

L^AT_EX in 24 Hours

A Practical Guide for Scientific Writing

Dilip Datta

L^AT_EX in 24 Hours

A Practical Guide for Scientific Writing

 Springer

Dilip Datta
Department of Mechanical Engineering
Tezpur University
Tezpur, Assam
India

ISBN 978-3-319-47830-2 ISBN 978-3-319-47831-9 (eBook)
DOI 10.1007/978-3-319-47831-9

Library of Congress Control Number: 2016956633

© Springer International Publishing AG 2017

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made.

Printed on acid-free paper

This Springer imprint is published by Springer Nature
The registered company is Springer International Publishing AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

To My Parents
who gifted me the life

Preface

The necessity for writing this book was felt long back, during my Ph.D. work, when I saw students and researchers struggling with \LaTeX for preparing their articles and theses. A very limited number of books on \LaTeX are available in markets. Of course, a lot of resources on this subject can be obtained freely from the internet. However, most of the books emphasize on detailed documentation of \LaTeX , while the internet-based resources are topic-specific. But people are either unable or not interested to spare time, during their busy schedules of research works, to understand and learn the detailed genotype of \LaTeX covered in books, or to collect materials from different websites. Instead, they prefer to get direct and concise applications of various \LaTeX syntax in a single window, which they can modify easily, so as to get their works done in the least time and with the least effort. This is the motivation for writing the book. The book has been prepared by following a huge number of existing books and internet-based resources, as well as my personal experience with \LaTeX (but the Bibliographic list has been shortened referring only to some famous resources). An attempt is made here to present materials in such a way that, at least, a similar book can be produced using only this book. *Using only the raw version of this book, many of my students have already learned \LaTeX successfully up to the level of preparing articles and dissertations.* Hence, I am confident that the book would be able to cater to the needs of other students and professionals also, who want to learn and use \LaTeX in a short time. Suggestions for any correction, modification, addition, or deletion will be highly appreciated (the same may be mailed to ddatta@tezu.ernet.in, datta_dilip@rediffmail.com or ddatta@iitkalumni.org).

The book, **\LaTeX in 24 Hours: A Practical Guide for Scientific Writing**, explains the basic $\text{\LaTeX}2\epsilon$ required for writing scientific documents. Applications of most of the discussed \LaTeX syntax are presented in such a way that a reader would be able to use them directly without any confusion, however maybe with some minor modifications as per requirement. In many cases, multiple procedures are presented for producing a single item. The main part of the book is stretched over 276 pages dividing into 24 chapters, named as Hours. Hour 1 introduces \LaTeX , including how a \LaTeX document is prepared and compiled. Various \LaTeX

syntax required for fonts selection, texts and page formatting, items listing, table preparation, figure insertion and drawing, equation writing, user-defined macros, bibliography preparation, list of contents and index generation, and some other miscellaneous issues are discussed in Hours 2–18. Hours 19 and 20 explain the preparation of complete documents, such as letter, article, book, and report. Since a work often needs to be presented to an audience, slide preparation is also explained in Hours 21 and 22. Being an unavoidable fact, error and warning messages generated in different cases are discussed in Hour 23. Finally, some exercises are included for learners in Hour 24. Further, L^AT_EX commands for producing different symbols are presented in Appendix A.

I am thankful to my Ph.D. supervisor, Prof. Kalyanmoy Deb, Indian Institute of Technology Kanpur, India (presently in Michigan State University, USA), from whom I could learn many things about L^AT_EX. In fact, I was inspired to work with L^AT_EX from him only. I am also thankful to my friend, Dr. Shamik Choudhury (working in GE Capital, Bengaluru, India), who helped me in preparing and compiling my very first L^AT_EX document. My special thanks are due to my better half, Madhumita, and beloved daughters, Devoshree and Tanushree, from whom I got continuous inspiration and support for writing the book. Finally, I am indebted to my parents, late Paresh Chandra Datta and late Saraju Datta, whose blessings have brought me to this height to be able to write a book.

