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BOOK REVIEWS

Fast Science Facts
by Surendra Verma
Universities Press : Hyderabad, India (1997)
ix+238 pages, illustrated ; price : Rs 125 00 (soft cover) ; ISBN 81-7371-092-9

This is a reference book consisting of compilation of data and explanation of basic scientific terms in all fields. The price is very reasonable and the appearance attractive. We are told that basically science students at the secondary level are targeted. For most of the fields covered, the standard of explanation and the details of the data presented will be adequate for such an audience. Though almost everyone can learn something from this book because of its wide coverage, school students, who do not get any exposure to earth sciences, astronomy or environmental sciences in their curriculum, will be most benefited.

The section on chemistry is very good, particularly the careful compilation of the properties of each element. The table of properties of common inorganic compounds and another table listing the physical properties of common liquids and gases are also interesting. As mentioned earlier, the sections on astronomy, the earth, our weather and the environment have enough facts to interest not only the school students, but also occasionally professional persons from other fields. However, the section on physics is not as good. In particular, the omission of formulas for the energy levels of hydrogen atom, Bohr radius and related topics is rather surprising. The author probably tried to avoid calculus (though derivatives enter the book in one or two places, as in Faraday's Law of Induction), but even without calculus, inclusion of a few quantitative relations in the topics like interference of light, special theory of relativity and radioactive decay would make them much more intelligible.

Technology is another all embracing subject to which it is impossible to do justice in such a book, but the small dictionary of computers (about 125 terms) is remarkably useful for its size. The section on biology is reasonable. The sections on science people and timelines are well organized, though improvements can always be made.

However, the section on mathematics is disappointing. This very short section will neither be useful as a reference, nor will it be able to generate great interest in anyone giving a general look into its contents. Even very elementary triangle formulas, trigonometric formulas, and many other pertinent formulas, (like those involving complex algebra) have been left out. Differentiation and integration have not been mentioned and the concept of series not even touched. Users would look forward to the rectification of these defects in the next edition of the book.

In conclusion, I should say that apart from its usefulness as a reference book for basic scientific data, this book will be able to stimulate students to learn more about the natural world surrounding them.

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Differential Equations : with Applications and Programs
by S Balachandra Rao and H R Anuradha
Universities Press : Hyderabad, India (1996)
viii + 408 pages, illustrated ; price . Rs 160 00 (soft cover) . ISBN 81-7371-023-6

As mentioned in the preface, this is essentially a textbook at the undergraduate level aimed at students of Science, Engineering and Technology in Indian Universities. The authors claim that the book "conforms to the prescribed syllabi of most Indian Universities". Assuming this to be correct, the book certainly serves the purpose of giving the student "a good grounding in the fundamentals of the subject through a rigorous treatment of the theoretical concepts".

However, standing at the threshold of a new millenium, one feels that the book could have covered more ground relevant to modern Physics. Indeed, for science and engineering students, the motivation for studying differential equations stems from its usefulness as a tool in Physics, and the latter is growing at a phenomenal rate ; what was considered post-graduate subject-matter twenty years ago is now taught in graduate courses. The reviewer personally feels that the inclusion of Riccati-Bessel equation and Kummer's hypergeometric equation would have significantly added to the timeliness as well as the usefulness of the book, in view of their relation to Schrödinger equation for a free particle and that for a particle in a potential field.

Also, in the chapter on numerical solution of differential equations, the authors describe several variants of the Runge-Kutta method, but the much more powerful Bulirsch-Stoer methods are not mentioned. Also, the Numerov method for solving second-order differential equations could have been included in view of its wide use in Quantum Mechanics.

Within these limitations, the book under review would constitute a useful addition to an undergraduate library. It is hoped that the printing mistakes would be corrected in subsequent reprints/editions.

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Mathematical Methods in Classical and Quantum Physics

by Tulsi Das and Satish K Sharma
Universities Press : Hyderabad, India (1998)
xii + 703 pages, illustrated, price Rs 350.00 (soft cover) ; ISBN 81-7371-089-9

This book is a dependable textbook on mathematical physics intended for Ph.D. students doing research in theoretical physics. The book will also be useful for M.Sc. (Physics) students and Ph.D. students doing research on physical/theoretical chemistry. The book consists of 13 chapters : the first 11 chapters, *viz.*, 1, Vector analysis, 2. Matrices and linear vector spaces, 3. Tensors, 4. Complex variables, 5. Ordinary differential equations, 6. Special functions, 7. Calculus of variations, 8. Functions spaces, orthogonal expansions and Sturm-Liouville theory, 9. Integral transforms ; Generalized functions, 10. Partial differential equations, and 11. Green's functions, cover areas in mathematical physics. The last 2 (quite big) chapters, *viz.*, 12. Probability and statistics, and 13. Elements of group theory, are also useful. There is an Appendix on Sets and mappings.

Each chapter of the book is comprehensive as well as self-contained and deals with the topic in a very lucid manner presenting a substantial number of well-selected examples with solutions. At the end of each chapter, there is an adequate number of interesting unsolved problems. The references (given chapterwise), at the end of the book, are very useful.

This book will be a very important addition to the libraries of the science universities and institutes for use of the post-graduate (Physics) and Ph.D. (Physics/theoretical chemistry) students. In fact, this is one of the best books, I have every seen, on mathematical physics. In my opinion, the better and proper name of the book would be *Mathematical Functions and Methods in Theoretical Physics and Chemistry.*

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