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ID # 7846

Section # "B"

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Subject # Hydraulic Eng.

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Assignment #1 (1) 7846.

1: What is venture flame ? explain with detail:.

Ans: A VENTORI FLAME :->

Ventori flame is a critical flow open flame with a constructed flow which causes a drop in the hydraulic grade line, creating depth.

It is used in flow measurment of very large flow rates usually givens in millions of cubic units.

A ventori meter would normaly measure in mm whear as a ventori flame measure is meters.

Measurment of dis charge with ventri flames requires two measurmend one up stream and one at the throat.

If the flow passes is subcritical state through the flame. if the flame are designed so at as to pass the flow from subcritical to the super-critical state while passing through the flame, a single measurment at the throat is sufficient for computation of discharge to ensure the occurence of critical depth at the throat the flumes are usually designated in such away as to form.

(2): Example:
A 3m wide channels carries a total discharge of $12 m^3 s^{-1}$. calculat.

* The critical depth.
* The minimum specific energy.
* The alternate depth while.

$E = 4m$, $b = 3m$, $Q = 12\ m^3 s^{-2}$

A :- Discharge per unit width. 7846 (3)

$$q = \frac{Q}{b} = \frac{12}{3} = 4\ m^2 s^{-1}$$

$$h_c = \left(\frac{q^2}{g}\right)^{1/3} = \left(\frac{4^2}{9.81}\right)^{1/3} = 1.177\ m.$$

=> Answer :

critical depth = $\boxed{1.18\ m.}$

B :->

For rectangular channel

$$E_1 = \frac{3}{2} h_c = \frac{3}{2} \times 1.177$$

$$= \boxed{1.766\ m}$$

=> Answer minimum Specific energy

= 1.77 m

C :-

As $E > E_1$ There are two possible depth for a given specific energy.

$$E = h + \frac{v^2}{2g} \quad \text{where. } v = \frac{Q}{A} = \frac{q}{h} \rightarrow \text{for Rectangular channel.}$$

$$\Rightarrow E = h + \frac{q^2}{2gh}.$$

Subsituting value in meter second units. 7846. (4)

For subcritical (slow, deep) The 1st term associated with P.E.

$$h = y \quad \frac{0.8155}{h^2}$$

$$\boxed{y = 3.45 \text{ ft}}$$

ASSIGNMENT # 02

Problem # 01 → Water flows a depth of 10cm with a velocity of 6 m/s in a Rectangular channel what is the alternate depth.

Solution :→

Cheak Froude no.

$$Fr = \frac{V}{\sqrt{gy}} = \frac{6\ m/s}{\sqrt{9.81\ m/s^2 \times 0.1\ m}}$$

$$= 1.935\ m$$

So the flow is supper critical,

$$E = y + \frac{V^2}{2g} = 0.1\ m + \frac{(6\ m/s)^2}{2 \cdot 9.81\ m/s^2}$$

$$= 1.935\ m$$

⇒ Solving from for Alternate depth for an

$E = 1.935m$.

Yields $y_{alt} = 1.93\ m$.

Scanned with CamScanner

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Problem # 2.

water flows with a velocity of 2 m/s and at a depth of 3m in a rectangular channel ....

SOLUTION :-> $E_1 = y_1 + \frac{v_1^2}{2g} = 3\,m + \frac{2\,m/s^2}{2 \times 9.81\,m/s^2}$

$$\boxed{E_1 = 3.20\,m.}$$

$E_2 = E_1 - \Delta z \Rightarrow 3.20\,m - 0.60\,m \Rightarrow \boxed{2.60\,m}$

Also $E_2 = y_2 + \frac{q^2}{2g \cdot y_2^2} = y_2 + \frac{(6\,m^3/s\,m)^2}{2 \times 9.81\,m/s^2} =$

$\Rightarrow \boxed{2.60\,m}$

So $y_2 = 2.24\,m$ $\quad \Delta y = y_2 - y_1 = 0.76\,m.$

So water surface drops 0.16 m for a downward step 15 cm we have.

$E_2 = E_1 - \Delta z \Rightarrow 3.20\,m - (-0.15\,m)$
$\Rightarrow \boxed{3.35\,m}$

giving 'y_2' $= 3.17\,m$ and $\Delta y_2 = y_2 - y_1 \Rightarrow \boxed{0.17\,m}$

So water surface raises $\Rightarrow \boxed{0.02\,m}$

The maximum upstream.

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Possible before effecting upstream water surface level is for.

$$y_2 = y_c$$

$$y_c = \sqrt[3]{\frac{q^2}{g}} = \sqrt[3]{\frac{(6 m^3/s\,m)^2}{9.81\ m/s^2}}$$

$$\Rightarrow \boxed{1.54\ m.}$$

ASSIGNMENT # 03. 7646. (8)

Problem :

A water Passing from the slice gate in Dam having a depth of water at upstream side is 3.6m. After Passing through sluice gate The back water curve shows that ....

Given Data :->

$y_1 = 3.8m$; $y_2 = 0.9m$

$b = 3.9m$.

Solution :->

As we know that.

$E_1 = E_2$.

$$\Rightarrow y_1 + \frac{v_1^2}{2g} = y_2 + \frac{v_2^2}{2g} \rightarrow (1).$$

$$\Rightarrow Q = A_1 v_1 = A_2 v_2$$

$$b_1 y_1 \cdot v_1 = b_2 y_2 \cdot v_2 \qquad b(b_0 = b_1 = b_2).$$

$$\cancel{b_1} y_1 v_1 = \cancel{b_2} y_2 . v_2$$

$$y_1 v_1 = y_2 v_2$$

$$v_2 = \frac{y_1}{y_2} \times v_1$$

$$V_2 = \frac{3.6}{0.9} \times V = 4v_1 \rightarrow (2).$$

Put eq(1).

$$y_1 + \frac{v_1^2}{2g} = y_2 + \frac{v_2^2}{2g}$$

$$\Rightarrow 3.6 + \frac{v_1^2}{2g} = 0.9 + \frac{(4v_1)^2}{2g}$$

$$\Rightarrow \boxed{v_1 = 1.879 \text{ m/sec}}$$

Put in eq (2) we got.

$$V_2 = 4v_1$$

$$Q_1 = A_1 v_1 = b y_1 . v_1$$

$$= 3.9 \times 3.6 \times 1.879$$

$$\boxed{Q_1 \Rightarrow 26.38 \text{ m}^3/\text{sec}}$$

$$\Rightarrow Q_2 = A_2 V_2 = b . y_2 . V_2$$

$$= 3.9 \times 0.9 \times 7.516$$

$$\boxed{Q_2 \Rightarrow 26.38 \text{ m}^3/\text{sec}}$$

1) Froud number: → At upstream side.

$$Fr_1 = \frac{V1}{\sqrt{gy_1}} = \frac{1.879}{\sqrt{9.81 \times 3.6}} = \boxed{0.3}$$

↓

subcritical flow

2) Froud number → At down stream side.

$$Fr_2 = \frac{V2}{\sqrt{gy_2}} = \frac{7.516}{\sqrt{9.81 \times 0.9}} = \boxed{2.52}$$

↓

Super critical flow.