

Einstein's first ever political statement – 'Manifesto to the Europeans' dated mid-October 1914 – lecture notes for courses given in winter 1914–1915 on relativity, and notes by a student on the Wolfskehl Lectures given at Gottingen in 1915.

The quality of production of this volume, as one might expect, is excellent. One awaits with anticipation and eagerness the appearance of its companion English translation.

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Physics for Engineers. M. R. Srinivasan, New Age International Publishers, 4835/24, Ansari Road, Daryaganj, New Delhi 110 002. 1996. 519 pp. Price not known.

How much physics should be included in the curriculum of a 4-year undergraduate course in engineering? What kind of physics should be taught, and how should it be sequenced?

These questions are important – not only in their own right, but also because they are relevant to a relatively large segment of our student population. After all, a degree in engineering or medicine is widely regarded in our society as one of the pre-requisites for eternal bliss (the others being a fair bride with a handsome dowry, male offspring, non-stop film music on loudspeakers, and a national cricket team that always wins). They are also questions that have no easy answers. One gathers from the book under review, however, that for students of engineering in Karnataka the study of physics is restricted to a single semester in the first year. The stated aim of the book is to provide a comprehensive text geared to meet this requirement, taking 'the syllabus as a guide for the organization' of the book.

It is at once evident that this places severe constraints on the author. On the one hand, there is his laudable and unexceptionable value system – he urges students to study physics in more detail and depth, with the assurance that 'a

proper study of physics would certainly enhance your capabilities as an engineer'. On the other hand, there is the syllabus 'to be covered' – preparing the students to perform the rituals attendant upon the examination system – namely, the appeasement of minor deities named derivations, numericals, short notes, objectives, and so on! The gap between these two poles has become virtually unbridgeable. The author has opted to cater to the second system. Within the parameters chosen, the outcome is a reasonably good book. To understand its limitations, however, it is necessary to understand the two major problems posed by the system, and how they affect even the best of efforts in our textbook scene.

The first difficulty is the inability or unwillingness (or both) of most of our students (and, one might add, many of our teachers) to work out intermediate steps on their own. This has led to the stabilization of a ruthlessly efficient engine: a (vicious) cycle of spoon-feeding and regurgitation in which the working substance is a litany of trivial algebra and arithmetic. Textbooks that do not work out all the steps explicitly are shunned – they are either 'foreign books' or 'foreign-type books' that are 'not suitable for our conditions'. The 'successful' textbooks are poorly printed, excessively bulky hack works that waste a lot of paper and convey little of real substance, let alone challenge the ingenuity or inspire the imagination of the student. Worked out problems most often comprise little more than routine substitution of numerical values in formulas and subsequent simplification in excruciating detail – the argument being that our students only understand material presented in this manner. This is identical to the way our film-makers justify the nauseating trash they purvey as 'what the audience out there wants'. The creation of a vicious cycle in each case is then a mathematical certainty.

The second difficulty is in striking a balance between 'theory' and 'application', especially within the strong constraints posed by a curriculum in which the time allotted to physics is quite meagre. As technology progresses, it becomes necessary to incorporate at least some of the advances into the already abbreviated (4-year instead of the earlier 5-year) BE or B Tech programme (examples: computer-aided design, robotics,

...). How is this done? Almost always, by removing or reducing portions perceived as unessential, or at least less essential. This is how the 'pure' science part of the engineering curriculum has shrunk over the past 15 years or so – in physics, from a rough average of at least 8 semester-long courses to no more than 3, more often 2, or even 1 (as seems to be the case in Karnataka, and elsewhere too). What happens next in such a situation is tragic: inexorably, what is 'old' gets identified with what is obsolete, and what is new gets confounded with what is relevant. The baby gets thrown out with the bath water: the study of basic principles is eliminated in favour of an inevitably superficial coverage of a patchwork quilt of topics regarded as modern and hence 'relevant' and 'application-oriented', in the fond hope that students who merely hear the magic words or acronyms will automatically become the suppliers of the 'deliverables' of 'futuristic technology'!

