NAME :

NAVEED AHMAD

I.D :- 7880

SUBJECT :-

FLUID I

SEMS :- SUMMER - FINAL

DEPTT :- CIVIL.

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QUISTION- 1 "ä"

DISCHARGE :-

"The amount of fluid passing a section of a stream in unit time is called discharge."

If v is the mean velocity and A is the cross sectional area, the discharge Q is defined by $Q = AV$ which is known volume flow rate. Discharge is also expressed as mass flow rate and weight flow rate.

Volume flow rate, $Q = AV$

mass flow rate, $M = \rho Q$

Weight flow rate, $W = \gamma Q$

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Where

Q = discharge is in m^3/sec or ft^3/sec

A = cross sectional area of flow in m^2 or ft^2

v = mean velocity of fluid in kg/m^3 or $slug/ft^3$

γ = unit weight of fluid in N/m^3 or Lb/ft^3

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HEAD :-

"It is the sum of all energies head at a point in fluid or total energy per unit weight of fluid at a point"

From Bernoulli's principal. the total energy at a given point in a fluid is the energy associated with the moment of the fluid, plus energy from static pressure in fluid plus energy from the hight of fluid relative to an arbitrary datum. Head expressed in unit of height such as meter or feet.

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TYPES OF HEAD

Following are types of Head.

- Kinitic head
- potential head
- Pressure head

KINITIC HEAD :-

It is kinit energy per unit weight of fluid

$\frac{K.E}{W} = \frac{1}{2} \frac{mv^2}{mg} = \frac{v^2}{2g}$ which is kinit head.

POTENTIAL HEAD :-

It is potential energy per unit weight of fluid

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$$\frac{P.E}{W} = \frac{mgh}{mg} = h$$

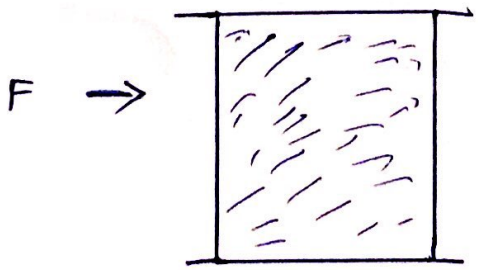
which is potential head.

PRESSURE HEAD:-

The vertical hight of a free surface above any point in a liquid at rest is pressure head OR level of fluid due to pressure exerted by fluid.

Which is $\frac{Work}{W} = \frac{F.ds}{W}$

$$\frac{PA.ds}{W} = \frac{P \times Vol}{W} = \frac{P}{\gamma}$$



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QUESTION- 2- "a"

DATA:-

Velocity = 20 cm/s = 0.2 m/s

Datum height, z = 0.4 m

Pressure 'p' = 30 kPa.

γ = 9810.

SOLUTION:-

H = ?

$$H = z + \frac{V^2}{2g} + \frac{P}{\gamma}$$

$$H = 0.4 + \frac{(0.2)^2}{2 \times 9.8} + \frac{30 \times 10^{+3}}{9810}$$

$$H \Rightarrow \boxed{3.4601}$$

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QUESTION - 2 "b"

GIVEN DATA:-

dia = 150 mm = 0.15m

discharge, Q = $0.5\ m^3/s$

REQUIRED:-

Velocity = ?

SOLUTION:-

$Q = AV$

$V = Q/A$

$= \dfrac{0.5}{\frac{\pi}{4} d^2}$

$\Rightarrow \dfrac{0.5}{\frac{\pi}{4} (0.15)^2}$

$\Rightarrow \boxed{28.29}$

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QUISTION-3

GIVEN DATA:

Spacific gravity = 0.9

length = 40m

dia = 200mm = 0.2m

Viscosity = 6x10^{-5} N.S/m^2.

Q = 0.06 m^3/s

f = 0.032

REQUIRED:

Head loss = H_L = ?

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SOLUTION:-

$$h_L = f \frac{L}{D} \frac{V^2}{2g}$$

Now we will find

$$Q = AV, \quad V = \frac{Q}{A}$$

$$= \frac{0.06}{\frac{\pi}{4}(0.2)^2}$$

$$V = 1.9098.$$

$$h_L = 0.0032 \times \frac{40m}{0.2m} \times \frac{(1.9098)^2}{2 \times 9.8.}$$

$$\boxed{h_L = 0.119}$$

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