



Fluid Mechanics II

Course Code: 28462
Credits: 3
Course Type: Theoretical
Prerequisites: Fluid Mechanics I
Corequisite: Engineering Mathematics, Fluid Mechanics Lab
Course Length: 51 hours

Outlines:

1. Differential Analysis of Fluid Flow

- Fluid Element Kinematics
- Conservation of Mass
- The Stream Function
- Conservation of Linear Momentum
- Navier-Stokes equations
- Energy equation
- Boundary conditions for the governing equations
- Exact solutions of N-S equations (some examples)

2. Potential Flows

- Elementary Plane Flows
- Superposition of plane flow solutions
- Other plane potential flows (flow around a corner)
- Image method
- Airfoil theory
- Axisymmetric potential flows

3. Flows passed immersed bodies

- Flat plate boundary layer (Laminar and Turbulent)
- Integral method
- Blasius solution of boundary layer
- Boundary layer with pressure gradient
- Drag of immersed bodies
- Lift of immersed bodies

4. Turbomachinery

- Classification of turbomachines
- Centrifugal pumps
- Pump performance curves
- Non-dimensional groups in turbomachines
- Specific speed



Axial pumps
Classification of turbines
Impulse turbines
Reaction turbines

5- Compressible flows

Ideal gas flow relations
Mach Number, Speed of Sound and classification of flows
Isentropic Flow of an Ideal Gas
Effect of Variations in Flow Cross-Sectional Area
Constant-Area Duct Flow
Normal Shock Waves

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.