Tezpur, India
September 2016

Dilip Datta

About the Author



Dilip Datta obtained his Bachelor degree in Mechanical Engineering from Gauhati University, Master degree in Applied Mechanics from The Indian Institute of Technology (IIT) Delhi, and Ph.D. in Optimization from IIT Kanpur. He has been teaching Mechanical Engineering courses, as well as some interdisciplinary courses for more than twenty years. His research area is optimization, specially evolutionary algorithms for multi-objective combinatorial optimization problems. However, it is his passion to play with \LaTeX . This book is written based on his personal experience with \LaTeX . Going through the initial draft of this book only, many of his students could learn \LaTeX up to the level of writing scientific articles and academic theses. Hence, he believes that this book will be a proper practical guide for beginners to learn \LaTeX .

Contents

	Page
1 Introduction	1
1.1 What Is L ^A T _E X?	1
1.2 Why L ^A T _E X Over Other Word Processors?	1
1.3 How to Prepare a L ^A T _E X Input File?	2
1.4 How to Compile a L ^A T _E X Input File?	4
1.5 L ^A T _E X Syntax	5
1.5.1 Commands	5
1.5.2 Environments	6
1.5.3 Packages	6
1.6 Keyboard Characters in L ^A T _E X	7
1.7 How to Read this Book?	8
2 Fonts Selection	9
2.1 Text-Mode Fonts	9
2.2 Math-Mode Fonts	11
2.3 Emphasized Fonts	12
2.4 Colored Fonts	13
3 Formatting Texts I	15
3.1 Sectional Units	15
3.2 Labeling and Referring Numbered Items	16
3.3 Texts Alignment	18
3.4 Quoted Texts	18
3.5 New Lines and Paragraphs	19
3.5.1 Creating New Lines	19
3.5.2 Creating New Paragraphs	20
3.6 Creating and Filling Blank Space	21
3.7 Producing Dashes Within Texts	24
3.8 Preventing Line Break*	24
3.9 Adjusting Blank Space After a Period Mark*	24
3.10 Hyphenating a Word*	25

- 4 Formatting Texts II** 27
 - 4.1 Increasing Depth of Sectional Units* 27
 - 4.2 Changing Titles and Counters of Sectional Units* 28
 - 4.3 Multiple Columns. 29
 - 4.3.1 Multiple Columns Related Parameters 30
 - 4.3.2 A Flexible Approach to Generate Multiple Columns 30
 - 4.4 Mini Pages 31
 - 4.5 Foot Notes 32
 - 4.5.1 Foot Notes in Mini Pages* 33
 - 4.5.2 Altering the Pattern of Foot Notes* 34
 - 4.6 Marginal Notes* 35
- 5 Page Layout and Style** 37
 - 5.1 Page Layout 37
 - 5.1.1 Standard Page Layout 37
 - 5.1.2 Formatting Page Layout* 38
 - 5.1.3 Increasing the Height of a Page* 39
 - 5.2 Page Style 40
 - 5.3 Running Header and Footer 40
 - 5.3.1 Header with the **headings** Style 41
 - 5.3.2 Header with the **myheadings** Style 42
 - 5.3.3 Header and Footer with the **fancy** Style Under the **fancyheadings** Package* 43
 - 5.3.4 Header and Footer with the **fancy** Style Under the **fancyhdr** Package* 45
 - 5.4 Page Breaking and Adjustment 46
 - 5.5 Page Numbering 46
- 6 Listing and Tabbing Texts** 49
 - 6.1 Listing Texts 49
 - 6.1.1 Numbered Listing Through the **enumerate** Environment 49
 - 6.1.2 Unnumbered Listing Through the **itemize** Environment 53
 - 6.1.3 Listing with User-Defined Labels Through the **description** Environment 54
 - 6.1.4 Nesting Different Listing Environments 55
 - 6.1.5 Indentation of Listed Items* 56
 - 6.2 Tabbing Texts Through the **tabbing** Environment 57
 - 6.2.1 Adjusting Column Width in the **tabbing** Environment 57
 - 6.2.2 Adjusting Alignment of Columns in the **tabbing** Environment* 58
- 7 Table Preparation I** 59
 - 7.1 Table Through the **tabular** Environment 59
 - 7.2 Table Through the **tabularx** Environment 60
 - 7.3 Vertical Positioning of Tables 62
 - 7.4 Sideways (Rotated) Texts in Tables* 62
 - 7.5 Adjusting Column Width in Tables* 63
 - 7.6 Additional Provisions for Customizing Columns of Tables* 64
 - 7.7 Merging Rows and Columns of Tables 66
 - 7.8 Table Wrapped by Texts* 68
 - 7.9 Table with Colored Background* 68

