

## REVIEWS

**High Speed Diesel Engines.** By A. W. Judge. (Chapman & Hall, Ltd.), 1957. Pp. vii + 578. Price 65 sh.

This is the fifth edition of the popular book, *High Speed Diesel Engines*, by A. W. Judge, bringing its scope and contents in line with current developments. In a rapidly expanding scientific field like Internal Combustion Engines, considerable variations in the type of approach and technical level of treatment are possible in presenting the engineering information, analytical treatment and descriptive details of speciality equipment of manufacturers. The author's approach is admirably suited for the student, engineer, draughtsman and engine operator for whom the book is mainly intended. The book represents a summarisation and integration of a vast amount of engineering knowledge on the current state of development and practice in the High Speed Diesel Engines and their applications in various fields.

The opening chapter commences with a survey of the history and development of the diesel and compression ignition engines, leading to the present highly developed form of high speed compression ignition engines—more popularly called as "High Speed Diesel Engines". Following this, the fundamental principles of I. C. Engine and its features like engine cycles, combustion, thermodynamic performance and efficiency are dealt with. A comprehensive survey of fuel injection equipment, combustion chambers, combustion processes, etc., are next discussed in a manner that will specially appeal to junior engineers. A full chapter is devoted to supercharging with descriptive details of superchargers of leading manufacturers. Separate chapters deal with two-stroke engines, stationery engines, air-cooled engines, small passenger vehicle engines and commercial vehicle engines. The versatility of the high speed diesel in its applications is significantly brought forth in a chapter on special purpose engines and a number of individual makes of engines are discussed for road and rail transport, diesel electric traction, marine engines, submarines, aircrafts, etc. The last three chapters are devoted to the subjects of starting of the engines, filters for air and fuel and special characteristics of fuels.

The book is eminently suited as a standard text-book for the upper division course in tech-

nical high schools and should be welcomed by students and engineers having to deal with the production or operation of high speed diesel engines.

A. V. NATH.

**The Manufacture of Iron and Steel. Vol. I.** By G. Reginald Basforth, F.I.M. (Chapman & Hall, Ltd.), 1957. Pp. xii + 306. Price 45 sh. net.

The second edition of the book is an excellent addition to others on the metallurgy of iron and steel and a distinct improvement on its first edition.

Written by an expert in the production metallurgy of iron and steel, this book is an ideal text-book for the general student on the subject. To the industrialist, it provides adequate latest references on diverse aspects of iron metallurgy and blast furnace operations. To the engineer its importance is obvious in presenting an assimilable account of complicated physico-chemical reactions involved in the production metallurgy of iron. The book represents a typical British attitude on teaching metallurgy—a painstaking effort to combine theory with practice. As one runs through the book, he finds the optimum balance—thermodynamics of chemical reactions on the one hand to the actual steel plants layout on the other. To have attained this in a book of 300 pages is a remarkable achievement. Another praiseworthy feature of the book is the appendages of "recent research and developments" at the end of each chapter.

The book starts with the classification of iron ores, their geographical distribution and their evaluation. In this connection, however, it is pointed out that the book sadly lacks a broad-based world outlook in respect of iron ore resources and classifications, other raw materials and metallurgical practices. In case of India, e.g., reference is made of Mysore iron ores and of its magnetites; there is, however, no mention of classic haematite iron ores of Bihar and Orissa. In the iron ore belts of Bihar and Orissa, discovered at the turn of the present century, lie probably the richest and largest iron ore deposits of world surpassing in magnitude even the Lake Superior ores which are now nearing exhaustion. These Indian iron ore



reserves reckoned at over 8,000 million tons are a world envy. The book dwells far too disproportionately upon British resources of iron ores and other raw materials which are by any standards meagre, than its title warrants. The world iron ores and connected raw material reserves and resources are now being well detailed in United Nation's publications of surveys of world's raw materials which could have advantageously been profusely referred to so that the book attracts attention outside the shores of Britain. This is not to say, distracting from the intrinsic worth of the publication but the comment is made with the hope that in the third edition of the book these gaps will be bridged to meet the requirements of the readers in countries other than Britain. Mention may also be made of printer's devil here and there such as relating to references on page 258 and their mix up in the text starting from Nos. 13 to 18. These can be readily rectified now through the issue of an "erratum". On page 257 the last para needs slight changes. Mention could also have been made on page 256 that at Mysore, the latest Tysland-Hole electric pig iron smelting furnace is in operation relegating the charcoal furnace very much to the background.

