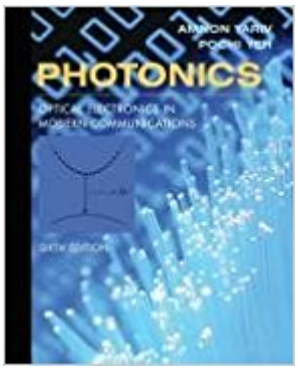
Photonics: Optical Electronics In Modern Communications (The Oxford Series In Electrical And Computer Engineering)



Synopsis

Due to its central role in modern communications technologies, photonics--or optical electronics--has evolved dynamically over the last ten years. Photonics by Amnon Yariv and Pochi Yeh is extensively revised and updated to keep pace with this unprecedented development. Now more tailored to optical communication, the sixth edition integrates material on generating and manipulating optical radiation and designing photonic components for the transmission of information. It also presents a broader theoretical underpinning and more explanations of mathematical derivations than the previous edition.The text describes the basic physics and principles of operation of major photonic components in optical communications and electronics. These components include optical resonators, various lasers, waveguides, optical fibers, gratings, and photonic crystals. photonics, Sixth Edition, also covers the transmission, modulation, amplification, and detection of optical beams in optical networks, as well as nonlinear optical effects in fibers. It assumes a background in electromagnetic theory, Maxwell's equations, and electromagnetic wave propagation.Including numerous examples throughout, Photonics, Sixth Edition, is ideal for advanced undergraduate and graduate courses in photonics, optoelectronics, or optical communications. It is also a useful reference for practicing engineers and scientists.New Material in the Sixth EditionÂ Stokes Parameters and PoincarÃ© Sphere: polarization states in birefringent optical networks, principal states of polarizationÂ Fermat's Principle: rays, beam propagation, and the Fresnel diffraction integralÂ Matrix Formulation: wave propagation in multi-cavity etalons, multi-layer structures, mode coupling, and supermodes in mode-locked lasersÂ Dispersion: chromatic dispersion and polarization mode dispersion (PMD) in fibers and their compensationÂ Coupled Resonators Optical Waveguides (CROWs): matrix formulation, critical coupling and dispersion relationÂ Nonlinear Optical Effects in Fibers: self-phase modulation, cross-phase modulation, stimulated Brillouin scattering (SBS), stimulated Raman scattering (SRS), optical four-wave mixing, and spectral reversal (phase conjugation)Â Electroabsorption: waveguide electro-optic Mach-Zehnder modulatorsÂ Photonic Crystals: Bloch wave formulation, photonic bands, photonic bandgaps, periodic layered media, fiber Bragg gratings, and Bragg reflection waveguidesÂ Optical Amplifiers: SOA, EDFA, and Raman

Book Information

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Customer Reviews

Amnon Yariv is Martin and Eileen Summerfeld Professor of Applied Physics at the California Institute of Technology.Pochi Yeh is Professor of Electrical & Computer Engineering at the University of California, Santa Barbara.

The book presents the material as clearly as one could expect it to be written. The material is difficult no matter the format, but the ideas are presented clearly and that’s all I think you can really expect from a text. I would recommend this ahead of all the other texts I have used pertaining to Optics in my undergrad and grad-school programs simply because of the heightened clarity and the logical progression of subject matter. I bought this book new and I don’t regret it.

good!

This text struggles to relate the mathematics to the theory. A nice supplement to a solid theory source, but lacking as a stand alone teaching tool is how I would describe this book.

I belive that this author wrote this textbook with the mind of mentor. This book is very easy to understand. I spent less than 1 hour about this book. I hope I will gain much knowledge from this book in as fast as I can!

This text is good for a moderately advanced exposure of photonics at the graduate level. It covers a lot of different topics and gives you everything you need to derive equations yourself. The problems

I have with this text are as follows:1) Quite a few typographical errors - if you are deriving everything yourself you will find most of these and it isn’t much trouble2) There are some blatant errors which are reused again in examples and derivations - one I remember off hand was the coupling coefficient in sinusoidal gratings but I haven’t looked at this in a long time3) Things are explained okay but not as clear as many other photonics texts in my opinion4) The index is okay at bestI believe this book is a fairly standard graduate textbook for a first exposure on photonics which it serves pretty well if you are careful when reading it. I would not recommend this as a reference book. A better reference book at the same level or a bit more advanced would be "Physics of Photonic Devices" by Chuang.

An excellent book on the optics side, with good theoretical derivations on many topics. However, I wish that the sections on semiconductor devices were more extensively updated in one of these new editions, especially since Yariv’s group at CalTech were pioneers in the field of semiconductor lasers, and it would be well worth knowing what insights he can give on modern devices. For example, there is no discussion of strained quantum wells that I could find. The book has an excellent discussion of Bragg mirrors, and some discussion of their use in DFB lasers and VCSELs, but nothing about resonant cavity LEDs or resonant cavity photodiodes (or even just plain vanilla LEDs). The description of APDs is one of the few covered areas that is not rigorous. Of course, the book is a reasonable size, and so cannot contain everything, but I get the feeling that the semiconductor device areas were hardly touched from earlier editions. However, most of what Yariv and Yeh do cover, they do so in a detailed manner, so this is still a good book to have around. Chapters:1. Electromagnetic Fields and Waves2. Rays and Optical Beams3. Guided waves in Dielectric Slabs and Fibers4. Optical Resonators5. Interaction of Radiation and Atomic Systems6. Theory of Laser Oscillation and Some Specific Laser Systems7. Chromatic Dispersion and Polarization Mode Dispersion in Fibers8. Nonlinear Optics9. Electro-Optic Modulation of Laser Beams10. Noise in Optical Detection and Generation11. Detection of Optical Radiation12. wave propagation in Periodic Media13. Waveguide Coupling14. Nonlinear Optical Effects in Fibers15. Semiconductor Lasers-Theory and Applications16. Advanced Semiconductor Lasers17. Optical Amplifiers18. Classical Treatment of Quantum Noise and Squeezed StatesAppendixes:A. Wave Equation in Cylindrical Coordinates and Bessel FunctionsB. Exact Solutions of the Step-Index Circular WaveguideC. Kramers-Kronig RelationsD. Transformation of a Coherent Electromagnetic Field by a Thin LensE. Fermi Level and its Temperature DependenceF. Electro-optic Effect in Cubic 43m CrystalsG. Conversion for Power Units and Attenuation Units

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