(Pamb). It is denoted with Sub-cript "e". Pe and is Calculated.

$$Pe = Pabs - Pamb$$

b) A water tank having dimensions of 1500mm x 1500mm. Depth of the water tank is equal to your ID number in mm. What is the net pressure force on wall of water tank? Find the location of force application?

If the water level drops to the half of the depth, what will be the force and point of application of force? (4)

Solution:

Given data:

length, $l = 1500mm = 1.5m$

Breadth, $b = 1500mm = 1.5m$

Depth, $h = 7952mm = 7.952m$

Unit Weight of water $= 9.81 KN/m^3$

Now,

$r = \rho g$

$r = 1.38 \times 9.81$

$r = 13.54 \ Nm^3$

So,

The specific weight is $= 13.54 \ N/m^3$.

Types :-

1) Atmospheric Pressure
2) Absolute pressure
3) Differential Pressure
4) Guage Pressure

Absolute Pressure.

Absolute Pressure is a pressure that is related or relative to the zero pressure in the empty, air free space of the universe. This reference pressure is the ideal or absolute vacuum. It is noted with Subscript "abs". Pabs.

Guage Pressure:

The guage pressure is defined as the difference between an absolute pressure (Pabs) and the prevailing atmospheric.

(10)

2. Define Pressure? What is an absolute and guage Pressure?

Pressure:

The amount of force exerted (thrust) on a surface per unit area is defined as "pressure" it can also be defined as the ratio of the force to the area (over which the force is acting:

Formula.

$$\text{Pressure } (P) = \frac{\text{Thrust}}{\text{Area}}$$

(11)

SI Unit:

Pascol (Pa)

$1\,Pa = 1\,N/m^2$.

Dimension:

$ML^{-1}T^{-2}$

a) Net Pressure :-

$P = \rho h$

$P = 9.81 \times 7.952$

$P = 78.00912 \ KN/m^3$

b)

$\bar{y} = h/3$

$\bar{y} = \frac{7.952}{3}$

$\bar{y} = 2.650 \ m$

c)

Pressure at half depth,

$P' = \rho h/2$

$P' = 9.81 \times \frac{7.952}{2}$

$P' = 39.00456 \ KN/m^2$

c. If specific volume of gas is 0.72 m^3/kg. What is Specific Weight in N/m^3?

Solution:

Given that,

Specific volume, V = 0.72 m^3/kg

We have to find,

Specific Weight, r = ?

As,

$V = 1/P$

$P = 1/V$

$P = 1/0.72$

$P = 1.38\ kg/m^3$

Now,

~~$r = \rho g$~~

~~$r = 1.38 \times 9.81$~~

~~$r = 13.54\ N/m^3$~~

Then,

$$P = \frac{m}{V}$$

Where P is density

So,

$$r = pg \text{ or } P = \frac{r}{g}$$

r = specific weight.

P = Density

(7)

Specific Volume:

Specific volume is defined as the of cubic meters occupied by one kilogram of matter. It is the ratio of a material's volume to its mass which is reciprocal of its density Simply inversly proportional to density.

Formula :- $V = 1/p$

P = density

Unit:-

m^3/kg

(16)

Centroid,

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

$$\bar{y} = \frac{1}{3} \times \frac{7.952}{2}$$

$$\bar{y} = \frac{1}{3} \times 3.976$$

$$\bar{y} = 1.3253 \text{ m}$$

Answer:

Q1. Define Viscosity? Derive newton equation of viscosity?

a.

Viscosity:

Viscosity is a measure of a fluid's resistance to flow. It describes the internal friction of a moving fluid. A fluid with large viscosity resists motion because its molecular make-up gives alot of internal friction.

A fluid with low viscosity flows easily Because its molecular makeup results in very little friction when it is in motion.

Example:

Syrup has higher viscosity than water.

Newton's Equation of Viscosity:-

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$F \propto \frac{Au}{y}$

$F = \frac{\mu A u}{y}$

$\frac{F}{A} = \frac{\mu A}{y}$

$\tau = \frac{\mu u}{y}$

$\frac{du}{dy}$ = Rate of shear Deformation

μ = co-efficient of viscosity

F/A = shear stress

τ = shear stress

For Dry,

$$\tau = \frac{\mu du}{dy}$$

This is called Newton's Equation of Viscosity.

b. Define Density, specific weight and Specific volume. Show relalation between Density and Specific Weight?

DENSITY:

The Density is the mass per unit volume. The symbol most often used for density is P.

Mathematically, density is defined as mass divided by volume, where p is the density, m is the mass and V is the volume.

$$P = \frac{m}{V}$$

⑤

Specific Weight:-

The specific Weight, known as the unit weight, is the weight per unit volume of Material (fluid)

$$\gamma = \frac{W}{V}$$

Its unit is N/m^3

Relation between Density And Specific Wei

As we know that,

$$\rho = \frac{W}{V}$$

⑥

Where

$$W = mg$$

Now,

$$\rho = \frac{mg}{V}$$