No. CLASS

ROLL No.

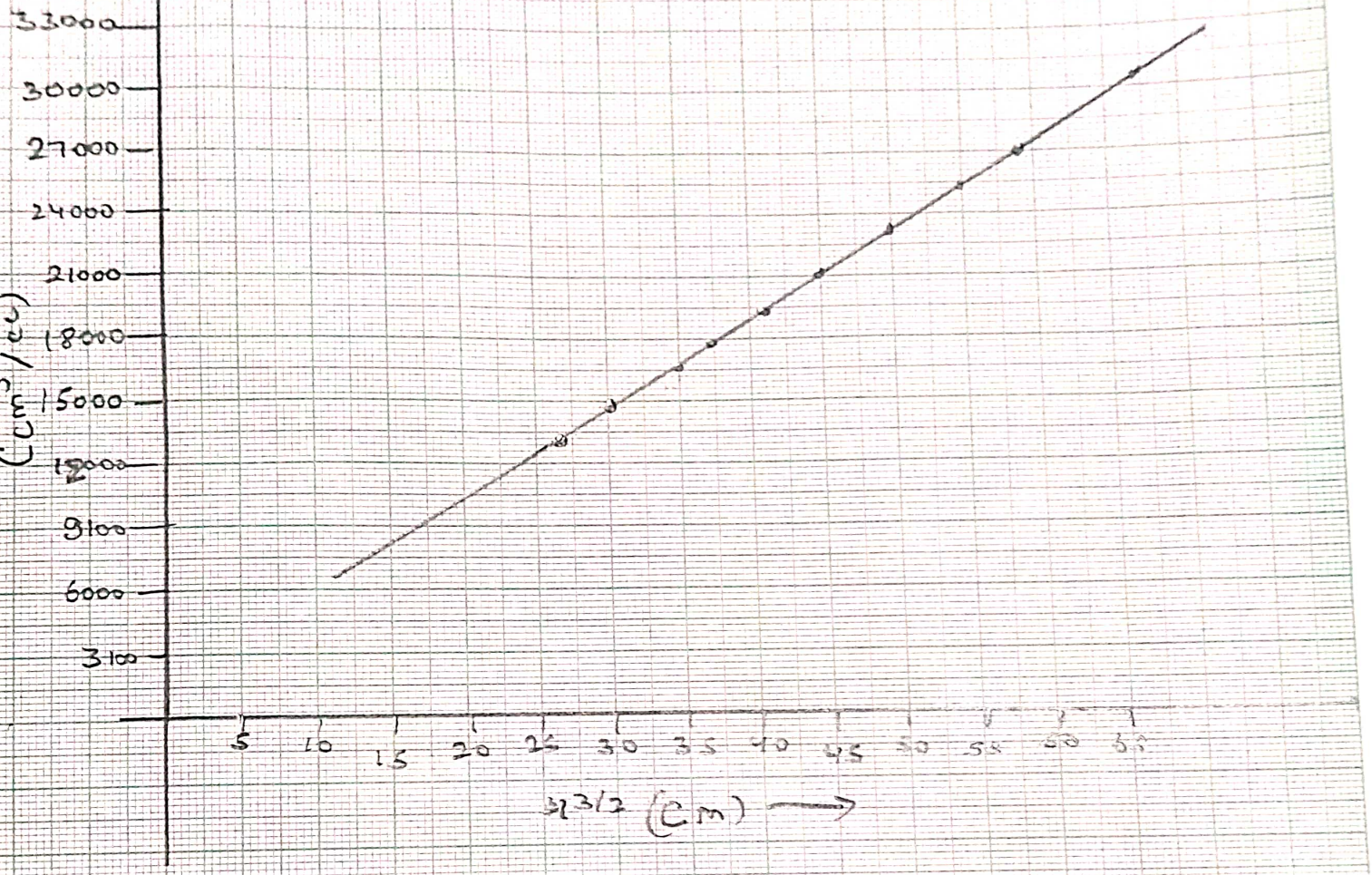
| Sl no | Q in 1000 gallon/hr | | | H | H | Q | $H^{3/2}$ | Cd | Mean Cd | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Left | Right | Mean | in cm | cm | $cm^3/sec$ | | | | log Q | log H |
| 1 | 24 | 24 | 24 | 6.3 | 16 | 30310 | 64 | 0.6315 | (Experimental) | 11 | 1.20 |
| 2 | ~~21.5~~ | 22.5 | 22.5 | 6 | 15.24 | 28416 | 59.49 | 0.6369 | | 1.58 | 1.20 |
| 3 | 21 | 21 | 21 | 5.7 | 14.48 | 26521 | 55.1 | .6448 | | 1.55 | 1.18 |
| 4 | 19.5 | 19.5 | 19.5 | 5.4 | 13.72 | 24627 | 50.82 | .6468 | | 1.32 | 1.16 |
| 5 | 18 | 18 | 18 | 5.1 | 12.95 | 22739 | 4660 | .6504 | | 1.29 | 1.14 |
| 6 | 16.5 | 16.5 | 16.5 | 4.9 | 12.44 | 20838 | 43.93 | .6325 | | 1.26 | 1.11 |
| 7 | 15 | 15 | 15 | 4.5 | 11.43 | 18944 | 38.64 | .6597 | | 1.22 | 1.09 |
| 8 | 13.5 | 13.5 | 13.5 | 4.3 | 10.92 | 17049 | 36.09 | .6299 | | 1.18 | 1.06 |
| 9 | 12 | 12 | 12 | 3.9 | 9.91 | 15155 | 31.2 | .6476 | | 1.08 | 1.04 |
| 10 | 10.5 | 10.5 | 10.5 | 3.5 | 8.89 | 13260 | 26.51 | .0669 | | 1.02 | 0.95 |

