

HYDRAULIC LAB

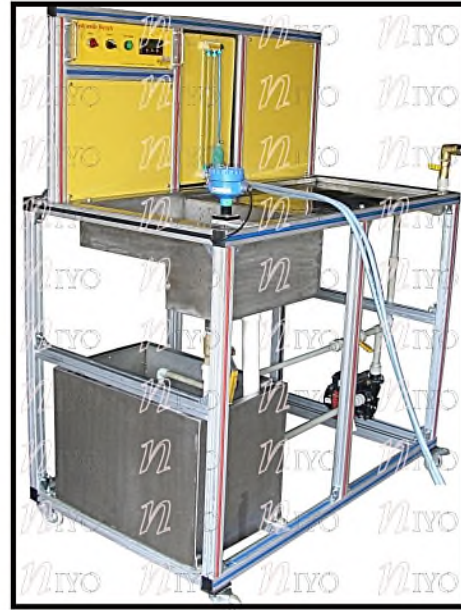
MODEL:FM10

HYDRAULIC BENCH MODEL (A)

This module is self-contained unit. This unit is used to provide all basic services for transportation and volumetric measurement of water. It has good working space and several experimental modules can be easily attached or mounted. Hence a wide range of experiments can be performed using these modules. Necessary pipes, fittings and valves are preinstalled with each module. The bench has the advantage of being non-corrosive and mobile.

It consists of,

- 1 Sump tank
- 2 Volumetric tanks
- 3 Centrifugal pump with motor
- 4 Work bench to conduct experiments and mount experimental modules

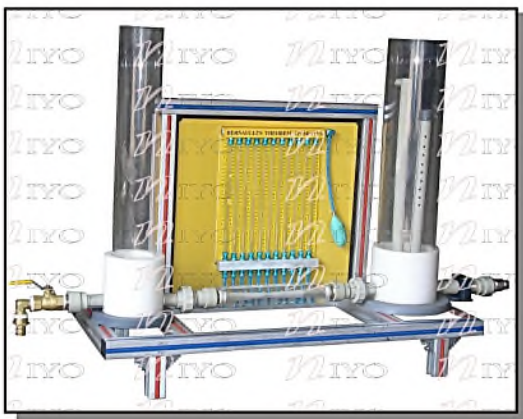


LOSSES IN PIPE FITTINGS & PIPE BENDS (B)

This module is used in conjunction with the hydraulic bench. The module used to determine the losses encountered during liquid flow through pipes, other fittings which occur due to presence of bends, valves & enlarged and diminished cross-sections. Tappings are taken at a fixed distances on the differential pressure and flow measuring arrangement are provided. Flow can be varied manually using combination of valves

Areas of study

- 1 Determination of heads loss due to friction in long bend
- 2 Determination of heads loss due to friction in short bend
- 3 Loss due to Sudden Expansion, Sudden Contraction
- 4 Loss due to friction in gate valve and globe valve



IMPACT OF JETS (C)

This module is used in conjunction with the hydraulic bench. This module helps in study of effects occurring due to the force exerted by a fluid jet on vanes of various shapes and hence evaluates the hydrodynamic force exerted.

Areas of study:

- 1 Measurement of force on flat/hemispherical and/or conical vanes
- 2 Comparison of change in momentum with force
- 3 Effect of impact due to change in jet size and flow rate. If optional jets are purchased
- 4 Effect of impact due to change in flow rate

LOSSES IN PIPES (D)

This module in conjunction with the hydraulic bench aims at studying the velocity profile for flow. Water is fed to pipe. Tapping are taken at a fixed distances on the pipe. These can be fitted to an U tube manometer. Flow is measured using flow measurement unit provided.

Areas of study:

- 1 Determination of Reynold's number
- 2 Determination of friction factor
- 3 Effects of material and size on friction factor If optional additional pipe set is purchased
- 4 Effect of size on friction factor If optional additional pipe set is purchased



BERNOULLI'S THEOREM (E)

The module can be used in conjunction with the hydraulic bench in order to study the variation in pressure distribution across varying cross sections and hence verify Bernoulli's theorem.

Areas of study

- 1 To verify Bernoulli's theorem
- 2 Flow measurement using venturimeter

CENTRE OF PRESSURE (F)

The module helps in the study of measurement of moment due to total thrust on wholly or partially submerged plain surface and its comparison with theory. This is therefore a convenient and effective means for determination of centre of pressure of a body.

Areas of study:

- 1 Measurement of centre of pressure of a vertical water submerged surface
- 2 Measurement of static thrust on a vertical water submerged surface



STABILITY OF A FLOATING BODY (METACENTRIC HEIGHT APPARATUS) (G)

The module is used to study and observe the various states of equilibrium attained by a floating body when its centre of gravity is displaced, leading to the determination of the metacentric height of the floating body and hence illustrating the floatation characteristics.

