

Semester 3

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
CE-301	Fluid Mechanics	PCC	4	3	1	0	50	100	150

Course Outcomes:

At the end of the course the students will be able to:

CO1	Mathematically analyze simple flow situations and get clear thoughts of the concept of continuity.
CO2	Analyze of various flow solutions and various boundary layers of bounding surface.
CO3	Comprehend the momentum equation & dimensional analysis.
CO4	To obtain the velocity/pressure variations and the application of mass and momentum conservation laws for fluid flows.
CO5	Evaluate the flow and performance of pumps and turbines

Detailed Syllabus**Section-A**

Unit 1: Fluid: Definition of fluid, Newton's law of viscosity, units and dimensions-Properties of fluids, mass density, specific volume, specific gravity, viscosity, compressibility and surface tension, control volume- application of continuity equation and momentum equation, incompressible flow, Bernoulli's equation and its applications.

(9 Hrs)

Unit 2: Flow of fluid: Exact flow solutions in channels and ducts, couette and poiseuille flow, laminar flow through circular conduits and circular annuli- concept of boundary layer - measures of boundary layer thickness – Darcy Weisbach equation, friction factor, Moody's diagram.

(9 Hrs)

Unit 3: Dimension Analysis: Need for dimensional analysis, methods of dimension analysis, types of similitude dimensionless parameters, application of dimensionless parameters, model analysis.

(6 Hrs)

Unit 4: Pumps: Euler's equation, theory of rotodynamic machines, various efficiencies, velocity components at entry and exit of the rotor, velocity triangles. Centrifugal pumps, working principle, work done by the impeller, performance curves, cavitations in pumps, reciprocating pump, working principle.

(8 Hrs)

Unit 5: Turbines: Classification of water turbines, heads and efficiencies, velocity triangles(axial, radial) and mixed flow turbines- Pelton wheel, Francis and Kaplan turbines, working principles, draft tube, specific speed, unit quantities, performance curves for turbines, governing of turbines.

(8 Hrs)**Text Books**

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Fluid Mechanics and Machinery	C.S.P.Ojha, R. Berndtsson and P. N. Chadramouli,	Oxford University Press	4 th (2010)
2	Fluid Mechanics and Hydraulic Machines	Sukumar Pati	McGraw Hill Education	10 th (2020)
3	Fluid Mechanics	Fox and McDonald	Wiley	8 th (2015)

Reference Book

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Fluid Mechanics Through Problems	R.J.Garde	New Age Publisher	7 th (2018)
2	Fluid Mechanics	D.S.Kumar	Katson	4 th (2012)