



Numerical Methods for Engineers

By S.K. Gupta

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Numerical techniques required for all engineering disciplines explained
Necessary amount of elementary material included
Difficult concepts explained with solved examples
Some equations solved by different techniques for wider exposure
An extensive set of graded problems with hints included

This book is intended to be a text for either a first or a second course in numerical methods for students in all engineering disciplines. Difficult concepts which usually pose problems to students are explained in detail and illustrated with solved examples. Enough elementary material that could be covered in the first-level course is included, for example, methods for solving linear and nonlinear algebraic equations, interpolation, differentiation, integration, and simple techniques for integrating ODEs and PDEs (ordinary and partial differential equations). Advanced techniques and concepts that could form part of a second-level course include Gear's method for solving ODE-IVPs (initial value problems), stiffness of ODE-IVPs, multiplicity of solutions, convergence characteristics, the orthogonal collocation method for solving ODE-BVPs (boundary value problems) and finite element techniques. An extensive set of graded problems, often with hints, has been included. Some involve simple applications of the concepts and can be solved using a calculator, while several are from real-life situations and require writing computer programs or use of library subroutines. Practice on these is expected to build up the reader's confidence in developing large computer codes.

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About the Author

Santosh K Gupta is Professor of Chemical Engineering at the Indian Institute of Technology, Kanpur, India. A graduate of the same institute, he obtained his PhD from the University of Pennsylvania, Philadelphia, USA, in 1972. His research interests include modelling, optimization and on-line optimal control of polymerization reactors, and modelling and multi-objective optimization (using genetic algorithm) of chemical engineering systems. He has published over 200 papers in these areas, and has also authored/co-authored the textbooks, *Fundamentals of Polymer Science and Engineering*, *Momentum Transfer Operations*, *Fluid Mechanics and its Applications*, *Reaction Engineering of Step-Growth Polymerizations*, and *Mathematical Methods in Chemical and Environmental Engineering*. He has been Visiting Professor at the Department of Chemical Engineering, University of Notre Dame, IN, USA (1985-87), National University of Singapore (1998-99), University of Wisconsin, Madison, USA (1999-2000), and IIT Bombay, Mumbai (2008-2010), where he was the L & T Chair Professor of Chemical Engineering. He has received several awards and honours including being the honoree in two festschrift sessions in the Catalysis and Reaction Engineering Division, AIChE Annual Meeting, Minneapolis, 18 Oct 2011, and the honoree in the festschrift issue of the journals *Polym. Eng. Sci.* (Volume 51, No. 10, 2011).

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