ME 221 Fluid Mechanics - I (2-1-0-6)

Basic concepts and properties of fluids, Fluid Statics: Hydrostatic pressure distribution; Application to manometry; Hydrostatic forces on submerged plane and curved surfaces; Buoyancy and stability. Fluid Kinematics: Lagrangian and Eulerian description; Deformation of fluid element; Reynolds transport theorem; Fundamentals of flow visualization. Integral relations for a control volume: Conservation equations for mass, momentum and energy; Bernoulli equation. Conservation equations in differential form: Stream function; Velocity potential; vorticity. Dimensional analysis and similitude: Buckingham Pi theorem; Modeling and similarity. Viscous Flow in Ducts: Reynolds number regime; Head loss and friction factor; Laminar fully developed pipe flow; Turbulent pipe flows; Flow in non-circular ducts; Minor losses in pipe systems.

Texts:

- [1] F. M. White, Fluid Mechanics, 6th Ed., Tata McGraw-Hill, 2008.
- [2] R.W. Fox, A.T. McDonald and P.J. Pritchard, Introduction to Fluid Mechanics, 6th Ed., John Wiley, 2004

References:

- [1] B.R. Munson, D.F. Young and T.H. Okhiishi, Fundamentals of Fluid Mechanics, 5th Ed., Wiley India Edition, 2002.
- [2] J.F. Douglas, J.M. Gasiorek, J. A. Swaffield and L.B. Jack, Fluid Mechanics, Pearson Education, 2008.
- [3] Y. A. Cengel and J.M. Cimbala, Fluid Mechanics, Tata McGraw-Hill, 2006