The contents consist of six chapters and a comprehensive bibliography. In Chapter 1 the more important aspects of modern metallurgical theory are surveyed, and the common metallurgical terms are explained. Chapter 2, devoted to structural materials, deals separately with aluminium, magnesium, beryllium, iron and steel, and the refractory metals, zirconium, niobium, tantalum, vanadium and molybdenum. Subsequent chapters deal with the fuel materials (uranium, plutonium and thorium); liquid metals as coolants and as carriers for liquid-metal fuels and blankets; ceramics and metal-ceramic mixtures used as fuels, moderators, or as control and shielding materials; and the final chapter discusses the problem of corrosion of the fuel and canning materials by the various coolants. The text is adequately supplemented by tabulated data and clear line drawings. S. Weintroub

Nuclear Reactor Optimization

By P. H. Margen. (Nuclear Engineering Monographs.) Pp. x + 81. (London: Temple Press, Ltd., 1960.) 12*s*. 6*d*. net.

THE book which is under notice is intended to provide students and research assistants with a broad understanding of specific topics in this field. It competently describes a technique, based on fairly elementary formulations of the relevant theory, for varying the parameters of a given power reactor design to reach the lowest overall power cost and gives a detailed discussion of the application of this technique to a heavy-water-moderated, carbon-dioxide-cooled reactor.

Such a discussion requires a brief comment on almost all the factors which affect the design of the reactor, and the author has succeeded in providing a mass of detailed information without obscuring the main lines of the argument.

This presentation may lead the reader to conclude that effective design can therefore always be achieved by appropriate modification of the elementary mathematical procedures described in this book. In practice, validation of a particular design requires the use of markedly more sophisticated computational techniques. These provide a starting point for an optimization study and must again be used to check the optimized design if it departs appreciably from the initial concept.

In fact, a situation in which all main reactor parameters can be fixed merely by a minimization of total power cost is unusual—and the inclusion of constraints such as peak fuel centre temperature or burn-out margin is vital to the analysis. The essential role of such constraints is insufficiently emphasized in the presentation.

These criticisms do not obscure the merits of a clear presentation of an important aspect of reactor design.

J. Fell

University Physics

By Prof. F. C. Champion. Revised, one volume edition. Pp. viii + 786. (London and Glasgow: Blackie and Son, Ltd., 1960.) 30*s*. net.

THIS book aims at giving what might be called basic physics—roughly the content of first- and second-year university courses—in one volume. It succeeds in this aim by sternly resisting any temptation to stray on to specialized topics, and it thus gives the impression of being rather dull. There are, however, three chapters at the end that deal with modern physics, but they do not go deeply into any aspects.

Many examples of examination questions, with answers and hints for solutions, are also included. These are not always wisely chosen; often they are purely bookwork questions which do not give the aid to students that quantitative problems would give. Moreover, the practical element sometimes seems to be lacking; in a.c. theory, for example, the emphasis—quite rightly—is on basic principles, but there should also be some attention paid to producing answers in ordinary units.

It might also be mentioned that a Cartesian convention is used for optics, in accordance with general university practice. In electricity and magnetism the C.G.S. system is used, the M.K.S. system being dismissed rather summarily.

To summarize, this is a sound book that will be useful as a reference book for students, but it is unlikely to fire them with an enthusiasm for physics.

H. Lipson

Analytical and Canonical Formalism in Physics

By Prof. André Mercier. (Series in Physics.) Pp. viii + 222. (Amsterdam: North-Holland Publishing Company; New York: Interscience Publishers, Inc., 1959.) 40*s*.

LAGRANGE'S formalization of analytical dynamics by sets of differential operators applied to certain functions characterizing a dynamical system led to Hamilton's variational principle and his canonical equations. The extension of the field of application of Hamilton's principle, from classical dynamics to more general physical systems, may sometimes have seemed to be an exercise in pure mathematics, but relativity and quantum field theory have renewed the interest in structural formalism, so that it is not surprising that one of Prof. Mercier's aims is to show that much of the modern formal field theory is of pre-quantic character. The emphasis is on structure, but here and there illustrations from specific physical domains are given, and a number of problems for the reader are proposed; these are not examination-type questions, but generally ask for the completion or extension of abbreviated detail in the text. The book provides a profound investigation of the role of basic mathematical formalism in physics, from Lagrange to Dirac, and will repay those readers who are prepared to follow a closely argued mathematical essay in anatomy.

T. A. A. Broadbent

A Course in Applied Mathematics

By Prof. Derek F. Lawden. Pp. xv + 655. (London: English Universities Press, Ltd., 1960.) 70*s*. net.

PROF. LAWDEN'S book is chiefly intended for students reading for Part 2 of the London General B.Sc. under the recently revised regulations. It conveniently contains all the applied mathematics required by this syllabus: Lagrange's equations, but not variational principles, in dynamics; the elements of the Faraday–Maxwell electromagnetic theory and foundations of potential theory; stress and strain and simple elastic problems; basic equations for the motion of an ideal fluid, with simple instances of irrotational flow and of vortex motion.