Physical Quantities And Measurement

B. Short/Long Ans questions

1. Density refers to the amount of matter present in 1 cubic cm of a substance, or how much dense it is.
2. SI unit of Density = Kg/m^3
   $1 kg/m^3 = 1 g/cm^3 \times 1000$
3. It means that 8.4g of matter (Brass) is present in $1 cm^3$ of it.
4. Iron, Brass, cork, mercury, Water
5. Normally, the density of substances increases with decrease in temprature and Vice Versa, but, its not applicable for water.
6. (a) decrease, Indirect variation
   (b) decrease "
   (c) Decrease "
7. Aim of the activity: to determine the density of a coin
   Materials required: a coin, beam balance, meter.
   Procedure: first, we find the mass of the coin by beam balance. then to find its volume, we can apply the formulae 'πr^2' as its cylindrical in shape and measure its radius using a meter. Now, we divide the value of M by V.
8. Aim of the activity: to determine the density of a liquid
   Materials required: a beam balance, measuring cylinder & the liquid.

Procedure: We first measure the mass of the liquid by a beam balance and Note the value. Now we measure the volume of the liquid by Measuring cylinder and Note the values.
Now to find the density, apply the formula $\frac{m}{v}$.

9. Density bottle is a simple glass bottle which gives us the mass and volume of a liquid by which, we can find its density.
It has a stopper which removes the extra liquid from the bottle. By filling the bottle with liquid, measuring its wt. and subtracting the bottle's wt, we can get the Mass of the liquid. By the same steps we can find the volume by measuring the wt. of water in it. Now we can apply $\frac{m}{v}$ to find density.

10. The Density of a substance with reference to water, is known as Relative Density.

11. It has No unit.

12. Density: Its the mass present per unit volume.
R. Density: Its the ratio of density of the given substance to that of water.

13. It means that the Ratio of Density of Aluminium and Density of water is 2:7.

14. i) If the density of Solid > D. of Liquid, It will sink.
ii) If the d. of Solid < D. of Liquid, It will float.
iii) If the D. of Solid = D of Liquid, It will float, but just bellow the water surface.

15. The density of cork is less that the density of water, whereas the density of Iron is more than water's Density.

16. (a) float
(b) Sink
(c) Sink
(d) float

17. The Law of floatation states that the amount of liquid a solid displaces, that much weight of the solid sinks in the liquid.

18. a) Sink
b) float

19. a) Equal in all
b) Liquid C
c) Liquid B

20. Buoyant force = Wt of liquid Displaced = the weight of solid submerged.

21. The density of water is 1g/cm³, whereas the Density of Ice is 0.9 g/cm³. thus, Ice floats on water.

22. Iron nail is a solid whose density is more than that of water and thus, it sinks down, but a Iron ship has air filled inside it, as its hollow thus, the avg. density becomes less and it floats on water.

23. River water is less denser than Sea water for which it difficult to swim, but Sea water has salt dissolved in it thus its density increases and it makes it Easy to swim.

24. The density of Ice being 0.9 gram^3, floats on water, but its max^m part is submerged in Liquid Water, which makes the Driver think that the Ice berg is smaller and it causes accident when the bottom part of Ship crashes with the submerged part of Ice berg.

25. Inside Water, the weight of Stone decreases as the water also gives a upthrust (Buoyant force) but the same stone is felt heavier in air as the up thrust provided by air is negligible.

26. Submarine is a Veichle which can travel both Inside and out side the sea. It can be made to sink by filling up the empty space in its bottom and by removing the water, it can be made to float.

27. The density of Hydrogen is less than the Density of air. Thus, a hydrogen filled Balloon floats in the air.

Physical Quantities And Measurement -

Numerical -

1. density of air = 1.28 g litre^{-1}

$= \frac{1.28\,g}{l} = \frac{1.28\,g}{1000\,ml} = 0.00128\,g/cm^3$.

Density (in kg/m^3) of air = $0.00128\,g/cm^3 \times 1000$

$= 1.28\,kg/m^3$.

2. ATQ,

$\rightarrow D = \frac{m}{V}$

a) $\frac{m}{10 \times 7 \times 5\,m^3} = 1.11\,kg/m^3$

b) $\frac{M}{350\,m^3} = 1.11\,kg/m^3$

c) $M = 1.11\,kg/m^3 \times 350\,m^3$

$= 388.5\,kg$

3. Density of Alluminium = $2.7\,g/cm^3$

$\therefore$ Density (in kg/m^3) $= (2.7 \times 1000)\,kg/m^3$

$= 2700\,kg/m^3$.

4. Density of alchohol = $600\,kg/m^3$

Density (in g/cm^3) $= \frac{600}{1000}\,g/cm^3 = 0.6\,g/cm^3$

5. Given,

mass = 428.6g

Volume = 86 cm^3

* Density = $\frac{M}{V} = \frac{436.8}{86}$ g/cm^3

= 5.1 g/cm^3

6. Mass = 150g

Vol^m = 200 cm^3

(a) $D_{CGS} = \frac{M}{V} = \frac{150}{200}$ $g/cm^3 = \frac{3}{4}$ g/cm^3

(b) $D_{SI} = \frac{M}{V} = \frac{150 \times 1000 \times 1000 \times 1000}{200 \times 1000}$

= 750 kg/m^3

7. ATQ,

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

$\Rightarrow \frac{1}{V} = \frac{D}{m}$

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

$= \frac{6000kg}{0.8\ g/cm^3} = \frac{6000kg}{800\ kg/m^3} = 7.5\ m^3$

8. ∴ Initial vol^m of liquid = 24ml

final vol^m of liquid = 42ml

→ vol^m of solid = 42ml - 24ml

= 18ml

$M = 72gm$

$\therefore$ Density $= \frac{M}{V} = \frac{72g}{18ml} = \frac{4g}{1}\ g/cm^3 = 4g/cm^3$.

9. Given,
→ Mass of Empty D. Bottle (M_1) = 21.8 g
→ Mass of D. Bottle + Water (M_2) = 41.8 g
→ Mass of D. Bottle + liquid (M_3) = 40.6 g

(a) Volume of Density bottle = Wt. of water = 41.8 g − 21.8 g
= 20 ml.

(b) R.D. of liquid $= \frac{M_3 - M_1}{M_2 - M_1} = \frac{(40.6 - 21.8)\ g/cm^3}{(41.8 - 21.8)\ g/cm^3}$

$= \frac{0.94}{1}$

$= 0.94$.

10. Given,
→ mass of Empty DBottle (M_1) = 22g
→ Mass of Bottle + Water = 50g
→ Mass of Bottle + Brine Soln = 54g

Density of Liquid $= \frac{M}{V} = \frac{54g - 22g}{50g - 22g} = 32g$