Fluid Mechanics I

Course Code:28461Credits:3Course Type:TheoreticalPrerequisites:Differential EquationsCorequisite:-Course Length:51 hours

Outlines:

1. Fundamental Concepts of Fluids

Fluid Properties:

Density, viscosity, compressibility, vapor pressure and cavitation, surface tension.

2. Fluid Statics and Pressure Measurements

Manometry, Hydrostatics Forces, Solid-like motion, Buoyancy, Stability.

3. Bernoulli equation

Derivation of Bernoulli equation, Application of Bernoulli equation in flow measurement devices, Restrictions on Use of the Bernoulli Equation.

4. Conservation of Mass, Momentum and Energy for Control Volume

Kinematics of fluid motion, some definitions in fluid motions such as control volume and system, streamlines, and so on, Reynolds Transport Theorem, Integral form of continuity, Linear Momentum, Angular Momentum, Conservation of Energy, Application of Integral relations (such as forces on fixed and moving blades, elbows)

5. Dimensional Analysis and Similitude

Pi-Buckingham theorem, Non-dimensional groups such as Reynolds, Froude, Weber, Mach, Euler, Modeling and Similitude, Some model studies and non-dimensional groups in experiments.

6. Viscous Flow in Pipes and Ducts,

Reynolds experiment in ducts, Laminar and turbulent flow equations in a duct, head loss, minor loss, series and parallel pipe systems, Measurements.

References

- 1. Frank M. White, "Fluid Mechanics", Mc- Graw Hill, ed.8th, 2020.
- 2. B. R. Munson: Young & Okishi, "Fundamentals of Fluid mechanics", John Wiley, ed. 6th, 2019.
- 3. V. L. Streeter: Wylie & Bedford, "Fluid Mechanics", Mc- Graw Hill, 9th ed, 2010.
- 4. Irving H. Shames, "Mechanics of Fluid", Mc- Graw Hill. Ed. 4th, 2013.
- 5. W. P. Graeble, "Engineering Fluid Mechanics", Tylor & Francis Publishers, 2001.
- 6. Fox: Mc- Donald, "Introduction to Fluid mechanics", John Wiley, ed. 10th, 2020.