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Book Review

'Fundamentals of Heat and Mass Transfer' by Frank P. Incopera and David P. DeWitt, John Wiley & Sons, Inc. New York-Toronto-Singapore, 1996. This is the fourth edition of the book. The book has 886 pages and 23 introductory pages.

The first noteworthy feature is the excellent style of production: the attractive, airy, readable printing set-up. This makes the reader interested in reading and brings him nearer to the content of the book.

In character the book is a university text-book. With the passage of 15 years since publication of the first edition, the content has been constantly improved from to edition, and now provides an excellent presentation of this subject. The authors, teachers at the School of Mechanical Engineering, Purdue University (West Lafayette, Indiana, USA), were helped by opinions and additional comments in connection with the previous edition from over 100 colleagues. In consequence, a 'twin brother' of the book, 'Introduction to Heat Transfer', is now available. The two volumes differ in the stressed or rather allusive treatment of mass transfer.

In may opinion the book is primarily suitable for mechanical engineering students, although other students (electrical engineers, metallurgical engineers, physicists, etc.) can also use it profitably.

Each of the 14 chapters contains well-constructed figures and instructive examples with solutions, together with a summary followed by references and problems. The numbering of figures, formulas, tables and problems follow the numbering of the chapters. Figures belonging to the examples and problems are unnumbered, but this causes no problems (the sketches greatly facilitate understanding).

The 'weight' of the book, in which the quality is equal to the quantity, is shown by the following table:

Chapter number	Number of examples	tables	figures	problems	references
1	7	5	8	53	0
2	3	1	10	46	11
3	10	5	21	136	10
4	4	2	8	79	11
5	8	2	12	103	7
6	7	3	17	72	12
7	6	9	19	124	30
8	7	4	12	101	27

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Chapter number	Number of examples	tables	figures	problems	references
9	5	4	14	99	46
10	4	1	17	64	53
11	6	4	21	72	19
12	11	3	31	131	11
13	7	4	20	127	12
14	6	2	9	36	5
Σ	76	49	219	1234	203

The contents:
Chapter 1, Introduction; Chapter 2, Introduction to Conduction; Chapters 3 and 4, One-Dimensional, Steady-State Conduction and Two-Dimensional, Steady-State Conduction; Chapter 5, Transient Conduction; Chapter 6 Introduction to Convection; Chapter 7, external Flow, e.g. flow along a flat plate, or around immersed cylinders or spheres; Chapter 8, Internal Flow, e.g. flow in concentric tubes and annular tubes (in these Chapters, forced flow is discussed); Chapter 9, Free Convection (Chapters 6–9 concern sensible heat transfer; Chapter 10; Boiling and Condensation, discusses the most important insensible heat transfer; Chapter 11, Heat Exchangers, deals not so much with constructions as with the transformation of logarithmic mean temperature difference, of temperature distributions in heat exchangers and with the NTU method; Chapters 12 and 13 deal with Radiation: Process and Properties; Radiation Exchange Between Surfaces; Chapter 14, Diffusion Mass Transfer.
The book is an ideal university text-book on heat transfer for mechanical engineering students. Talkativeness and overexplanation are avoided, and the subject-matter is well presented without too many formulas. From a chemical engineering aspect, the discussion of mass transfer is perhaps a little short (only one chapter), but in other chapters references can be found to the analogy between heat and mass transfer (e.g. Chapter 6).
The 76 examples with solutions and the selection of numerous problems pertinent to engineering practice make the book of great value.
References are mostly from the English-speaking bibliography. Only a few basic German, Japanese and Russian articles and books are referred to by the authors (in English translation or version), e.g. Nusselt, W., 'Die Oberflächenkondensation des Wasserdampfes' Z. VDI. 60, 541, 1916.
The Appendix provides useful tables and Gröber charts.
It is difficult to mention deficiencies in such an excellent book were extent of the subject-matter must naturally be limited. some suggestions can be offered: In the Fifth Edition, an extension of the subchapter on packed beds and a discussion of fluid beds would be expedient. Regenerators could be dealt with, especially in connection with Chapter 11 (only a reference is to be found on page 618). A discussion of heat transfer in agitated vessels and in direct-contact condensers might be omitted.
To summarize: the book is excellent from both a professional and a didactic point of view.

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