Advanced Calculus

By Prof. Ivan S. Sokolnikoff. Pp. x+446. (New York and London: McGraw-Hill Book Co., Inc., 1939.) 26*s*.

THE preparation of a book on advanced calculus always entails some difficulty, for, on one hand, essential rigour must not, at this stage, be sacrificed, while, on the other, the course must be sufficiently concrete to appeal to the student and especially to the practical student. There is no doubt that interest in mathematics is often thwarted by a too rigorous presentation of analytical doctrine, and yet even practical students must assimilate an irreducible minimum of valid theory in order to make an intelligent use of mathematics. With these thoughts in mind, it is interesting to turn to Prof. Sokolnikoff's new volume. In the preface, the author admits that the subject is far from easy, but lays down the unalterable aphorism that the solving of problems "is essential to a mastery".

The ideas the basis of which lies in geometry are presented intuitively, whilst proofs of many academic theorems, like those on convergence of monotone sequences; those of Bolzano-Weierstrass, Darboux and a few others, have been wisely omitted, although references to other treatises, where proofs may be found, are given. One very commendable feature lies in the fact that the author has relegated no difficult or essential proof to the exercises provided for the student's practice.

The course embraces the usual topics dealt with in what is generally known as advanced calculus. It begins with limits and continuity; derivatives and differentials; then passes to a full consideration of integration—including definite, multiple and line integrals, and, after two chapters on series, improper integrals. Finally, Fourier series and a simplified formal treatment of some of the important problems arising from the theory of implicit functions are discussed.

The text is written with clarity and is well illustrated both by diagrams and exercises, worked and unworked.

Algebra for Science and Engineering Students

By E. H. Lockwood. Pp. ix+102. (Cambridge: At the University Press, 1940.) 6*s*.

THIS book has been specially prepared for secondary school pupils taking advanced courses in science and engineering. As the author points out, its essential feature is brevity, the aim being to present those parts of the so-called 'higher algebra' which are essential for sixth form pupils, on the science and engineering side, who do not offer mathematics as a main subject. The course begins with indices, logarithms and surds, then passes to variation; the theory of quadratic equations; factors and their development, including cyclic symmetry and partial fractions; permutations and combinations, leading to the binomial theorem for a positive integral index. The remaining part of the volume is devoted to the elements of simple probability, series and an introduction to statistics. A few practical applications of some of the principles explained in the text are given among the exercises provided for the student to solve.

The deliberate brevity of the treatment renders the text, particularly in the earlier chapters, almost a summary—and a good summary too—of the algebra needed for a sound training in what, a few years ago, would have been called the non-mathematical sciences, and, judging by the preface, the author has the biology student especially in mind, for he states: "Biology is becoming every day more mathematical." The treatment of the latter part on probability and statistics is much fuller and interesting, and should prove a welcome introduction to these subjects.

The book is certainly valuable for its purpose and is well illustrated both by line drawings and exercises to which answers are given. In the case, however, of engineering or physics, is not a full course in mathematics, taken to main subject standard, essential?

Electricity and Magnetism for Students

By S. R. Humby. Pp. 319. (London: John Murray, 1939.) 6*s*. 6*d*.

THIS excellent book is intended mainly for students who are preparing for entrance scholarships to the universities, and the Higher School Certificate and University Intermediate examinations, while it also covers a lot of the ground necessary for an ordinary degree. One of the many good features of the book is the flexibility of the treatment given, for as the author says in his preface, "Each chapter gives a complete, though necessarily limited, discussion of its part of the subject"; this means that the chapters may be dealt with in any order to suit requirements, and though in the book the work on electrostatics is separated from that on current electricity by the long chapter on magnetism, the author does not suggest that this sequence should be rigidly adhered to.

Mr. Humby has kept the needs of the students well in the forefront, and his courage in concentrating on one aspect of a theory which can be approached by several methods is to be commended, and will no doubt be greatly appreciated by students.

The author claims to have made a special effort to resolve the difficulties of magnetic induction, and it must be said that the skilful way in which he has developed this theory in the same chapter as other magnetic phenomena, instead of making it appear more formidable by devoting a separate chapter to it, seems to have justified his claim. Another pleasing feature is the logical sequence adopted in connexion with conduction of electricity, the conduction in solids, liquids and gases being dealt with in successive chapters.

Altogether it is an up-to-date book, well produced on very sound lines, and it should be found very helpful by students.