



# Introduction to Control Engineering Modeling, Analysis and Design

By Ajit K. Mandal



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The material in the text has been organized for gradual and sequential development of control theory starting with a statement of the task of a control engineer at the very outset. This text presents a comprehensive analysis and design of continuous-time control systems and includes more than introductory material for discrete systems with adequate guidelines to extend the results derived in connection with continuous-time systems. Most of the materials including solved and unsolved problems presented in the book have been class-tested in senior undergraduate courses in the field of control systems at the Electronics and Telecommunication Engineering Department, Jadavpur University, India. Some representative MATLAB scripts used for solving problems are included at the end of each chapter. The detailed design steps of fuzzy logic based controller using SIMULINK and MATLAB has been provided in the book to give the student a head start in this emerging discipline. In view of extensive use of MATLAB for rapid verification of controller designs, some notes for using MATLAB script M-files and function M-files are included at the end of the book. A chapter has been included to deal with non-linear components and their analysis using MATLAB and SIMULINK through user defined s-functions. Finally, a chapter has been included to deal with the implementation of digital controllers on finite bit computer, to bring out the problems associated with digital controllers. Transfer function and state variable models of typical components and subsystems have been derived in the Appendix at the end of the book

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