

# **Fluid Mechanics Lab**

## **SUBJECT OVERVIEW:**

Fluids are a key element of study for many engineering disciplines. Fluid Mechanics is of vital importance in energy conversion systems (hydro power, gas turbines, combustion etc.), in process industry (paper, metals, polymers etc.) and for transports (airplanes, ships etc.). The Fluid Mechanics laboratory is actively engaged to reinforce and enhance understanding of the fundamentals of Fluid Mechanics. The experiments here are designed to demonstrate the applications of the basic fluid engineering principles and to provide a more intuitive and physical Understanding of the theory.

The all experimental set-ups are designed and developed by the institute according to the Indian standards. The Fluid Mechanics lab is equipped with different flow measuring set-ups such as venturi meter, orifice meter, nozzle, centrifugal head meter, where students can visualize the basic theory of working of the flow meter.



### **Centrifugal head meter:**

The primary element in a centrifugal head meter is a curved passage which may be in the form of either an elbow or a bend. As such when a fluid is flowing through an elbow or bend, the pressure at the outer wall is more as compared to the pressure at the inner wall. The difference in the pressure across the stream as if flows through a bend can be used to measure the discharge through the conduit.



### **Pipe Friction Factor:**

The flow of liquid through a pipe is resisted by viscous shear stresses within the liquid and the turbulence that occurs along the internal walls of the pipe, created by the roughness of the pipe material. This resistance is usually known as pipe friction and is measured in meters head of the fluid, thus the term head loss is also used to express the resistance to flow.



### **Venturimeter:**

Venturimeters are flow measurement instruments which use a converging section of pipe to give an increase in the flow velocity and a corresponding pressure drop from which the flowrate can be deduced. They have been in common use for many years, especially in the water supply industry.



### **Orifice meter:**

Measurement of the flow rates of liquids, gases and vapors with orifice meters has found wide use both in industrial and in scientific measurements. It consists of a flat orifice plate with a circular hole drilled on it. There is a pressure drop between upstream from the orifice plate and just downstream from which the flowrate can be deduced which gives a measure of the discharge.



### **Nozzle:**

Nozzles are profiled ducts for speeding up a liquid or a gas to a specified velocity in a preset direction. As the fluid flows through the nozzle it gets accelerated and the differential head is created across the entrance and the exit section of the nozzle and the differential head is related to the flow rate.



### **Impact of Jet:**

The purpose of this experiment is to demonstrate and verify the integral momentum equation. The force generated by a jet of water detected by an impact surface is measured and compared to the momentum change of the jet.



Stability study of a floating body is of importance because of the vessels floating in the sea, aero planes flying in the air and many other such applications. By stability of a body we mean that if any temporary extraneous displacement acts on the body then it should return back to the original position from its disturbed position.

### **Metacentric Height:**

