

## BOOK REVIEWS

**The Anatomy of Environmental Hazards—DISASTERS** by John Whittow. Allen Lane Publishers, 536, Kings Road, London SW 100 VH, 1980, Pp. 411, £ 8.95.

Disasters have always been unavoidable in natural happenings of events in spite of man's relentless efforts to develop methods to predict and resort to preventive measures. A book of this nature, which is very difficult to collect, collate and synthesize information, is a welcome addition.

The first three parts of the book deal with the disasters associated with inherent and induced changes in the earth's crust, *i.e.*, lithosphere and the consequent external manifestation such as, in earthquakes, volcanoes, sinking coastlines, landslides and avalanches and ground surface collapse. Earthquakes measurement and explanation is very lucid and enables even a non-technical person to comprehend. Prediction and alleviation of volcanic hazards is very interesting. Several parts of the world such as Eastern Canada, Norway, Sweden and coastal areas of India and South East Asia have undergone tremendous urbanization and industrialization. Inherent nature and diversity of geological processes induce complexities to soil deposits in coastal regions. Hence a discussion on sinking coastlines is appropriate. Remedial measures suggested is a welcome addition to this chapter. In the chapter on landslides and avalanches the addition of world's major landslides and avalanche disasters is apt in reflecting the gravity of the problem. It would have been preferable to have more discussion on the mechanisms of slope failure, prediction and mitigation of slope stability in greater detail, since safety measures can be resorted to if the potential of the landslide is identified well in the early stages of their symptoms. Further observations by simple field instrumentation has to be done by a wide spectrum of people over large tracts of land for possible identification of impending landslides and avalanches. This aspect of instrumentation merits a more detailed treatment. The discussion on the modes of disturbing the equilibrium states of sub-soil stratum either by surface loading or removal of fluids and then resultant effects on ground surface collapse as depicted by interesting case studies, is noteworthy. Still metastable equilibrium state can be reached without collapse if the rates of changes of differential movements are extremely slow. Leaning tower of Pisa is a living example as has been illustrated by the author.

The latter part of the book deals with disasters associated with interactions between atmosphere and hydrosphere. High winds, floods, drought, snow and fog are the specific aspects covered in this book. Elementary wind physics lucidly explain as to how storms, hurricanes, tornado-like whirl winds originate. Data on Fujita scale of tornado damage has been linked up with wind velocities as high as 421 km/hr. Next two extreme cases of excessive or no precipitations resulting either in floods or severe

droughts and the associated damages to human lives and property have received due attention. Most parts of the northern hemisphere experience incessant snow and fog problems. Hence the treatment of this aspect of disaster is apt. It has been clearly depicted with illustrations that the disasters caused by snow and fog need not be direct but could be mostly due to impeded visibility and other associated causes.

Lastly, the author deserves a rich commendation for painstaking effort in producing a book of this nature with illustrations which makes one to grasp the gravity of disasters. It is only slightly short of being there actually at the locations where the disasters took place.

T. S. NAGARAJ

**Modern Power System Analysis** by L. J. Nagrath and D. P. Kothari. Published by Tata McGraw-Hill Publishing Co. Ltd., New Delhi 110 002, 1980, Pp. 448, Rs. 39

In recent years, the trend in power system operation has been the interconnection of neighbouring units into progressively larger systems. Impetus to this development has been provided by the need for increasingly large quantities of highly reliable electrical energy supply, and it has been made feasible by the availability of sophisticated computational facilities. The modern power engineer must have the ability to apply the digital computer to the analysis of exceedingly complex power systems, as well as to develop on-line computer control methods. In keeping with these developments, the stress in power system engineering has moved from the simplified analysis of single machine and two machine systems to the study of large power systems with the aid of a computer. Most of the recent publications in the field, including the one under review, are intended to prepare fresh power engineering graduates for these new tasks, as well as to enable practising engineers to keep abreast of the changing circumstances.

The earlier chapters of the book serve as an introduction; they deal with transmission line parameters and performance, as well as the representation of power system components. Later topics include load flow, optimal operation, automatic generation control, fault analysis and stability studies. The book thus follows the established pattern of previous publications in the field, the main departure being the chapter on optimal operation which deals with, in some detail, optimal generation scheduling and reliability considerations.

The coverage of the transmission line and generator analysis is very thorough, exhaustive, and easy to follow, but very little attention has been paid to the modelling of loads, an aspect of power system analysis which is now recognised as being of great significance. It is hoped that this oversight will be rectified in later editions. The chapter on load flow begins with the formation of the network matrices; this is followed by the formulation of the problem. The Gauss-Seidel and Newton-

Raphson solution techniques are developed and illustrated through examples, and the decoupled load flow solution is introduced. The presentation is sufficiently elementary to be grasped by the novice, and yet has enough detail to be adequate for the practising engineer.

Under optimal system operation, optimal load allocation among generators is tackled through the use of Lagrangian multipliers, and unit commitment through dynamic programming. Patton's security function is introduced to bring in reliability considerations. Optimal generation scheduling, where line losses are not neglected, and optimal load flow studies, using the method of Dommel and Tinney, are also covered. Due perhaps to the advanced nature of the topics, the beginner may find them a bit difficult to follow, but their inclusion is to be welcomed.

In the chapter on automatic generation and voltage control, the governors and turbines are modelled, and the load frequency control studies of single area and two-area systems are carried out. Proportional and integral control schemes are considered. Automatic voltage control schemes are also presented. The knowledge of advanced control concepts is assumed, hence undergraduate students may have difficulties in comprehending this chapter.

