tions. The importance of the work of the weather observers on land, on sea and in the air is rightly stressed, and a survey is given of their work and the instruments they use in making routine measurements of atmospheric pressure, temperature and humidity, wind speed and direction, rainfall and cloud height.

The preparation of weather charts and the meaning of the various pressure systems in terms of weather and wind are discussed, and the author valiantly attempts a non-mathematical explanation of Buys Ballot's law, or, strictly speaking, of Coriolis force. This, if a little inelegant because apparently different arguments are applied to meridional and latitudinal motion, serves to indicate the effect, although to a non-mathematical reader the exact variation with latitude will not be readily seen.

The reader is introduced to the extremely important notion of air masses and fronts, which did so much to improve forecasting when first recognized during the First World War and is still the basis of forecasting up to twenty-four hours ahead.

In a book rich with information one hesitates to ask for more; but an account of the different effects on weather of coastal waters, as between winter and summer, and the modifying effects of high ground and long passage overland on cloud and weather, would have been extremely valuable. A man in London hearing overcast conditions and maybe drizzle forecast for south-west England on a fine August morning would then go his way confident that for once the weather is not spreading east.

The principal causes of bad forecasts are lightly touched upon; but many meteorologists would wish that more stress had been put on changes in the weather associated with fronts as they cross Great Britain in particular. After all, if it rains two or three hours after the forecast time, that is a small thing to the man in the street; if it does not rain at all he is little impressed by being told that the warm front passed him exactly on time!

Within the two hundred pages of this book there is a vast amount of information; but the reader is not likely to feel he is being crammed : the frequent plates (there are thirty-six of them in all) and clear line diagrams aerate the text, and Sibley's drawings do much more than illustrate points in the text.

M. K. MILES

MATHEMATICS FOR ELECTRICAL ENGINEERING

Modern Electrical Engineering Mathematics
An Introduction to the Mathematical Methods more Recently Employed in Electrical Engineering Theory, with Special Reference to Stationary Linear Networks. By S. Austen Stigant. Pp. 372. (London : Hutchinson's Scientific and Technical Publications, n.d.) 31s. 6d. net.

THERE are few branches of mathematics which have not found useful application to electrical phenomena, and the engineer is continually receiving new tools of a theoretical nature to add to his equipment. He has long since had to become familiar with the use of infinite series, with Fourier analysis and with many of the differential equations and functions of mathematical physics. More recently, however, matrix theory and tensor analysis have been added to the list, and the operational methods of approach to circuit problems, including that of the Heaviside calculus, are becoming increasingly important.

In these circumstances, many engineers must be wondering whether it is better to be thoroughly conversant with a limited field of mathematics, so as to be able to make the fullest and most practical use of the knowledge they possess, or to understand in a general way the vast mass of symbolic theory available for their use, with little hope—unless, indeed, possessing an unusual faculty for mathematics—of being really proficient in any of it. There is no general solution to this very real dilemma ; it depends upon the individual concerned and upon the degree of specialization within which he works. The author of the book under notice believes that no branch of mathematics likely to have practical application should be neglected by any engineer on the score of its being new or unnecessary : "The advanced engineering theories of to-day become the commonplace practice of to-morrow". It is likely that most engineers would so far agree as to admit the desirability of being at least aware of what analytical methods are available and of their useful range of application.

From this point of view, Mr. Stigant's book is to be welcomed. It deals with a limited number of subjects, having nothing to say concerning differential equations, infinite series or function theory generally, all of which have been discussed adequately before. More than half the book (ten of the eighteen chapters) is concerned with determinants, matrices and tensor algebra ; the Heaviside operational calculus, symmetrical components and dimensional analysis in its various forms account for five chapters. The book is thus probably the most comprehensive account of these subjects—with the exception of the operational calculus—that has so far been written for engineers.

The many branches of theory discussed and the large amount of space legitimately and usefully devoted to engineering applications might lead one to anticipate a less detailed treatment than is, in fact, given. On the contrary, a criticism of the reviewer—albeit a minor one—is that in some instances, particularly perhaps in the chapters on tensors, the discussion could be more concentrated. Nevertheless, the writing is careful, and pains have been taken to stress the connexion between the different analytical methods of approach to problems. The original Heaviside method is used in the chapter on operational calculus ; the Laplace transform approach is usually preferred nowadays, although the reviewer would agree that, for many, the method adopted in this book would seem a more natural way of introducing the subject. The equivalent of perhaps five chapters is given to examples illustrating the theory, including, among others, the steady state and transient response analysis of networks, three-phase systems, line faults and line protection. Many examples are solved by more than one method.

The book does not make easy reading, which is a fault of the subject rather than that of the author. It could scarcely be recommended as useful reading, however, to anyone who was not already quite familiar with the more usual mathematical methods applied to engineering problems.

There seem to be few errors, and although the production is in conformity with war economy standards, the clarity and lay-out are good. Most useful features are the bibliographies which are given at the end of nearly every chapter. V. J. FRANCIS