Fluid Mechanics

01CI1304

Objective of the Course

- To know the properties of fluid and identify their types.
- To calculate hydro static forces and the measurement techniques for pressure.
- To understand the fluid kinematics and dynamics.
- To classify various types of fluid flow.
- To develop the concepts of (a) buoyancy force on immersed and floating body and (b) drag- lift force on the object.

Credits Earned: 4

Students Learning Outcomes

After successful completion of the course, it is expected that student will be able to,

1. Identify the properties of different types of fluids
2. Measure the pressure and hydrostatic force generated by fluid.
3. Categorize various types of fluid flow through channels and conduits
4. Evaluate the buoyancy force and drag-lift force for the floating and immersed bodies in fluid.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	IA (M)	CSE (I)	Viva (V)	Term Work (TW)	
03	00	02	04	50	30	20	25	25	150

Detailed Syllabus

Sr. No.	Topic Name	Hours
1	**Fluid Properties & Fluid Statics**	18
	1.1 Types of Fluid and Properties	
	1.2 Newton's Law of viscosity, Surface Tension, Compressibility.	
	1.3 Fluid Pressure Measurement	
	1.4 Hydrostatic Pressure	
	1.5 Buoyancy And Floatation	

Sr. No.	Topic Name	Hours
2	**Fluid Kinematics**	6
	2.1 Fluid Flow analysis methods, Flow pattern stream line path line	
	2.2 Types of fluid flow :	
	2.3 Velocity and Acceleration	
	2.4 Continuity equation for 1-D, 2-D and 3-D flow and application	
	2.5 Circulation and vorticity, velocity potential and stream function, flow net	
3	**Fluid Dynamics**	4
	3.1 Euler's Equation	
	3.2 Bernoulli's Equation for Ideal and Real Fluid – Its Applications	
	3.3 Energy Correction Factor	
	3.4 Momentum equation and its application	
4	**Flow Measuring Devices**	10
	4.1 Measurement of Discharge	
	4.2 Measurement of Velocity	
	4.3 Flow through reservoir opening, Mouthpiece, Notches and Weirs	
5	**Compressible flow**	4
	5.1 Basic equations & Bernoulli's Equation	
	5.2 Mach number	
	5.3 Propagation of sound wave	
	Total	**42**

List of Practicals

1) To Validate Bernoulli's Theorem.
2) To determine the Metacentric height of a given floating body.
3) To Study Laminar and Turbulent Flow and its visualization on Reynolds's Apparatus.
4) To calibrate and study different flow meters particularly Venturimeter, orifice meter, Nozzle meter and Rota meters.
5) To obtain surface profile of free and forced vortex.
6) To calibrate the given Rectangular, Triangular and Trapezoidal notches.
7) To determine fluid friction factor for the given pipes.
8) To determine loss coefficient for different pipe.

Suggested Theory Distribution

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
5%	35%	40%	10%	10%	00%

Instructional Method and Pedagogy

1. Prerequisite of the course and its pattern shall be discussed on the commencement of the course.
2. Lectures shall be conducted in class room using various teaching aids.
3. Presence in all academic sessions is mandatory which shall carry 5% marks of the total internal evaluation.
4. At the end of each unit/topic an assignment based on the course content shall be given to the students which shall carry 5% weightage for timely completion and submission of the assigned work.
5. The laboratory experiments are planned in such a way that it covers the practical aspects of the course contents. The performance of these experiments shall bring the clarity of the theoretical concepts which the students have studied during the academic sessions.

Recommended Study Material

Text Books

1. Fluid Mechanics and Hydraulic Machines, Er. R. K. Rajput , S. Chand & company
2. Fluid Mechanics & Hydraulic Machines, R.K. Bansal, Laxmi Publication.

Reference Books

1. Engineering Fluid mechanics, K.L. Kumar, 8th Edition S. Chand & Company Ltd.
2. Hydraulics and Fluid Mechanics, P.M. Modi and S.M. Seth, Standard Book House.
3. Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill.