Unit I

Chapter 1 : Properties of Fluids 1-1 to 1-21

Syllabus : Definition of fluid and fluid mechanics : examples and practical applications, Classification of fluids :Real and Ideal, Physical properties of fluids : mass density, specific weight, specific volume, relative density, viscosity, Newton's law of viscocity, Dynamic and kinematic viscocity, compressibility, cohesion, adhesion, surface tension, capillarity, vapour pressure.

Chapter 2 : Fluid Statics 2-1 to 2-48

Syllabus : Basic equation of hydrostatics, concept of pressure, pressure head, Pascal's Law, measurement of pressure (absolute, guage) Principle of manometers : Balancing liquid column, dead weight, pressure transducers and their types. Total pressure and centre of pressure : on plane horizontal, vertical, inclined and curved surfaces practical applications. Buoyancy and Floatation : Principle of floatation and buoyancy, stability of floating and submerged bodies.

Unit II

Syllabus : Eulerian and Lagrangian approach, velocity and acceleration, and their components in Cartesian co-ordinates, Classification of flows, steam line, stream tube, path line, sreak line, control volume. Equation of continuity for 3-D flow in Cartesian co-ordinates, components, components of rotation, velocity potential, stream function and flow net.

Syllabus : Forces acting on fluid mass in motion, Euler's equation of motion along a streamline and its integration to get Bernoulli's equation and its limitations, Modified Bernoulli's equation, concept of HGL and TEL, Application of Bernoulli's equation to measure discharge and velocity of flow : Venturimeter, Orifice meter, Rotameter and Pitot tube.

Unit - III

Syllabus : Dimensional homogeneity, dimensional analysis using Buckingham's π theorem method, geometric, kinematic and dynamic similarity, important dimensionless Numbers (Reynolds No., Froude No., Mach No. and Weber No) and their significance, Model Laws (Reynold's law and Froude's Law)

Syllabus : Concept, development of boundary layer on a flat plate and factors affecting growth, Boundary layer thikness, displacement thickness, momentum and energy thicknesses, Laminar sub layer, Local and mean drag coefficients, Hydrodynamically smooth and rough boundary, boundary layer separation and methods to control separation

Unit - IV

Syllabus : Characteristics of laminar flow, laminar flow through a circular pipe: Hagen Poiseuille equation, Characteristics of turbulent flow, instantaneous velocity, temporal mean velocity, scale of turbulence and intensity of turbulence, Prandtl's mixing length theory, velocity distribution equation, variation of friction factor for laminar flow and for turbulent flow, resistance to flow in smooth and rough pipes, friction factor for commercial pipes, Moody's diagram.

Syllabus : Energy loss in pipe flow, Equation for major loss and minor losses in pipe, flow through pipes in simple and compound pipe, pipes in series, parallel, Dupuit's equation, pipe network analysis by Hardy Cross method, Introduction to siphon.

Unit V

Syllabus : a) Introduction to Open channel flow : Classification of channels, channel flows and geometric elements of channel, Basic governing equations of Channel flow viz. continuity equation, energy equation and momentum equation, One dimensional approach, Velocity distribution in open channel flow.

b) Uniform flow in open channels : Uniform flow formulae: Chezy's and Manning's formulae ; Factors affecting Manning's roughness coefficient; Important terms pertaining to uniform flow, viz. normal depth, conveyance, section factor, concept of second hydraulic exponent, Uniform flow computations. Most efficient channel sections: rectangular, triangular and trapezoidal.

Depth-Energy Relationships in Open Channel Flow : Specific energy and Specific force diagram, Depth discharge Diagram, Critical depth, Conditions for occurrence of critical flow; Froude's number, flow classification based on it, Important terms pertaining to critical flow viz. section factor, concept of first hydraulic exponent

Unit VI

Syllabus :

a) Gradually Varied Flow (GVF) in Open Channel Flow : Theory and Computation Basic Assumptions of GVF; Dynamic equation of GVF - Alternative forms; Classification of channel bed slopes, Various GVF profiles, Methods of GVF computations: Direct Step method. (mention of other method)

b) Fluid Flow around Submerged Objects : Practical problems involving fluid flow around submerged objects, Definitions and expressions for drag, lift, drag coefficient, lift coefficient, types of drag. Introduction to Drag on sphere, cylinder, flat plate and Aerofoil, Karman's vortex street, Development of lift, Introduction to Magnus effect, Lift on cylinder and Aerofoil, Polar diagram.

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