

MME303L: Fluid Mechanics and Machinery Lab

Programme: B. Tech. (MME)
Course: Core

Year: II
Credits: 1

Semester: IV
Hours: 2 (per week)

Course Context and Overview (100 words):

The objective of the Lab is to provide the students with practical 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 working 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 practical concepts of fluid statics and fluid dynamics.
2. To understand application of Bernoulli's theorem and other laws of fluids.
3. To learn various flow measurement techniques.
4. To learn the working principle, applications and design criterion of the fluid machines.

Prerequisite Courses: Nil (It has prior requirement of the theory part of FMM to be completed)

Course outcomes (COs):

On completion of this course, the students will have the ability to:
CO1 Understand the calculation of properties of fluids
CO2 Apply the analytical techniques to determine the important fluid parameters through experiments.
CO3 Solve the fluid flow problems to the internal flows and piping systems through experiments.
CO4 Apply the flow measuring techniques through experiments.
CO5 Conduct the experimental studies on the Fluid machines e.g. Turbines, pumps etc.

Course Topics: (List of Experiment for Fluid mechanics and Machines Lab)

S. No.	Name of the experiment	Hours
1.	To determine experimentally the metacentric height of a flat bottomed pontoon through Metacentric Height apparatus.	2
2	Verification of Bernoulli's Theorem through Apparatus of Bernoulli's Theorem with complete accessories.	2
3	Measuring flow by using a venturimeter, orificemeter and nozzle meter, Flow Anemometer AM-4202 through Flow measurement apparatus for air with complete accessories.	2
4	To measure losses due to friction in pipelines through Friction flow apparatus with complete accessories.	2
5	To measure the coefficient of discharge C_d , Coefficient of velocity C_v & coefficient of contraction C_c of various types of orifices through Orifice Apparatus with complete accessories.	2
6	To conduct the experimental Study on the Francis wheel turbine through Francis Turbine test rig with complete accessories.	2
7	To conduct the experimental Study on the Kaplan turbine through Kaplan Turbine test rig with complete accessories.	2
8	To conduct the experimental Study on the Pelton wheel turbine through Pelton Turbine test rig with complete accessories.	2
9	To conduct the experimental Study on the Centrifugal pump through Centrifugal pump test rig with complete accessories.	2
10	Study of Hydraulic control system through Hydraulic trainer, Study of construction & operation of hydraulic equipment such as valves, limit switches etc.	2

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. Mohd. Kaleem Khan, *Fluid Mechanics and Machinery* Oxford University Press, 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.

Additional Resources (NPTEL, MIT Video Lectures, Web resources etc.):**Evaluation Methods:**

Item	Weightage (%)
Internal sessional assessment (Lab work with report)	40
Midterm (Quiz & Viva)	20
End term practical Examination	40

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