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mechanochemistry of muscular contraction.

R. D. Preston's brief and compact discussion of ultrastructure and kinetic aspects of solute translocation in plant stems begins by pointing out that sugars move in plant stems at linear rates that are as much as 80 000 times the rates that would occur for ordinary diffusion flow. The paper presents a vivid, though technical, picture of the aggressive nature of living cell systems. The paper has included in it contributions by R. Kollmann, D. C. Spanner, and P. E. Wheatley.

Several basic questions of the physical interaction of ionizing radiations are appraised by L. G. Augenstein. G. Scholes reviews current data and concepts in the radiation chemistry of aqueous solutions of nucleic acids and nucleoproteins. A timely review of a recently developed and lively subject is given in M. Gruneberg-Manago's paper on the enzymatic synthesis of nucleic acids. O. Kratky reviews the much newer field of x-ray small-angle scattering with substances of biological interest in diluted solutions. The last paper is on the mechanochemistry of muscular contraction, a critical revaluation of in vivo studies, by F. D. Carlson.

The six papers maintain the high level of scholarly excellence one has come to associate with this series. Although the title has been changed, the format is still the same as that of the previous volumes.

Mathematical Methods in Engineering and Physics. Special Functions and Boundary-Value Problems. By David E. Johnson and Johnny R. Johnson. 273 pp. Ronald, New York, 1965. $9.50.
Reviewed by Donald A. McQuarrie, North American Aviation Science Center.

There are indeed a great many books on applied mathematics or boundary-value problems (as there are in most areas) but any new book which is well written and well planned should still be welcome. The emphasis of this book is on the solutions of boundary-value problems and on the orthogonal polynomial systems which arise from these problems. Out of sixteen chapters ten are devoted to special functions, viz., orthogonal functions, Legendre functions, the gamma function, Bessel functions, Hermite polynomials, Laguerre polynomials, Chebyshev polynomials, Mathieu functions, other special functions, and a general class of orthogonal polynomials. The remaining six chapters discuss Fourier series, series solution of differential equations, boundary-value problems, partial differential equations of mathematical physics, Laplace and Fourier transforms, and Sturm-Liouville transforms. Contrary to most texts at this level there is no discussion of complex-variable theory, nor is it assumed (until the last chapter where it is peculiar to do so since it could have been used to advantage several times before).

The book is well written and quite free of typographical errors. The discussion of the method of separation of variables is one of the best available at this level and the problems in the chapter on partial differential equations in mathematical physics are both numerous and worthwhile. Many books of this type are so slanted toward special applications that they are useless to the general reader, but the authors have done well not to base any developments on electrical engineering applications, say. This makes the book easily understood by any senior majoring in science or engineering.

Although most developments are clearly written, there are very few worked examples. A great deal of important material is introduced by way of problems. Why is the treatment of such an important technique as Laplace transforms shorter than either of the treatments of Hermite polynomials, Laguerre polynomials, or Chebyshev polynomials? In summary, this is a fine choice for a course in boundary-value problems for seniors where for one of a number of reasons the instructor does not wish to use or discuss complex variable theory.

Optical Masers. By George Birnbaum. 306 pp. Academic, New York, 1964. $9.50.
Reviewed by Herbert Malamud, Sperry Gyroscope Company, Division of Sperry Rand Corporation.

The book is Supplement 2 to the well-known series "Advances in Electronics and Electron Physics", edited by L. Marton of the National Bureau of

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(M224) 1965, 576 pp., $11.50

CLASSICAL ELECTROMAGNETIC RADIATION

by **Jerry B. Marion**

This sophisticated account of classical electrodynamics is aimed at advanced undergraduate and beginning graduate students in physics. Dr. Marion introduces Maxwell's equations at an early stage and uses them in a comprehensive discussion of electromagnetic radiation and the propagation of waves in free space and in material media. He emphasizes aspects of electromagnetic theory that are important in modern theories of matter and radiation, and gives extensive applications of electromagnetic radiation processes. The text gives the most comprehensive treatment of relativistic electrodynamics presently available in an undergraduate text.
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OPTICAL PHYSICS

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This book uses a novel approach to this relatively new field of physics. After introducing atomistic models of varying refinement, the author discusses the processes by which radiation between the infrared and the ultraviolet region is emitted. Based on these fundamentals, the principles and applications of modern optics are treated with particular reference to such subjects as monochromatic and continuum light sources, broadening of spectral lines, optics of materials, lasers, nonlinear optics, and processes of detection.
(G186) 1965, 466 pp., $14.50

PRINCIPLES OF VECTOR ANALYSIS

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Develops all of the methods of vector analysis for graduate and undergraduate student of physics. The material is limited strictly to vector analysis, and, assuming a basic familiarity with elementary concepts of vectors, the author approaches the subject from the standpoint of the transformation properties of points in space. Matrix methods are introduced early and are used throughout the book.
(X480) September 1965, about 160 pp., paperbound $2.45
(X481) Hardcover $5.50

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(B318) Summer 1965, about 320 pp., hardcover $8.50
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(H924) September 1965, about 620 pp., $19.50

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Standards. It fully merits its membership in that excellent series, being one of the best monographs on lasers seen by this reviewer.

The book covers thoroughly the field of laser theory and technology, including optical resonators, excitation, spectral characteristics, and both transient and steady-state operation of the various types of lasers, as well as multiple-photon processes (nonlinear effects) and other applications. It does this in only 229 pages of text and 38 pages of appendices by frequent omission of derivations of many equations, referring the reader instead to the more than 500 references listed. In the reviewer's opinion, this practice subtracts somewhat from the pedagogical value of the book; in a textbook for a course on lasers, this reviewer would prefer that more of the basic equations be derived, even at the cost of an increase in the size of the book, because very frequent reference to original sources is overly costly in time to the student. This can of course be circumvented by a good lecturer, who can supply this information in class if he desires.

Numerous tables summarize the important characteristics of various lasers, laser materials, and other pertinent physical data.

An 18-page index completes the volume. It is as thorough as one could wish, in keeping with the book in every way.

Potential Barriers in Semiconductors. By B. R. Gossick. 153 pp. Academic, New York, 1964. Cloth $5.50, paper $2.45.
Reviewed by H. J. Hagger, Albiswerk, Zurich.

The growing interest in basic semiconductor theory shown by specialists in electronics has led to an almost endless repetition of semiconductor physics in all transistor textbooks. All these introductions do not illuminate the behavior of transition regions between unequal semiconductor or metal surfaces. There are very concise and excellent textbooks on semiconductor physics for the solid-state scientist, but they go into too many details for the electronics engineer who wants to know more about the dynamic behavior of junctions, but who is not particularly interested in the whole