1. Define the term moment of force. State the S.I. unit of moment of force.

   Answer:

   Movement of force — The turning effect of force acting on a body about an axis is called the moment of force.

   S.I. units : N m (Newton meter)

2. State two factors which effect on the moment of force.

   Answer:

   Factors on which moment of force depends

   (i) The magnitude of the force applied.

   (ii) The distance of line of action of the force from the axis of rotation

3. Define the term 'pressure' and state its unit.

   Answer:

   PRESSURE : "The thrust on unit area of the surface is called PRESSURE."

   $$\text{Pressure} = \frac{\text{Thrust}}{\text{Area}}$$

   S.I. unit = Nm^{-2}

4. State two factors on which the pressure at a point in a liquid depends.

   Answer:

   Factors are : (hρg)

   (i) h — Depth of the point below free surface.

   (ii) ρ — Density of liquid.

   (iii) g — Acceleration due to gravity, (constant)

5. The moment of a force of 25 N about a point is 2.5 N m. Find the perpendicular distance of force from that point.

   Answer:

   Moment of force = 2.5 N m

   Force applied = 25

   ⊥ distance from the point of rotation ?

   Moment of force = Force × ⊥ distance

   $2.5 = 25 \times x$

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$$\therefore x = \perp \text{ distance} = \frac{2.5}{25} = \frac{1}{10} \text{ m}$$

$$= \frac{1}{10} \times 100 = 10 \text{cm}$$

6. Calculate the pressure in pascal exerted by a force of 300 N acting normally on an area of 30 cm².

Answer:

F = 300 N

$$A = 30 \text{ cm}^2 = \frac{30}{100 \times 100} \text{m}^2 = 30 \times 10^{-4} \text{m}^2$$

$$P = \frac{F}{A} = \frac{300}{\frac{30}{100 \times 100}} = \frac{300 \times 100 \times 100}{30} = 100000 = 10^5 \text{Pa}$$

7. Which of the following will sink or float on water? (Density of water = 1 g cm⁻³)   [4]

   (a) body A having density 500 kg m⁻³

   (b) body B having density 2520 kg m⁻³

   (c) body C having density 1100 kg m⁻³

   (d) body D having density 0.85 g m⁻³

   Answer:

   Density of water = 1 g cm⁻³

   (a) Density of body A = 500 kg m⁻³ = 500 × 1/1000 = 0.5 g cm⁻³

        Density of body A is less than density of water hence A will float on wateR

   (b) Density of body B = 2520 kg m⁻³ = 2520 × 1/1000 = 2.52 g cm⁻³

        Density of body B is more than density of water and hence B will sink in water

   (c) Density of body C = 1100kg m⁻³ = 1100 × 1/1000 = 1.1 g cm⁻³ is greater than water.

        Hence, body C will sink in water.

   (d) Density of body D = 0.85 g cm⁻³ < 1.0 g cm⁻³

        Density of body D is less than the density of water hence body D will float on water

8. Explain why an iron needle sinks in water, but a ship made of iron floats on water.

   Answer:

   Density of iron is more than density of water,

   ∴ weight of iron nail is more than wt. of water displaced by it and nail sinks. while shape of iron ship is made in such a way that it displaces more weight of water than its own weight. secondly the ship is hollow and the empty space contains air which makes the average density of ship less than that of water and hence ship floats on water.

9. Calculate the density of solid from the following data :

(a) Mass of solid = 72 g

(b) Initial volume of water in measuring cylinder = 24 ml

(c) Final volume of water when solid is completely immersed in water = 42 ml

Answer:

Mass of solid (M) = 72 g

Intial volume of water V_1 = 24 ml

Final volume of water V_2 = 42 ml

Volume of solid (V) = $V_2 - V_1$ = 42 – 24 = 18 Cm³

Density of solid (D) = ?

$$D = \frac{M}{V} = \frac{72}{18} = 4.0 \text{ g cm}^{-3}$$

10. Define the term relative density of a substance. Explain the meaning of the statement 'relative density of aluminium is 2.7' ?

Answer:

RELATIVE DENSITY: "is the ratio of density of a substance to the density of water at 4° C."

Or

RELATIVE DENSITY "is the ratio of mass of the substance to the mass of an equal volume of water at 4° C."

A piece of aluminium of any volume has mass 2.7 times that of an equal volume of water.

i.e. Aluminium is 2.7 times heavier than water.

11. What is the law of floatation?

Answer:

When a body floats in a liquid, the weight of the liquid displaced by its immersed part is equal to the total weight of the body. This is the law of floatation, i.e. while floating. Weight of the floating body = Weight of the liquid displaced by its immersed part.

12. Define the term density of a substance. Name the S.I. unit of density

Answer:

Density of a substance is defined as "Mass per Unit volume".

$$\text{Density [d]} = \frac{\text{Mass of the substance}}{\text{Volume of the substance}}$$

$$d = \frac{M}{V}$$

S.I. unit of density is kg m^{-3} In C.GS. system unit of mass is g and unit of volume is cm^3, so CGS unit of density is g cm^{-3} (gram per cubic centimetre)