

# Contents

|  |     |
|--|-----|
| Preface  | ix  |
| 1. Deposition for Microelectronics—Plasma Enhanced Chemical Vapor Deposition, <i>Rafael Reif</i>     | 1   |
| 2. Etching—Applications and Trends of Dry Etching, <i>L. M. Ephrath and G. S. Mathad</i>             | 27  |
| 3. Oxidation Technology—The Application of High Pressure Oxidation to VLSI, <i>Natsuro Tsubouchi</i> | 73  |
| 4. Structures and Fabrication of Metal-Oxide-Silicon Field-Effect Transistor, <i>Paul J. Tsang</i>   | 92  |
| 5. Electron Beam Testing, <i>E. Wolfgang</i>   | 148 |
| 6. Metallization for Very Large-Scale Integrated Circuits, <i>P. B. Ghate</i>                        | 181 |
| 7. MOS Technology Advances, <i>Youssef A. El-Mansy and William M. Siu</i>                            | 229 |
| 8. CMOS Devices, <i>Pallab Chatterjee</i>  | 260 |
| 9. Bipolar Gate Array Technology, <i>Seiken Yano</i>   | 287 |
| 10. Packaging Technologies for High-Performance Computers, <i>Akira Masaki</i>                       | 305 |
| 11. Packaging Cost-Performance Computers, <i>John W. Balde</i>                                       | 321 |
| 12. Microprocessors, <i>Kenneth C. Smith and Mark A. Scott</i>                                       | 346 |
| 13. Programmable Logic Arrays (PLAs)—Design and Application, <i>John Wyn Jones and Paul Lowy</i>     | 379 |
| 14. Design for Testability, <i>T. Williams</i>   | 425 |
| 15. Silicon Design Methods and Computer-Aided Design Tools, <i>Ian L. McWalter</i>                   | 463 |

xviii CONTENTS

|     |   |     |
|-----|---|-----|
| 16. | Design Verification of VLSI Circuits, <i>Kaoru Okazaki and Isao Ohkura</i>                              | 504 |
| 17. | The Complexity of Design Automation Problems, <i>Sartaj Sahni, Atul Bhatt, and Raghunath Raghavan</i>   | 526 |
| 18. | Hierarchical Automatic Layout Algorithms for Custom Logic LSI, <i>Hidekazu Terai</i>                    | 574 |
| 19. | Layout Compiler-Annealing Applied to Floorplan Design, <i>Ralph H.J.M. Otten</i>                        | 596 |
| 20. | Automatic Placement, <i>Bryan T. Preas and Patrick G. Karger</i>  | 649 |
| 21. | High Density Routing for Printed Wiring Board, <i>Isao Shirakawa</i>                                    | 683 |
| 22. | Cell Based Physical Design for VLSI, <i>Ulrich Lauther</i>  | 708 |
| 23. | Logic Design Expert System, <i>Shigeru Takagi</i>   | 743 |
| 24. | Fault-Tolerant Multiple Processor Systems—Modeling and Analysis, <i>Kishor Trivedi and Robert Geist</i> | 776 |
| 25. | Parallel Execution of Logic Programs, <i>Doug DeGroot</i>   | 797 |
| 26. | Organization and Operation of Massively Parallel Machines, <i>David Elliot Shaw</i>                     | 826 |
| 27. | Advances in Signal Processor Architecture, <i>Peter N. Marinos and Nick Kanopoulos</i>                  | 864 |
|     | Index   | 927 |