Areas of study:

- 1 Determination of the metacentric height of a floating body.
- 2 Comparison of actual results with theoretical predictions

FREE AND FORCED VORTICES (H)

The module in conjunction with the hydraulic bench helps in study of vortex formation when a liquid is under the influence of a rotational motion. Necessary arrangement enables complete study of the profile of both free and forced vortices under changing conditions of speed and volume of liquid.

Areas of study:

- 1 Determination of surface profile of free and vortex.
- 2 Determination of total head variation in a free and forced vortex.
- 3 Comparison of practical results with theoretical predictions.

ORIFICE AND MOUTHPIECE (I)

The module in conjunction with the hydraulic bench helps in study of change in discharge of a liquid through an orifice and mouthpiece of uniform cross-section, under varying pressure heads. The experiments can also be carried out with different orifice plates by maintaining a constant pressure head.

Areas of study:

- 1 Determination of coefficient of discharge
- 2 Verification of the relationship between flow and head





ORIFICEMETER , VENTURIMETER (K)

An orifice meter and venturi meter are fitted into two parallel lines with valves to select the use of any one at a time. Tapping are taken at a fixed distances on the pipe for the differential pressure measurement on a U tube manometer. Facility to change the flow is provided. Results obtained from various flow meters are compared and studied. Rotameter is optionally available.

Areas of study

- 1 Determination of flow coefficient
- 2 Study of variable area flow meters. If Rotameter is purchased.
- 3 Comparison of different type of flow meters
- 4 Comparisons of pressure drop across Venturi meter and Orifice meter.

REYNOLD'S APPARATUS (L)

The Trainer consists of a properly machined transparent tube that is connected to a sump tank. The supply tank supplies the steady and uniform water flow into the tube. The flow rate and other parameters decide the nature of the flow. By injecting the dye one can visually observe the laminar turbulent or transition flow patterns.

Areas of study

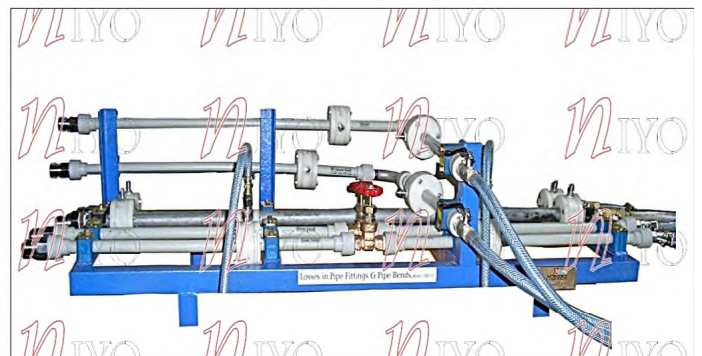
- 1 Demonstration of Laminar and Turbulent Flow.
- 2 To determine the Reynold's Number of flow.

NOTCHES APPARATUS (J)

The module in conjunction with the hydraulic bench helps in study of the relationship between upstream water level and discharge over a notch. Changing flow patterns due to different notches can also be effectively studied. if different notches are purchased.

Areas of study

- 1 Determination of coefficient of discharge for each type of notch
- 2 Verification of relationship between head and flow for various types of notch



COMPONENT	A	B	C	D	E	F	G	H	I	J	K	L
Sump Tank	1											
Volumetric tanks	1											
Centrifugal Pump with Motor	1											
Work bench to conduct experiments and mount experimental modules	1											
Pipes and fittings	1	1		1	1						1	1
Differential pressure manometer	1				1							
Supply Manifold	1											
Transparent vertical vessel			1		1							1
Diff. types of brass vanes- horizontal/ conical and/or Hemispherical			1 each									
Nozzle(s)			1									
Bernoulli Tube					1							
Centre of pressure apparatus						1						
Set of weights						1 set	1 set					
Water tanks							1					
Floating body							1					
Transparent rotating vessel								1				
Electric geared motor								1				
Speed variation unit								1				
Constant Head Tank									1	1		
Sharp edged orifice plates									1 set			
Mouthpieces									1 set			
Rectangular/ V and/or Trapezoidal notch										1 set		
Hook gauge/Level Measuring Arrangement								1		1		
Venturimeter											1	
Orificemeter											1	
Rotameter											1	

INSTRUCTION MANUAL

Self-explanatory operating manuals are provided with each system. Detailed theory as well as practical exercises is also included in the manual

SERVICES REQUIRED

1. Electric supply 220V A. C., 50 Hz
2. Water supply and drain arrangement

Note:

List of experiments mentioned under Areas of study may vary depending on model selected .accessories ordered



engineers

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