

FLUID MECHANICS & HYDRAULICS LABORATORY

III Semester: AE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
AAE102	Foundation	L	T	P	C	CIA	SEE	Total
		-	-	3	2	30	70	100
Contact Classes: Nil		Tutorial Classes: Nil		Practical Classes: 36			Total Classes: 36	
I. COURSE OVERVIEW:								
<p>The Fluid Dynamics laboratory is designed to examine the properties of fluids and to conduct experiments involving both incompressible and compressible flow. This course will also provide the fundamental knowledge on basic measurements and devices used in fluid dynamic application. It is an introductory course where flow behavior, fluid forces and analysis tools are introduced. The course also discusses about various flow measuring devices, pumps, turbines used in fluid dynamic application and measurement of their performance characteristics. Students are expected to get hands on experience on investigating the fundamentals of fluid statics as well as kinematics and kinetics of fluid flow and operation of turbo machineries.</p>								
II. OBJECTIVES:								
The course should enable the students to:								
<p>I The types of fluids, properties and behavior under static and dynamic conditions of closed conduit and external flow systems.</p> <p>II The operating principle of various turbo machinery and analyze their performance characteristics under various operating conditions.</p> <p>III The measurement of flow rate through various internal and external flow systems.</p>								
III. COURSE OUTCOMES:								
After successful completion of the course, students should be able to:								
CO 1	Interpret the concept of calibrating orifice and venturi meter for reducing the uncertainty in the discharge coefficient. .	Apply						
CO 2	Make use of pipe friction test apparatus to measure the friction factor under a range of flow rates and flow regimes for calculating major losses in closed pipes	Apply						
CO 3	Demonstrate the verification of Bernoulli's theorem for incompressible steady continuous flow. for regulating pipe flow across resection and datum	Understand						
CO 4	Identify the critical Reynolds number using Reynolds apparatus for illustrating the transition of laminar flow into turbulent flow.	Apply						
CO 5	Make use of jet impact apparatus for investigating the reaction forces produced by the change in momentum.	Apply						
CO 6	Distinguish the performance characteristics of turbo machinery to various operating conditions for calculating efficacy of turbines under specific applications	Analyze						
IV. SYLLABUS:								
LIST OF EXPERIMENTS								
Week-1	CALIBRATION							
Calibration of Venturimeter and orifice meter.								
Week-2	PIPE FLOW LOSSES							
Determination of pipe flow losses in rectangular and circular pipes								
Week-3	BERNOULLI'S THEOREM							
Verification of Bernoulli's theorem.								
Week-4	REYNOLDS EXPERIMENT							
Determination of Reynolds Number of fluid flow								

Week-5	IMPACT OF JET ON VANES
Study Impact of jet on Vanes.	
Week-6	CENTRIFUGAL PUMPS
Performance test on centrifugal pumps.	
Week-7	RECIPROCATING PUMPS
Performance test on reciprocating pumps.	
Week-8	PELTON WHEEL TURBINE
Performance test on piston wheel turbine.	
Week-9	FRANCIS TURBINE
Performance test on Francis turbine.	
Week-10	FLOW THROUGH WEIRS
Rate of discharge Flow through Weirs	
Week-11	FLOW THROUGH NOTCH
Flow through rectangular and V-Notch	
Week-12	FLOW THROUGH ORIFICE MOUTH PIECE
Flow analysis of different shapes of mouth pieces	
Reference Books:	
<ol style="list-style-type: none"> 1. Yuan S W, "Foundations of fluid Mechanics", Prentice-Hall, 2nd Edition, 1987. 2. Milne Thompson L M, "Theoretical Hydrodynamics", MacMillan, 5th Edition, 1968. 3. Rathakrishnan. E, "Fundamentals of Fluid Mechanics", Prentice-Hall, 5th Edition, 2007. 4. Som S. K., Biswas. G, "Introduction to fluid mechanics and fluid machines", Tata McGraw-Hill, 2nd Edition, 2004. 	
Web References:	
<ol style="list-style-type: none"> 1. https://nptel.ac.in/courses/112105171/1 2. https://textofvideo.nptel.iitm.ac.in/112105171/lec1.pdf 3. https://www.fkm.utm.my/~syahruls/3-teaching/2-fluid-II/fluid-II-enote/32-pump-2.pdf 4. https://www.scribd.com/doc/16605891/Fluid-Mechanics 	
Course Home Page:	

LIST OF EQUIPMENTS REQUIRED FOR A BATCH OF 36 STUDENTS:

S No	Details of Equipment	Quantity Required	Experiment Number
1	Venturimeter setup	1	1
2	Orifice meter setup	1	1
3	Pipe friction setup	1	2
4	Flow through Weirs and notches	1	10, 11

5	Reynolds Apparatus	1	4
6	Bernoulli's Apparatus	1	3
7	Centrifugal pump	1	6
8	Reciprocating pump	1	7
9	Pelton wheel turbine	1	8
10	Francis turbine	1	9
11	Flow through External Mouthpiece	1	12
12	Impact on Jet of Vanes	1	5