FLUID MECHANICS
VENTURIMETER EXPERIMENT

BACKGROUND

A Venturimeter is a tube with a constricted throat section that increases velocity and decreases pressure (**Figure 1**). Venturimeters are used for measuring the flowrate of both compressible and incompressible fluids in a pipeline.

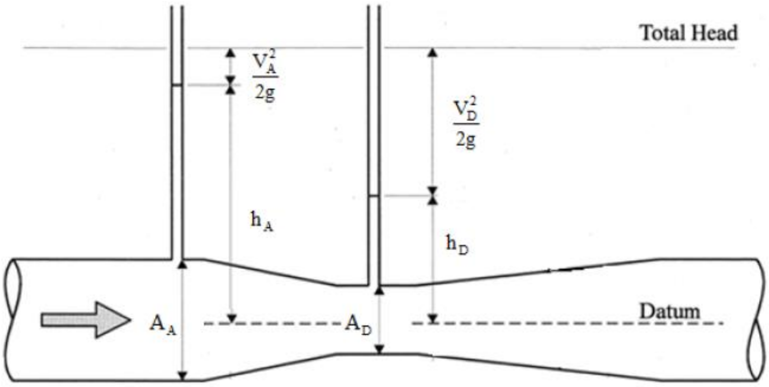

Figure 1. Ideal Conditions for venturimeter

Using the continuity and energy equations between the upstream section (cross-section A) and the throat (narrowest pipe section – cross-section D) it can be shown that;

$$Q = C_d A_D \sqrt{\frac{2g(h_A - h_D)}{1 - \left(\frac{A_D}{A_A}\right)^2}}$$

where, **D_A=26mm, D_D=16mm** (Diameters for each section)

Q_{actual}:Actual discharge, Q_{theory}:Theoretical discharge, C_d:Discharge coefficient, h_A:Head at the upstream section, h_D:Head at the throat section section, A_A:Pipe cross sectional area at the upstream section, A_D:Pipe cross-sectional area at the throat section.

The discharge coefficient (C_d), In other words the coefficient of the Venturimeter, typically has a value between 0 and 1. The actual value is dependent on a given Venturimeter, and then it may change with flowrate.

CALCULATIONS

1. Read the piezometric heights in each section. Fill the table given below.

Experiment 1			
Piezometric	**Actual**	**Area (m^2)**	**Velocity head**

height (mm)		Flowrate (m^3/sec)			(m)	
Section A	Section D		Section A	Section D	Section A	Section D

Experiment 2						
Piezometric height (mm)		Actual Flowrate (m^3/sec)	Area (m^2)		Velocity head (m)	
Section A	Section D		Section A	Section D	Section A	Section D

2. Give brief explanation about venturimeters and experimental setup.

3. Use Bernoulli equation to calculate the velocity at the throat section (V_D). **<u>Discuss and compare your result.</u>**

4. Compute Q_{actual} and Q_{theory}. Find the discharge coefficient (C_d) for both experiments. **<u>Discuss your result.</u>**

5. Do you have any suggestions for improving this apparatures.

<u>Include all 5 answers in your report….</u>