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Sec :- B

Subj :- Fluid Mechanics.

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Q1 a Define viscosity ? Derive Newton equation of viscosity.

viscosity :-

Viscosity is the propority of fluid which Opposses the relative motion between the two Surface of the Fluid. Different Fluid have different viscosity depends upon the incermolecular force in Fluid.

Example :- has great viscosity Than water → (H_2O)

Newton Equation of viscosity :-

it is states That.

" The shear stress in a flowing Fluid is directly propotional to

The rate of Shear Strain

Mathematically:

$$\tau \propto du/dy$$

$\tau \rightarrow$ Shear Stress

$$\tau \propto du/dy$$

change the sign of Proportionality.

$$\tau = \mu \, du/dy$$

μ = viscosity (Dynamic viscosity)

$$\mu = \tau \, dy/du$$

μ = viscosity (Dynamic viscosity)

$$\mu = \tau dy/du$$

* The Fluid which Follows a Newton's law of viscosity are Called a Newtonian Fluid.

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Part B

Define density, Specific weight and Specific volume. Show Relation between Density and Specific weight.

Density:

→ Property of Fluid

Density can be define as "mass per unit volume of a Fluid."

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

$$\rho = m/v = kg/m^3$$

Specific weight:

Specific weight is the weight possessed by unit volume of a Fluid.

Denoted by "w"

$$w = \text{weight}/\text{Volume}$$

$$w = N/m^3$$

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Relation Between Density & Specific weight:

As,

$$w = W/v$$

We known That

$$w = mg \quad \text{or} \quad \rho = m/v$$

$$w = mg/v$$

$$\boxed{w = \rho g}$$

$\rho \rightarrow$ density.

Specific Volume:

→ Property of fluid.

Specific Volume is the volume of a fluid (v) occupied per unit (m).

→ it is the reciprocal of density.

Specific Volume $v = V/m$

$$V = m^3/kg$$

$$\boxed{V = 1/\rho}$$

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Q1 Part c

If the Specific Volume of a gas is $0.72\ m^3/kg$. What is its Specific weight in N/m^3?

Solution:

Given Data;

Specific Volume, $V = 0.72\ m^3/kg$

We have to find,

Specific weight, $\gamma = ?$

As; $V = 1/\rho$

$\rho = 1/\gamma$

$\rho = 1/0.72$

$\rho = 1.38\ kg/m^3$

As; $\gamma = \rho g$

$\gamma = 1.38 \times 9.81$

$\gamma = 13.54\ N/m^3$

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Q2 Part A

Define Pressure:-

Pressure is the ratio of applied Normal force action an area to the area on which it is applied.

$$\text{Pressure} = \frac{\text{Normal Force}}{\text{Area of Surface}}$$

Normal force is applied perpendicular to given surface

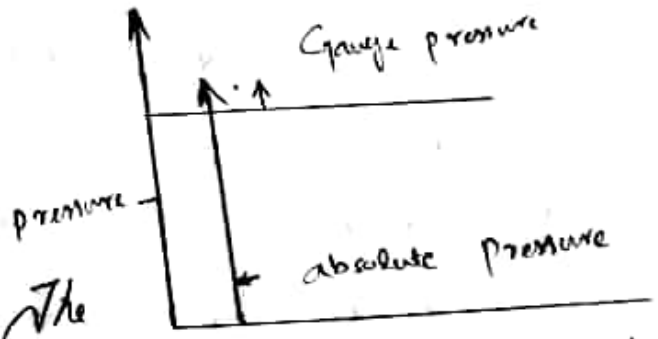
Pressure is also defined as Normal force per unit area.

→ Absolute Pressure:- it is the pressure measure from absolute vaccam.

Absolute vaccum mean zero.

The pressure up to prossure which is above atomsphere.

→ Gauge Pressure.-



Gauge pressure is the pressure use measure on measuring instrument it will start from zero reading. it is above atmospheric pressure.

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Q: part B

Sol:

We know That

Length = L = 1500mm

$= 1500/1000 = 1.5m$

width = W = $1500/1000 = 1.5$

Depth = d = 7373 m

$= \frac{7373}{1000} = 7.373$

Net Pressure

i) $D = 7.373$ ii) $D' = D/2 = \frac{7.373}{2}$ m

$= 3.6685$

Wet Pressure

$D = 7.373$

$F = Par \times A$

$F = \rho g\ h/2) \times (L \times D)$

$F = 1000)\ (9.8)\ (7.373/2) \times 1.5 \times 7.373$

$F = 395.7$ KN

wet pressure 7ore when $D' = 3.6685$

$S = (\rho g\ D'/2) \times (\times D$

$P = 1000)\ (9.8)\ 3.6685/2 \times 1.5 \times 3.6685$

$F = 989.8N$

$= 99.1$ KN

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