REVIEWS

Elementary Differential Equations. Second Edition. By W. T. Martin and E. Reissner. (Addison-Wesley Publishing Company, Inc., Reading, Massachusetts and 10-15, Chitty St., London, W. 1), 1961. Price $ 6.75.

The fact that this text-book has had a second and enlarged edition vouches for the success with which the authors have provided "the Science and Engineering student who needs to know Mathematics rather well with a useful working knowledge of the subject". The stress, of course, must be laid upon the words "useful" and "working knowledge" for Mathematics students would require a more thorough treatment.

One of the authors is a Mathematician known for his research work in Pure Mathematics ; the other is an Engineer teaching Applied Mathematics in the M.I.T. Such a collaboration explains why this text differs much from many other texts written with the same purpose. On the one side there is always perfect rigour in the proofs ; on the other the selection of material will allow the student to acquire a good deal of information about some of the fundamenal ideas of the theory of differential equations. I point, in particular, to the Picard theorem of existence by the method of successive approximations and to the integration by series.

Lacking experience in teaching Engineering students, the reviewer wonders whether some questions might not have received more generous developments. The chapter on Finite Differences is certainly very sketchy. Some idea of partial differential equations of the hyperbolic and of the elliptic types could have been given.

The great number of examples and exercises to be found in this text-book will certainly prove most useful to the students as well as to their teachers.

C. RACINE.

Techniques of High Energy Physics. By Ritson (Interscience Publishers, New York, London), 1961. Pp. 540. Price $ 16.75.

This is the fifth volume in the Interscience monographs and texts in physics and astronomy, under the general editorship of Marshak of the University of Rochester. Since World War II, the style of Instrumentation in high energy physics has changed so fundamentally, that a young physicist starting his career in research, would be very greatly handicapped unless good books are available, written lucidly, by distinguished workers in the field. Out of the eleven chapters, in the present book, five are written by members of staff of the Massachusetts Institute of Technology, the rest by those near about or in Massachusetts. This has contributed to a real unified treatment, which, otherwise, would have been difficult. In this fast growing field, as the editor has recognized, many sections could be out of date, even before they appear in print. This fear has been occasioned by the particularly rapid strides made in the use of computors for handling data and the advent of new breeds of faster and more intelligent computors. Yet, one does not feel less bewildered even after reading the section on digital computers by Flanagan of the Business Machine Corporation, New York and Calwell of MIT. The technique of image intensifiers and spark chambers are dealt with, all too briefly in the section of scintillation and Cerenkov counters, subsection, solid scintillation chambers and hodoscopes, by Ritson and Weinstein. Appendix VI is a welcome supplement for pulsed spark counters. Old techniques, such as of Geiger counters and expansion cloud chambers, have rightly been omitted, as being obsolete. Diffusion cloud chambers by Schluter (Chapter II), bubble chambers by Plem (Chapter III), Ionization counters by Wilson (Chapter VI) have all been lucidly written. Beam optics, dealing with the determination of the nature, energy and number of particles produced or scattered when a target is bombarded by very high energy particles, is treated in Chapter IX, while the last two chapters are devoted to target preparation and beam monitoring. There is no doubt that this book is invaluable to all nuclear physicists and to those teachers who have to keep in touch with the latest developments in physics.

B. DASANNACHARYA.

Lectures in Theoretical Physics, Vol. III. Edited by W. E. Brittin, B. W. Downs and J. Downs. (Interscience Publishers, New York-1, N.Y.), 1961. Pp. 531. Price $ 11.00.

The third volume in this series contains material presented in lectures given at the third annual Summer Institute for Theoretical

Physics held in the Department of Physics of the University of Colorado from June 20 to August 25, 1960. The authors having chosen their own topics of interest have brought to bear not only expert knowledge on the subject but also a method of presentation which will be clearly understood. There is no doubt that students and researchers of physics will be profited by a close study of the book.