Breadth of Notch $C_d$ = 25.4 cm (from graph)

Slope $= \tan\theta = \frac{Q}{H^{3/2}} = \frac{(26.4-12)\times 10^3}{55-25} = 0.48\times 10^3 = 480$

240000 gallon/hr $= \frac{24000}{3600}$ gallons/sec $= 66.6$ gallon/sec

$= 66.6 \times 4.5$ l/sec $= 66.6 \times 4.54 \times 1000$ Cc/sec




$$\text{Slope} = \frac{Q}{H^{3/2}}$$

$$\therefore Q = \frac{2}{3} C_d \sqrt{2g}\, B H^{3/2}$$

$$\therefore C_d = \frac{3Q}{2\sqrt{2g}\, B H^{3/2}} = \frac{3}{2} \frac{\text{Slope}}{\sqrt{2g}\, B}$$

# Experiment No:-5
## Rectangular Notch

**Object:-** To determine the Coefficient of Discharge ($C_d$) of a small rectangular notch.

**Apparatus used:-** Manometer, stop watch, Venturimeter, Hook gauge, Channel, rectangular Notch.

**Theory:-** A notch is a device used for measuring the rate of flow of a liquid through a small channel or a tank. It is defined as an opening in the side of a tank or a small channel in such a way that the liquid surface in the tank or channel is below the top edge of opening. It may be rectangular, triangular, trapezoidal and/or stepped.

**Formula used:-**

1. The quantity of water flowing over a rectangular notch is given by expression:

$$Q = C_d (2/3) \cdot (\sqrt{2g}) \cdot L \cdot H^{3/2}$$

where $C_d$ = Coefficient discharge, $L$ = Breadth of Notch
$H$ = height of water above S.L.

2. Alternative method is to assume the discharge to be proportionate to height

$Q = K H^n$, where $K = C_d \cdot (2/3) \cdot (\sqrt{2g}) L$

$\log Q = \log K + n \log H$, $n = [\log Q - \log K] / \log H$,

Say $n = 3/2$

Plot $H^{3/2}$ as base and Q as vertical ordinate.

Find Slope from graph = $\tan \theta = Q/(H)^{3/2}$

$C_d = \text{Slope} \cdot (2/3) \cdot (\sqrt{2g}) L$

Procedure :

(i) For a given Inlet: Vary speed N by placing Allow water to flow into the channel through notch. Take initial readings of the Hook gauge keeping pointer touching the surface of water which is just touching the sil of the notch and no flow over the notch is taking place.

(ii) Open the valve to the full and see that flow has stabilised. Take the readings of the pointer gauge with the pointer just touching the water surface for different discharge at regular intervals.

(iii) Take the readings of venturimeter. Take at least 10 sets of such readings.

Observation :-

Breadth of notch = 25.4 cm

Graph :-

(i) Starting from origin plot H at base Vs Q at vertical ordinate and determine Cd from graph [C = Slope / [2(3) x (√2g) L]

(ii) Starting from origin plot H at base Vs. Q at vertical ordinate which is parabolic and termed as calbiration graph

(iii) Starting from origin plot Log H at base vs Log Q at vertical ordinate and find value of n and Cd from graph.

