Course Title: Fluid Mechanics

Course Code: PE-209

Course Contents

Fluid Properties

Properties of fluids such as density, viscosity, compressibility, surface tension and capillarity, types of fluids.

Fluid Statics

Pressure in a fluid at a point, variation of pressure with depth, Homogeneous fluid, Several fluids of different specific weights, Interconnected vessels, Rigid-body motion of fluid, Force on plane and curved surfaces, Buoyancy and flotation, Stability of a floating body.

Fluid Dynamics

System and control volume, classification of flows, velocity and acceleration fields, stream lines, path lines, and streak lines, Equation of continuity, Euler's equations of motion, Bernoulli equation, Energy equation, Impulse and momentum, One dimensional viscous flow, Flow in open channels.

Dimensional Analysis

Buckingham- Pi Theorem, Reynolds' Law of Similitude, geometrical, kinematic and, dynamic similarity and related problems.

Potential Flow

Definition, irrotational flow, stream function, application of Bernoulli's equation to irrotational flow.

Steady Flow through Pressure Conduits

General equation of friction, laminar and turbulent flow, Reynold's Number, Velocity profile in circular pipes, Nukurade's experiment- boundary layer theory including viscous sub layer: smooth, transition and fully rough pipe concepts and equations & Moody's diagram, Minor losses.

Text book

1. Munson, Young and Okiishi's, Fundamentals of Fluid Mechanics, 8th Edition, Wiley, 2018.

Reference Book

Frank M. White, Fluid mechanics, 7th Edition, McGraw Hill, 2011.