Aspirants appearing for a M.S. Degree

All candidates will be tested on Basic Mathematics and Basic Fluid Mechanics. Apart from this the candidates can choose any one of the following areas for the purpose of interview.

Syllabus

Basic Fluid Mechanics

a. Fluid continuum; Properties of fluids; Methods of describing fluid motion; Kinematics of fluid streamlines, streak lines, path lines; equation of Continuity, Euler's equations of motion; Navier Strokes equations.
b. Hydrostatics; Manometry; Fluid force on planes and curved surfaces, submerged and floating bodies; stability of submerged and floating bodies - Fluids subjected to uniform linear acceleration and uniform rotation.
c. Analysis of fluid motion in integral form; Concept of a system and a control volume; equations of continuity, energy, linear momentum and angular momentum as applied to a control volume in fluid flow and their applications to propellers, cascades and pumps and turbines.
d. Dimensional analysis, similitude and model testing; Laminar and turbulent flows; Viscous effects; Boundary layer; Separation phenomena; Losses in pipes and minor features.

Suggested Text:

a. Fluid Mechanics, Gupta & Gupta, John Wiley & Sons (Asia) Pte Ltd (1984)
b. Fluid Mechanics by F.M. White, 5th Ed., McGraw Hill International, (2003)
c. Physical Fluid Dynamics by D.J. Tritton, Clarendon Press (1987)

Aspirants appearing for a Ph.D. Degree

All candidates will be tested on the material listed above for MS candidates. In addition, the following material will also be tested.

Syllabus

Introduction to Fluid Mechanics, Fluid properties; Surface Tension, Viscosity; Fluid Statics; Cartesian Tensors ; Kinematics; Vorticity and circulation; Integral laws for conservation of mass, momentum, angular momentum and energy; Constitutive laws, Differential forms of mass conservation equation, Bernoulli's equation; Navier-Stokes Equations; Differential form of Energy equation. Applications of integral and differential conservation equations. Scaling and dimensional analysis, Dynamic Similarity, Buckingham's Pi Theorem; Laminar Flows, similarity solutions, high Re flows, creeping flows

Fundamentals of finite difference methods – explicit and implicit schemes; numerical stability and numerical solution to ordinary differential equations.

Suggested Reading:

a. Kundu, P.K. and Cohen I.M., Fluid Mechanics, 3rd Ed., Academic Press, (2004).
b. Sherman F.S., Viscous Flow, McGraw Hill International, (1990)
c. Muralidhar K and Biswas G., Advanced Engineering Fluid Mechanics, 2nd Ed., Alpha Science, (2005)
d. White F.M., Viscous Fluid Flow, McGraw Hill International, (1991)