In the chapter on iron ores, useful reference has been made on the use of sinter in the iron blast furnace. Not all blast furnaces of the world operate on sinter burden whilst many operate on 100% sinter charge. Perhaps, a reference to Russian blast furnace practice operating more or less invariably on iron sinter burden resulting in very much increased productivity and reduced fuel costs would not have been quite out of place even though no reference has otherwise been at all made to Russian raw materials and practices despite the recent tide of interest shown by British team of metallurgists visiting Soviet Union and commenting upon Russian iron and steel technology. Perhaps, it may also be mentioned that some figures like that of magnetic separator on page 45, old beehive coke oven no longer widely used these days could be safely substituted by due references to latest assessment, raw materials situation and research and plant developments in parts of the world other than the U.K. It is hoped that these comments will be taken in the spirit in which they are made, that is, with a view to further widen the range of readers in different parts of the world for this otherwise undoubtedly excellent addition to the texts on iron and steel metallurgy, lucidly written, neatly printed and well bound for which the author is to be warmly congratulated.

It is also greatly heartening to note the references made to low shaft iron production and manufacture of ferro-alloys—subjects currently of great interest to India in the background of our Second Five-Year Plan wherein determined efforts are being made to set up ferro-alloy manufacture and low shaft furnace iron production methods.

B. R. NIJHAWAN.

### **The General Theory of Electrical Machines.**

By B. Adkins (One of the Advanced Engineering Text-Book Series.) (Chapman & Hall, Ltd., London), 1957. Pp. ix + 236. Price 45 sh.

The book presents a general theory of rotating electrical machines applicable to all the normal types of machines and to all conditions of operation. Thus the theory is more fundamental and is of wider application than the usual theories given in the standard text-books on electrical machines.

Though there has been developments both in the concepts for different types of machines as also in the theory explaining the characteristics of operation of the machines, in the past, each type of machine has been dealt with on its own merits without much reference to other types and simple methods of analysis have been developed by means of which the performance under specified conditions can be calculated. The methods, thus, have been piecemeal and have the disadvantage that completely fresh start has to be made when it is necessary to analyse a new type of machine or to deal with unbalanced or transient conditions.

Gabriel Kron's visualisation that all electric machines may be considered from the point of view of electromagnetic field problems and his application of tensorial methods to their analysis as a group have led to the new line of thought in modern theory of electric machines. In the modern theory, algebraic equations are accepted as the fundamental means of expression. In line with recent developments in circuit theory, the use of equations leads to a general theory of all electrical machines which embraces all types and all conditions of operations. It may be noted, however, that while matrix methods are often extremely useful for organising the algebraic and other experimental work and tensors are of great value for more advanced investigations, both these should be regarded as mathematical tools applied to a fundamental concept which can be completely, although less elegantly, expressed in terms of ordinary algebra. The author has very ably demonstrated this in the book under review.



In the first ten chapters, matrix notation is used only for the purpose of setting out the equations in an orderly manner. The manipulation of the equations is, however, carried out by ordinary algebraic method.

The author, after referring to Blondel's "two-reaction theory" of the steady state operation of the salient pole synchronous machines and West's "cross-field theory of alternating current machines", has indicated how Park's transformation provides the most important fundamental concept in the development of Kron's generalised theory.

In the first ten chapters, consisting of introduction, D.C. machines and A.C. machines, the general equations are derived and used to demonstrate the wide range of application for solving practical problems.

In the last chapter a statement of the generalised theory is given in matrix notation, and some of the simpler methods of matrix algebra is explained.

