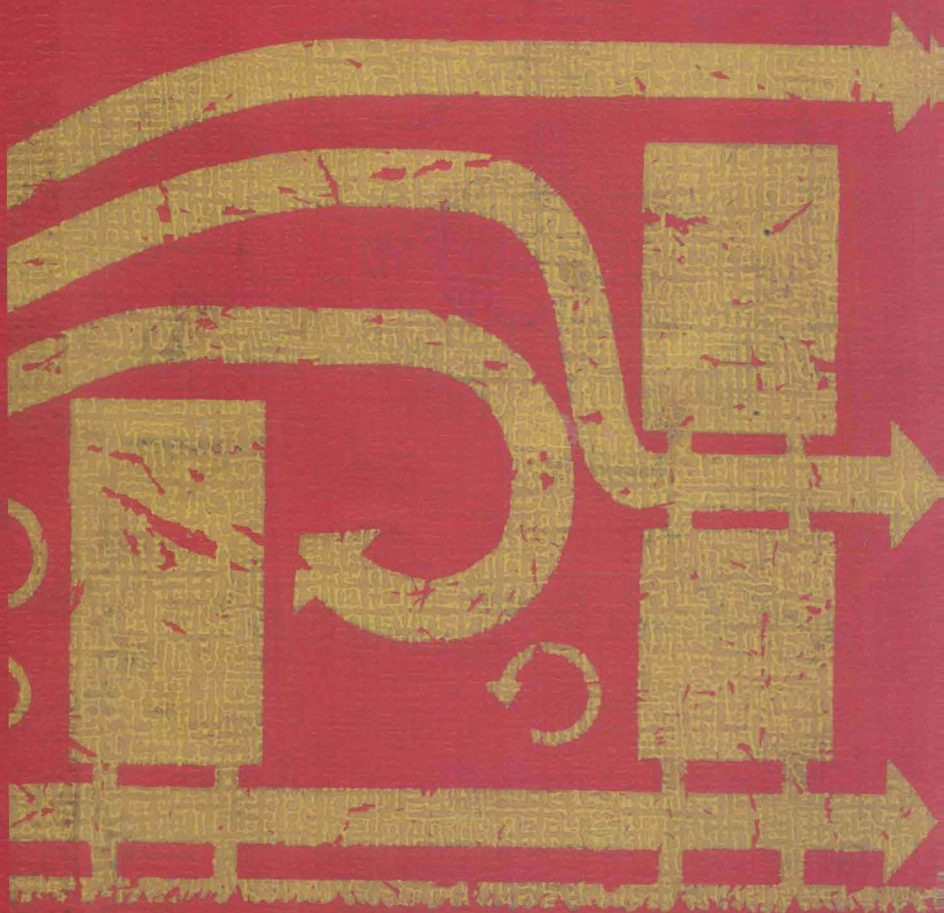


FLUID

mechanics

A. K. JAIN



FLUID MECHANICS

[*A Text-book for Engineering Students*]

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PREFACE TO THE SECOND EDITION

The book has been thoroughly revised and the solved examples shifted to appropriate places just after the concerned text. More number of solved examples mostly taken from question papers of U.P.S.C. Exams. have been added. An article on Hazen—Williams formula and its modified version has been included for the benefit of those associated with water-distribution network design and analysis. A new chapter on Reciprocating Pumps has been added. It is hoped that the book in its new form will be more useful to the students, teachers and the practicing engineers.

AUTHOR

PREFACE TO THE FIRST EDITION

The writing of this book was prompted by a desire to meet the requirements of an average undergraduate student in engineering. It is the outcome of the author's association with the subject for the last sixteen years. While planning the course contents, the general requirements for civil, mechanical, aeronautical, chemical and electrical engineering students were kept in mind. In dealing with the various aspects of flow phenomena, efforts have been made to project a physical picture through description aided with illustrations. The main emphasis is thus on the physical aspect rather than rigorous mathematical treatment.

The author is of the opinion that the text alone is not generally adequate to provide fuller understanding and in order to achieve this objective it should be supplemented by typical worked out examples exposing various facets of application of basic principles. All chapters therefore, contain good many examples to bring out clearly the application of fundamental concepts developed in the chapter. The historical developments in Hydraulics and Fluid Mechanics are very interesting indeed and the author feels that the readers will be benefitted by a short history included in the beginning of Chapter I.

To apprise the readers with the type and quality of questions asked in the examinations conducted by institutions of national repute, many typical examples (both solved and unsolved) from the examination question papers of the University of Roorkee, Engineering Services Examinations of the Union Public Service Commission (U.P.S.C.) and the Institution of Engineers Examination for Associate Membership have been included. Included also are some typical questions on the pattern of those asked in the examinations of Indian Institutes of Technology.

The book also contains outcome of some of the research with which the author was associated directly or otherwise at the University of Roorkee. It pertains to : (1) Accurate Explicit Equation for Friction Factor, Chapter IX ; (2) Explicit Equations for Pipe Flow Problems, Chapter XI ; (3) Direct Solution of Three-reservoir Problem, Chapter XI ; (4) Energy Loss due to Orificemeters, Chapter XIII ; and (5) General Discharge Equation for Orificemeters, Chapter XIII.

In accomplishing this task the author has received encouragement, advice, suggestions and help from many of his teachers and colleagues. Thankful gratitude is expressed to Dr. Bharat Singh, Professor, W.R.D.T.C., University of Roorkee and Prof. V.V.

Sarwate, Director of Technical Education, Madhya Pradesh (formerly Principal, G.C.E. and T. Raipur) for going through initial chapters and rendering valuable advice and suggestions. The author has been greatly benefitted by his association with Dr. K.G. Ranga Raju, Professor of Civil Engg., University of Roorkee and wishes to record his gratefulness to him for the useful discussions. Thanks are also due to Dr. R.N. Ingle, Professor and Head of the Civil Engineering Deptt., V.R.C.E., Nagpur and Prof. D.M. Kondap, College of Engineering, Amaravati (now at Poona) for their suggestions. Dr. N. Vittal, Reader in Civil Engineering, University of Roorkee and Shri M.L. Agrawal, Reader in Mechanical Engineering, G.E.C, Jabalpur, reviewed the chapters on Fluid Machines and Compressible Fluid Flow, respectively, and the author expresses his gratefulness to them. To Shri S.V. Dandekar, Lecturer in Civil Engineering, G.C.E. & T., Raipur who helped the author in checking certain chapters of the typed script and Sarvashri S.K. Kulkarni and R.A. Mishra who prepared the initial tracings of the figures, the author wishes to record his sincere thanks.

Although sufficient care has been exercised in checking the manuscript and also in proof reading, it is just possible that a few errors might still have escaped the attention. The author shall be grateful if such errors, if any, are communicated. Suggestions for improvement are most welcome.

September 1976

A.K. JAIN

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The author is extremely grateful to the University of Roorkee, the Union Public Service Commission and the Institution of Engineers (India) for permission to include typical questions from the respective question papers on Fluid Mechanics.

Thanks are also due to M/s John Wiley and Sons, New York (U.S.A.), publishers of "Elementary Mechanics of Fluids" by Hunter Rouse, for permission to convert and use certain typical problems of the book.

ERRATA

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