

FLUID DYNAMICS

Unit I

Real fluids and ideal fluids – Velocity of a fluid at a point – streamlines and path lines; steady and unsteady flows – The velocity potential – The vorticity Vector – Local and Particle Rates of change – The equation of continuity – worked examples – Acceleration of a fluid – Pressure at a point in a fluid at Rest – Pressure at a point in Moving fluid – Conditions at a Boundary of Two Inviscid Immiscible fluids.

Unit II

Euler's equations of motions – Bernoulli's equation – Worked examples – Some flows Involving Axial symmetry – Some special two – Dimensional flows – Some three – Dimensional flows: Introduction – sources, sinks and Doublets – Axi – Symmetric flows; Stokes stream function.

Unit III

Some Two – Dimensional flows: Meaning of a Two – Dimensional flow – use of cylindrical Polar coordinates – The stream function – The complex Potential for Two – Dimensional, Irrotational, Incompressible flow – Complex velocity Potentials for standard Two Dimensional flows – Some worked examples – The Milne – Thomson circle theorem and applications – The Theorem of Blasius.

Unit IV

Stress components in Real fluid – relations between Cartesian Components of stress – Translational Motion of fluid Element – The Rate of strain Quadric and Principal Stresses – Some further properties of the Rate of strain Quadric – Stress Analysis ion fluid Motion – Relation Between stress and rate of strain.

Unit V

The Coefficient of viscosity and Laminar flow – The Navier – Stokes equations of Motions of a viscous fluid. Some solvable problems in Viscous flow - steady viscous flow in Tubes of uniform crass section.

TEXT BOOKS (S)

1. Content and Treatment as in Text Book of fluid Dynamics by F.Charlton (CBS Publishers d Distributors, New Delhi-110032) 1985.
Unit I - Chapter 2: Sections 2.1 to 2.9 and Chapter 3: Sections 3.1 to3.3
Unit II – Chapter 3: Sections 3.4 to 3.6, 3.9, 3.10 Chapter 4: Sections 4.1, 4.2, 4.5
Unit III – Chapter 5: Sections 5.1 to 5.9 except 5.7
Unit IV – Chapter 8: Sections 8.1 to 8.7
Unit V - Chapter 8: Sections 8.8-8.12 except 8.8.4