



LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)

Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada

L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

DEPARTMENT OF MECHANICAL ENGINEERING

FLUID MECHANICS AND HYDRAULIC MACHINES LAB

Introduction:

The Fluid Mechanics Laboratory is at service of the Department of Mechanical Engineering, The purpose of Fluid Mechanics and Hydraulic Machinery laboratory is to reinforce and enhance understanding of the fundamentals of Fluid mechanics and Hydraulic machines. The experiments here are designed to demonstrate the applications of the basic fluid mechanics principles and to provide a more intuitive and physical understanding of the theory. The main objective is to introduce a variety of classical experimental and diagnostic techniques, and the principles behind these techniques.

This laboratory is used by B.Tech 2nd and 3rd year students. The laboratory has as mission the offering of potentials for practical work and demonstrations for the sake of teaching activities by the sections as well as providing research facilities. This laboratory caters to the needs of mechanical and electrical engineering students in the subject of fluid mechanics and hydraulic machinery. The laboratory is equipped with a large number of equipment and experimental setups to study the fundamental and applied aspects of hydraulics and fluid mechanics.

R17 – IV Semester

17ME67 - FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

COURSE EDUCATIONAL OBJECTIVE:

In this course student will learn about the insights of calculating the discharge in various flow measuring devices, performance parameters of hydraulic machines.

COURSE OUTCOMES:

After completion of the course students are able to:

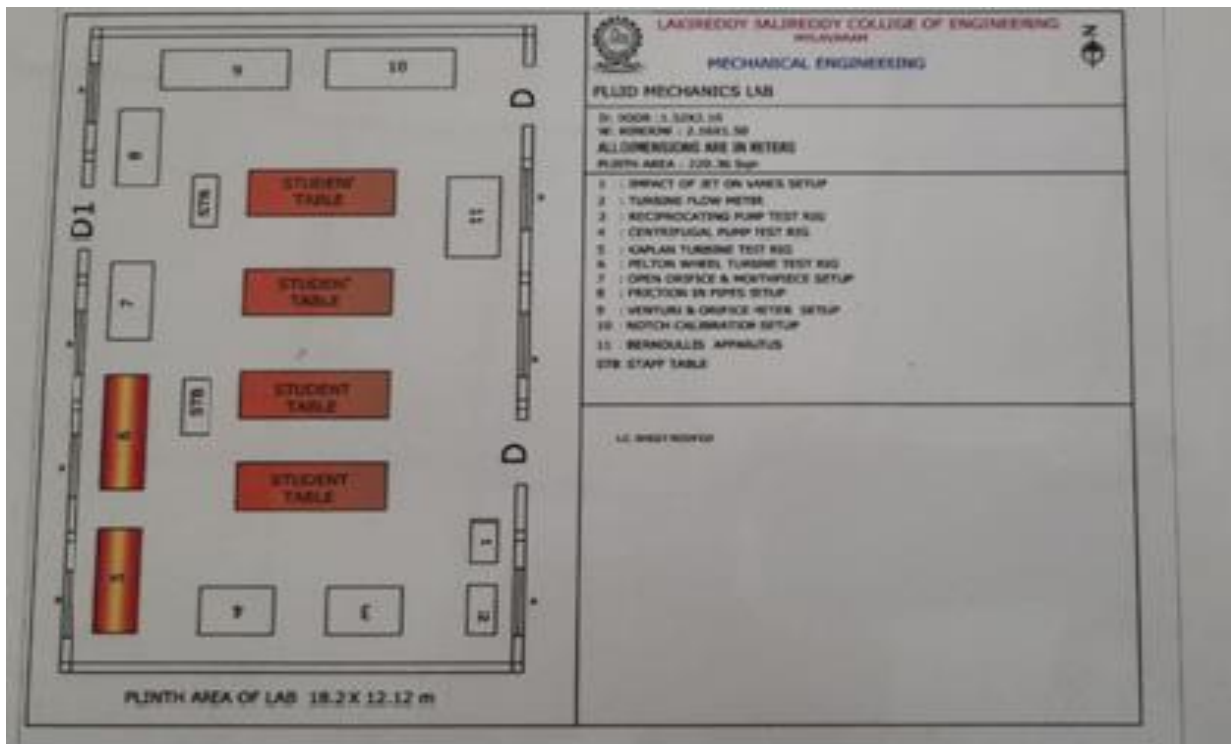
CO1: Tuning flow discharge measuring devices used in pipes channels and tanks.

CO2: Compute flow equations to solve control volume analysis problems in fluid mechanics.

