FLUID MECHANICS

CIVIL ENGINEERING VIRTUAL LABORATORY

EXPERIMENT: 4 **MOUTHPIECES**

INTRODUCTION:

A mouth piece is a short length of the pipe about three times its diameter connected to the face of an orifice, which is provided in the side or bottom of the vessel. It is used for the measurement of discharge of large quantities of liquid since; the rate of discharge through a mouth piece will be more than that of an orifice, for the same diameter and head.

OBJECTIVE:

To determine the coefficients of discharge (C_d) of the given mouth piece.

GRAPHS:

Q_a Vs $\sqrt{h}$

Q_a Vs h

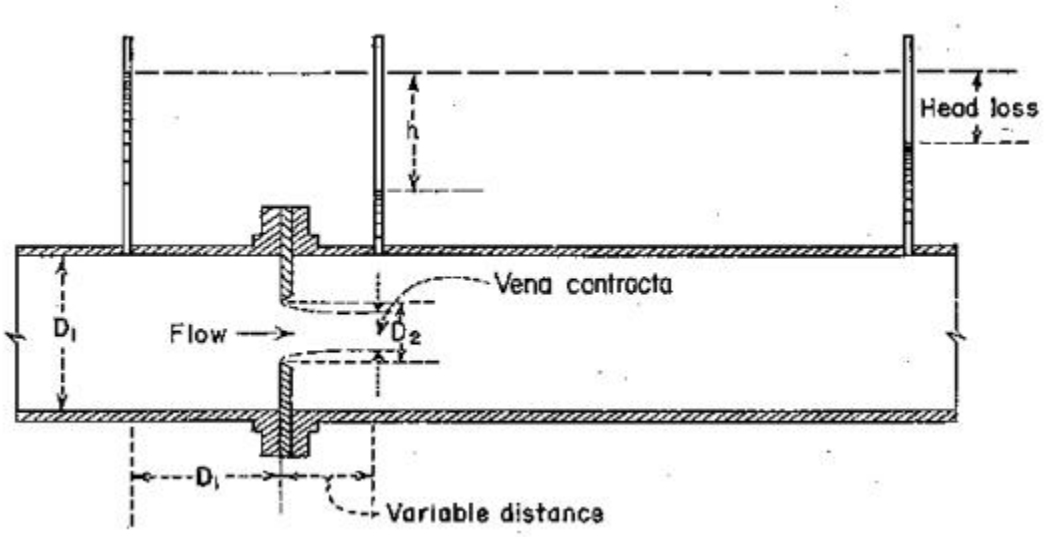
Taking h and $\sqrt{h}$ on x-axis Qa on y- axis.

EQUIPMENT:

- Mouth piece fitted to a balancing tank.
- Piezometer, to measure the head of water.
- Meter scale, to measure the internal dimensions of the collecting tank.
- Callipers to measure the internal diameter of the mouth piece.
- Stop watch to measure the time of collection of discharge for known rise of water level in the collecting tank.
- Collecting tank with control valve to collect the water.

THEORY:

The test rig consists of a mouthpiece fitted to a tank along with piezometer. The liquid is allowed to flow through the mouth piece and the liquid from the mouth piece is collected in the collecting tank fitted with piezometer to measure the rise of the liquid level.



PROCEDURE:

- Measure the internal diameter of the mouth piece using calipers.
- Measure the internal plan dimensions of the collecting tank.
- Open the inlet valve to allow the water in to the balancing tank.
- Maintain a steady head in the balancing tank by operating the inlet valve
- When the head causing flow is maintained constant, close the outlet valve of the collecting tank.
- Using the stopwatch, note the time taken (t) for a known rise (H) of water level in the collecting.
- Repeat the above procedure for at least five times and tabulate the observations.
- Calculate the co-efficient of discharge, Cd for each observations and compute the average value

OBSERVATIONS AND TABULATIONS:

Diameter of mouthpiece, d = mm

Internal plan dimension of collecting tank

Length of collecting tank, L= mm

Width of collecting tank, B = mm

Area of collecting tank, A = L x B = mm

S.No	HEAD (h) mm	Time 't' to 'H' mm of rise in collecting tank			$\sqrt{h}$	Actual discharge (Q_a) in m^3/sec	Theoretical discharge (Q_t) in m^3/sec	Co-efficient of discharge (C_d)
		T_1	T_2	Avg.				
1								
2								
3								
4								
5								