Result :-

(i) Mean value of C obtained experimentally is 0.626 and obtained from straight line graph b/w Q and $H^{3/2}$ is 0.63.

ii) Graph b/w Log Q and log H is a straight line and value of n calculated from graph is 1.5

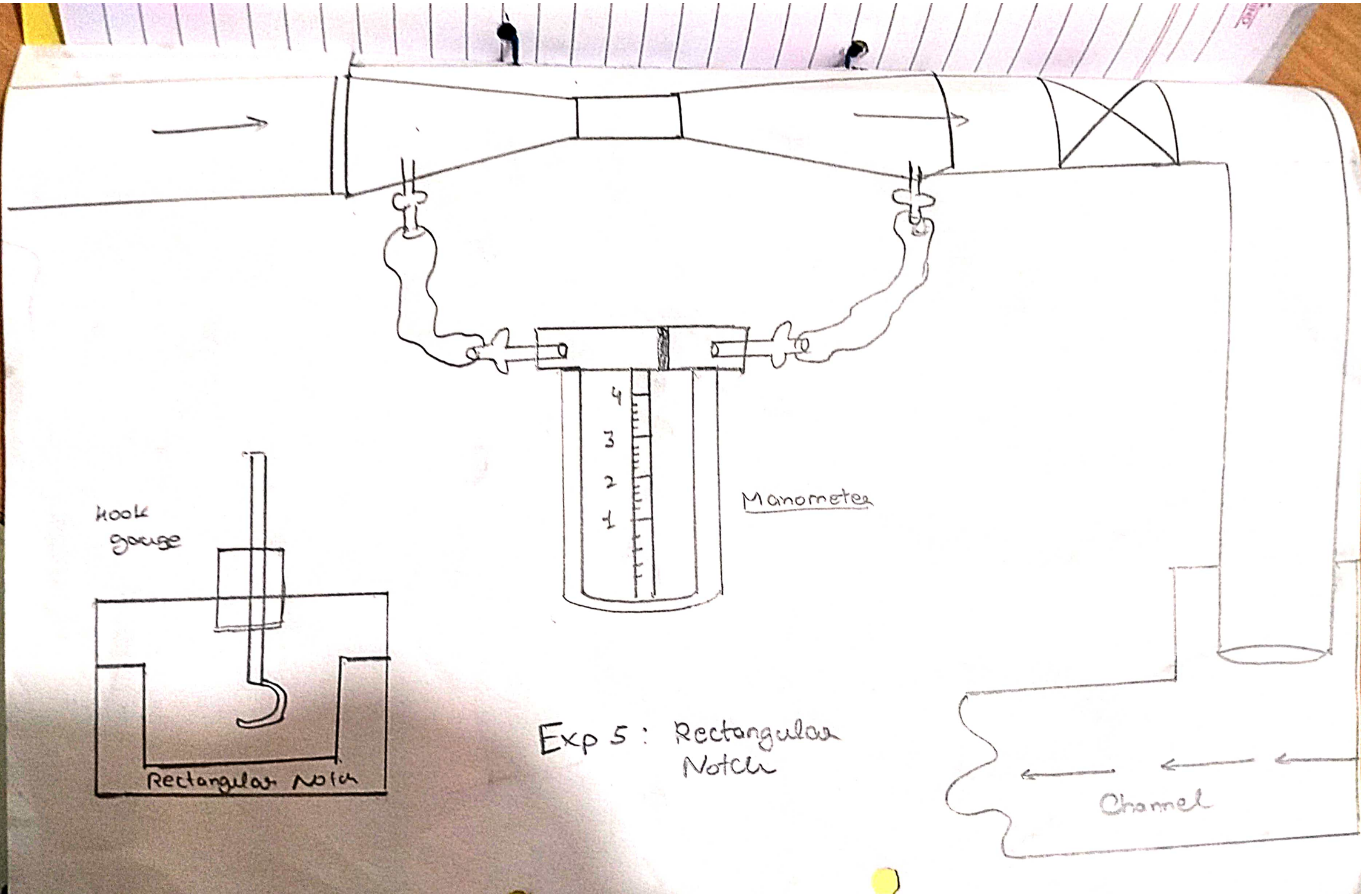
Precaution :-

(i) Valve was opened slowly and carefully to take reading of manometer level in stable position. There shall be no air bubble in manometer tube and pipes etc.

(ii) The pointer of Hook Gauge shall be just touching the water level.

Comments :- Nature of graph to be discussed

Utility :- Flow in pipe line can be determined with minimum head loss.




Exp 5 : Rectangular Notch