The contents are as follows: Causality and Dispersion Relations by A. Bohr, Selected Topics in Theoretical Physics by W. F. Weisskopf, Statistical Mechanics of Irreversibility by R. Zwanzig, The Scattering of Electrons by Atoms by B. L. Moiseiwitsch, Some Applications of the Generating Functional of the Molecular Distribution Functions by M. Green, Non-equilibrium Statistical Mechanics by E. Montroll, Quantum Theory of Collision Processes by R. Haag, Canonical Commutation Relations in Field Theory and Functional Integration by R. Haag, General Theory of Non-equilibrium Phenomena by R. Balescu, Martin-Schwinger Methods in the Many Body Problem by N. Ashby, Green's Functions and the Quantum Theory of Fields by K. Symanzik.

Dover Publications:

A Treatise on Hydrodynamics. By A. B. Basset. 2 Volumes. Price $ 1.75 each.

Strength of Materials. By J. P. Den Hartog. Price $ 2.00.

Mechanics. By J. P. Den Hartog. Price $ 2.00.

Mathematics of Modern Engineering. By Ernest G. Keller and Robert E. Doherty. 2 Volumes. Price $ 1.65 each.

Supersonic Aerodynamics. By E. R. C. Miles. Price $ 1.45.

Applied Elasticity. By John Prescott. Price $ 2.95.

Fluid Mechanics for Hydraulic Engineers. By Hunter Rouse. Price $ 2.00.

Mathematical Methods for Scientists and Engineers. By Lloyd P. Smith. Price $ 2.00.

Basset's *Treatise of Hydrodynamics* covers the entire theory of classical hydrodynamics with much material on the works of classical formulators as well as documentation on the results and methods of papers by such men as J. J. Thompson, A. E. H. Love, Hicks, Greenhill, G. H. Darwin, Besant, Lamb, Kirchhoff and other turn-of-the-century investigators. It is an excellent text for the beginning student and a basic reference work.

Strength of Materials was originally prepared by Professor Den Hartog to meet the needs of engineering students at MIT for a sound first course in strength of materials. *Mechanics*, published only a dozen years ago, has become something of a classic among introductory texts on mechanics.

Mathematics of Modern Engineering is directed to the contemporary engineer who draws heavily on mathematical techniques that would have been out of reach of the average engineer of a generation ago. It deals with such branches of mathematics as determinants, tensors, the Heaviside operational calculus, dyadics, the calculus of variations, etc.

Miles' *Supersonic Aerodynamics* is distinctive for its emphasis on mathematics. It prepares the advanced student for handling the mathematical tools and principles necessary for a sound understanding of theoretical aerodynamics.

Prescott's *Applied Elasticity* develops every important type of elasticity problem from theoretical principles to practical solution with just enough mathematical theory to make the development clear and easy to follow.

Fluid Mechanics for Hydraulic Engineers was the first book to present a coherent picture of fluid mechanics from the point of view of the hydraulic engineer. First published in 1938, it has since become a classic and one of the most frequently cited works in fluid mechanics.

Lloyd P. Smith's *Mathematical Methods for Scientists and Engineers* offers a thorough investigation of mathematical methods and a practical description of the conditions under which each method should be used. This is a very useful book for practising scientists and engineers as well as advanced students.

Columbium Metallurgy. Edited by D. L. Douglass and F. W. Kunz. (Interscience Publishers, New York, London.) Pp. 746. Price $ 26.00.

The book under review is part of the series covering the proceedings of the 9th Metallurgical Society Conference, sponsored by the Metallurgical Society of the A.I.M.E. and it presents the 'state of the art' of columbium mettallurgy and alloy development. The aircraft, the missile and the nuclear industry have created many a material problem which titanium and stainless steels cannot surmount and the logical choice falls upon the truly high temperature material, columbium even among the refractory metals And the symposium was the consequence of the earnest realisation that

exchange of ideas, avoiding duplication, and 'fertilizing' the field were paramount.

The 746-page book contains 32 papers from well-known workers in the field in the U.S.A. and Austria and is classified under five major headings prefaced by an introduction, critically appraising the relative position of columbium as compared with other materials for missile, aircraft and nuclear application.

The first heading 'Fabrication' contains some 8 papers and discussions thereon. The contributions discuss a method of self-bonding of columbium, details of forming characteristics of five columbium alloys, workability and mechanical properties, fabrication at low temperature, influence of gaseous contaminants, oxidation resistance of aluminium dip coating, and vacuum arc melting.