CO3: Determine the laminar and turbulent boundary layer fundamentals in fluid flow problems.

CO4: Develop capability to apply conservation principles to hydraulic machines.

Lab Layout:



Over view of Fluid Mechanics and Hydraulic Machinery Lab

Equipment Details:

S. No.	EQUIPMENT	QTY	AMOUNT
1	Orifice and Mouthpiece Apparatus	01	87,516.00
2	Venturi meter and Orifice meter Apparatus	01	72,930.00
3	Notches Apparatus	01	82,654.00
4	Pipe Friction Apparatus	01	77,30.00
5	Bernoulli's Apparatus	01	34,034.00
6	Impact of Jet on vanes	01	72,930.00
7	Pelton Wheel Turbine	01	1,55,584.00
8	Reciprocating Pump	01	1,06,964.00
9	Kaplan Turbine	01	2,75,400.00
10	Centrifugal Pump Test Rig	01	1,16,275.00
11	Turbine Flow meter	01	1,06,144.00
TOTAL			11,87,737.00

List of Experiments:

S. No	Name of the Experiment
1	Verification of Bernoulli 's Theorem
2	Calibration of Venturi meter
3	Calibration of Orifice meter
4	Determination of friction factor for a given pipeline
5	Determination of loss of head due to sudden contraction in a pipeline
6	Determine Co-Efficient of Impact of jets on Vanes.
7	Performance Test on Pelton Wheel.
8	Performance Test on Kaplan Turbine.
9	Performance Test on Single Stage Centrifugal Pump.
10	Performance Test on Reciprocating Pump.
11	Calibration of Notches
12	Calibration of Mouthpiece
13	Calibration of Orifice
14	Calibration of Turbine flow Meter

PELTON WHEEL TURBINE:



Technical specifications:

Make	: IND – LAB EQUIPMENTS, Bangalore
Type of pump	: Multistage Centrifugal pump
Supply Pump head	: 0- 50 m
Pump capacity	: 200 LPM
Motor capacity	: 7.5 HP, 3 Ph, 440 V, 50 HZ, 13.5 A
Turbine type	: Reaction
Dia. of Propeller	: 300 mm
Alternator capacity	: 4 KW, 2500 RPM,
Loading	: Lamp loading
Sump tank size	: 1000 mm x 1000 mm
Collecting tank size	: 500 x 1500 x 500 mm
Notch canal size	: 390 x 1500 x 250 mm

KAPLAN TURBINE:



Technical specifications:

Make	: IND – LAB EQUIPMENTS, Bangalore
Type of pump	: Single stage Centrifugal pump
Supply Pump head	: 0- 10 m
Pump capacity	: 2000 LPM
Motor capacity	: 10 HP, 3 Ph, 440 V, 50 HZ, 13.5 A
Turbine type	: Reaction
Dia. of Runner	: 150 mm
Alternator capacity	: 4 KW, 2500 RPM,
Loading	: Lamp loading
Sump tank size	: 1000 mm x 1000 mm
Collecting tank size	: 1560 x720 mm
Notch canal size	: 1500 x 600 mm

RECIPROCATING PUMP TEST RIG:



Technical specifications:

Make	: IND – LAB EQUIPMENTS, Bangalore
Type of pump	: Single stage Centrifugal pump
Supply Pump head	: 0- 10 mts
Pump capacity	: 2000 LPM
Motor capacity	: 10 HP, 3 Ph, 440V, 50HZ, 13.5A
Turbine type	: Reaction
Dia. of Runner	: 150 mm
Alternator capacity	: 4 KW, 2500 RPM,
Loading	: Lamp loading
Sump tank size	: 1000 mm x 1000 mm
Collecting tank size	: 1560 x720 mm
Notch canal size	: 1500 x 600 mm

CENTRIFUGAL PUMP TEST RIG:



Technical specifications:

Make	: IND – LAB EQUIPMENTS, Bangalore
Type of pump	: Single stage Centrifugal pump
Type of Motor	: DC Motor
Motor capacity	: 2.25 kW, 3000 RPM, 16 A, 220 V.
Supply Pump head	: 40 mts
Pump capacity	: 5.8 LPS
Dia of Impeller	: 218mm
Alternator capacity	: 4 kW, 2500 RPM,
Loading	: Lamp loading
Pump size	: 50 mm x 40 mm
Area Collecting tank	: 0.25 Sq.m

IMPACT OF JET ON VANES:



Technical specifications:

Make	: IND – LAB EQUIPMENTS, Bangalore
Type of pump	: Single stage Centrifugal pump
Type of Motor	: A.C. Induction Motor
Motor capacity	: 1 Hp, Single phase, 220v, 50 Hz, 5.8A, 2800 RPM, .
Supply Pump head	: 12 mts
Pump capacity	: 450 LPM
Type of Vanes	: Hemisphere, Flat, Inclined

MOUTH PIECE SETUP:



Technical specifications:

Make	: IND – LAB EQUIPMENTS, Bangalore
Type of pump	: Single stage Centrifugal pump
Type of Motor	: A.C. Induction Motor
Motor capacity	: 1 Hp, Single phase, 220 V, 50 Hz, 6.5 A, 2800 RPM,
Pump discharge	: 1.1 LPS
Supply Pump head	: 24 mts
Orifice Dia.	: 10, 15, 20 mm
Mouthpiece types	: Convergent, Divergent, Straight, Bordas
Collecting tank size	: 0.12 sqm
Head over orifice & Mouthpiece	: 300, 400, 500 mm

FRICITION IN PIPES SETUP:



Technical specifications:

Make	: IND – LAB EQUIPMENTS, Bangalore
Type of pump	: Single stage Centrifugal pump
Type of Motor	: A.C. Induction Motor
Motor capacity	: 1 Hp, Single phase, 220 V, 50 Hz, 5.8 A, 2800 RPM,
Pump discharge	: 10 LPS
Supply Pump head	: 45 mts
Pressure Tapping Distance	: 1.5 m
Inside dia. 1” GI pipe	: 27 mm
Inside dia. 1” GI pipe	: 26 mm
Inside dia.3/4” GI pipe	: 20 mm
Inside dia.1/2” GI pipe	: 16 mm
Area of collecting tank	: 0.12 Sqm

VENTURI METER & ORIFICE METER SETUP:



Technical specifications:

Make	: IND – LAB EQUIPMENTS, Bangalore
Type of pump	: Single stage Centrifugal pump
Type of Motor	: A.C. Induction Motor
Motor capacity	: 1 Hp, Single phase, 220V, 50 Hz, 5.8 A, 2800 RPM,
Pump discharge	: 10 LPS.
Supply Pump head	: 40 mts
Venturi inlet dia.	: 25 mm
Throat dia.	: 12.5 mm
Orifice inlet dia.	: 25 mm
Area of collecting tank	: 0.12 sqm

NOTCH CALIBRATION SETUP:



Technical specifications:

Make	: IND – LAB EQUIPMENTS, Bangalore
Type of pump	: Single stage Centrifugal pump
Type of Motor	: A.C. Induction Motor
Motor capacity	: 1.5 Hp, Single phase, 220 V, 50 Hz, 6.5 A, 2800 RPM,
Pump discharge	: 3.4 LPS.
Delivery head	: 16 m
V. Notch angle	: 60 ⁰ , 90 ⁰ Throat dia.
Rectangular Notch Breadth	: 100 mm
Trapezoidal Notch Angle	: 0: 14 ⁰
Area of collecting tank	: 0.25 sqm

BERNOULLI 'S APPRATUS:



Technical specifications:

Make	: IND – LAB EQUIPMENTS, Bangalore
Type of pump	: Single stage Centrifugal pump
Type of Motor	: A.C. Induction Motor
Motor capacity	: 0.5 Hp, Single phase, 220 V, 50 Hz, 2.6 A, 2800 RPM,
Pump discharge	: 450 LPM
Delivery head	: 6.2 m
Area of collecting tank	: 0.115 sqm

TURBINE FLOW METER SETUP:



Technical specifications:

Make	: IND – LAB EQUIPMENTS, Bangalore
Type of pump	: Single stage Centrifugal pump
Type of Motor	: A.C. Induction Motor
Motor capacity	: 0.5 Hp, Single phase, 220 V, 50 Hz, 2.6 A, 2800 RPM,
Pump discharge	: 450 LPM
Delivery head	: 6.3 m
Area of collecting tank	: 0.05 sqm

Laboratory Utilization:

S. No.	Laboratory Name	Branch(s)
1	Fluid Mechanics and Hydraulic Machines Lab	B.Tech., IV Semester ME
2	Fluid Mechanics and Hydraulic Machines Lab	B.Tech., IV Semester Civil
3	Strength of Materials & Fluid Mechanics Lab	B.Tech., III Semester Aerospace
4	Basic Civil and Mechanical Engg. Lab	B.Tech., I Semester EEE

Faculty In-charge: Mr. D. Mallikarjuna Rao *M.Tech. (Ph.D)*

Sr. Technician: Mr. G. Subrahmanya Charyulu