

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/382523492>

Textbook of FLUID MECHANICS

Book · July 2024

CITATIONS

0

READS

616

2 authors:



[Ajay Yadav](#)

Nepal Engineering College

24 PUBLICATIONS 21 CITATIONS

SEE PROFILE



[Sanjog Chhetri Sapkota](#)

Sharda University

43 PUBLICATIONS 101 CITATIONS

SEE PROFILE



Er. Ajay Yadav

Er. Ajay Yadav (DEAN LIST) is a dedicated researcher and lecturer at Fast Track Engineering Institute and Eternal Academy. A consistently outstanding student, he earned the title of University Topper by achieving a perfect 4.0 SGPA in the Second and Third Year University Board Exams during his undergraduate studies. Ajay was awarded a merit-based full scholarship from Pokhara University to pursue his bachelor's degree and distinguished himself by receiving the prestigious Geo-tec Award for securing the highest marks in Soil Mechanics, Foundation Engineering, and Geology. Additionally, he actively participated in the B+NeSDG program, co-funded by the European Union. He has authored several textbooks, including "Hydropower," "Design of Steel and Timber," and "Fluid Mechanics", showcasing his dedication and expertise in engineering.



Er. Sanjog Chhetri Sapkota

Er. Sanjog Chhetri Sapkota is a civil engineering gold medalist from India. He is a PhD aspirant engaged in several interdisciplinary research projects and collaboration internationally. Beyond academia, Sanjog's entrepreneurial spirit and commitment to innovation are evident. He holds numerous design and innovation patents in India, a testament to his pioneering solutions in civil engineering. His research integrates advanced soft computing techniques like machine learning and deep learning to address several civil engineering problems, including liquefaction, prediction modeling of sustainable concrete, discharge modeling, and monitoring of structures using sensors. He has completed over 50 papers solving different existing civil engineering problems and is on the verge of publication in a reputed international journal.

Distributor: Sugam Stationery Suppliers

Koteshwor, Kathmandu

Phone: 9841599592

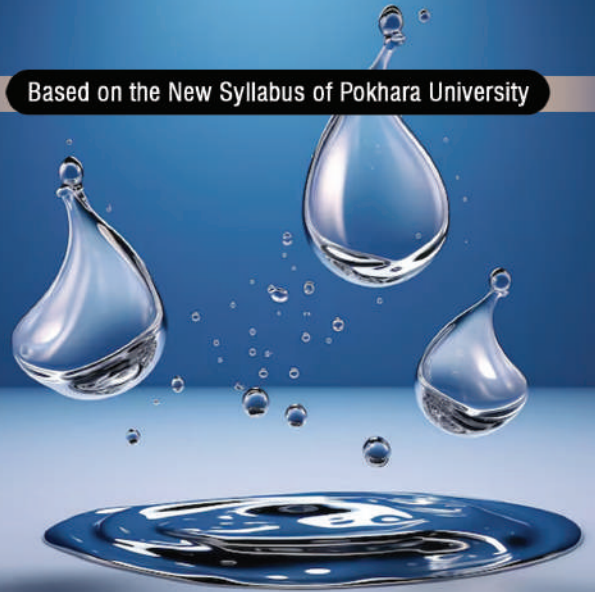
E-mail: sugamstationery@gmail.com



Price Rs. 500/-

Textbook of Fluid Mechanics

Based on the New Syllabus of Pokhara University



Textbook of

FLUID MECHANICS

For BE Civil, Civil and Rural and Diploma Holders

Er. Ajay Yadav

Er. Sanjog Chhetri Sapkota

A Text Book of

FLUID MECHANICS

Bachelor of Engineering

II Year / I Part

AUTHORS

Er. Ajay Yadav

Er. Sanjog Chhetri Sapkota

SINCERELY THANKS TO

Er. Swostika Shrestha

Er. Sumit Paudel

Er. Tushar Singh

Er. Dipak Dahal

Distributor

Sugam Stationary Suppliers

Koteshwor, Kathmandu

Phone: 9841599592

Book: Fluid Mechanics
Bachelor of Engineering
II Year / I Part

AUTHORS

Er. Ajay Yadav

Gmail: ajayy018804@nec.edu.np

Face book: yadavajay52@yahoo.com

Contact Number: 9845751227, 9823487956

Er. Sanjog Chhetri Sapkota

Gmail: sanjogchhetrisapkota@gmail.com

Distributor

Sugam Stationary Suppliers

Koteshwor, Kathmandu

Phone: 9841599592

Email: sugamstationery@gmail.com

Copyright : Authors

First Edition : 2081/82

Price : Rs. 500.00

ISBN :