- 8 Table Preparation II** 71
 - 8.1 Nested Tables* 71
 - 8.2 Column Alignment About Decimal Point* 71
 - 8.3 Side-by-Side Tables* 73
 - 8.4 Sideways (Rotated) Table* 75
 - 8.5 Long Table on Multiple Pages* 76
 - 8.6 Tables in Multi-column Documents 78
 - 8.7 Foot Notes in Tables* 78
 - 8.8 Changing Printing Format of Tables* 79
 - 8.9 Tables at the End of a Document 80

- 9 Figure Insertion** 81
 - 9.1 Commands and Environment for Inserting Figures 81
 - 9.2 Inserting a Simple Figure 82
 - 9.3 Side-by-Side Figures* 83
 - 9.4 Sub-numbering a Group of Figures. 85
 - 9.5 Figure Wrapped by Texts* 86
 - 9.6 Rotated Figure 87
 - 9.7 Mathematical Notations in Figures* 87
 - 9.8 Figures in Tables* 89
 - 9.9 Figures in Multi-column Documents 89
 - 9.10 Changing Printing Format of Figures* 89
 - 9.11 Figures at the End of a Document 90
 - 9.12 Editing L^AT_EX Input File Involving Many Figures* 90

- 10 Figure Drawing** 91
 - 10.1 Circles and Circular Arcs 92
 - 10.2 Straight Lines and Vectors* 93
 - 10.3 Curves* 95
 - 10.4 Oval Boxes* 96
 - 10.5 Texts in Figures* 97
 - 10.6 Compound Figures* 100

- 11 Equation Writing I** 101
 - 11.1 Basic Mathematical Notations and Delimiters. 101
 - 11.2 Mathematical Operators. 103
 - 11.3 Mathematical Expressions in Text-Mode 104
 - 11.4 Simple Equations 104
 - 11.4.1 Eliminating Equation Numbering 105
 - 11.4.2 Overwriting Equation Numbering 105
 - 11.4.3 Changing Printing Format of Equations* 105
 - 11.5 Array of Equations. 107
 - 11.6 Left Aligning an Equation* 109
 - 11.7 Sub-numbering a Set of Equations* 111

- 12 Equation Writing II** 113
 - 12.1 Texts and Blank Space in Math-Mode 113
 - 12.2 Conditional Expression 114
 - 12.3 Evaluation of Functional Values. 115
 - 12.4 Splitting an Equation into Multiple Lines* 115

