

GUJARAT TECHNOLOGICAL UNIVERSITY
PDDC - CIVIL ENGINEERING
Semester: III

Subject Name: **Advanced Fluid Mechanics**

Sr. No.	Course content
1.	Kinematics and Dynamics: Types of fluid flow, continuity equation in three dimensions in Cartesian coordinates, velocity and acceleration, velocity potential and stream function. Types of motion Vortex flow, Euler's Equation of motion, Bernoulli's Equation from Euler's Equation.
2.	Viscous Flow: Flow of viscous fluid through circular pipe and two parallel plates, loss of head due to friction in viscous flow, methods of determination of coefficient of viscosity (capillary tube method, orifice type, falling sphere Resistance method, rotating cylinder method), network of pipes (Hardy-cross method)
3.	Turbulent Flow : Reynolds's experiments, friction loss in pipe flow, velocity distribution in turbulent flow in pipe, sheer stress in turbulent flow, Nikuradse work on artificially rough pipe, Cole brooks and white equations : Moody's diagram.
4.	Boundary Layer Flow: Definitions, growth, thicknesses, drag forces, laminar and turbulent boundary layer on a flat plate, and separation of boundary layer.
5.	Dimensional and Model Analysis: Concept of dimensions and dimensional homogeneity dimensionless parameters, methods of dimensional analysis, model analysis, types of similarities, types of forces acting on moving fluid, dimensionless numbers, model laws, classification of model.
6.	Open Channels: Classification of flow in channel, velocity distribution, discharge through open channel, most economical section, specific energy and specific energy curve, critical flow, standing wave flume and parshall flume, gradually varied flow, hydraulic jump and its application.

Term Work:

Term work shall be based on the above mentioned course content.

Field Visit:

Field visits based on course content are suggested.

Reference Books:

1. Fluid mechanics & Hydraulic Machines By Dr.R.K.Bansal
2. Fluid mechanics By Dr.D.S.Kumar
3. Fluid mechanics & Hydraulic Machines By Dr.P.N.Modi & Sheth
4. Fluid mechanics By Dr.A.K.Jain
5. Hydraulic Fluid mechanics & Fluid Machines By S.Ramamurthan
6. Engineering Fluid Mechanic By R.J.Garde & A.C.Mirajgaoker