Mechanical properties are next discussed in the succeeding 8 papers, the first two dealing excellently with the columbium-titanium-tungsten alloys. The use of columbium base alloys in pressurized water reactors, strain aging effects in titanium and the processing of the F-48 columbium alloy sheet are presented next. Details have also been presented on the performance at elevated temperature, the creep mechanism and the interrelation between structure and some mechanical properties.

The subject of the general metallurgy of columbium is covered by the next 8 contributions. Aspects like alloying behaviour, flow and fracture characteristics of columbium and details on some important binary systems, their thermodynamic functions, technology of some alloys, recovery and recrystallization in some alloys are discussed in some detail.

The last section styled "Oxidation and Corrosion" is covered again by another 8 papers. The first two papers discuss the oxidation and mechanical properties of columbium-aluminium-vanadium alloys. In the other papers the authors discuss steam corrosion of columbium-vanadium alloys, ignition, oxidation at low pressures, 'Break away' phenomena, hot water corrosion and the kinetics of oxidation.

The 32 papers in the book very convincingly establish that columbium is the metal of the future for high temperature applications from standpoints like availability, strength-weight ratio, and oxidation resistance, etc.

The book is profusely illustrated with diagrams, graphs, tables and photomicrographs and is a 'must' to the columbium metallurgist and the metals engineers of the aircraft, missile and nuclear industry.

A. A. KRISHNAN.

Quantitative Organic Microanalysis, Second Edition. By Al Steyermark. Academic Press, New York and London; India: Asia Publishing House, Bombay-1), *1961*. Pp. *665*. Price $ 16.50.

The second edition of *Quantitative Organic Microanalysis* by Al Steyermark has made its appearance as a great impetus to organic analysts to adopt improved methods and techniques of analysis, to augment more efficient working of the equipments, and also to popularise the estimation of the element, oxygen, in organic laboratories. The book has been written by a well-known authority on the subject, who has not only been in the active field for more than twenty years but also is the Chairman of the committees concerned with microanalytical determination of the American Chemical Society, American Society for Testing Materials, and the International Union of Pure and Applied Chemistry, and as such it contains most reliable up-to-date developments in methods and techniques of microanalysis in great details. The book also provides a useful chapter on micro-determination of some physical constants, such as melting-point, boiling-point, specific gravity, etc., and also extensive tables of reference at the end of each chapter. D. K. BANERJI.

Numerical Methods of Curve Fitting. By P. G. Guest, 1961. Pp. xiv + 422. Price 80 *sh.*; **A Book of Curves.** By E. H. Lockwood, 1961. Pp. xi + 198. Price 25 *sh.* (Cambridge University Press, London, N.W. 1).

To many drawing curves is a fascinating hobby. Records are not wanting to show that many famous mathematicians and scientists altogether enjoyed playing with curves. It is said that Kepler found the planetary orbit to be an ellipse after a series of trials with a variety of curves. The importance of curves as mathematical objects cannot be overemphasised. Their value in statistical science and as aids in analysis of observational data is well known. The two publications by the Cambridge University Press, one full of curves and written at an elementary level for schools, and the other almost void of curves but replete with equations and tables and written at the college level, will be welcomed by the category of students for which each is intended.

The *Book of Curves* describes methods of drawing plane curves, beginning with conic sections and going on to cycloid curves, spirals, catenaries, conchoids, pedal curves, glissettes, caustics, and so on. The approach is by pure

geometry, starting in each case with methods of drawing the curve and guiding the interested reader to explore for himself the construction and properties of new and more fascinating curves. A delightful photograph of the Pearly Nauticus fossil appears as the frontispiece.

In *Numerical Methods of Curve Fitting* Prof. Guest gives a comprehensive account of methods for reducing sets of observations and for fitting curves to numerical data. The book is in three Parts of increasing importance, and also of increasing clarity in treatment. Part I, of about 80 pages, deals in a cursory manner with observations of a single variable. Part II, of about 60 pages, deals with the regression theory and the straight line. Part III which forms the bulk of the book is devoted to the fitting of polynomial curves and of special types of curve. A number of typical examples have been worked out in detail and these should prove useful from a practical point of view. Much of the material in this part is to be found only in original papers and the inclusion of these treatments brings them within easy access to research workers and students.

A. S. G.

Plastic Flow and Fracture in Solids. By T. Y. Thomas. (Academic Press, New York and London; India: Asia Publishing House, Bombay-1), 1961. Pp. x + 267. Price $ 8.50.

