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I.D 7892-

SUBJECT Fluid Mechanics.

Question No 1 :-

PART A :-

Define Viscosity ? Derive Newton equation of viscosity.

⇒ **Viscosity :-** ⇒ Resistance of fluid (liquid or Gases) to a change in shape or movement of neighbouring portions relative to one another.

⇒ **Newton Equation of Viscosity :-**

It State that

"The Shear Stress in a flowing fluid is directly proportional to the rate of Shear Strain"

Mathimatically :- $\tau \propto du/dy$

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

Where "μ" is Co-efficient of viscosity

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

Change the Sign of proportionality to the Sign of equality

⇒ PART B :-

⇒ Density :-

Density is a measurement that compares the amount of matter an object has to its volume.

⇒ Specific weight :-

The Specific weight also know as the Unit weight is the weight per unit volume of a material.

⇒ Specific volume :-

The Specific volume of a Substance's is "the ratio of the Substance's volume to its mass."

⇒ Relation Ship B/w Density and Specific weight :-

As we know that

Density = ρ = Mass / volume And

Specific weight = γ = weight / volume.

$\gamma = \frac{m}{V} g$ $\quad \because w = mg.$

So $\gamma = \rho \cdot g.$ $\quad \because \rho = \frac{m}{V}$

PART C :-

If the Specific volume of gas is $0.72\ m^3/kg$ what is Specific weight in N/m^3 ?.

Given Data :-

Specific volume $= V = 0.72\ m^3/kg.$

Specific weight $= ?$

Sol :-

As we know that

$V = \frac{1}{\rho}$ So Density $= \rho = \frac{1}{V}$

$\Rightarrow \rho = \frac{1}{0.72} = 1.389\ kg/m^3$

Specific weight $= \gamma = \rho \cdot g.$

$= 1.389 \times 9.8$

$\boxed{\gamma = 13.6\ N/m^3}$ Required.

Question No 2 :-

PART A :- Define pressure? what is an absolute AND gauge pressure?

⇒ PRESSURE :-

⇒ Pressure is defined as "force per unit area"

⇒ It is more Convenient to use pressure rather than force to describe the influence upon fluid behaviour.

OR

⇒ The force applied perpindicular to Surface of an object per unit Area on which that force is distributed.

⇒ It Standard Unit is Pascal.

N/m^2 or Nm^{-2}

⇒ $P = F/A$

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⇒ Absolute pressure :-

Define as

"Total pressure at a point in a fluid equaling the Sum of the gauge and the atmospheric pressure"

$$P_{Ab} = P_g + P_{atm.}$$

⇒ e.g :- if our tire gauge is 34 Psi Then the absolute pressure is 34 Psi plus 14.7 psi

⇒ Gauge pressure :-

Gauge pressure is the pressure relative to atmospheric pressure.

⇒ Gauge pressure is positive for pressure above atmospheric pressures above atmospheric pressure and negative for pressure below it.

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Question No 2:-

PARB B :-

Given Data:-

Length = 1500mm = 1.5m.

Breadth = 1500mm = 1.5m.

Depth = 7892mm = 7.892

Unit weight of water = 9.81 KN/m³

⇒ Required Data = ?

A = net pressure = P = ?

B = location of force

C = if water level drop half of depth. find "P" And location of force.

Sol ⇒

⇒ Net pressure = P = γh

= 9.81 × 7.892

$$\boxed{P = 77.42}$$

⇒ location of force.

$$\bar{y} = h/3 = \frac{7.892}{3} = \boxed{2.63m}$$

⇒ Half Depth :-

Pressure at half Depth = "P'"

$$P' = \gamma \frac{h}{2}$$

$$\Rightarrow P' = 9.81 \times \frac{7.892}{2}$$

$$\Rightarrow \boxed{P' = 38.71 \text{ KN/m}^3}$$

⇒ location of force At half Depth :-

$$\Rightarrow \bar{y} = \frac{h}{2} \times \frac{1}{3}$$

$$\Rightarrow \bar{y} = \frac{7.892}{2} \times \frac{1}{3}.$$

$$\Rightarrow \boxed{\bar{y} = 1.315 \text{m}}$$