FLUID MECHANICS HYDRAULICS AND HYDRAULIC MACHINES

K.R. ARORA

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Fluid Mechanics, Hydraulics and Hydraulic Machines

(IN METRIC UNITS)

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TO
MY GURU

Preface to the Third Edition

The Author has great pleasure in presenting the third edition of his book Fluid Mechanics, Hydraulics and Hydraulic Machines to its readers. The text has been thoroughly revised and enlarged. A large number of new articles, illustrative examples and problems have been added. Separate Chapters have been written on the 'Boundary Layer Theory' and 'Flow Around Immersed Bodies'. To make the book more useful for its readers, three new Chapters on 'Laboratory Experiments', 'SI Units', and 'Fluvial Hydraulics' have been added. Appendix A contains miscellaneous questions taken from the A.M.I.E. examination papers. Besides, 7 more Appendixes have been given to discuss some additional topics. Multiple choice Questions which will be useful for the students appearing for the competitive examination are given at the end.

The basic aim of the third edition is the same as that of the earlier two editions, namely, to present the fundamentals of Fluid Mechanics, Hydraulics and Hydraulic Machines in a simplified manner and to illustrate each basic concept with the help of illustrative examples.

The Author is grateful to the learned teachers of the various univeristies and technical institutions who have appreciated the first two editions and have cared to send valuable suggestions for the improvement of the book. The Author thanks his friend and colleague Shri J. Chandra for useful suggestions and other help given. Finally, the author thanks his wife, Mrs Rani Arora for assisting in the preparation of this edition and for the proof reading.

June 26, 1980 K.R. ARORA

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Preface to the First Edition

This book is the outcome of about 15 years of experience in teaching, research, design and construction in the field of Hydraulic Engineering. In this book an attempt has been made to explain the fundamentals of Fluid Mechanics, Hydraulics and Hydraulic Machines. Although there are a number of books on these subjects, there is hardly any book covering all these subjects in one volume. The book covers the Syllabi of Indian Universities for undergraduate courses in Fluid Mechanics, Hydraulics and Hydraulic Machines. The book will be especially useful for the students of Civil, Mechanical, Electrical and Aeronautical Engineering. The book will also be useful for the sudents appearing for AMIE examination of the Institution of Engineers (India) and the competitive examinations conducted by the Union Public Service Commission.

Special emphasis is laid on the basic principles. Each basic concept has been explained in a simplified manner and illustrated with the help of examples. Additional examples and unsolved problems with answers have been given at the end of each chapter. The book contains 375 solved examples and 395 problems with answers.

A number of problems from the examination papers of London University, Institution of Mechanical Engineers (London), Institution of Engineers (India), Union Public Service Commission (India) and various Indian Universities have been included. The author is grateful to all these organisations for their kind permission to reproduce their examination questions.

The text has been divided into three parts. The first part deals with the fundamentals of Fluid Mechanics and Hydraulics and is useful for beginners taking the first course in the subject. The second part deals with advanced topics in Fluid Mechanics and Hydraulics. The third part deals with Hydraulic Machines. The second and third parts will be useful to advanced students.

The author expresses gratitude to his reverend teachers Prof. R.M. Advani, Prof. M.L. Mathur, Prof. Alam Singh and Prof.

S. Divakaran for the constant encouragement and guidance. The author thanks his friends and senior colleagues Shri B.C. Punmia and Shri J. Chandra for the valuable suggestions. The author also thanks his wife Mrs. Rani Aroa for typing work and other help rendered by her in the preparation of the book.

The author greatly appreciates the co-operation extended by the publisher who has kept the price within the reach of an average student despite very high cost of production.

In spite of every care taken to ensure accuracy, some errors might have crept in. The author will be obliged to the readers for bringing such errors to his notice. Suggestions for the improvement of the text will be gratefully acknowledged.

JODHPUR K.R. ARORA

April 4, 1973

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