

SCIENTISTS & ENGINEERS

with exceptional abilities are invited to investigate opportunities with the
Research Laboratories of Brown Engineering Company, Inc.

As the prime research support contractor for NASA-Marshall Space Flight Center, Brown's Research Laboratories have a major role in America's most advanced space project: Apollo Extension Systems.

Staff positions are open in many disciplines, with urgent requirements in • geo-astronautics • space instrumentation • mission analysis • electronic systems.

Openings normally require advanced training (25% of the staff hold PhD degrees) but inquiries are invited from capable personnel at all education and experience levels. Submit your resume in confidence to Raymond C. Watson, Jr., Director of Research.

BROWN

ENGINEERING COMPANY, INC.
300 Sparkman Drive, N.W.
Huntsville, Alabama 35805

An Equal Opportunity Employer

numerical problems are included to illustrate and amplify the text. Although calculus is used, the mathematical treatment is not formidable. Gaussian units are used possibly to the annoyance of students currently studying texts using mksa units. A seven-page appendix shows the use of Lagrange multipliers in finding the maximum of a function of n variables, discusses the flow of molecules across an area, and derives the expression for scattering in an inverse-square field.

The book is chiefly valuable for its enlightenment on historical aspects of atomic theory, and on viewpoints not commonly presented in general first-year physics texts. Among such topics are: virial theorems and equations of state, reasons for the ^{12}C scale, the state of confusion in early (1906) views of atomic composition, and Thomson's indifference to relativity. The last twenty pages deal with the experiments of Rutherford, Geiger and Marsden on alpha particle deflections and their elucidation of the nuclear structure of atoms and the significance of atomic number.

A NONCALCULUS COURSE

CONCEPTS IN PHYSICS. Reuben Benumof.
562 pp. Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1965, \$13.00.

by **Daniel B. Butrymowicz**

In *Concepts in Physics*, Benumof undertakes to provide a course in general physics from a modern point of view for students in career-oriented programs. The author, who is associated with the City University of New York-Staten Island Community College, feels there are few textbooks available for these programs. It is a noncalculus text written on the premise that the mathematical preparation of such students is usually insufficient, and at the outset only a minimum dexterity in algebra and trigonometry is assumed. All twenty chapters are arranged in somewhat like fashion: each begins with an introduction in which

* * *

The reviewer is a physicist with the National Bureau of Standards in Washington.

a simple basic experiment is described, follows with a statement of the objectives and a development of the important ideas, and concludes with a summary of the main concepts and problems to be solved.

Rather than use the customary procedure of beginning with a discussion of mechanics, the author prefers to use an introduction to modern physics, and presents the new student with such topics as nuclear, atomic, and molecular structure in the first three chapters. Kinematics, dynamics, and statics are covered in the next six chapters. It is assumed that the student, taking a concurrent course in mathematics, will have at this stage acquired a great facility in the use of trigonometry and quadratic equations and thus be prepared for the material contained in these six sections. A short review of simple trigonometry is included to assist in gaining the mathematical tools.

Chapters 10-12 are concerned with defining temperature, deformations of solids and liquids resulting from temperature and stress, ideal gases, and the first and second laws of thermodynamics. Electricity and magnetism are discussed in Chapters 13-16. Electrostatics, the principles underlying the operation of direct current circuits, the notion of a magnetic field and magnetic forces, and transient and alternating currents are treated in this portion of the book.

Explained in Chapter 17 are both electromagnetic and sound waves, along with some of the photon aspects of light. Light itself is considered in the two following chapters: one dealing with geometrical optics, the other with physical optics. Included in these sections are a description of a ruby laser and interference in thin films. There is a summary and additional discussion in the final chapter entitled "Recapitulation and Extensions."

At the end of each of the chapters is a substantial number (usually 20 or more) of problems of varying degrees of difficulty. Answers follow immediately after the problem; however, none are supplied for the review problems of the last chapter.