The Heaviside method has been used throughout the book as in the author's view it is advantageous to use the Heaviside notations for the general equations of machines because of the fact that they are non-linear. According to the author, the Laplace transform notation is suitable for the study of circuits and control systems because, for the subjects, the equations used in developing the basic theory are linear.

A chronological bibliography gives all references to assist the reader pursue the matter further. A good deal of attention has been given to the development of approximate methods and to the use of analyzers and computing devices.

The author is to be commended for the timely presentation of such a book when a co-ordinated and unified method of approach is very much needed to provide a more powerful line of attack on new problems.

The book will be very useful to students and designers as a basis for the understanding of the modern unified approach to the generalised electrical machine theory.

C. S. G.

---

**Crystal Structures.** Vol. II. Chapters XI and XII. By Ralph W. G. Wyckoff. (Interscience Publishers, Inc., New York), 1957. Price \$ 7.00.

The first instalment of the book, *Crystal Structures*, by Dr. R. W. G. Wyckoff, appeared in 1948 in loose leaf form printed in imitation

typescript and comprised of Chapters I to VII under Section I. Crystallographic data and atomic parameters for a large number of inorganic structures were discussed in the section and the substances were classified according to their chemical formulæ. Tentative contents of Section II and Section III that were to follow had also been indicated in it. Supplement and replacement sheets to bring the material up-to-date were also promised in the publisher's note attached. Several of these have appeared since then. The plan of the book has slightly been altered and the whole of the material is presented in three volumes: Volume I comprising of Chapters I to VII (1948), Volume II, Chapters VIII to XII (Chapters VIII to X and XIII, 1951) and Volume III, Chapters XIII to XV with an index to organic compounds attached to it (1953).

The matter under review forms part of Volume II and consists of Chapters XI and XII. Chapter XI bears the title, "Miscellaneous Inorganic Compounds", and presents structural data and atomic parameters for some complex and basic halides thio salts, complex sulfides, complex oxides and for three other miscellaneous compounds. Chapter XII under the heading, "Structure of the Silicates", concerns itself with a large number of silicates under four major groupings: Discrete silicate groups, silicate chain structures, silicate sheet structures and network silicates. The discrete silicate group is further subdivided into orthosilicates, pyrosilicates and more complex SiO groups.

With the addition of a large number of silicate structures, the publication will interest a much wider group of investigators in the field of mineralogy and structural chemistry. The great advantage of the new method of publication adopted here is the collection of information for a particular substance in one place. Continuous numbering of pages has not been practicable, but one should experience no difficulty in locating a particular compound after going through the instructions. However, an alphabetical index of compounds would be a welcome addition. Each chapter consists of a text portion, tables and illustrations (illustrations to follow). A bibliography commencing from 1931 up to 1955 is given at the end of each chapter.

The whole collection is well worth having as a reference book and will be of interest to all those who in one way or another are concerned with the crystalline state.

A. JAYARAMAN.



**Antibiotics Annual, 1956-57.** Edited by Henry Welch, Ph.D. and Felix Marti-Ibanez, M.D. (Medical Encyclopædia, Inc., New York, N.Y.), 1957. Pp. xviii + 1134. Price \$10.00.

This fourth successive volume gives an account of the Proceedings of the Fourth Annual Symposium on Antibiotics held on October 17, 18 and 19, 1956, in Washington, D.C. It contains 154 papers and an account of three panel discussions on "Antibiotics and Intestinal Antiseptics", "Susceptibility of Micro-organisms to Antibiotics Isolated from Hospitalised and Non-Hospitalised Persons" and "Present Status of Antibiotics in the Preservation of Food". As stated by Dr. Welch, "these Annual Symposia on Antibiotics have become an important forum in which the progress, failures and new trends are initiated in a worldwide interchange of ideas". The collection of papers, particularly in a single volume, "constitutes a complete story for those interested in appraising their past year's advance and accomplishments and hopes for the future".

