

4 th Semester	RMF4D002	Fluid Mechanics and Fluid Power Engineering	L-T-P 3-0-0	3 CREDITS
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Module–I: (10hrs)

Introduction: Physical properties of fluids, Density, Specific weight, Specific volume, Specific gravity, Compressibility, Elasticity, Surface tension, Capillarity, Vapour pressure, Viscosity, Ideal and real fluids, Concept of shear stress, Newtonian and Non-Newtonian Fluids.

Fluid Statics: Pressure-Density-Height relationship, Manometers, Pressure on plane and curved surface, Centre of pressure, Buoyancy, Stability of immersed and floating bodies, Fluid masses subjected to uniform acceleration, Free and Forced vortex.

Module – II: (08 hrs)

Fluid Dynamics: Basic Equations- equation of continuity, One-dimensional Euler's equations of motion and its integration to obtain Bernoulli's equation and Momentum equation. Dimensional Analysis and Principles of Model Testing: Dimensional homogeneity, Dimensional analysis, Rayleigh's method and Buckingham Theorem. Similarity laws and model studies. Distorted models.

Module – III: (07 hrs)

Drag and lift: Drag and lift coefficient, pressure drag and friction drag on stream lined body and bluff body. Boundary layer separation & its control. Drag over flat plate. Profile drag. Drag characteristics of sphere, cylinder and disc. Circulation and lift on a circular cylinder, Magnus effect. Circulation and lift on an airfoil.

Module–IV: (10 hrs)

Hydraulic Turbines: Classification of turbines, Different heads and efficiencies of turbines, Study of Pelton, Francis and Kaplan turbines, Specific speed and unit quantities, performance of turbines, Governing of turbines, Cavitations in reaction turbines, Principles of similarity applied to turbines.

Module – V: (10 hrs.)

Centrifugal Pump: Principle, classification, pressure changes in a pump. Velocity vector diagrams and work done, minimum speed of pump to deliver liquid, multistage pumps. Similarity Relations and specific speed. Reciprocating pump: Principle of working, slip, work done, effect of acceleration and frictional resistances, separation, air vessels.

Books:

- Fluid Mechanics & Hydraulics Machines –By:Modi and Seth, Standard Book House,New Delhi
- Fluid Mechanics & Hydraulic Machines- By Dr.R.K.Bansal Laxmi Pub.(p) Ltd.
- Fundamentals of Fluid Mechanics by Som & Biswas, TMH.
- Introduction to Fluid Mechanics & Fluid Machines – By S. K. Som&G. Biswas, TMH Pub. (p) Ltd.
- A Textbook of Fluid Mechanics and Hydraulic Machines by Dr. R K Bansal, Laxmi Pu