12.5	Vector and Matrix	117
12.6	Overlining and Underlining	119
12.7	Stacking Terms*	120
12.8	Side-by-Side Equations*	123
13	User-Defined Macros	125
13.1	Defining New Commands	125
13.1.1	New Commands Without Argument	126
13.1.2	New Commands with Mandatory Arguments	126
13.1.3	New Commands with Optional Arguments	128
13.2	Redefining Existing Commands*	128
13.3	Defining New Environments	130
13.3.1	New Environments Without Argument	130
13.3.2	New Environments with Arguments	131
13.3.3	Theorem-Like Environments	131
13.3.4	Floating Environments for Textual Materials*	133
13.4	Redefining Existing Environments*	135
14	Bibliography with L^AT_EX	137
14.1	Preparation of Bibliographic Reference Database	137
14.2	Citing Bibliographic References	138
14.3	Compiling thebibliography Based L ^A T _E X Input File	140
15	Bibliography with B_IB_TE_X Program	141
15.1	Preparation of B _I B _T E _X Compatible Reference Database	141
15.2	Standard Bibliographic Styles of L ^A T _E X	146
15.3	Use of the natbib Package	147
15.4	Compiling B _I B _T E _X based L ^A T _E X Input File	149
15.5	Editing the .bbl File*	149
15.6	Multiple Bibliographies*	150
16	Lists of Contents and Index	153
16.1	Lists of Contents	153
16.1.1	Information to the Lists of Contents	153
16.1.2	Formatting Lists of Contents*	154
16.1.3	Multiple Lists of Contents*	156
16.1.4	Compiling L ^A T _E X Input File Having Lists of Contents	158
16.2	Making Index	158
16.2.1	Indexing Terms	159
16.2.2	Some Guidelines on Indexing	160
16.2.3	Compiling a L ^A T _E X Input File Having Index	160
17	Miscellaneous I	161
17.1	Boxed Items	161
17.1.1	Texts in Plain Boxes	161
17.1.2	Texts in Color Boxes	162
17.1.3	Mathematical Expressions in Boxes	163
17.1.4	Paragraphs in Boxes*	163
17.1.5	Set of Items in a Box	164
17.2	Rotated Items*	166

- 17.3 Items at Different Levels and Forms* 167
- 17.4 Geometric Transformation of Items* 169
- 18 Miscellaneous II** 171
 - 18.1 Horizontal Rules and Dots. 171
 - 18.2 Hyperlinking Referred and Cited Items 171
 - 18.3 Current Date and Time* 172
 - 18.4 Highlighted Texts* 173
 - 18.5 Verbatim Texts 173
 - 18.5.1 Boxed and Listed Verbatim Texts. 174
 - 18.5.2 Verbatim Texts with L^AT_EX Commands* 174
 - 18.6 Fragile Commands 176
 - 18.7 Watermarking on Pages* 177
 - 18.8 Logo in Header and Footer* 178
 - 18.9 Paragraphs in Different Forms* 178
- 19 Letter and Article** 181
 - 19.1 Letter Writing 181
 - 19.2 Article Preparation 182
 - 19.2.1 List of Authors. 185
 - 19.2.2 Title and Abstract on Separate Pages. 186
 - 19.2.3 Left Aligned Title and List of Authors* 186
 - 19.2.4 Articles in Multiple Columns 187
 - 19.2.5 Section-Wise Numbering of Items* 189
 - 19.2.6 Dividing an Article into Parts* 189
- 20 Book and Report.** 191
 - 20.1 Template of a Book 191
 - 20.2 Book Preparation Using a Root File 192
 - 20.3 Dividing a Book into Parts* 198
 - 20.4 Compilation of a Book 198
 - 20.4.1 Executable File for Compiling a Book* 199
 - 20.4.2 Partial Compilation of a Book* 201
- 21 Slide Preparation I** 203
 - 21.1 Frames in Presentation 203
 - 21.2 Sectional Units in Presentation. 205
 - 21.3 Presentation Structure 205
 - 21.3.1 Title Page 207
 - 21.3.2 Presentation Contents 208
 - 21.3.3 Bibliographic Reference Page. 209
 - 21.4 Appearance of a Presentation (BEAMER Themes) 209
 - 21.4.1 Presentation Theme. 209
 - 21.4.2 Color Theme* 210
 - 21.4.3 Font Theme* 212
 - 21.4.4 Inner Theme* 212
 - 21.4.5 Outer Theme* 213
 - 21.5 Frame Customization* 213
 - 21.5.1 Logo in Frames 214
 - 21.5.2 Font Type 214