Interest in plastic phenomena in solids has increased considerably in recent years, due to the desire and necessity to know more about the materials used in construction of structures. This book deals at a fairly advanced level with the fundamental principles involved in plastic flow leading ultimately to failure of solids from a macroscopic point of view. It is devoted mainly to the propagation, growth and decay of discontinuities in solids. Extensive use is made of the tensorial notation and concepts.

The book is divided into six chapters. The first two chapters are devoted to discuss the fundamental concepts of equilibrium and compatibility with particular reference to discontinuous surfaces. The problem of decay of waves in elastic media is treated in Chapter III. The various constitutive equations for perfectly plastic solids are presented in the fourth chapter. An interesting method of deriving an yield condition involving an arbitrary material function is presented. As applications of the theory developed, the problem of characteristic surface and wave propagation in plastic solids is treated in Chapter V.

In Chapter VI, the problem of fracture in solids is discussed. Fracture in a perfectly plastic solid is interpreted as the occurrence of a surface over which any initial slip is not damped out and, instead, the velocity of deformation becomes infinite in a finite time. This approach and interpretation are very interesting.

The book, on the whole, is a welcome addition to the growing volume of literature on plasticity and fracture and can be of great interest to every mathematically inclined engineer.

P. Narasimha Murthy.

British Flies, Vol. VI.—Empididæ. By J. E. Collin. Part II. Hybotinæ and Empidinæ (except *Hilara*), 1961. Pp. 223–551. Price 30 *sh.*; Part III. Empidinæ (*Hilara only*) and Hemerodrominæ. (Cambridge University Press, London, N.W. 1), 1961. Pp. 552–782. Price 30 *sh.*

This standard work on *British Flies* was first inaugurated by the late Mr. G. H. Verral, and Vol. VI on Empididæ by Collin constitutes the third to be published in this series. The complete volume contains full descriptions of all the 354 recorded British species of the family Empididæ. By comparing many of them with the original 'Types' the author has ensured a high standard of stability in their nomenclature. The volume is profusely illustrated and contains as many as 317 figures, all clearly drawn. Among the Empididæ, as the male genital organs offer important generic and specific characters, many large-scale drawings of these are given.

While the whole book is available in a cloth cover, for convenience in practical use it is issued in three separate paper-covered parts with continuous pagination.

Part II deals with Hybolinæ (Pp. 221-324) and Empidinæ (except *Hilara*) (pp. 325-551), and Part III with *Hilara* (Pp. 555-680) and Hemerodrominæ (Pp. 681-767). Part III also contains the general index for the whole volume.

This standard work is indispensable as a reference book to workers whose special field of study is *Empididæ*.

International Review of Cytology, Vol. X and XI. Edited by G. H. Bourne and J. F. Danielli. (Academic Press, New York and London, India: Asia Publishing House, Bombay-1), 1960 and 1961. Pp xiv + 409 and xii + 356 Price $ 13.00 and $ 11.00.

The authoritative nature of the contributions and the attempt at objectivity by the contributors have made the general student as well

as the specialist look forward to fresh issues of the *International Review of Cytology*. As usual, the reader gets a varied fare and some articles like the Ultrastructure of the Nucleus (Wischmitzer, Vol. X) and the Electron Microscopic Analysis of the Secretion Mechanism (Kurosumi, Vol. XI) are on topics published in the earlier volumes. The time and the author make the newer approaches refreshing.

It is not surprising, therefore, to find that the earlier analysis of the Chromosome Structure presented by Kaufmann, Gay and McDonald in Volume IX, claiming resolution into a large number of sub-chromonemata, are questioned by Wischnitzer (Vol. X). He concludes: "In general it can be stated that in so far as the elucidation of the fine structure of chromosome by electron microscopy is concerned, this new cytological technique has failed to confirm the presence of any highly organized structures" (Vol. V, p. 145).

The study of the molecular anatomy of various structures now being attempted would require radical periodic revisions and it is in this context that the *International Review of Cytology* is likely to play an increasingly active role.

M. K. SUBRAMANIAM.

Fish as Food, Vol. I. Edited by Georg Borgstrom. (Academic Press, New York and London), 1961. Pp. xiv + 725. Price Approx. $ 24.00.