In general, the text must be considered well organized. The author has

introduced the important concepts in a logical order (relating one concept to another) in an attempt to develop a system of thought from beginning to end. The book is clearly written and the notation is usually that of most standard texts on general physics. Most of the sections are thorough and well presented, with some detailed discussion of a few applications of intrinsic interest to students. Another asset of the text is the clear and helpful diagrams sprinkled liberally throughout.

As with most texts, this one will be found to have its advantages and disadvantages, many of which vary in importance with the particular instructor's interests and ideas. Some will question the elementary mathematics or the order in which the material is presented, but neither should be of major consequence. Instructors should certainly consider this text for their students in an elementary, noncalculus, general physics course.

WITH MATHEMATICAL RIGOR

RADIATIVE TRANSFER ON DISCRETE SPACES. By Rudolph W. Preisendorfer. 462 pp. Pergamon, New York, 1965.

by *T. Teichmann*

Problems of radiative transfer have long held great physical interest because of their application to problems of stellar structure. In recent years, this interest has increased and become more urgent because similar questions play an important role in reactor physics and in high-temperature phenomena of various types (for example, ablation, shock waves). In the course of this development, the general structure of the theory (pioneered by Schuster and Schwarzschild) has become mathematically more precise and sophisticated due largely to the work of Ambrartzumian and Chandrasekhar, using global as well as local formulations of the problem. At the same time, substantial

* * *

The reviewer, a physicist with the General Dynamics Corporation, has been concerned in recent years with a variety of transport and transfer problems of nuclear radiation and of point explosions.

improvements in quantitative results were achieved with numerical methods stimulated largely by nonastrophysical applications.

The author, whose interest has been particularly in optical transfer problems in the atmosphere and the oceans (carried out at the Scripps Institution of Oceanography), has set as his objective the precise and vigorous mathematical formulation of essentially the entire gamut of radiative-transfer problems, both to illuminate their conceptual foundation and to indicate and facilitate numerical techniques which may not be apparent from the formal structure of the equations.

The work is scholarly and extensive, replete with bibliographic notes and detailed verbal descriptions of the operational and physical significance of the various concepts and relations which occur in the theory. The latter are often very illuminating and unique but do not, in this reviewer's opinion, have the impact they should because of the author's penchant for using notations particularly adapted to a rigorous mathematical formulation rather than to physical perspicuity. This effect is not alleviated by the substantially uniform mathematical precision—rather than a more gradual transition from the heuristic to the rigorous. Actually any given topic is not difficult to cover, despite the above comments; it is rather the total mass of careful mathematical detail that tends to become formidable.

Following the description of basic philosophies and concepts and the continuous equations of transfer in various forms, a major portion of the book is devoted to the formulation of radiative-transfer problems in discrete spaces; it serves both to provide further insights and more particularly to provide an effective guide to numerical methods.

Finally extended discussions are given, with the same general approach of effects of polarization, of the probabilistic interpretation of the transfer process, and of its derivation from the laws of electromagnetism.

To summarize, this book plumbs the concepts and general methods of the field very thoroughly. Specific

SUPERCONDUCTIVITY

Phonons

Plasmons

Magnons

Phase Transitions

These and many other topics at the frontiers of

SOLID STATE PHYSICS

are in Benjamin lecture note volumes:

CONCEPTS IN SOLIDS

P. W. Anderson

Paper (229) \$4.95

Cloth (228) \$9.00

PHASE TRANSITIONS

Robert Brout

Cloth (1350) \$13.50

ELEMENTARY EXCITATIONS IN SOLIDS

David Pines

Paper (7913) \$6.95

Cloth (7912) \$11.00

THEORY OF SUPERCONDUCTIVITY

J. R. Schrieffer

Cloth (8500) \$12.50

Written for students by leading experts, these volumes contain authoritative descriptions of the new concepts and methods which have transformed solid state theory in the past decade. And if you're interested in a clear and elegant account of field theoretic methods applied to the many-body problem, you'll find it in

INTERACTING FERMION SYSTEMS

P. Nozieres

Cloth (7500) \$14.50

W. A. BENJAMIN, INC.

ONE PARK AVENUE

NEW YORK