- 21.5.3 Frame Size. 214
- 21.5.4 Frame Shrinking. 215
- 21.5.5 Removal of Headline/Footline and Sidebar. 215
- 21.5.6 Frame Breaking 216
- 22 Slide Preparation II. 217**
 - 22.1 Piece-Wise Presentation (BEAMER Overlays) 217
 - 22.1.1 Table of Contents 217
 - 22.1.2 Uncovering Sequentially Using the `\pause` Command 218
 - 22.1.3 Uncovering Sequentially Using the Incremental Specification `<+>` 218
 - 22.1.4 Other Piece-Wise Presentation Specifications* 219
 - 22.2 Environments in BEAMER Class* 223
 - 22.3 Table and Figure in Presentation* 224
 - 22.4 Dividing a Frame Column-Wise* 226
 - 22.5 Repeating Slides in Presentation* 227
 - 22.6 Jumping (Hyperlink) to Other Slides* 227
- 23 Error and Warning Messages 231**
 - 23.1 Error Message 232
 - 23.2 Warning Message. 237
 - 23.3 Error Without Any Message 238
 - 23.4 Tips for Debugging 239
- 24 Exercise 241**
- Appendix A: Symbols and Notations 247**
 - A.1 Text-Mode Accents and Symbols 247
 - A.2 Math-Mode Symbols 248
- Bibliography. 255**
- Index 257**

List of Tables

	Page
1 Introduction	1
1.1 Standard options to the <code>\documentclass[]{} </code> command	3
1.2 A simple LaTeX input file and its output	4
1.3 Keyboard characters that can be produced directly	7
1.4 Keyboard characters to be produced through commands	8
2 Fonts Selection	9
2.1 Different types of text-mode fonts used in \LaTeX	10
2.2 Different types of math-mode fonts used in \LaTeX	11
2.3 Various forms of emphasized texts under the <code>ulem</code> package	13
2.4 Predefined as well as some user-defined colors for fonts	14
3 Formatting Texts I	15
3.1 Labeling and referring numbered items	17
3.2 User-defined alignments of texts.	18
3.3 Quoted texts in a narrowed width and specified line spacing	19
3.4 Creating new lines	20
3.5 Creating new paragraphs	21
3.6 Creating blank spaces	22
3.7 Applications of some blank space creating commands.	22
3.8 Dashes of different lengths	24
3.9 Maintaining proper gap after a period (full-stop) mark	25
4 Formatting Texts II.	27
4.1 Changing titles of sectional units	28
4.2 Two columns separated by a vertical line through the <code>\columnseprule</code> command.	30
4.3 Multiple columns generated through the <code>multicols</code> environment	31
4.4 Dividing a page width-wise using the <code>minipage</code> and <code>boxedminipage</code> environments.	32
4.5 Foot notes generated through the <code>\footnote{}</code> command.	33

- 4.6 Foot notes in mini pages 34
- 4.7 Foot notes of a mini page to work like those in main pages 35
- 5 Page Layout and Style 37**
 - 5.1 Types and sizes of standard papers accepted by the `\documentclass[]{}` command 37
 - 5.2 Commands controlling some important parameters of a page layout 38
 - 5.3 A manually defined page layout 40
 - 5.4 Page styles to control running header and footer in a document 41
 - 5.5 Styles of headers under the `headings` page style 41
 - 5.6 Redefining running header generating marker commands 42
 - 5.7 Commands for headers and footers under the `fancyheadings` package 43
 - 5.8 Header and footer with the `fancy` page style under the `fancyheadings` package 44
 - 5.9 Header and footer with the `fancy` page style under the `fancyhdr` package 45
 - 5.10 Different types of page numbering 47
- 6 Listing and Tabbing Texts 49**
 - 6.1 Numbered listing through the `enumerate` environment 49
 - 6.2 Nested numbered listing through the `enumerate` environment 50
 - 6.3 Altering styles of numbered listing under the `enumerate` environment 51
 - 6.4 Numbered listing under the `enumerate` environment mixed with global fixed texts 52
 - 6.5 Numbered listing under the `enumerate` environment mixed with local fixed texts 53
 - 6.6 Unnumbered listing through the `itemize` environment 53
 - 6.7 Nested unnumbered listing through the `itemize` environment 54
 - 6.8 Altering styles of unnumbered listing under the `itemize` environment 54
 - 6.9 Listing with user-defined labels through the `description` environment 55
 - 6.10 Nested different listing environments 56
 - 6.11 Tabbing texts in different columns through the `tabbing` environment 57
 - 6.12 Adjusting tabbing column width in the `tabbing` environment through the `\hspace{}` command 57
 - 6.13 Adjusting tabbing column width in the `tabbing` environment using the `\kill` command 58
 - 6.14 Aligning tabbing texts in the `tabbing` environment using `\` and `\'` 58
- 7 Table Preparation I 59**
 - 7.1 A simple table through the `tabular` environment 59
 - 7.2 A simple table through the `tabularx` environment 61
 - 7.3 Table with entries in vertical direction 63
 - 7.4 Fixing column widths in tables with `p{}` , `m{}` , and `b{}` 64