It is perhaps considerations along these lines that have dictated the structure of the syllabi of various universities, which the book under review presumably reflects. The sequence of chapters reads: acoustics, nondestructive testing, geometrical optics, interference, diffraction and polarization, fibre optics, laser (*sic*), vacuum science and technology, This is followed by electronic structure of atoms, semiconductors, dielectric materials, magnetic materials, superconductivity, and *then* magnetism and electricity! Heat and thermodynamics comes next, and then comes the final chapter, basic electronic components – essentially a description of different kinds of resistors, capacitors and inductors. With such a quixotic sequencing of topics, the treatment can only be a largely descriptive listing of facts. Can the average student taking such a course be blamed, then, if he goes away with the impression that physics (which he 'cleared' in his first year by writing short notes on any three out of the following five: noise and its insulation, electron microscope, holography, diffusion pump, energy band theory of crystals (*sic*)) is just a grab bag of disconnected topics like the ones listed above, with little or no unified perspective or guiding principle, half of which can be ignored as it 'was asked last year' and the rest of which is best forgotten in favour of 'real engineering'?!

It is the *system* to which the book under review caters that is under criticism, rather than the book *per se*. Within its limitations, it is an honest effort, certainly better than most other books of its type. The figures are reasonably clear, as is the language. There are not too many places in which trivial algebraic simplification is written out in detail. The author has taken care to avoid errors and misinformation to the extent possible – although there are passages that either beg the question (example: Sec. 16.5 on the zeroth law of thermodynamics) or are too obtuse to be of any help in understanding the matter under discussion (examples: Sec. 8.6 on holography, Sec. 11.18.1 on light emitting diodes). On the whole, one may regard the book as a mild form of medicine that may alleviate some of the symptoms of the malady pervading the system, without attempting to cure the illness itself.

But is there no satisfactory solution to the dilemma itself – namely, the problem of striking a balance between basic principles and applications in a highly time-constrained curriculum? This reviewer believes that there does exist a reasonable solution (modulo adjustments of detail depending upon the actual circumstances). When one has to make an absolute choice between a basic principle that has very wide applicability, and a specific application whose technical details are in any case too complex to be dealt with satisfactorily in an elementary course, the correct choice is virtuous and clear! A careful exposition of the former, with the help of simple illustrations, would stand the student in good stead in his subsequent career, both educational and professional. To paraphrase a thoughtful colleague's remark, the student would then have been

empowered rather than bedazzled, and that's a good thing to be.

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Ecology and Sociobiology of Indian Primates. M. D. Parthasarathy, Dynaram Publications, 20, 1st Floor, South Cross Road, Basavanagudi, Bangalore 560 004. 119pp. Price: Rs 100, \$10.

It is a small monograph on the ecology and sociobiology of some Indian (rather south Indian) primates, written lucidly after proper scientific understanding of primates. The monograph, appropriately illustrated with self-explanatory line drawings, provides a unique overview on many hitherto unknown social behaviour in primates. It has covered the different categories of behaviour and provides a detailed account on loris, the bonnet macaques, lion-tailed monkey, Hanuman langur and Nilgiri langurs. The book provides a synthesis of the most current information and theoretical significance. The language used is not very difficult or complicated even for a learner primate researcher. It is a monumental piece of work which will be of immense interest and use to diverse readers specially for researchers, the academic community and scholars alike for comprehending primate eco-ethology. In my opinion, it is a commendable job by M. D. Parthasarathy which will guide young ethologists.

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Atlas of Paleogene Ostracodes of Rajasthan Basin. *Paleontol. Indica*, No. 4. Anil Bhandari. KDM Institute of Petroleum Exploration, Dehradun 248 195. 157 pp. Price not known.

For the first time there has been a sincere effort to prepare an atlas of Paleogene ostracodes of Rajasthan basin. An exhaustive study of the surface outcrop samples and subsurface well samples (from 5 wells) were examined by the author. One hundred and twenty four species of which eleven taxa are in open nomenclature are included in the work, illustrated excellently in the plates.

Ostracodes are mainly utilized for environmental interpretations and their scope for dating of rocks is limited due to their benthic habitat and strong response to environmental changes. The author could have included a chapter on environment in this publication.

The author has contributed an excellent work more of which must be coming in the near future. The data available from different sedimentary basins are enormous and dedicated workers in ONGC must contribute to this field. Workers in India and abroad are awaiting anxiously for more atlases and if possible, a stereo-atlas similar to that published by Leicester University, UK. The stereo-atlas will clear the confusions in taxonomy, since examining the stereopairs under ordinary stereoscope is easier than going through actual specimens or holotypes, etc., Bhandari's work is highly appreciated and will benefit a lot of research workers in this field.

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