Workers in USA certainly unearth for more number of antibiotics than those anywhere else. The output of work on antibiotics is also much more in USA than anywhere else. Consequently, the papers are mostly from USA. There are contributions from nine other countries, but one wishes that more countries take part in this Symposium, much more actively than at present. The work reported is concerned with the antibiotics: oleandomycin, vancomycin, amphotericin B (an antifungal antibiotic), arcocin, nystatin, novobiocin, ristocetin, synnematin B, hygromycin, xanthocillin, penicillin V, etc. The search for synergistic and additive combinations of antibiotics is actively going on. But not all, including some authorities in the subject, will share the enthusiasm of Dr. Welch about the combinations that it heralds a new era of antibiotic therapy. One has to guard against this being capitalised as a commercial selling point to put in the market all sorts of combinations of dubious value, descending to the level of proprietary medicines. Oleandomycin, neomycin and nystatin show the polyandrous tendency as regards the combinations. The use of antibiotics, particularly chlortetracycline and oxytetracycline, as good preservatives, is being investigated to put a stop to the 25% of the spoilage now taking place in food products even in USA.

Marti-Ibanez in his characteristic philosophical way adds a thought-provoking article on problems of medical communications. It is not well appreciated that for the effective appli-

cation of the antibiotics, not only do we need the antibiotics but also the doctors fully posted with the most accurate knowledge about these potent weapons. In view of this, the reviewer hopes that the commendable wish of Marti-Ibanez "to bring out at the earliest possible date, to as many people as possible, the greatest possible number of the best possible medical work" will not remain Utopian but becomes a reality at the earliest possible date.

K. GANAPATHI.

**UHF Tubes for Communication and Measuring Equipment.** (Compiled by Members of Philips Electric Tube Division, Philips Technical Library), 1956. Pp. 70. Price Rs. 5.

**Tube Selection Guide, 1956-57.** Compiled by Th. J. Kroes. (Philips Technical Library), 1956. Pp. 124. Price Rs. 5.

One of the significant developments in electronics circuitry in the post-war era is the rapid opening up of the centimetric and millimetric wave region and the increasing applications of such waves in the fields of television, radar, and other public services. The first book under review describes in some detail the tubes that can be used in this frequency range. To reduce the transit-time effects, the interelectrode distances are to be drastically shortened and it is interesting to see how this has been achieved in tubes such as EC 89, EC 81, K 81 A and DC 70. At frequencies above 500 Mc/s. disc-seal triodes (EC 55, EC 56 and EC 57) in which the concentric electrodes are replaced by flat equidistant electrodes are employed. Transit-time effects are taken advantage of in designing velocity modulation tubes and two reflex klystrons 2 K 25 and 723 A/B suitable for use in the 3 cm. band are described. Finally, for the computation of the noise figures of receivers, the use of K 81 A (for metric waves) and the gas discharge tubes K 50 A and K 15 A (for the 3 cm. and 10 cm. bands respectively) is detailed.

In the conventional RF and AF regions, there is such a variety of tube types that the experimenter is often baffled to select the right type for the application in any particular case and further to assess the equivalence of one type with another in case of replacements. The second book under review is handy for this purpose since it includes: (i) Tables of all tubes manufactured by Philips or those for which Philips have an equivalent, (ii) Tables in which the tubes are grouped according to their functions, (iii) Preferred tube types, (iv) Replacement tube types, (v) Replacement



of obsolete tubes, (vi) RETMA and continental systems of tube designation and data on tube bases and tube holders.

Tube manuals have become such an integral part of any laboratory in electronic circuitry that the publication of these two books by the well-known manufacturing company of Philips will be welcomed.

RAM K. VEPA.

**Proceedings of the International Conference on the Peaceful Uses of Atomic Energy, Vol. 5.—Physics of Reactor Design.** (United Nations Publication, New York), 1956. Pp. viii + 545. Price, \$ 9.00.

This is the fifth volume of the series which report the Proceedings of the International Conference held in Geneva in August 1955, on the peaceful uses of atomic energy. The volume is divided into five sections dealing with interglobal experiments important to the design of reactor, such as exponential and critical experiments as well as resonance integrals and kinetic measurements.