- 7.5 Some additional provisions for customizing a table. 66
- 7.6 Merging two or more cells of a table into a single one 67
- 7.7 Table wrapped by texts through the **wratable** environment. 68
- 7.8 Table with colored background through the **\rowcolor{}**,
\columncolor{}, and **\cellcolor{}** commands 69
- 8 Table Preparation II** 71
 - 8.1 Nesting two or more tables 72
 - 8.2 Aligning columns of a table about decimal marks. 72
 - 8.3 Side-by-side tables through consecutive **tabular** environments 73
 - 8.4 Side-by-side tables through the **minipage** environment 74
 - 8.5 Rotated table through the **sideways** environment 75
 - 8.6 Rotated table on landscape page through the **sidewaystable**
environment 76
 - 8.7 Long table in multiple pages through the **longtable** environment 77
 - 8.8 Foot notes in a table under the **tabular** environment 79
- 9 Figure Insertion** 81
 - 9.1 L^AT_EX compilation commands and supported figure formats 81
 - 9.2 Figure insertion through the **\epsfig{}** command 83
 - 9.3 Side-by-side figures in a single row 84
 - 9.4 Side-by-side figures through the **minipage** environment. 84
 - 9.5 Sub-numbering a group of figures using the **\subfigure[]{}
command** 85
 - 9.6 Figure wrapped by texts 86
 - 9.7 Rotated figure on a landscape page through the **sidewaysfigure**
environment 87
 - 9.8 Mathematical notations in figures through the **\psfrag{}{}
command** 87
 - 9.9 Mathematical notations in figures through xfig software 88
- 10 Figure Drawing**. 91
 - 10.1 Circle and circular arc drawing 93
 - 10.2 Straight line and vector (arrow) drawing 94
 - 10.3 Open and closed curves, and Bézier quadratic curves 95
 - 10.4 Options to the **\oval()[]** command for drawing partial ovals. 96
 - 10.5 Oval boxes through the **\oval()[]** command. 96
 - 10.6 Settings of the **\makebox()[]{}
\framebox()[]{}
\dashbox{}()[]{}
commands** for positioning texts in figures 97
 - 10.7 Texts in figures through the **\makebox()[]{}
command** 98
 - 10.8 Boxed texts in figures using the **\framebox()[]{}
\dashbox{}()[]{}
commands**. 99
 - 10.9 Multi-line texts in a figure through the **\parbox[]{}{}
command** 99
 - 10.10 Rotated texts in figures through the **\rotatebox{}{}
command**. 100
 - 10.11 Compound figures through multiple commands 100