The subject-matter of this volume is dealt with in seventeen chapters, under the three main divisions production, biochemistry and microbiology. In writing the book the editor has succeeded in securing the co-operation of leading fishery scientists, mainly from Europe, U.S.A., Canada and Japan. Dr. Borgstrom has edited this book with the objective that this comprehensive volume of reviews will be a source of "abundant and valuable information" to a wide range of research workers.

The first five chapters on production describe respectively—biology of seafish production, world fisheries, fish cultivation in Europe, carp cultivation in Japan, and raising fish for food in south-east Asia. All the articles are ably written, especially the one on "world fisheries", even though most of the catch figures both in marine and inland fisheries do not appear to be up-to-date. One of the obvious omissions in the fifth chapter is the contribution of India in the field of fisheries. India being one of the major fish-producing countries in this region, one would expect India's contribution mentioned in this article.

In the field of biochemistry of fish, eight well-known scientists have contributed articles on—organic constituents of fish and other aquatic animal foods, biochemistry of fish oils, recent findings in fatty acid composition of marine oils, fish protein with special reference to freezing, histamine problem, non-protein nitrogenous compounds, rigor-mortis and vitamins of fish. In these chapters the contributors have discussed the composition of different types of flesh, influence of sex on the composition of fish flesh, distribution of nitrogen in fish flesh, amino-acid composition of different species of fish, general characteristics of fish lipid, composition of different types of oils, fatty acids and rancidity problems in fish, proteins with special reference to muscle-protein and changes in frozen fish-protein, non-protein nitrogenous compounds, fat-soluble and water-soluble vitamins in edible parts of fish. The importance of increasing the duration of rigor for suppressing the development of micro-organisms causing spoilage and particularly role of ATP for the onset of rigor-mortis in fish has found mention in Chapter 12.

Under the subject of microbiology are included sea-water fish, spoilage of freshwater fish, shellfish deterioration and chemical control of microbiological deterioration. At the end of each chapter there is a comprehensive list of references on the subject.

There is no doubt that the book will be of considerable interest to Fishery Technologists and Administrators.

B. S. BHIMACHAR.

The Invertebrata. By L. A. Borradaile and F. A. Potts. (Cambridge University Press, London, N.W. 1), 1961. Pp. xvii + 820. Price 55 *sh*.

This text-book of zoology has been most popular with the undergraduate and honours students for over a quarter of a century. Since its first publication in 1932, the book had gone through several reprints, and a completely revised, enlarged and reset edition appeared in 1958 as the Third Edition, with a special chapter on zoological literature added to the text. In this Fourth Edition G. A. Kerkut has made further revisions, many figures have been redrawn and the last chapter on zoological literature has been brought up-to-date. There is no doubt that this comprehensive manual of invertebrate zoology will hold its leading position among the undergraduate text-books on the subject.

Books Received

From : Dover Publication, 180, Varick Street, New York-14, N.Y. :

Applied Elasticity. By J. Prescott. Pp. 666. Price $ 2.95.

Mechanics. By J. P. Den Hartog. Pp. ix + 462. Price $ 2.00.

Fluid Mechanics for Hydraulic Engineers. By Hunter Rouse. Pp. xvi + 422. Price $ 2.25.

Strength of Materials. By J. P. Den Hartog. Pp. 323. Price $ 1.95.

Mathematics of Modern Engineering. By E. G. Keller and R. E. Doherty. Vol. I, Pp. xii + 264, Price $ 1.75 ; Vol. II, Pp. xv + 328, Price $ 1.75.

Supersonic Aerodynamics—A Theoretical Introduction. By E. R. C. Miles. Pp. xi + 255. Price $ 1.45.

Mathematical Methods for Scientists and Engineers. By L. P. Smith. Pp. x + 453. Price $ 2.00.

The Life of Pasteur. By R. V. Radot, 1960. Pp. xxi + 484. Price $ 2.00.

Elementary Concepts of Topology. By P. Alexandroff, 1961. Pp. 73. Price $ 1.00.

The Fourth Dimension Simply Explained. By P. Alexandroff, 1960. Pp. 251. Price $ 1.35.

