

technical journals and forgetting about personal intercommunication. I think it particularly unfortunate, then, that the discussion section has been cut so badly as to be useless in parts.

Analysis of Linear Systems. By David K. Cheng. 431 pp. Addison-Wesley Publishing Co., Inc., Reading, Mass., 1959. \$8.50. *Reviewed by W. T. Wintringham, Bell Telephone Laboratories.*

AS circuit analysis and design become increasingly sophisticated, greater and greater dependence is being placed on advanced mathematical techniques. This is not a new situation. Throughout the years the analysis of linear circuits has progressed through the addition of improved mathematical methods. But, oddly enough, most textbooks in this field are written by electrical engineers instead of by mathematicians. Listing a few names at random—Bode, Gardner and Barnes, Guillemin, Middelndorf, Schelkunoff, Seshu and Balabanian, and Weber—we find only a small minority who might be called professional followers of Muse.

Cheng fits into the pattern, since he is an electrical engineer. And, as is so often the case, his book *Analysis of Linear Systems* is a good one.

Cheng has chosen a method of presentation which makes his book of particular value as a text. He has elected to interleave—in successive chapters—electrical and mathematical principles. We find a chapter on elementary linear circuits followed by one on the classical methods for solving linear differential equations. Chapters on lumped-constant electrical and mechanical systems are followed by chapters on the Fourier and the Laplace transforms. The subject of feedback in linear systems is used as an excuse to introduce flow graphs, and serves as a springboard for the treatment of sampled systems by the *Z* transformation. Problems illustrating the subject matter are included in each chapter, and answers are appended to the book.

Methods for the numerical solution of the common algebraic equations and a short table of Laplace transforms are given in appendixes.

The author states, his book may be used either in advanced undergraduate or beginning graduate courses. It should prove useful in this area.

Atlas of γ -Ray Spectra from Radiative Capture of Thermal Neutrons. By L. V. Groshev, V. N. Lutsenko, A. M. Demidov, and V. I. Pelekhov. Translated from Russian by J. B. Sykes. 198 pp. Pergamon Press, London & New York, 1959. \$20.00. *Reviewed by Evans Hayward, National Bureau of Standards.*

THIS atlas is frankly a compilation of data. In it the authors have collected the results available up to January, 1958, on the gamma-ray spectra produced in thermal neutron capture. The introduction contains an almost too brief discussion and evaluation of the methods by which the data have been obtained. This is

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followed by a table of basic information such as the thermal neutron capture cross sections of the stable isotopes, the binding energies of the neutron in the resulting nuclei, and other data pertinent to the analysis of neutron capture gamma-ray spectra.

The main body of the book consists of tables and graphs of capture gamma-ray spectra and, wherever possible, their interpretation in terms of the responsible nuclear energy levels. The data quoted derive primarily from the Compton spectrometer measurements by the authors, including previously unpublished results for nineteen elements. Wherever Compton spectrometer data do not exist, the authors have supplemented the tables with spectra obtained by other methods; e.g., pair, scintillation, and diffraction spectrometry. The detected gamma rays that follow the β decay of neutron-induced radioactivities are very helpfully identified as such.

The authors have undertaken, with remarkable success in view of the complexity of the observed spectra, to correlate the observed photon energies with possible transitions in the nuclei produced. Data on β decay and charged particle reactions have been utilized in this analysis, and energy-level diagrams summarizing these results are included wherever possible. These will be of interest to the general nuclear spectroscopist and the whole book will be invaluable to the specialist in neutron physics.

Radiation Biology of Vicia Faba in Relation to the General Problem. By John Read. 270 pp. Charles C Thomas, Springfield, Ill., 1959. \$10.50. *Reviewed by Joseph G. Hoffman, University of Buffalo.*

QUANTITATIVE measurement of the diverse responses of living cells to radiation dosage depends on having cells under controlled conditions. The rapidly multiplying cells in the root tip of the Windsor bean, *Vicia faba*, sometimes called the broad bean, meet the requirements of radiobiological experimentation. The bean resembles a very large and flat lima bean and under suitable circumstances grows a single root that attains a length of 35 cm in 18 days. It provides a living system whose time constants afford a kind of standard by which the effects of physical and chemical agents can be assessed the world over.

A fair portion of the technical literature about the bean root cells' response is summarized in this book in a systematic manner that makes it a valuable addition to the radiobiologist's book shelf. Eighteen chapters describe all phases of the subject ranging from bean root culture, histology of the root structure, standard radiation dose-response data, and mitotic division of root cells, to chromosome breaks, protein synthesis in cells, the oxygen effect, and the responses of many other cell types to radiation dosage.

The bean root's shape is uniquely suited to demonstrate the phenomenon of growth of a cylindrical geometry by a small (about 250 000) number of cells at the tip of the cylinder. After the tip cells divide, their