PCE3I101FLUID FLOW AND FLOW MEASUREMENT

Module I:

Units and dimensional analysis, Types of Fluids.

Fluid Statics: Hydrostatic Pressure, Pressure measuring Devices.

Introduction to fluids in motion, Flow in boundary layers. Its formation & growth in tubes & plates. Basic equations of fluid flow continuity, momentum &Bernoulli's equation. Flow measuring devices: Venturi, Orifice, Pitot tube, and Rotameter.

Module II:

Flow of incompressible fluid in pipes, Relation between skin friction & wall shear. Laminar flow in pipes, Hagen–Poiseuille equation, Friction factor, Friction from changes in velocity or direction, Flow of compressible fluids, Basic equations. Flow past immersed bodies, Drag Co-efficient. Motion of particles through fluids. Its mechanics, Terminal velocity.

Module III:

Friction inflow through beds of solids, Fluidization, Mechanism of fluidization, pressure drop in fluidization, Applications of fluidization.

Transportation of fluids, Reciprocating, rotary, and centrifugal pump, fans, blowers & compressors. Characteristics curves & calculation of power & efficiency of pumps. Concept of slip.

Text Books:

1. *Unit Operations of Chemical Engineering, 7th ed. by W L McCabe, J C Smith, and P Harriott, McGraw-Hill.*
2. *Fluid Mechanics for Chemical Engineers, 3rd ed. by Noel de Nevers, McGraw-Hill.*

Reference Books:

1. *A Textbook of Fluid Mechanics and Hydraulic Machines, 9th ed. by R K Bansal.*
2. *Fluid Mechanics: Including Hydraulic Machines by AKJain.*
3. *Introduction to Fluid Mechanics and Fluid Machines, 3rd ed. by S K Som, G Biswas, and S Chakraborty, McGraw-Hill, 2011.*