From : Pergamon Press Ltd., Headington Hill Hall, Oxford :

Popular Lectures in Mathematics (Vols. I-VI) :

Vol. I. *The Method of Mathematical Induction.* By I. S. Sominskii, 1961. Pp. vii + 57. Price 7 *sh.* 6 *d.*

Vol. II. *Fibonacci Numbers.* By N. N. Vorob'ev, 1961. Pp. viii + 66. Price 10 *sh.*

Vol. III. *Some Applications of Mechanics to Mathematics.* By V. A. Uspenskii, 1961. Pp. vii + 58. Price 10 *sh.*

Vol. IV. *Geometrical Constructions Using Compasses Only.* By A. N. Kostovskii, 1961. Pp. xi + 79. Price 10 *sh.*

Vol. V. *The Ruler in Geometrical Constructions.* By A. S. Smogorzhevskii, 1961. Pp. viii + 86. Price 10 *sh.*

Vol. VI. *Inequalities.* By P. P. Korovkin. Pp. vii + 60. Price 10 *sh.*

Experimental Correlograms and Fourier Transforms. By N. F. Barber, 1961. Pp. 136. Price 30 *sh.*

Surface Phenomena in Metals and Alloys. By V. K. Semenchenko. Edited by R. Kennedy, 1961. Pp. xx + 466. Price £5-5-0.

John Von Newmann Collected Works (Vol. I)—*Logic, Theory of Sets and Quantum Mechanics.* Edited by A. H. Taub, 1961. Pp. x + 654. Price £ 5.

Six Figure Logarithms, Antilogarithms and Logarithmic Trigonometrical Functions. By C. Attwood, 1961. Pp. 139. Price $ 2.00.

From : Academic Press, New York and London ; India : Asia Publishing House, Bombay-1 :

Recent Progress in Hormone Research (Vol. XVII). Edited by G. Pincus, 1961. Pp. viii + 600. Price $ 14.00.

Lectures on Field Theory and the Many-Body Problem. Edited by E. R. Caianiello, 1961. Pp. xiii + 327. Price $ 9.50.

The Cell (Vol. III)—*Biochemistry, Physiology, Morphology.* Edited by J. Brachet and A. E. Mirsky, 1961. Pp. xiii + 440. Price $ 12.00.

Metabolic Pathways. Edited by D. M. Greenberg, 1961. Pp. xiii + 814. Price $ 24.00.

Advances in Space Science and Technology (Vol. III). Edited by F. I. Ordway, III, 1961. Pp. xiii + 482. Price $ 14.00.

Gyrodynamics. By R. N. Arnold and L. Maunder, 1961. Pp. x + 484. Price £ 5.

Methods of Experimental Physics (Vol. V)—*Nuclear Physics* (Part A). Edited by L. C. L. Yuan, Chien-Shung Wu, 1961. Pp. xix + 733. Price $ 18.00.

Mathematics in Science and Engineering (Vol. IV)—*Stability by Liapunov's Direct Method with Applications.* By J. L. Salle and S. Lefchetz, 1961. Pp. vii + 124. Price $5.50.

The Chemistry of Heterocyclic Compounds. By C. M. Badger, 1961. Pp ix + 498. Price $ 12.00.

General Cytochemical Methods (Vol. II). Edited by J. F. Danielli, 1961. Pp. xi + 297. Price $ 10.00.

The Action of Insulin on Cells. By M. E. Krahl, 1961. Pp. ix + 202. Price $ 7.50.

Advances in Applied Mechanics (Supplement I)—*Rarefied Gas Dynamics.* Edited by L. Talbot, 1961. Pp. xv + 748. Price $ 19.00.

Advances in Genetics (Vol. X). Edited by E. W. Caspari and J. M. Thoday, 1961. Pp. ix + 429. Price $ 10.00.

Polyelectrolyte Solutions—A Theoretical Introduction. By S. A. Rice and M. Nagasawa, 1961. Pp. xv + 568. Price $ 16.50.

Advances in Clinical Chemistry (Vol. IV). Edited by Harry Sobotka and C. P. Stewart, 1961. Pp. xiv + 378. Price $ 12.00.

Introduction to Hypersonic Flow. By G. G. Chernyi. Translated by Ronald F. Probstein, 1961. Pp. xiv + 262. Price $ 8.00.