

OBJECTIVE:

- To understand the basic properties of the fluid, fluid kinematics, fluid dynamics and to analyze and appreciate the complexities involved in solving the fluid flow problems.

UNIT I FLUID PROPERTIES AND FLUID STATICS 9

Fluid – definition, distinction between solid and fluid – Units and dimensions – Properties of fluids – density, specific weight, specific volume, specific gravity, viscosity, compressibility, vapour pressure, capillarity and surface tension – Fluid statics: concept of fluid static pressure, absolute and gauge pressures – pressure measurements by manometers-forces on planes – centre of pressure – buoyancy and floatation.

UNIT II FLUID KINEMATICS AND DYNAMICS 9

Fluid Kinematics – Classification and types of flow – velocity field and acceleration – continuity equation (one and three dimensional differential forms)- stream line-streak line-path line- stream function – velocity potential function – flow net. Fluid dynamics – equations of motion -Euler’s equation along a streamline – Bernoulli’s equation – applications – venturi meter, orifice meter and Pitot tube- linear momentum equation and its application to pipe bend.

UNIT III DIMENSIONAL ANALYSIS AND MODEL STUDIES 9

Fundamental dimensions – dimensional homogeneity – Rayleigh’s method and Buckingham Pitheorem – dimensionless parameters – similitudes and model studies – distorted models.

UNIT IV FLOW THROUGH PIPES 9

Reynold’s experiment – laminar flow through circular pipe (Hagen poiseulle’s) – hydraulic and energy gradient – flow through pipes – Darcy – Weisbach’s equation – pipe roughness -friction factorMoody’s diagram- major and minor losses of flow in pipes – pipes in series and in parallel.

UNIT V BOUNDARY LAYER 9

Boundary layer – definition- boundary layer on a flat plate – laminar and turbulent boundary layerdisplacement,

energy and momentum thickness – Momentum integral equation-Boundary layer separation and control – drag on flat plate.