FLUID MECHANICS

III Semester: CE

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACEC03	Core	3	1	0	4	30	70	100
Contact Classes:45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes:60		

Prerequisite: Engineering Mechanics

I. COURSEOVERVIEW

Fluid Mechanics is a branch of physics concerned with the mechanics of fluids, the forces acting on them and basic understanding on fluid properties, fluid dynamics, fluid flow in closed and open conduits. The flow of incompressible fluids in pressure systems constitute as the major portion of this course. This course enables to work and formulate the models necessary to study and analyze fluid systems through the application of control volume. Further, the principles used in Fluid Mechanics help to study the concepts in Hydraulic Machinery and Water Resources Engineering.

II. COURSEOBJECTIVES

The Students will try to learn:

1. The fundamental knowledge of fluid properties at rest, in transit for various conditions in both closed and open channels.
2. The concept of buoyancy, stability of floating bodies and the forces acting on immersed bodies by employing the concept of pressure.
3. The basic laws of continuity, energy and momentum and their governing equations.
4. The analysis of intensive, extensive properties by basic bifurcation and similitude.

III. COURSESYLLABUS

MODULE-I:PROPERTIES OF FLUIDS (12)

Distinction between a fluid and a solid; Properties of fluids, intrinsic and extrinsic, Newton law of viscosity with classification, cavitation, surface tension, capillarity, Bulk modulus of elasticity, and compressibility.

MODULE–II:FLUID STATICS(12)

Fluid Pressure: Pressure at a point, Pascal's law, Pressure measuring devices, piezometer, different types of manometers and pressure gauges; Hydrostatic pressure for submerged bodies. buoyancy and stability of floating bodies.

MODULE–III:FLUID KINEMATICS (12)

Classification of fluid flow with respect to time, space, rotation about its axis, Reynolds number, Froude number, combinations of fluid flows.

Flow patterns, Laplace equations and flow net, Derivation of Continuity equations in Cartesian coordinate system with practical applications.

MODULE–IV:FLUID DYNAMICS(12)

Surface and body forces, law of conservation of mass and energy, equations of motion, Euler's equation and derivation of Bernoulli's equation, TEL and HGL of pipes; Practical applications of Bernoulli's equation; Momentum principle, applications.

MODULE–V:FLOW THROUGH PIPES (12)

Major losses (Derivation of Darcy's Weischbach – Equation) and minor losses thorough pipes, Pipes in series, equivalent pipes, pipes in parallel. Analysis of pipe networks - Hardy Cross method.

IV. TEXT BOOKS

1. S. Ramamrutham, "Hydraulic Fluid Mechanics and Fluid Machines", Dhanpat Rai Publishing Company Private Limited, 9th Edition, 2014.

2. C. S. P. Ojha, R. Berndtsson and P. N. Chadramouli, “Fluid Mechanics and Machinery”, Oxford University Press, 2010.
3. P M Modi and S M Seth, “Hydraulics and Fluid Mechanics”, Standard Book House, 2014.

V. REFERENCE BOOKS

1. K. Subramanya, “Theory and Applications of Fluid Mechanics”, Tata McGraw Hill.
2. R.L. Daugherty, J.B. Franzini and E.J. Finnemore, “Fluid Mechanics with Engineering Applications”, International Student Edition, Tata Mc Graw Hill.
3. Jack b. Evett, Cheng Liu, “2500 Solved Problems in Fluid Mechanics and Hydraulics”, MCGRAW-HILL, INC.

VI. WEB REFERENCES

1. http://nptel.ac.in/courses/112105171/1
2. http://nptel.ac.in/courses/105101082/
3. http://nptel.ac.in/courses/112104118/ui/TOC.htm

VII. E-TEXT BOOKS

1. http://engineeringstudymaterial.net/tag/fluid-mechanics-books/
2. http://www.allexamresults.net/2015/10/Download-Pdf-Fluid-Mechanics-and-Hydraulic-Machines-by-rk-Bansal.html
3. http://varunkamboj.typepad.com/files/engineering-fluid-mechanics-1.pdf