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Q NO 1(a)

Derive newton equation of Viscosity.

ANSWER:

NEWTON EQUATION OF VISCOSITY:

VISCOSITY:

Viscosity is the property of fluid which oppose relative motion between two surfaces of fluid.

OR

the measure of fluid resistance to deformation at given rate

EQUATION:

$$\tau \propto \frac{du}{dy}$$

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

μ = Viscosity

τ = Shear stress

$\frac{du}{dy}$ = Rate of Shear deformation.

Specific Volume:

It is the ratio of the substance volume to its mass

or

it is reciprocal of density

$$V_s = \frac{V}{m} = \frac{1}{\rho}$$

Relation b/w specific weight and Density

As

$$\gamma = W/V \quad -(a)$$

$$\because W = mg$$

$$\gamma = \frac{mg}{V} \quad -(b)$$

$$\rho = \frac{m}{V} \Rightarrow \text{put in (b)}$$

$$\gamma = \rho g$$

$$\rho = \gamma/g$$

Q No 1(b)

Define

Density:

It is define as

Mass per unit volume of a substance is called Density

$$\rho = m/V$$

Specific weight:

Specific weight is also known as unit weight. is the weight per unit volume of a material

Q(1)(c)

Given:

Specific Volume = $0.72 m^3/kg$

Required:

Specific Weight, $\gamma = ?$

SOLUTION:

As

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

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

$$= \frac{1}{0.72}$$

$$= 1.389 \, kg/m^3$$

Specific weight:

$$\gamma = \rho \times g$$

$$\gamma = 1.389 \times 9.81$$

$$\gamma = 13.62 \, N/m^3$$

Q No 2(a)

What is an absolute and Guage Pressure:

ANSWER: Part(a)

ABSOLUTE PRESSURE:

It is a pressure that is relative to the zero pressure in the empty air-free space of the universe.

It is measured using barometer.

$$P_{abs} = P_{atm} + P_{guage}$$

Guage Pressure:

The pressure relative to atmospheric Pressure is called guage Pressure

$$P_G = P_T - P_{atm}$$

$$P_G = \rho g h$$

or

the difference b/w absolute pressure and atmosphere pressure is what we call guage pressure.

Q No: 2(b)

GIVEN DATA:

Length = 1200mm

Breadth = 1200mm

Depth = $\frac{1DNo}{2} = \frac{7888}{2} = 3944$

Required:

Net pressure = ?

Location of force application = ?

~~Location of fo~~

Force and point of application of force at half water level = ?

P-T·O

SOLUTION:

Net pressure:-

$$P = \gamma h$$

$$= 9.81 \times 3.944 = 38.690 \text{ kN/m}^2$$

Location of force:

$$y' = h/3$$

$$= \frac{3.944}{3}$$

$$= 1.31 \text{ m}$$

at half depth:

$$P' = \gamma \cdot h/2$$

$$9.81 \times \frac{3.944}{2}$$

$$= 19.34$$

Centriod:

$$y = \frac{h}{2} * 1/3$$

$$= \frac{3.944}{2} * 1/3$$

$$= 0.657 \text{ m}$$