



# MANIPAL UNIVERSITY JAIPUR

School of Civil and Chemical Engineering

Department of Civil Engineering

Course Hand-out

Fluid Mechanics - II | CV 1301 | 4 Credits

Session: Jul- Dec 2017 | Faculty: Prof. M.K. Mittal

**Course Outcomes:** At the end of the course, students will be able to

- 1301.1:** Analyse fluid and its flow characteristics in a manner in which one analyses solid mechanics.
- 1301.2:** develop the basic fundamentals for next core courses on fluid mechanics and water resources engineering
- 1301.3:** analyse the forces on dams, gates along with stability analysis of floating and submerged objects in water;
- 1301.4:** design the pressure and discharge measurement techniques for pipes carrying water, oil and gas and also for flow measurement in canals and rivers;
- 1301.5:** To fulfil the requirements of present day employers, who demand sound engineering skills employability.

## A. SYLLABUS

Introduction: Overview and scope of the subject, Fluid properties, ideal and real fluids, fluid pressure and its measurement using manometers. Hydrostatic: Forces on plane surface and curved surfaces, centre of pressure; stability of floating and submerged bodies. Kinematic of fluid motion: Lagrangian and Eulerian approach, classification of flows- one, two and three dimensional, steady, unsteady, uniform and non –uniform, laminar and turbulent, streamline, path line, streak line and stream tube, continuity equation, tangential and normal acceleration, velocity and stream functions , rotational and irrotational flows and flow net. Dynamics of fluid motion: Euler's equation of motion, Bernoulli's equation, and its applications, venturimeter, orifice meter and pitot tube. Momentum equation and its application on stationary and moving vanes. Flow through pipes: Ideal fluid flow: Renolds' experiment, laminar and turbulent flow through pipes- velocity distribution, head loss, Darcy- Weisbach's equation, pipes in series and parallel. Velocity distribution in laminar flow and turbulent flow  
Flow measurement: Orifices, mouthpieces, notches and weirs, sluice gate, time of emptying and filling of tanks through orifices.  
Dimensional Analysis: Dimensional parameters and their significance, Buckingham's Pi theorem and model similarities.

## B. TEXT BOOKS

- I. Garde R.J. and Mirajgaokar A.G., Engineering Fluid Mechanics (Including Hydraulic Machines), Nem Chand & Bros, Roorkee, Second Edn, 1983.
- II. Modi P.N. & Seth. S.M., Hydraulics and Fluid Mechanics, Standard Book House, New Delhi, 2005.
- II. Subramanya K., Theory and Applications of Fluid Mechanics (Including Hydraulic Machines), Tata McGraw-Hill Publishing Company Limited, New Delhi, 2011.
- V. Jain A.K., Fluid Mechanics Including Hydraulic Machines, Khanna Publishers, Delhi, 2004.

