CHAPTER 10
FLOATATION

SOLUTIONS

EXERCISES

Q1. What is thrust? State its direction of action.

Ans: The force acting perpendicularly on the surface is called thrust.

Its direction of action is perpendicular to the surface.

Q2. In which direction does the buoyant force on an object immersed in a liquid act ? State the magnitude of buoyant force.

Ans: The buoyant force acts in the upward direction.

Weight of the displaced liquid is the magnitude of buoyant force.

Q3. Why does a block of plastic or cork come up to the surface of water when they are released under water ?

Ans: Because the buoyant force acting on the block of plastic or cork is greater than the weight of the block and also the density of plastic or cork is less than the density of water.

Q4. The volume of a solid block of mass 180 gm is 100 cm^2. If the block is placed in water of density 1 gm/cm^3, will it float or sink? Explain.

Ans: Here,

Mass of a solid block = 180gm

Volume of a solid block = 100cm^3

$$\textbf{Density} = \frac{mass}{volume}$$

$$= \frac{180}{100}$$

$$= 1.8\text{gm/cm}^3$$

Thus, the density of the solid block is greater than that of water so, the solid block will sink.

Q5. **A lump of plastic of relative density 0.4 has a mass of 10gm. It is placed in water. Calculate the volume of the lump projecting above the surface of water.(take the density of water as 1 gm cm^{-3}.**

Ans: Here,

Mass of plastic (M) = 10g

Relative density of plastic (D) = 0.4

Volume of the lump of plastic (V) = $\frac{10}{0.4}$ = 25cm^3

Let x cm^3 be the volume of the lump projecting above the surface of water, then the volume inside the water will be (25 - x) cm^3

Now,

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

$$\Rightarrow 1 = \frac{10}{25-x} = 25\text{-}x = 10$$

Therefore, x = 25-10

$$= 15 \text{ cm}^{3.}$$

TEXTUAL QUESTIONS AND ANSWERS

1. **Kitchen knives have very sharp edges and if the edge is not that sharp it is not easy to cut vegetables. Give reason why?**

   Ans: The area of the edge of a sharp knife is less than the area of edge of a blunt knife. Hence pressure exerted by the sharp knife is more than the pressure exerted by a blunt knife. Thus it is difficult to cut vegetables with a blunt knife.

2. **Why is it difficult to hold school bags and heavy canvas bags with straps made of thin and strong strings?**

   Ans: It is because the straps have small surface area and hence large pressure is exerted by the straps on the shoulder making it difficult to hold bags.

3. What is buoyancy?

Ans: Buoyancy or upthrust is an upward force exerted by a fluid that opposes the weight of a partially or fully immersed object.

4. Can we use objects which dissolve in water or in the experimental liquid? Can we use objects which absorb the liquid?

Ans: No, we cannot use objects which dissolve in water and which absorb water.

5. Your weight is 50kg on a weighing machine. Is your mass more or less than 50kg?

Ans: If the weight is 50kg, the mass will be less than 50kg because

Weight = mass x acceleration due to gravity

W = mg

6. You have a bagful of cotton and iron rod of the same mass say 50 kg when measured using a weighing machine. In reality one is of heavier mass than the other. Can you say which one is heavier? Explain why?

Ans: cotton bag will be heavier than iron rod because true weight is given by-

True weight = apparent weight + upthrust

The density of cotton bag is less than that of the iron bar, so the volume of cotton bag is more compared to the iron bar. So the cotton bag experiences more upthrust due to the presence of air. Therefore in the presence of air the true weight of cotton bag is more compared to the true weight of iron rod.

<h3 style="text-align:center; color:red">EXTRA QUESTION AND ANSWER</h3>

Q1. Why does an iron nail sink in water? Give two points.

Ans: i) the density of iron nail is greater than the density of water

ii) the buoyant force acting vertically upward is less than the weight of the iron nail.

Q2. What is apparent weight of an object? How is it related to the actual weight of the object?

Ans: The weight of a body in a fluid is called its apparent weight.

Actual weight= Apparent weight +buoyant force.

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