Course No	Course Name	L-T-P-Credits
CE 204	**FLUID MECHANICS**	**(3- 0/1- 0: 3/4)**

Prerequisite: nil;   Co requisite: nil

Course Objectives:
1. To familiarize with the properties of fluids and to understand the concept of fluid measurement, types of flows, stability and dimensional analysis.
2. To imbibe the basic laws and equations used for analysis of static and dynamic fluids

Course Outcomes:
1. Students will be able to understand the concepts of various properties of fluids
2. Students will be able to understand the concepts of conservation of mass, momentum and energy in regards to fluid flow
3. Students will be able to understand the applications of various flow measuring devices to measure the flow

SYLLABUS

Module	Contents	Hours
I	**Basic Concepts** Continuum Approach, Important physical properties: density, specific weight, viscosity, surface tension, capillarity, compressibility, vapour pressure, Classification of fluids-ideal and real fluid, non-Newtonian fluids.	4
II	**Fluid Statics** Pressure at a point-Pascal's Law, pressure variation in a static fluid. Scales of Pressure-absolute and gauge pressure, Measurement of pressure-manometers, Forces on submerged plane and curved surfaces, Buoyant Force centre of buoyancy, metacentre, determination of metacentric height, Equilibrium of floating and submerged bodies, relative equilibrium-translation and rotation of fluid masses.	8
III	**Dynamics of Fluid Flow** Euler's equation of motion, Bernoulli's equation and its application-venturi-meter, orifice meter, pitot tube, Momentum equation and its application to simple problems.	7
IV	**Orifice and Mouthpiece** Classification, discharge through a free orifice, orifice coefficients-experimental determination, External and internal mouthpiece, mouthpiece running full and free.	4
V	**Notches and Weirs** Classification, Velocity of Approach, Broad crested weir	4
VI	**Flow through Pipes** Losses in pipe flow-major loss (Loss due to friction)-Darcy Weisbach equation, minor losses, Hydraulic gradient lines, Total Energy lines. Pipes in series, pipes in parallel, equivalent pipe, Siphon.	5
VII	**Dimensional Analysis** Dimensions-fundamental and derived qualities, dimensional homogeneity, methods of dimensional analysis Rayleigh's method and Buckingham's π theorem.	6

Essential Readings:
1. SK Som, Gautam Biswas, Suman Chakraborty, :Introduction to Fluid Mechanics and Fluid Machines" McGraw Hill Publications, Third Edition, 2010
2. Dr. R K Bansal, "A text book of Fluid mechanics & Hydraulics machines", Laxmi Publications, Revised Ninth Edition, 2010
3. Modi P.N. and Seth S.M., "Hydraulics and Fluid Mechanics", Standard Book House, 21st Edition, 2017
4. Er. R K Rajput, "A text book of Fluid Mechanics", S Chand publications, 9th Edition, 2017

Supplementary Readings:
1. Kumar K.L., "Fluid Mechanics", S. Chand & Co., 22nd Edition, 2016
2. Jain A.K., "Fluid Mechanics", Khanna Publisher, 23rd Edition, 2010
3. White B.F., "Fluid Mechanics", McGraw Hill.,7th Edition, 2010

4. Frabzini J., "Fluid Mechanics with Engineering Applications", McGraw Hill.,10th Edition, 2001