The first section, on integral measurements, includes mainly the determinations of diffusion and slowing down areas in the moderators using the static and pulsed techniques. An interesting review of theoretical and experimental work on slowing down in hydrogenous media is included by Wilkins *et al.* (USA).

The second section reports measurements of resonance integral, long-term changes and criticality of solutions of fissile materials. The third section deals with zero energy and exponential experiments with excellent reviews of D<sub>2</sub>O-uranium and graphite-uranium lattices. The discrepancy between the different experimental results performed with D<sub>2</sub>O-uranium lattices is underlined by Cohen. This section will prove of great use to the reactor physicist.

The fourth section includes three papers covering the fast reactor experimental studies and five theoretical papers on reactor kinetics and control problems.

The fifth section is devoted to papers on reactor theory. These provide a useful discussion of theoretical techniques of particular interest in predicting the critical size of assemblies of a small number of fuel elements. A survey paper on neutron thermalization theories by Cohen is also included. The lack of experimental information of neutron thermalization in Be, C and Be O reflects the smaller number of investigations in this field. Also included in this section are the spherical harmonics method for fine-structure flux distributions and Milne's problem.

It is, for the reactor physicist, an essential reference book.

V. P. DUGGAL.

**Rice in Orissa.** (Department of Agriculture, Orissa), 1956. Pp. 121, 11 grs., 34 plates. Price Rs. 7.

Rice is the most important single crop in Orissa. The book under notice which is a compilation of contributions by G. V. Chalam and others is an account of the activities of the Orissa Agricultural Department during the past 20 years since Orissa was constituted into a separate province. Work on rice has been carried out in the three research stations, Cuttack, Berhampore and Jeypore. The first two were started as substations of Sabour and Coimbatore and rice research in Orissa Province is a continuation of the work previously conducted under the control of the paddy specialists of the old provinces of Bihar and Madras, respectively. Cuttack has, in recent years, been taken over for locating the Central Rice Research Institute and the provincial research station has been shifted to Bhubaneswar.

The book has six chapters, dealing with the general background, botanical research including breeding and physiology, agronomical research, pests and diseases, improved varieties and marketing. The rice research scheme has been in progress only for a comparatively short period and hence little work has been carried out by the way of hybridisation. The hybrids handed over by the Madras Agricultural Department at the time of partition have been carried to further generations and studied. Pure lines which are higher yielding are under study. The Department is obtaining the F<sub>2</sub> seeds of *japonica* × *indica* crosses effected by the Central Rice Research Institute under the auspices of the FAO. These are being studied with a view to selecting types to fulfil objectives of low height, heavy tillering, response to fertilisers, etc.

Orissa is a land of rivers and intermittent floods are common. The coastal areas are also subject to flooding by sea-water and many of the lands are saline. While flood- and salinity-resistant types are needed for the coastal plains, for the upland areas drought-resistant types are required. The evolution of these has claimed the attention of the breeder and the physiologist. Flood- and drought-resistance have been sought to be induced by presprouting treatments; correlations have also been attempted to be worked out between resistance and anatomical features. Seeds of spring rices are reported to lose their viability when sown



in the following spring and efforts have been made to prolong their viability and, in the alternative, to break the dormancy of winter rices to enable them to be grown in spring. Study of micro-nutrient nutrition is a feature of agronomical investigations. The chapter on marketing reveals the fact that the co-operative movement is yet to find its place in the marketing of rice in Orissa.