Mean value of C_d =

Specimen calculations:

Area of mouth piece, a = $\frac{\pi d^2}{4}$ = mm^2

Actual discharge, Q = $\frac{AH}{t}$ = $\frac{mm^3}{sec}$

Theoretical discharge, Q_t = $A\sqrt{2gh}$ = $\frac{mm^3}{sec}$

Coefficient of discharge C_d = $\frac{Q_a}{Q_t}$ =

g – Acceleration due to gravity (9.81)

RESULT:

- The Value of coefficient of discharge C_d =

QUIZ:

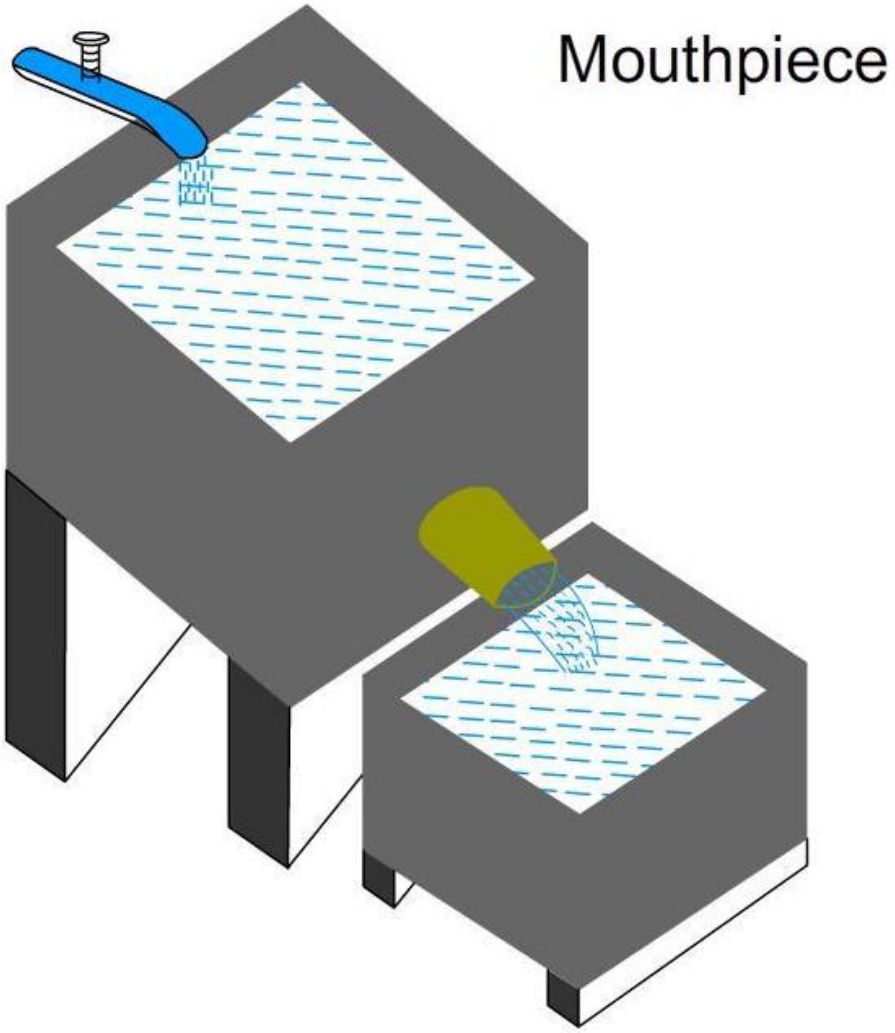
1) The approximate distance of venacontracta from the centre of orifice is
   a) d
   b) d/2
2 Coefficient of mouth piece is better than orifice
   a) true
   b) false
3 Location of vena contracta is d/2
   a) true
   b) false
4 A mouth piece is a short length of the pipe where 3times its diameter is connected to the face of an orifice.
   a) true
   b) false
5 The rate of discharge of an mouth piece is more than that of orifice
   a) true
   b) false
6 The approximate distance of venacontracta from the centre of mouthpiece is d
   a) true
   b) false

REFERENCES:

1) FLUID MECHANICS- RK BANSAL
2) EXPERIMENTS ON FLUID MECHANICS- SARABJIT SINGH
3) WIKIPEDIA
4) The constructor - http://theconstructor.org/

PART – 2

ANIMATION STEPS



PART – 3

VIRTUAL LAB FRAME