

### Matrix and Tensor Analysis in Electrical Network Theory

By S. Austen Stigant. Pp. 505. (London: Macdonald and Co. (Publishers), Ltd., 1964.) 80s. net.

THIS book presents the subject of network theory in a manner which was originally largely due to Gabriel Kron.

The volume is divided into three parts; theory, applications and appendixes. The first part, approximately one-third of the book, comprises introductory chapters on determinants and matrices, followed by three chapters on diagonalization of matrices. The three final chapters of this part develop tensors in relation to electrical networks.

The second part, again approximately one-third of the book, is taken up with applications in power distribution and engineering. A chapter on simple applications of determinants is followed by three on matrix applications, the examples being largely connected with three-phase systems. Examples on untransposed and transposed conductor systems, with and without faults, are given in later chapters. The application of tensors to multi-phase networks, multiple-winding transformers and automatic voltage control by series capacitor is considered in the concluding chapters of this second part.

The third part contains appendixes on material needed in the course of development of the second part, but unconnected with the main theme of the book. The treatment used in these appendixes is largely classical.

The book is well written, easy to follow and is directed at engineers rather than applied mathematicians. The latter would be rather unimpressed with the introductory chapters on matrices and tensors. The book should prove very useful to engineers who are interested in the modern treatment of power distribution systems and, possibly, to honours graduates studying heavy current electrical engineering in departments having an enlightened approach to the subject. The large number of practical examples included in this volume should make it more attractive to the less-academically inclined than some of the earlier treatises on matrices and tensors in network theory.

### Handbuch der Physik

Herausgegeben von S. Flügge. Band 27: Spektroskopie I. Pp. vi + 507. (Berlin, Göttingen und Heidelberg: Springer-Verlag, 1963.) 130 D.M.

THIS volume, the first of the two on spectroscopy in the *Handbuch der Physik*, contains three articles. The titles (which are in the languages used), authors and lengths of these are as follows: "Line Widths", R. G. Breene, jun., of Centerville, Ohio (pp. 79); "Atomic Spectra", Bengt Edlén of Lund (pp. 140); "Spectroscopie électronique moléculaire", Boris Rosen of Liège (pp. 253).

R. G. Breene is the author of the well-known book *The Shift and Shape of Spectral Lines* published in 1961. As would be expected from this, his article, which covers molecules as well as atoms, contains a clear account of many of the relevant mathematical researches. The more recent work does not, however, receive as much attention as it merits; thus, of the 95 references cited, 62 are dated 1939 or earlier, 15 are in the period 1940-49, 18 are in the period 1950-59 and none are later than this.

Bengt Edlén himself points out that "Atomic Spectra" is less comprehensive than the title suggests. It is indeed concerned mainly with the undisturbed gross structure of the energy-level systems of free atoms and ions. A considerable part of the material, especially that concerning isoelectronic sequences, is original. The article will be consulted for many years.

In "Spectroscopie électronique moléculaire", Rosen provides a much-needed outline of the principal theoretical and experimental investigations of diatomic and polyatomic molecules. The article is a valuable addition to the

literature of the subject. A defect is that the bibliography is not so full and as carefully compiled as might perhaps be wished. There are useful appendixes by W. B. Price on ionization potentials, by K. Wieland on the spectra of radices and by F. W. Dalby on absolute transition probabilities.

The book concludes with German-English and English-German subject indexes of all three articles, and a French subject index of the last article. The production is of a high standard. In particular, praise must be given to the anonymous artists responsible for the numerous beautifully drawn figures.

D. R. BATES

### Theorie et Technique de la Radiocristallographie

Third edition. By Prof. A. Guinier. Pp. xvi + 740. (Paris: Dunod, 1964.) 124 Fr.

THE first edition of this admirable text-book appeared in a paper-covered form in 1945. An English translation was published in 1952, but was soon superseded by a much enlarged and almost entirely rewritten second edition in French. The third edition, just published eight years later, is not enlarged but has been brought up to date by the addition of new references and some changes in text and tables. The binding and paper are good, but unfortunately many of the photographs are still very badly reproduced and some minor drafting inaccuracies remain in line drawings. In spite of these perennial criticisms, however, there is no doubt that this book is a classic, and that the author's French is so beautifully clear that it is a pleasure to read.

The five main parts of the book deal with the general properties and practical production of X-rays; elementary crystallography and diffraction theory; experimental diffraction techniques for powders and single crystals; applications to various practical and theoretical problems; and, finally, diffraction by imperfect crystals and amorphous bodies, including small-angle scattering. Problems of crystal structure determination are confined to about eight pages. For systematic treatment in that field there are many good text-books; but there is no other text-book having the range and the quality of *Theorie et Technique de la Radiocristallographie*.

K. LONSDALE

### The Waterfowl of the World, Vol. 4

By Jean Delacour. With contributions by Hildegard Howard, Milton W. Weller, Philip S. Humphrey and George A. Clark, jun. Pp. 364 + 15 plates. (London: Country Life, Ltd., 1964.) 126s. net.

THE first three volumes of this work, published between 1954 and 1959, gave a systematic account of the Anatidae, species by species (*Nature*, 185, 567; 1960). This final volume reviews the group as a whole, thus complementing the extensive presentation of facts by a valuable synthesis. Here Jean Delacour plays a mainly editorial part, although himself writing chapters on aviculture and on domestic waterfowl. The major contributor is Milton W. Weller, who provides the review of the biology of the family in four chapters dealing with general habits, the reproductive cycle, ecology, and distribution and species relationships. The same writer is also responsible for chapters on fowling and on conservation and management, while P. S. Humphrey and G. A. Clark deal with the anatomy of waterfowl and Hildegard Howard with fossil Anseriformes. Four of the colour plates by Peter Scott portray domesticated forms derived from the greylag goose, the swan goose, the Muscovy duck, and the mallard; the other—a somewhat unusual feature—pictorially corrects errors in the artist's illustrations of wild species in the earlier volumes. The procedure of adding a full general review to the systematic treatment is much to be commended, and the work as a whole forms an admirable monograph of a large and cosmopolitan family of birds.

LANDSBOROUGH THOMSON