Printed in Nepal

...✍ **Preface**

FLUID MECHANICS is the backbone of the Civil Engineering. This book provides a succinct, yet rigorous coverage of **FLUID MECHANICS** and fulfills the requirement of student minimizing the time for searching different books in libraries. This book covers all the syllabi of this subject prescribed by **Pokhara University**. This book has been divided into eight Chapters. Each chapter starts with an introduction of subject matter, develops the theory, sufficient worked out examples and PoU past question solution has been included in this book to fulfill entire need of readers. The subject matter has been presented in the simple unambiguous language which is easy to comprehend.

Any suggestion for the improvement of this book will be thankfully acknowledge and incorporated.

May, 2024

Er. Ajay Yadav

Er. Sanjog Chhetri Sapkota

Dedicated
To
My Parents
Shree Ram Prasad Yadav
&
Nirmala Devi Yadav

Table of Contents

1.	Fundamentals of Fluids	1–41
1.1	Definition, Scope and Application in Civil Engineering	1
1.2	Control Volume and Continuum Concept in Fluid Mechanics	2
1.3	Physical Properties of Liquid	3
1.4	Types of Fluid Pressure, Pressure Head and Laws of Pressure	11
1.5	Measurement of Pressure	14
2.	Hydrostatic Forces on Submerged Surfaces	42–66
2.1	Concept of Hydrostatics on Plane and Curved Surface	42
2.2	Total Pressure and Center of Pressure	42
2.3	Pressure Diagram	47
3.	Equilibrium Stability	67–98
3.1	Buoyancy Floatation Concept Thrust on Submerged and Floating Bodies Hydrometers	67
3.2	Stability of Floating Body and Submerged Body	70
3.4	Liquid in Relative Equilibrium	74
4.	Fluid Kinematics	99–110
4.1	Introduction	99
4.2	Approaches	99
4.3	Types of Fluid Flow	99
4.4	Description of Flow Pattern	101
4.5	Continuity Equation	102
4.6	Continuity Equation in 3D General Flow in Cartesian Co-ordinate	102
4.7	Continuity Equation in Cylindrical Polar Co-Ordinate	104

5.	Fluid Dynamics	111–132
5.1	Introduction	111
5.2	Equation of Motion	111
5.3	Euler's Equation of Motion	112
5.4	Derivation of Bernoulli Equation from Euler's Equation	113
5.5	Assumption of Bernoulli Theorem	114
5.6	Momentum Principle and Equation	114
6.	Application of Energy & Momentum Equations	133–194
6.1	Flow Measurement Devices	133
6.2	Orifice	135
6.3	Hydraulic Coefficient	138
6.4	Notches and Weir	141
6.5	Force Exerted By Jet at Different Shapes	151
6.6	Force Exerted by Following Fluid on a Pipe Bend	154
7.	Dimensional Analysis & Physical Modelling	195–222
7.1	Introduction to Dimensional Analysis	195
7.2	Method of Dimensional Analysis	196
7.3	Application of Dimensional Analysis	197
7.4	Concept of Physical Modeling and its Relation to Dimensional Analysis	197
7.5	Law of Similarity	199
7.6	Types of Model: Undistorted and Distorted	202
8.	Flow Through Submerged Body & Boundary Layer Theory	223–247
8.1	Force Exerted by a Following Fluid on a Stationary Body	223
8.2	Expression for Drag and Lift Force	224
8.3	Drag Force for Sphere and Cylinder	225
8.4	Boundary Layer Theory	227
8.5	Application of Boundary Layer Principle in Civil Engineering	232
	References	248