



C.U.SHAH UNIVERSITY – Wadhwan City

FACULTY OF: -Technology and Engineering (Diploma Engineering)

DEPARTMENT OF: -Civil Engineering

SEMESTER: - III **CODE:** -2TE03FLM1

NAME – Fluid Mechanics

Teaching & Evaluation Scheme:-

Subject Code	Subject Name	Teaching Scheme (Hours)				Credits	Evaluation Scheme							
		Th	Tu	Pr	To		Theory				Practical (Marks)		Total	
							Sessional Exam		University Exam		Internal			University
							Marks	Hours	Marks	Hours	Pr	TW		Pr
2TE03FLM1	Fluid Mechanics	03	00	02	05	04	30	1.5	70	03	30	20	---	150

Objectives:

This course gives an introduction to the fundamentals of fluid flow and its behavior so as to equip the students to learn related subjects and their applications in the higher semesters. Understand the concept of viscosity and where viscosity is important in real flows. Learn to use equations in combination with experimental data to determine losses in flow systems.

Prerequisites:- Basic knowledge of Linear Algebra and Differential Equations, Science.

Course Outlines:-

Sr. No.	Course Contents	Teaching Hours
1	Introduction: (a) Introductory Concepts And Definitions: Fluids and Soils; Liquid, Gas and Vapor; Coordinate systems; Continuum; Control volume. (b) Properties Of Fluids: Density; Specific weight; Specific Volume; Specific Gravity; Bulk modulus of Elasticity; Pressure; Viscosity; Surface Tension; Capillarity.	05
2	Fluid Statics: (a) Fluid Pressure and It's measurement: Introduction; Variation of static pressure; Atmospheric, Gauge and Absolute Pressure; Hydrostatic Paradox; Pressure measurement by different devices; Hydraulic press. (b) Hydrostatic Force: Pascal's Law; Hydrostatic force on submerged plane and curved surfaces ; Location of Hydroststic force ; Applications of Hydrostatic force. (c) Buoyancy: Archimedes' Principle; Buoyant force; Determination of metacentric height; Stability of floating bodies.	08

3	Fluid - Flow Concepts and Basic Equations: (a) Fundamentals of Fluid Flow: Introduction; Methods of describing fluid motion; Velocity and Acceleration of a fluid particle; Types of fluid flow; Streamline, Path line and Streak line; Continuity Equation in Integral form and Differential form; Existence of flow. (b) Vortex Motion. (c) Equation of Motion and Energy Equation: , Forces acting on fluid in motion; Euler's equation of motion for one - dimensional flow; Bernoulli's equation from Euler's equation of motion.	08
4	Fluid Flow Measurement: Measurement of discharge through a pipe by Venturimeter, Orificemeter, Orifice, Mouthpiece, Rotameter and velocity measurement by Pitot Tube. Measurement of discharge through an Open Channel by a Weir, and Notch.	06
5	Flow Through Pipes: Introduction; Types of flow; Reynolds's experiments; Laws of Fluid Friction; Frictional loss: Darcy - Weisbach formula, Chezy's formula, Manning's formula; Other Minor losses in pipe flow ; Total Energy line and Hydraulic Gradient Line; Power transmission through pipes; Pipes in series and Equivalent pipe; Pipes in parallel; Branched pipe; Water hammer phenomena in pipe flow; Loss of head due to friction in tapering pipe; Loss of head due to friction in a pipe with side tapings. Steady flow in conduits: Network of pipes and its hydraulic analysis by Hardy Cross method; Siphon and Rising Mains.	10
6	Impact of Jet On Vanes : Stationary and moving vanes; Jet propulsions.	04
7	Dimensional Analysis:	03
8	Computer Applications to Specified Problems:	03

Experiment List:-

- Flow through variable area duct.
- Calibration of notches.
- Calibration of weirs.
- Calibration of venturiflumes.
- Calibration of venturimeter.
- Determination of friction factor.
- To study velocity, viscosity and pressure measuring devices.
- To determine coefficient of discharge, contraction & velocity of an orifice.
- To verify the Bernoulli's theorem.
- To determine minor losses at sudden contraction and enlargement.
- To find metacentric height of a floating body.
- To determine the critical Reynold's number for a pipe flow.

Learning Outcomes:

- Students gain basic understanding of fluid mechanics fundamentals, including concepts of static fluid, fluids-flow measurements and flow through the pipes, also gain ability to apply the fundamental equation to solve problems in fluid mechanics.

Books Recommended:-

- Textbook of Fluid Mechanics & Hydraulic Machines by **Dr.R.K.Bansal**, Laxmi Publications.
- Hydraulics, Fluid Mechanics & Fluid Machines by **S Ramamurtham**, Dhanpatrai Publihsers.
- Fundamentals of Fluid Mechanics by **R.K.Purohit**, Scientific Publishers, Jodhpur.
- Fluid Mechanics & Machinery by **H M Raghunath**, CBS Publishers.