INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad – 500043

Aeronautical Engineering

List of Laboratory Experiments

FLUID DYNAMICS LABORATORY								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
AAEC05	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		0	0	2	1	30	70	100
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 24**				**Total Classes: 24**		
Branch: AE	**Semester: III**	**Academic Year: 2021-22**				**Regulation: UG20**		

Course overview: 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 behaviour, 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.

Course objectives:

The students will try to learn:

I. The gain knowledge on working of centrifugal pumps, positive displacement pumps, hydraulic turbines centrifugal blowers and steam turbines.
II. The compare performance of various machines at different operating points.
III. The knowledge of various flow meters and the concept of fluid mechanics.

Course outcomes:

After successful completion of the course, students will be able to:

CO 1 **Interpret** the concept of calibrating orifice and venture meter for reducing the uncertainty in the discharge coefficient.
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 loses in closed pipes
CO 3 **Demonstrate** the verification of Bernoulli 's equation for an incompressible steady flow.
CO 4 **Utilize** the V notch and rectangle notch for predicting coefficient of discharge for open channel flows
CO 5 **Make use of** jet impact apparatus for identification of the reaction forces induced duet to change in momentum.
CO 6 **Distinguish** the performance characteristics of turbo machinery at various operating conditions for calculating efficacy of turbines under specific applications

WEEK NO	EXPERIMENT NAME	Course Outcomes
WEEK – I	**CALIBRATION OF VENTURIMETER**	CO1
	Determine the Coefficient discharge of Venturimeter	
WEEK – II	**CALIBRATION OF ORIFICE METER**	CO1
	Determine the Coefficient discharge of Orifice meter	
WEEK – III	**PIPE FLOW LOSSES**	CO2
	Determine the head loss in a pipe line due to sudden expansion / sudden contraction/ bend.	
WEEK – IV	**BERNOULLI'S THEOREM**	CO 3
	Investigate the validity of the Bernoulli equation when it is applied to a steady flow of water through a tapered duct.	
WEEK – V	**FLOW THROUGH ORIFICE MOUTHPIECE**	CO 3
	Determine the value of coefficient of discharge, coefficient of velocity and coefficient of contraction for the given orifice	
WEEK – VI	**FLOW THROUGH NOTCH-I**	CO4
	Determine the value of the discharge coefficient for rectangular notch	

WEEK – VII	**FLOW THROUGH NOTCH-II**	**CO4**
	Determine the value of the discharge coefficient for triangular Notch	
WEEK –VIII	**IMPACT OF JETS ON VANES**	**CO5**
	Investigate the reaction forces produced by the change in momentum of a fluid flow when a jet of water strikes a flat plate and a curved surface	
WEEK - IX	**CENTRIFUGAL PUMPS**	**CO6**
	Determine the overall efficiency of Single Stage centrifugal pump at constant speed and constant head	
WEEK - X	**RECIPROCATING PUMPS**	**CO6**
	Determine the overall efficiency of Reciprocating pump at Constant Speed and Constant Head	
WEEK - XI	**PELTON WHEEL TURBINE**	**CO6**
	Determine the overall efficiency of Pelton turbine at constant speed and constant head	
WEEK - XII	**FRANCIS TURBINE**	**CO6**
	Determine the overall efficiency of Francis turbine	