherent communication and digital signal processing. Comprehensive treatment of fiber nonlinear transmission. Worked examples, exercises, and answers. Accompanying website with PowerPoint slides and numerical experiments in MATLAB. Intended primarily for senior undergraduates and graduates studying fiber-optic communications, the book is also suitable as a professional resource for researchers working in the field of fiber-optic communications. Fiber-optic communication systems have revolutionized our telecommunication infrastructures - currently, almost all telephone land-line, cellular, and internet communications must travel via some form of optical fibers. In these transmission systems, neither the phase nor frequency of the optical signal carries information - only the intensity of the signal is used. To transmit more information in a single optical carrier, the phase of the optical carrier must be**

explored. As a result, there is renewed interest in phase-modulated optical communications, mainly in direct-detection DPSK signals for long-haul optical communication systems. When optical amplifiers are used to maintain certain signal level among the fiber link, the system is limited by amplifier noises and fiber nonlinearities. Phase-Modulated Optical Communication Systems surveys this newly popular area, covering the following topics: - The transmitter and receiver for phase-modulated coherent lightwave systems - Method for performance analysis of phase-modulated optical signals - Direct-detection DPSK signal with fiber nonlinearities, degraded by nonlinear phase noise and intrachannel effects - Wavelength-division-multiplexed direct-detection DPSK signals - Multi-level phase-modulated optical signals, such as the four-phase DQPSK signal. Graduate students, professional engineers, and researchers will all benefit from this updated treatment of an important topic in the optical communications field. A useful source of information to anyone who works with fiber optics, this state-of-the-art guide covers the newest technological innovations in fibers, systems and networks, and provides a solid foundation in the basics with lots of examples, practical applications, graphical presentations, and solutions to problems that simulate those found in the workplace. Devotes complete chapters to optical fibers, singlemode fibers, light sources and transmitters, photodetectors and receivers, and more. Provides real data and



specification sheets to help users hone their ability to read data sheets and integrate concepts - a critical skill for practicing engineers. Offers a "two-level discussion" in each chapter: a "Basics" section introduces the main ideas and principles involved in the devices covered, and "A Deeper Look" section offers a more theoretical and detailed discussion of the same material. Describes the test, measurement, and troubleshooting of fiber optics communications systems based on existing standards and commercially available equipment. Integrates many pictures of commercially available devices and equipment throughout. For professionals in the electronic technology industry. Fiber-optic Communication is a method of transmitting information from one place to another by sending light through an optical fiber. An optical fiber (or fiber) is a glass or plastic fiber that carries light along its length. Light is kept in the "core" of the optical fiber by total internal reflection. The light forms an electromagnetic carrier wave that is modulated to carry information. The process of communicating using fiber-optics involves the following basic steps: Creating the optical signal using a transmitter, Relaying the signal along the fiber, ensuring that the signal does not become too distorted or weak, and receiving the optical signal and converting it into an electrical signal. Pulses of electricity corresponding to the bits arrive at the input transducer. A device that converts one form of energy to another. Devices similar to light bulbs are

used as optical transducers at the input of fiber-optic cables to convert electricity into light. Light emitting diodes (LED) and Laser diodes (LD) are used as electrical transducers. Electrical signals arriving at the input of optoelectronic devices are used to modulate the light source. The modulated optical signal is emitted by the source and coupled into the cable. Once the light is trapped inside the cable, it travels to the other end, where it is demodulated and an output transducer, such as a Photodiode (PD) or phototransistor, converts the light back into an electrical signal.

**Advantages of fiber optics:**

- Much Higher Bandwidth (Gbps)** - Thousands of channels can be multiplexed together over one strand of fiber.
- Immunity to Noise** - Immune to electromagnetic interference (EMI).
- Safety** - Doesn't transmit electrical signals, making it safe in environments like a gas pipeline.
- High Security** - Impossible to "tap into."
- Less Loss** - Repeaters can be spaced 75 miles apart (fibers can be made to have only 0.2 dB/km of attenuation).
- Reliability** - More resilient than copper in extreme environmental conditions.
- Size** - Lighter and more compact than copper.
- Flexibility** - Unlike impure, brittle glass, fiber is physically very flexible.

**Disadvantages of fiber optics:** Disadvantages include the cost of interfacing equipment necessary to convert electrical signals to optical signals. (optical transmitters, receivers) Splicing fiber optic cable is also more difficult.

**CD-ROM contains:** a software package for designing fiber-optic communication systems called "OptiSystem Lite" and a set of problems for each chapter. Starting with basics and progressing

logically to an applications level, this text provides an introduction to analog modulation, digital fibre optic system design, baseband coding for fibre optics, digital video transmission in optical fibre networks, optical receivers and more. First published in 1993: This book is an outgrowth of fiber optic design courses given by the author. Discover the latest developments in fiber-optic communications with the newest edition of this leading textbook In the newly revised fifth edition of **Fiber-Optic Communication Systems**, accomplished researcher and author, **Dr. Govind P. Agrawal**, delivers brand-new updates and developments in the science of fiber optics communications. The book contains substantial additions covering the topics of coherence detection, space division multiplexing, and more advanced subjects. You'll learn about topics like fiber's losses, dispersion, and nonlinearities, as well as coherent lightwave systems. The latter subject has undergone major changes due to the extensive development of digital coherent systems over the last decade. Space-division multiplexing is covered as well, including multimode and multicore fibers developed in just the last ten years. Finally, the book concludes with a chapter on brand-new developments in the field that are still at the development stage and likely to become highly relevant for practitioners and researchers in the coming years. Readers will also benefit from the inclusion of: A thorough introduction to the fundamentals of fiber-optic communication systems An exploration of the management of fiber-optic

**communication losses, dispersion, and nonlinearities A practical discussion of coherent lightwave systems, including coherent transmitters and receivers, as well as noise and bit-error rate, sensitivity degradation mechanisms, and the impact of nonlinear effects A concise treatment of space-division multiplexing, including multicore and multimode fibers, multicore lightwave systems, and multimode lightwave systems Analyses of advanced topics, including pulse shaping for higher spectral efficiency, Kramers-Kronig receivers, nonlinear Fourier transform, wavelength conversion, and optical regeneration Perfect for graduate students, professors, scientists, and professional engineers working or studying in the area of telecommunications technology, Fiber-Optic Communication Systems is an essential update to the leading reference in the area of fiber-optic communications.**

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