

**PAE31101 FLUID MECHANICS AND HEAT FLOW****UNIT I. Fluid properties And Fluid Statics:**

Units & Dimensions. Properties of fluids – Specific gravity, specific weight, viscosity, compressibility, vapour pressure and gas laws – capillarity and surface tension. Pascal's law, pressure variation with temperature, density and altitude. Hydrostatic law, piezometer, simple and differential manometers, pressure gauges, total pressure and center of pressure of plane, vertical and inclined surfaces. Buoyancy and stability of floating bodies.

**UNIT II. Kinematics and Dynamics:**

Stream line, path line, streak line, stream tube. Classification of flows: steady, unsteady, uniform, non-uniform, laminar, turbulent, rotational, irrotational flows. One, Two and Three dimensional flows. Continuity equation in 3D flow. Surface and Body forces. Euler's and Bernoulli's equations derivation, Navier–Stokes equation (explanation only). Momentum equation. Minor losses in pipes in series and parallel. Total energy line and hydraulic gradient line.

**UNIT III. Flow Measurement:**

Flow measurement through Venturimeters and Orifice meter. Flow through notches and weirs, Viscometers, Pitot tube, U tube manometer, Muly tube manometer, Hotwire Anemometers, pressure gauge, velocity measurement in flow, flow through nozzles.

**UNIT IV. Similitude and Boundary layer**

Similarity laws, distorted models, Laminar flow through circular conduits and circular annuli. Boundary layer concepts. Boundary layer thickness. Hydraulic and energy gradient. Darcy – Weisbach equation. Friction factor and Moody diagram.

**UNIT V. Heat flow**

Basic heat transfer process, Steady state conduction through- plan walls, cylindrical wall and spherical wall. Classification of convection heat transfer, Basic Boundary layer heat transfer applied to forced convection, natural convection, Basic laws of radiation heat transfer

**TEXT BOOKS:**

1. Fluid Mechanics Hydraulics and Hydraulics Machines, Modi & Seth, Standard Publications, New Delhi.
2. Engineering Fluid Mechanics by K.L.Kumar, S.Chand &Co..
3. Er. R. K. Rajput, Heat and Mass Transfer, S.Chand &Co..

**REFERENCES:**

1. Fluid Mechanics, Frank M. White, Tata Mc-Grawhill.
2. Fluid Mechanics, John F.Dauglas, Pearson Educations publishers
3. Fluid Mechanics & Hydraulic Machines, D. Ramadurgaiah, New age publishers2005.