Course Code	Course Name	Credits
26PH106	FLUID PHYSICS	04

Course Objectives

- To familiarize students with fluid properties, statics, and transport phenomena on various surfaces,
- To familiarize students Bernoulli's equation of fluid flow

Learning Outcomes

Upon successful completion of this course it is intended that a student will be able to:

- Understand various properties of fluids
- Understand different parameters of measurement of fluid properties
- Gain the concept of Flowing phenomenon of fluid.

Unit 1 - Fluid properties (12 Hrs.)

Definition of fluid, difference between fluid and solid, Differences between liquids and gases, Various properties of fluids, density, specific weight, specific gravity, pressure, temperature, viscosity, surface tension, and vapor pressure, Newtonian and Non-Newtonian fluids.

Unit 2 – Fluid Statics (12 Hrs.)

Absolute pressure, gage pressure, and vacuum, Blaise Pascal's law of pressure transmission, basic differential equation of hydrostatics, Equation for the pressure variation of a uniform-density fluid. Manometers and barometers, forces and moments exerted by a fluid at rest on submerged plane and curved surfaces. rigid-body motion of fluids.

Unit 3 - Fluid Flow (12 Hrs.)

Reynolds Transport Theorem and Classification of a flow (uniform or non-uniform, steady or unsteady, incompressible or compressible, 1-D, 2-D, or 3D), Mass flow rate, volume flow rate, and mean velocity for a flow. integral form of the continuity equation, incompressible, steady and unsteady flows.

Unit 4 – Bernoulli's Equation (12 Hrs.)

Derivation of Bernoulli's equation, Applications of Bernoulli's equation, cavitations in enclosed pipes or hydraulic machines, linear momentum equation.

Unit 5 - Pipe Flow (12 Hrs.)

Laminar and turbulent flow in a pipe, Moody diagram or turbulent or laminar flow friction factor, Minor losses (i.e., head losses in pipe inlets, outlets, valves, and other fittings), drag force, skin friction coefficients, pump head, brake, water horsepower, cavitations.

Reference Books:

1. "Physical Fluid Dynamics" by D. J. Tritton
2. An Introduction to Fluid Dynamics" by G. K. Batchelor
3. "Fluid Mechanics: An Intermediate Approach" by Bijay K. Sultanian

Websites and eLearning Sources:

1. https://nptel.ac.in/courses/105103192
2. https://youtu.be/Lgg5nn4u2ho?si=8Ip7tIULPKgXrm7z
3. https://youtu.be/Njct_dsN8fA?si=pvl-hg6L0IPK8WoX

COs and Bloom's Taxonomy Mapping – 26PH106		
Course Outcomes	**On successful completion of this course, students will be able to**	**BTL**
CO1	Recall and explain the key properties of fluids, including density, specific weight, specific gravity, pressure, viscosity, surface tension, and vapour pressure.	K1, K2
CO2	Apply concepts from fluid statics and dynamics to solve problems involving pressure variations and forces exerted by fluids on surfaces.	K3
CO3	Analyze fluid flow characteristics using the Reynolds Transport Theorem and classify different types of flow (steady vs. unsteady, laminar vs. turbulent).	K4
CO4	Evaluate the applications of Bernoulli's equation in real-world scenarios, including hydraulic machines and cavitations.	K5
CO5	Design and conduct experiments related to fluid dynamics, proposing innovative solutions to fluid flow problems based on theoretical models and experimental data.	K6

BTL (Bloom's Taxonomy Level) - K1 – Remembering, K2 – Understanding, K3- Applying, K4 – Analyse, K5- Evaluate and K6 - Create

Relationship Matrix – 26PH106													
Course Outcomes	**Programme Outcomes (POs)**						**Programme Specific Outcomes (PSOs)**						**Mean Score of Cos**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	
CO1	3	2	1	1	1	1	3	2	1	1	1	1	1.50
CO2	2	2	3	2	1	1	2	2	3	2	1	1	1.83
CO3	2	2	2	3	1	1	1	2	2	3	2	1	1.83
CO4	1	2	2	3	2	2	1	1	2	3	2	2	2.00
CO5	1	1	2	3	3	3	1	1	2	2	3	3	2.08
												Total	1.85

Mean Score: 3- High, 2- Medium/Moderate, 1-Low

FULLY HUMAN
Fully
Alive