11	Equation Writing I	101
11.1	Frequently used mathematical notations (math-mode)	102
11.2	Basic delimiters (math-mode)	102
11.3	Basic binary operators	103
11.4	Basic relation operators	103
11.5	A simple equation through the equation environment	104
11.6	Different approaches for producing equations without numbering	105
11.7	Overwriting equation numbering by the \tag*{} command	105
11.8	Changing the standard format for printing and numbering equations	106
11.9	Array of equations producing environments and their alignment structures	107
11.10	Array of equations in different forms	108
11.11	Left aligned equations through the flalign and flalign* environments	110
11.12	Sub-numbering a set of equations	111
12	Equation Writing II	113
12.1	Normal texts and gap in math-mode	114
12.2	Conditional mathematical expressions in different forms	114
12.3	Evaluation of a function for a given value	115
12.4	Splitting an equation into multiple lines through the multline environment	116
12.5	Splitting an equation into multiple lines through the split environment	116
12.6	Mathematical analysis through the split environment	116
12.7	Splitting an equation into multiple lines through the eqnarray environment	117
12.8	Matrices and vectors through direct environments	118
12.9	Matrices and vectors through the array environment	118
12.10	Matrix and vector mixed expression through the array environment	119
12.11	Mathematical expression overlined through the \overline{} command	119
12.12	Mathematical expression with over and under braces	120
12.13	Stacking a mathematical term with an arrow of fixed length	120
12.14	Stacking a mathematical term with an over or under arrow of flexible length	121
12.15	Stacking two mathematical terms above and below an arrow	122
12.16	Stacking multiple mathematical lines above or below of a symbol	122
12.17	Side-by-side equations along the page width	123
13	User-Defined Macros	125
13.1	Defining new commands without argument	126
13.2	Definition and application of new commands with mandatory arguments	127
13.3	Definition and application of new commands with optional arguments	128
13.4	Heading commands and their default label-words	129
13.5	Definition and application of new environments without argument	130
13.6	Defining theorem-like environments	132

13.7	Application of the user-defined ‘Definition’ environment	132
13.8	Floats for presenting algorithms and computer programs	134
13.9	Redefining the unnumbered listing environment itemize	135
14	Bibliography with L^AT_EX	137
14.1	Bibliographic references through the thebibliography environment . . .	138
14.2	Bibliographic reference database compatible to the thebibliography environment	139
14.3	Citing bibliographic references of the thebibliography environ- ment.	139
15	Bibliography with the B_IB_TE_X Program.	141
15.1	Types and fields of references under the B _I B _T E _X program	142
15.2	B _I B _T E _X program compatible bibliographic reference database	145
15.3	Some standard bibliographic styles of L ^A T _E X	146
15.4	Some bibliographic styles defined in the natbib package	148
15.5	Citation commands provided under the natbib package	148
15.6	Citation patterns under the natbib package.	149
16	Lists of Contents and Index	153
16.1	Book with chapter-wise lists of Contents	156
16.2	Book with chapter-wise lists of Contents (output of the input file of Table 16.1)	157
16.3	Document having index	159
17	Miscellaneous I	161
17.1	Single-line texts in boxes	162
17.2	Equations in boxes.	163
17.3	Paragraphs in boxes through the \parbox[]{}{} command.	164
17.4	Array of equations in a box through the tabular environment in \shabox{}	165
17.5	Array of equations in a box through the Beqarray environment in \shabox{}	165
17.6	Unnumbered list in a box through the Bitemize environment in \shabox{}	166
17.7	Rotated items through the rotate environment	166
17.8	Rotated items through the turn environment.	167
17.9	Texts at different levels and forms through the \raisebox{}{}{} command	168
17.10	Geometric transformation of texts.	169
18	Miscellaneous II	171
18.1	Manually formatted texts through the verbatim environment	173
18.2	Line numbering of verbatim texts through the listing environment under the moreverb package	175
18.3	Preserving L ^A T _E X syntax in verbatim texts through the alltt environment	175
18.4	Fragile commands in protected mode	176
18.5	Watermarking and logo on pages.	177

