Class - VII

PHYSICS

Ch. 1: Physical Quantities and Measurement

B. Short/Long Answer Questions:

Q.1. Define the term volume of an object.

⇒ The space occupied by an object is called its volume.

Q.2. State and define the S.I. unit of volume.

⇒ The S.I. unit of volume is cubic metre. In short form, it is written as m^3.

One cubic metre is the volume of a cube with each side 1 metre long as shown in Fig. 1.2 (Page-3) i.e.,

$$1\ m^3 = 1\ m \times 1\ m \times 1\ m.$$

Q.3. State two smaller units of volume. How are they related to the S.I. unit?

⇒ A smaller unit of volume is cubic centimetre (cm^3).

Relationship between S.I. unit of volume (m^3) and cm^3 —

$$1\ m^3 = 1\ m \times 1\ m \times 1\ m$$
$$= 100\ cm \times 100\ cm \times 100\ cm \quad (\because 1\ m = 100\ cm)$$
$$= 10,00,000\ cm^3$$
$$= 10^6\ cm^3.$$

Another smaller unit of volume is cubic decimetre (dm^3)

Relationship between S.I. unit of volume (m^3) and dm^3 —

$$1\ m^3 = 1\ m \times 1\ m \times 1\ m$$
$$= 10\ dm \times 10\ dm \times 10\ dm \quad (\because 1\ m = 10\ dm)$$
$$= 1000\ dm^3$$
$$= 10^3\ dm^3.$$

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Q.4. How will you determine the volume of a cuboid? Write the formula you will use.

⇒ Volume of a cuboid = length x breadth x height.

Ex- Consider that, the length, breadth & height of a book = 24 cm, 15 cm & 1 cm respectively.

∴ Volume of book V = length x breadth x height

= 24 x 15 x 1 cm^3.

= 360 cm^3.

Q.5. Name two devices which are used to measure the volume of an object. Draw their neat diagrams.

⇒ Two devices that are used to measure the volume of an object are:

(i) Measuring cylinder &

(ii) Measuring beaker

Diagram: Page-4 (Fig. 1.3 & Fig. 1.5)

Q.6. How can you determine the volume of an irregular solid (say a piece of brass)? Describe in steps with neat diagrams.

⇒ Page-5; Activity-2. (Full)

Fig.-1.7.

Q.7. ~~How~~ you are required to take out 200 ml. of milk from a bucket full of milk. How will you do it?

⇒ By using the measuring beaker. A measuring beaker is used to measure a fixed volume of liquid from a large volume.

Suppose it is required to measure 200 ml of milk from the milk contained in a bucket. For this, take the measuring beaker of capacity 200 ml. Wash it & dry it. Then, immerse the measuring beaker well inside the milk contained in the bucket so that the beaker gets completely filled with the milk.

Take out the measuring beaker from the bucket gently so that no milk splashes out and then pour the milk from the measuring beaker into another empty vessel.

Q.8. Describe the method in steps to find the area of an irregular lamina using a graph paper.

⇒ Page- 7; Activity – 3
Fig.- 1.8.

Q.9. Define the term density of a substance.

⇒ The density of a substance is defined as the mass of a unit volume of that substance.

If a volume 'V' of a substance has a mass 'M', the density 'd' of the substance is given as, $\text{Density} = \frac{\text{Mass}}{\text{Volume}}$ or $d = \frac{M}{V}$.

Q.10. State the S.I. and C.G.S. units of density. How are they related?

⇒ S.I. unit of density is Kg/m^3.

C.G.S. unit of density is g/cm^3.

Relationship between $Kg\,m^{-3}$ & $g\,cm^{-3}$ —

We know that, $1\ Kg = 1,000\ g$

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(P.T.O.)

or $1\,g = \frac{1}{1000}\,kg$

and $1\,m^3 = 10,00,000\ cm^3$.

Now, $1\,g\,cm^{-3} = \frac{1\,g}{1\,cm^3}$

$$= \frac{\frac{1}{1000}\,kg}{\frac{1}{10,00,000}\,m^3}$$

$$= \frac{10,00,000}{1000}\,kg\,m^{-3}$$

$$= 1,000\,kg\,m^{-3}$$

Thus, $1\,g\,cm^{-3} = 1,000\,kg\,m^{-3}$.

Q.11. The density of brass is $8.4\,g\,cm^{-3}$, what do you mean by the statement?

⇒ Density of brass is $8.4\,g\,cm^{-3}$. This means that unit volume of brass contain 8.4 g mass.

Q.12. Arrange the following substances in order of their increasing density:
(a) iron (b) cork (c) brass (d) Water (e) mercury.

⇒ cork ($0.24\,g/cm^3$); Water ($1\,g/cm^3$); iron ($7.86\,g/cm^3$); brass ($8.73\,g/cm^3$); mercury ($13.56\,g/cm^3$)

Q.13. How does the density of water change when:
(a) it is heated from 0°c to 4°c,
(b) it is heated from 4°c to 10°c.

⇒ Substances when heated expand. Their density decreases. But in case of water:
(a) when water is heated from 0°c to 4°c it contract & density increases,
(b) heating water above 4°c starts ~~expand~~ expanding & density of water decreases.

This means water has maximum density at 4°c.

Q.14. Write the density of water at 4°c?

⇒ The density of water at 4°c is $1\ g\ cm^{-3}$ or $1,000\ Kg\ m^{-3}$.

Q.15. Explain the meaning of the term speed.

⇒ The distance covered or travelled by a body in unit time is called the speed of the body. i.e.,

$$\text{Speed} = \frac{\text{Distance travelled}}{\text{Time taken}}$$

Speed is usually denoted by the symbol 'v'. If a body travels a distance 'd' in time 't', then its speed is given as,

$$\text{Speed}(v) = \frac{d}{t}$$

Q.16. Write the S.I. unit of speed.

⇒ The S.I. unit of speed is metre per second (symbol ms^{-1}).

Q.17. A car travels with a speed 12 ms^{-1}, while a scooter travels with a speed 36 kmh^{-1}. Which of the two travels faster?

⇒ Speed of car = 12 ms^{-1}.

Speed of scooter = 36 kmh^{-1}.

$\because$ 1 Km = 1000 m & 1 hr = 3600 sec.

$\therefore$ Speed of scooter $= \frac{36 \times 1000}{3600} = 10\ ms^{-1}$.

$\therefore$ Speed of car is more. Car travels faster than scooter.

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