deluge continues unabated and is touching nearly every specialized area of electrical and physical science, providing new tools of great flexibility and high precision wherever a high-radiance optical beam of well defined frequency and phase can be used to advantage. Certain portions of the field show signs of approaching maturity, and the time for review and appraisal of progress is at hand.

The five articles in this volume deal with nonlinear optics, frequency stabilization of gas lasers, and three commonly available species of laser sources: gas, glass and injection lasers. The book provides sufficient background knowledge and working information to facilitate development and widened application of these marvelous devices to diverse fields. Review articles in technical fields undergoing rapid expansion sometimes suffer unfairly when the growth rate is faster than an author can write. The strongest constructive criticism that can be made of the present series of articles is that they are about two years behind current developments. It would help if the closing date of review were indicated at the head of each article. The reviews are intended to be a critical assessment of progress in their respective fields, but it is clearly impractical to have the last word in a critical sense in an area undergoing explosive expansion. Consequently the authors have for the most part confined themselves to careful reporting.

Albert Levine edited Volume 1 of this series, and the excellent standards of scholarship evident in that work have been repeated in Volume 2.

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The reviewer is a physicist with the Naval Electronics Laboratory and is concerned with laser applications.

Semiconductors made simple

ENERGY BANDS IN SEMICONDUCTORS. By Donald Long. 212 pp. Interscience, New York, 1968. $9.95

by DANIEL C. MATTIS

This book is enthusiastically recommended as an introductory monograph dealing with theoretical and experimental aspects of homogeneous semiconductors. The author, who is actively involved in semiconductor materials research at Honeywell Corporation, has a felicitous style and brevity of exposition that make the book suitable either as an undergraduate or graduate textbook. Although it is probably somewhat too abbreviated to serve either as a reference book or for self-study, references to the literature, following each chapter of this book, will lead the reader to relevant supplementary sources. With little mathematical distraction, the author leads the reader, in part I, through energy-band theory, group theory and perturbation theory, followed by experimental methods (electrical, magnetic and optical). Application to Group IV elements (germanium and silicon), III–V compounds, II–VI compounds, IV–VI compounds and various alloys form part II; a helpful appendix explains some devices (transistors, tunnel diodes and so forth). Basically the only flaws are those inherent in oversimplification. This is not a serious objection as conscientious students will soon fill in the gaps, and others will not need to. This book will be useful to electronics engineers (as well as solid-state physicists) and to all others who wish to learn a little about a lot of aspects of the energy-band structure of solids from a small book easily scanned in a few hours.

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Application of graphs

GRAPH THEORY AND THEORETICAL PHYSICS. Frank Haray, ed. 358 pp. Academic Press, London, 1967. 84s

by GARRISON SPOSITO

A glance at the book title suggests that it deals with the relationship between a small part of mathematics and a large part of physics. In a rather subtle way this is true, although what one finds are polished versions of eight very mathematical lectures on graph theory along with four first-rate expositions on the uses of graphs in classical statistical physics and in electrical engineering. In this sense, the word *and* in the title is not to be taken lightly.

The three articles on theoretical physics are written by P. W. Kasteleyn, J. Groeneveld and George Stell, respectively, and first appeared along with their companion pieces as lectures in a NATO-sponsored institute. Kasteleyn's paper is an immensely readable assessment of the impact of graph theory upon some aspects of crystal physics, that is, the random and self-avoiding walk problems, the dimer problem and the Ising problem. The discussion is self-contained and complete, beginning with the very definition of "graph" and including descriptions of the use generating functions and Pfaffians. The two and one-half pages of references at the end of the article should contain sufficient starting material for anyone who is serious about lattice statistics.

The articles by Groeneveld and Stell may be regarded as distinguished supplements to George E. Uhlenbeck and Gerald W. Ford's fundamental paper on graph theory and the statistics of classical gases, published a few years ago in *Studies in Statistical Mechanics*. Groeneveld's paper indicates in a systematic way how one arrives at the ideal-gas approximation, the Mayer theorems and the celebrated Percus-Yevick and Hypernetted Chain approximations. In addition he presents his own (previous) derivations of rigorous thermodynamic inequalities that are consonant with the ideal-gas approximation and the Mayer theorems. Stell's paper deals with generating functionals as they are used in many-body perturbation theory and includes a lengthy list of references.

Graph Theory and Theoretical Physics is recommended highly to anyone interested in statistical physics and, in particular, to those who wish current findings in a nutshell as a guide to their own research.

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Orbital mechanics

ASTRODYNAMICS, ROCKETS, SATELLITES AND SPACE TRAVEL: AN INTRODUCTION TO SPACE SCIENCE. By John A. Eisele. 545 pp. National Book Co. of America, Washington, D. C., 1967. $10.00

by ROBERT L. WEBER

The author, a staff member of the U.S. Naval Research Laboratory, states