AMITY UNIVERSITY
UTTAR PRADESH

Course Title: Mechanics of Fluids **Credit Units: 03**

Course Level: UG **Course Code: MAE201**

L	T	P/S	SW/FW	TOTAL CREDIT UNITS
3		0	-	03

Course Objectives: The objective of Mechanics of Fluids is to make the students should understand the, properties of fluids, pressure measurement devices, hydraulic forces on surfaces, bouncy and flotation in fluids, kinematics and static behaviour of fluids, dimension and model analysis, laminar and turbulent flow, flow through pipes and orifices, boundary layer theory.

Pre-requisites: Basic Concepts of Physics, General Chemistry and Mathematics (Differential Equations, Integration and Calculus)

Course Contents/Syllabus:

	Weightage (%)
Module I: Refrigeration	**20%**
Fluid Properties and Fluid Statics **1.** Newtonian and Non-Newtonian Fluids; **2.** Viscosity; Incompressible and compressible fluids, compressibility. **3.** Measurement of pressure,Forces on plane surfaces, forces on curved surfaces, buoyant forces, and stability of floating bodies, metacentre and metacentre height.	
Module II	**20%**
Kinematics of Fluid Motion **1.** Steady and unsteady flow; uniform and non-uniform flow; **2.** Laminar and turbulent flow; streamline, path line and streak line; **3.** Continuity equation, irrotational and rotational flow, velocity potential and stream function, **4.** Vortex flow, free and forced	
Module III	**20%**

Dynamics of Fluid Flow **1.** Euler's equation of motion and its integration to yield Bernoulli's equation, its practical applications – **2.** Pilot tube, Venturi meter, orificemeter; **3.** Steady flow momentum equation, force exerted on a pipe bend	
Module IV	**15%**
Dimensional Analysis and Principles of Similarity 1. Buckingham π-Theorem and its applications, 2. Geometric, Kinematics and Dynamic similarity; 3. Dimensionless numbers-Reynolds, Froude, Euler, Mach, Weber Number and their significance	
Module V	**15%**
Laminar and Turbulent Flow **1.** Reynold's experiment, critical velocity, steady laminar flow through a circular tube, flow between parallel plates. **2.** Transition from laminar to turbulent flow, courses of turbulence, velocity distribution law near a solid boundary, **3.** velocity distribution in rough pipes, Hazen – Williams's formula	
Module VI	**10%**
Analysis of Pipe Flow **1.** Energy losses, minor losses in pipe lines, **2.** Concept of equivalent length, **3.** Flow between two reservoirs, and multiple pipe systems – in series and parallel, siphon, weir and notches	

Student Learning Outcomes:

On completion of the course the student will be able to:

1. Demonstrate knowledge of fundamental concepts of Fluid Mechanics.
2. Identify various components of Fluid Mechanics, and perform basic operations and apply safety procedures.
3. Design and analyze problems relating to Fluid Kinematics and Dynamics.

Pedagogy for Course Delivery:

The course pedagogy will include lectures, numerical practice, case studies, seminars and presentations. It also includes discussion on real life problems and demonstrations of Fluid flow apparatus**.**

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	Total
100%	0%	100%

Theory Assessment (L&T):

	Continuous Assessment/Internal Assessment				End Term Examination
Components (Drop down	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

Text & References:

Text:

- R.K. Bansal, "Fluid Mechanics & Hydraulic Machines", Laxmi Publications (P) Ltd., 2002.
- Gupta, S. C., Fluid Mechanics and Hydraulic Machines, Pearson Education, 2007
- D.S. Kumar, "Fluid Mechanics and Fluid Power Engineering", S.K. Kataria & Sons, 2000.

References:

- F. M. White, Introduction to Fluid Mechanics, McGraw Hill
- I.H. Shames, "Mechanics of Fluids", Tata McGraw Hill
- Douglas, J. F., Gasiorek, J.M. and Swaffield, J., Fluid Mechanics, Pearson Education, 4/e, 2006
- V.L. Streeter and E.B. Wylie, "Fluid Mechanics", Tata McGraw Hill

Massey B S, Mechanics of Fluids, Van Nostrand Reinhold Co