Three chapters have been devoted to fault analysis. The behaviour of transmission lines and machines under symmetrical faults is analysed, and short circuit symmetrical fault studies of multimachine power systems have been carried out. The study of symmetrical components serves as a prelude to unsymmetrical fault analysis, which is handled through the bus impedance matrix method. On the whole, the fault analysis of single and two-machine systems is very thorough and clearly developed, but the multimachine analysis will need to be supplemented by more advanced publications in this area.

The final chapter deals with steady-state and transient stability studies. The equal-area criterion and the point-by-point method are considered in much detail for simple systems; however, multimachine cases are limited to a brief discussion of the modified Euler method. This imbalance is to be regretted, since all practical transient stability analysis involves the computer study of large-scale power systems.

On the whole, the book gives a fairly broad overview of power system analysis. In addition to topics which have been covered by most of its predecessors in the field, the additional chapter on optimal operation is comprehensive, and is in fact one of the strengths of the book. However, the volume does have some general weaknesses, which must be mentioned. Since stress has been laid on mathematical details of solution, rather than on physical concepts, undergraduate readers will have to take special care to grasp the fundamental principles. Because the earlier chapters are largely a repetition of the material that is contained in elementary power texts, the later chapters have paid the price of having only a sketchy presentation of the details of computer solutions; this seriously jeopardises the utility of the book for practising

engineers. The references have been included only at the end of the book, without any referral to them in the body of the work, which makes it difficult for one to obtain further information on any particular topic.

The book may serve as a text for undergraduate courses; however, efforts must be made by the instructor, to ensure that the student obtains a certain physical understanding of how a power system works. Practising engineers and graduate students could use this volume as an introduction to the analysis of large scale power systems, and it would enable them to move on to more advanced works on computer analysis of the system. This volume merits a place in engineering libraries, and on the bookshelf of the power engineer.

LAWRENCE JENKINS

**Engineering Geology and Geotechnics** by F. G. Bell. Published by Newnes-Butterworths, 1980, Pp. 497, £ 22.00.

The book has twelve chapters. One chapter is devoted for each of the following topics: Site investigation, geophysical exploration, slopes and open excavation, subsurface excavation, foundations for buildings, reservoirs, dams and dam sites, hydrology and underground water supply, river engineering, beach engineering, engineering seismology and construction materials.

The presentation is lucid and well illustrated. It includes several case histories, field experiences. The author has included several recent developments and references. The references included are up to the year 1978. Numerical examples are not given.

The book is a welcome addition to the fields of engineering geology and geotechnical engineering since the emphasis has been to link up engineering geology with the profession and practice of geotechnical engineering. A chapter on engineering properties of soils and rocks is desirable and would have provided a sound basis for discussion of applications. Chapters 8 to 10 dealing with hydrology and underground water supply, river engineering and beach engineering are welcome additions. These have not been treated in detail in other books.

The book is written mainly for undergraduate students in engineering geology, civil engineering and mining engineering. It will be of considerable use for practising engineering geologists and geotechnical engineers. The author is to be congratulated on an informative text that is clear and well written. The book is well printed.

There are several typographical errors which the reviewer hopes will be corrected in the future editions. The price is prohibitive especially for students in developing countries.

A. SIVA REDDY

**Power Supplies** (Monographs on Solid State Electronic Instrumentation, Vol. 5) by B. S. Sonde. Published by Tata McGraw-Hill Publishing Company Ltd., 12/4 Asaf Ali Road, New Delhi 110 002, 1980, Pp. xi + 172, Rs. 57.

Almost all electronic circuits require D.C. source of power. Mostly solid-state electronic instruments and equipment are energised by a 'power supply', a piece of equipment which converts the alternating waveform from the power lines into an essentially direct voltage. The requirements and consequently the design philosophy of power supplies have undergone quite a number of changes in the recent years. The availability of integrated circuits and the introduction of new electronic components with improved technical characteristics at competitive prices have revolutionized the power supply design. The fifth volume in the series of monographs on solid-state electronic instrumentation written by Dr. B. S. Sonde adequately covers the recent advances in this field. Starting from basis, the book goes on to the latest trends in power supply for modern instrumentation.

The volume contains six chapters and two appendices. Chapter One provides a general introduction and description of important characteristics to be considered in the design of a power supply. The basic design features and criteria of AC/DC and DC/DC power supplies are described in Chapter Two. Chapters Three and Four mainly deal with theory and essential principles of constant voltage and constant current power supply design. The brief comparative study of techniques used for voltage regulation and discussion on practical circuit arrangement covered in Chapter Three will serve as a ready reference. Discussion on the design of essential elements (building blocks) of a power supply is of more general nature but will be useful for evolving a power supply design to meet the given requirements and constraints. This is an added feature of this volume. Chapter Five provides a clear understanding of power supplies using integrated circuits with practical examples. Chapter Six is devoted to special purpose power supply design along with a description of protection circuits and facilities in all types of power supplies. Appendix A provides a review of devices used for voltage reference sources. The recommended practice for power and load connections to improve the performance of power supplies given in Appendix B will be useful for all those involved in the design of high quality power supplies for electronic instruments and equipment.

The design examples given in Chapters Three and Four are of general nature to help the understanding of the principles involved in the power supply design and thus more emphasis is laid on theoretical consideration. Inclusion of a few examples of power supply designs illustrating the use of typical components and hardware widely used in the practical applications similar to the design examples given in Chapter Five on the use of ICs would have enhanced the usefulness of this volume.

On the whole, the book is well written and Dr. Sonde's long experience in teaching and guiding R & D activities in the field of solid-state electronics is well reflected in his volume. It will be quite useful for senior graduate and research students interested in the power supply system design philosophy and techniques.

B. S. RAO