The book presents the appreciable progress made in the brief period of work of the Department. The few words of criticism that follow are intended to help the authors to bring out a better edition free from avoidable defects. There is room for improvement in the arrangement of matter under headings. The studies on shattering and the nature of open and compact panicles are reported under the heading 'Drought Resistance' (p. 55). According to Parija (1938) (cited by Ramiah and Rao), the immediate objective of the treatments in the experiments to induce flood resistance was to 'educate' the sprouting plants to insufficiency of light and oxygen. This method of approach could have been explained by the present authors as they are apparently reporting the same or similar experiments. The use of the term 'vernalisation practice' to denote a procedure whose objective is not shortening the vegetative phase but inducing flood-resistance, does not appear to be appropriate. Techniques used could, with advantage, have been described in more adequate detail. It is somewhat confusing to read that there is no response to potash, and immediately thereafter to find that the best manurial combination is 45 lb. N, 40 lb.  $P_2O_5$ , and 30 lb.  $K_2O$  (p. 69). Vague terms and phrases which do not correctly convey the meaning intended are distressingly common, e.g., 'flood resisting selection' (p. 30); 'a week days earlier' (p. 31); 'nature of applying' (p. 60); 'the usage of edible cakes' (p. 62); 'There is no effect of liming' (p. 69). The bibliography is sketchy and by no means complete. For instance, work on salinity-resistance has been carried out by workers in Orissa for a number of years, but their reports do not find a place in the bibliography and a note that appeared in 1954 has been cited as the sole reference.

The book has many excellent photographs, bearing on the subject of rice in Orissa. The printers deserve much credit for the very attractive get-up; with such meticulous care given to the quality of the production, one wishes that the nine-line errata had not been necessary.

N. L. DUTT.

## Books Received

- Aircraft Hydraulics*, Vol. I. Second Edition. By Noel L. Allport and J. W. Keyser. (Chapman & Hall), 1957. Pp. xi + 424. Price 50 sh.
- Gas Dynamics*. By Klaus Oswatitsch. English version by G. Kuerti. (Academic Press, Inc.), 1956. Pp. xv + 610. Price \$12.00.
- Momentum Transfer in Fluids*. By H. Corcoran, J. B. Opfell and B. H. Sage. (Academic Press, Inc.), 1956. Pp. xi + 394. Price \$9.00.
- Fatigue in Aircraft Structures*. Edited by Alfred M. Freudenthal. (Academic Press, Inc.), 1956. Pp. xiii + 456. Price \$12.00.
- Brookhaven Symposia in Biology*, No. 9. *Genetics in Plant Breeding*. (Biology Department, Brookhaven National Laboratory, Upton, New York), 1956. Pp. ix + 236. Price \$1.25.
- The Defect Solid State*. By T. J. Gray and others. (Interscience Pub.), 1957. Pp. viii + 511. Price \$11.00.
- Earthquakes in the Himalayan Region*. By S. K. Banerji. (Indian Association for the Cultivation of Science, Calcutta-32), 1957. Pp. 64. Price Rs. 3.
- Mitochondria and Other Cytoplasmic Inclusions*. Edited by F. K. Sanders. (Society of Experimental Biology Symposia No. 10.) (Cambridge University Press, London, N.W. 1), 1957. Pp. 198. Price 55 sh.
- Hormones, Brain Function and Behaviour*. Edited by Hudson Hoagland. (Academic Press, New York), 1957. Pp. 257. Price \$7.00.
- Carnegie Institution of Washington Year-Book*, 1955-56. (Carnegie Institute of Washington, 1530, P. Street, Washington-5, D.C.) Pp. 343. Price \$1.00.
- The Indian Ephemeris and Nautical Almanac for the Year 1958*. (Director, Regional Met. Centre, Alipore, Calcutta-27.) Pp. xviii + 392. Price Rs. 12.
- Problems in Nuclear Engineering*, Vol. I. Edited by D. J. Hughes, S. McLain and C. Williams. (Pergamon Press, New York), 1957. Pp. ix + 365. Price £6.0.
- Reactor Operational Problems*, Vol. II. Edited by D. J. Hughes, S. McLain and C. Williams. (Pergamon Press, New York), 1957. Pp. vii + 278. Price £6.
- The Hypercircle in Mathematical Physics*. By J. L. Synge. (Cambridge University Press, London, N.W. 1), 1957. Pp. xii + 424. Price 70 sh.
- Introduction to Printed Circuits*. By Robert L. Swiggett. (Chapman & Hall, London, W.C. 2), 1957. Pp. vii + 101. Price \$2.70.