- 18.6 A window within a paragraph 179
- 18.7 Paragraphs of different shapes under the **shapepar** package. 180
- 19 Letter and Article** 181
 - 19.1 Standard commands under the document-class **letter** 181
 - 19.2 Standard format of the document-class **letter** 182
 - 19.3 A user-specified format in the document-class **letter** 183
 - 19.4 Article in the document-class **article** 184
 - 19.5 Article in the document-class **amsart** 184
 - 19.6 Authors in articles one below another. 185
 - 19.7 Authors side-by-side through the **tabular** environment. 185
 - 19.8 Author details at the bottom of a page through the **\thanks{}** command 186
 - 19.9 Article in two columns through the **twocolumn** option in **\documentclass[{}]** 187
 - 19.10 Article in two columns through the **\twocolumn[]** command 188
 - 19.11 Article dividing sections into parts and numbering them part-wise 190
- 20 Book and Report** 191
 - 20.1 General template of a book in the document-class **book**. 192
 - 20.2 User-defined template of a book in the document-class **book** 193
 - 20.3 Preamble of a book 194
 - 20.4 Some sample input files of a book 195
 - 20.5 Root file linking individual input files of a book 196
 - 20.6 Compilation file for compiling a book in command-prompt 199
 - 20.7 Intermediate files generated during the compilation of a book 200
- 21 Slide Preparation I** 203
 - 21.1 A simple presentation input file 206
 - 21.2 Slides under the **JuanLesPins** presentation theme for input file of Table 21.1. 207
 - 21.3 Various types of presentation themes under the BEAMER package 210
 - 21.4 Various color themes under the BEAMER package 211
 - 21.5 Various font themes under the BEAMER package 212
 - 21.6 Various inner themes under the BEAMER package 212
 - 21.7 Various outer themes under the BEAMER package 213
 - 21.8 Available frame sizes in the BEAMER package. 215
- 22 Slide Preparation II** 217
 - 22.1 Uncovering slide contents piece-wise using the **\pause** command 218
 - 22.2 Uncovering items piece-wise using the incremental specification **<+>** 219
 - 22.3 Slides with incremental overlay specification under the **Frankfurt** presentation theme 219
 - 22.4 Rules for piece-wise presentation (overlay) specification 220
 - 22.5 Commands which can take overlay specifications. 220
 - 22.6 Applications of some overlay-specification supported commands 221
 - 22.7 Slides with overlay specification under the **Hannover** presentation theme. 222

22.8 Slides with block-type environments under the **Berlin** presentation theme 223

22.9 Slides with theorem-like environments under the **Warsaw** presentation theme 224

22.10 Table in BEAMER presentation. 225

22.11 Table in slides with overlay specification under the **Madrid** presentation theme 226

22.12 Slides with side-by-side materials through the **columns** environment under the **Singapore** presentation theme 226

22.13 Hyperlinking slides in BEAMER presentation 228

22.14 Hyperlinked slides under the **Boadilla** presentation theme 228

Appendix A: Symbols and Notations 247

A.1 Text-mode non-English accents 247

A.2 Text-mode non-English symbols 248

A.3 Text-mode miscellaneous symbols 248

A.4 Greek letters (math-mode). 249

A.5 AMS binary operators (math-mode). 249

A.6 Stmaryrd binary operators (math-mode). 249

A.7 AMS relation operators (math-mode). 250

A.8 Stmaryrd relation operators (math-mode). 250

A.9 AMS negated relation operators (math-mode). 250

A.10 Arrow symbols (math-mode). 251

A.11 AMS arrow symbols (math-mode). 251

A.12 Stmaryrd arrow symbols (math-mode). 251

A.13 Accents and constructs (math-mode). 252

A.14 Delimiter symbols (math-mode). 252

A.15 Mathematical functions (math-mode) 252

A.16 Math-mode miscellaneous symbols. 253

List of Figures

	Page
1 Introduction	1
1.1 \LaTeX and other word processors	1
1.2 Structure of a \LaTeX input file	2
3 Formatting Texts I	15
3.1 Default three-tier numbering of sectional units	15
4 Formatting Texts II	27
4.1 Increasing depth of sectional units	27
5 Page Layout and Style	37
5.1 Commands controlling some important parameters of a page layout	39
10 Figure Drawing	91
10.1 Coordinate axes for drawing figures	91