

MME303: Fluid Mechanics and Machinery

Programme: B. Tech. (ME & MTRE)

Year: II

Semester: IV

Course: Core

Credits: 3

Hours: 40

Course Context and Overview (100 words):

The objective of the course is to provide the students with basic knowledge of fundamentals of the fluid statics, dynamics and fluid machinery e.g. Hydraulics turbines, pumps etc. This will help the students to develop the skill in understanding the principles, mechanisms and applications of the basic elements or components of the fluid or hydraulic machines. The further detailed objectives are as following:

1. To understand the basic concepts of fluid statics and fluid dynamics.
2. To understand application of mass, momentum and energy equation in fluid flow.
3. To learn various flow measurement techniques.
4. To learn the working principle, applications and design criterion of the fluid machines.

Prerequisite Courses: Nil

Course outcomes (COs):

On completion of this course, the students will have the ability to:
CO1 Understand properties of fluids and classification of flows
CO2 Formulate and solve equations of the control volume for fluid flow systems
CO3 Solve the fluid flow problems to the internal flows and piping systems
CO4 Apply the flow measuring techniques
CO5 Understand the basic principle and application of the Fluid machines

Course Topics:

Topics	Lecture Hours	
UNIT - I		
1. Topic Introduction to Fluid mechanics		
1.1 Introduction and motivation	1	6
1.2 Fluid Definition and properties	2	

1.3 Newton's law of viscosity, Concept of continuum	2	
1.4 Classification of fluids	1	
UNIT - II 2. Topic Submerged surfaces and bodies		6
2.1 Introduction	2	
2.2 Vertical plane surface submerged in liquid	2	
2.3 Inclined and curved surface submerged in liquid	2	
UNIT - III 3. Topic Elementary fluid dynamics, Momentum equation and its application		10
3.1 Flow concepts and Kinematics	3	
3.2 General control volume conservation equation	1	
3.3 Conservation of mass	1	
3.4 Conservation of momentum	2	
3.5 Conservation of energy	2	
3.6 Bernaulli's theorem	1	
UNIT - IV 4. Topic Dimensional analysis and similitude, Internal flows and piping systems		11
4.1 Dimensional analysis and similitude	3	
4.2 Viscous flow in pipes	2	
4.3 Laminar and turbulent flow over a plate	3	
4.4 Laminar and turbulent flow inside a pipe	3	
UNIT-V 5. Topic Principles and applications of fluid machines		7
5.1 Introduction to fluid machines	2	
5.2 Hydraulics pumps	2	
5.3 Hydraulic turbines	3	

Textbook references (IEEE format):

Text Book:

1. Som S and Biswas G, *Introduction to Fluid Mechanics and Fluid Machines*, 2nd ed., Tata McGraw-Hill, 2007.
2. Streeter, Wylie & Bedford, *Fluid Mechanics* 9th Edition, Mcgraw Hill Education (Indian) Pvt. Ltd.
3. Cengel, and Cimbala, *Fluid Mechanics*, McGraw Hill Education (India) Pvt. Ltd., 2015

Reference books:

1. Fox W. R, Pritchard P. J and Mcdonald A. T, *Introduction to Fluid Mechanics* 7th ed., John Wiley, 2009.
2. Anderson B. W, *The Analysis and Design of Pneumatic Systems*, Wiley, Latest Edition.
3. Kaleem Khan, *Fluid Mechanics and Machinery*, Oxford Higher Education, 2015

Additional Resources (NPTEL, MIT Video Lectures, Web resources etc.): NPTEL, MIT Open courseware etc.

Evaluation Methods:

Item	Weightage (%)
Quiz1: 5	20
Quiz2: 5	
Assignment1: 5	
Assignment2: 5	
Midterm	30
Final Examination	50

Prepared By: Dr. Kamal Kishore Khatri
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