1. An ornament weighing 50 g in air weighs only 46 g in water. Assuming that there is some amount of copper mixed with gold to make the ornament, find the copper in it. Specific gravity of copper is 10 and that of gold is 20.

   Ans: 30 g

2. A block of wood floats in a bucket of water in a lift. Will the block sink more or less if the lift starts accelerating up?

   Ans: No change

3. A weightless balloon is filled with water. What will be its apparent weight when weighed in water?

4. A body of weight W_1 displaces an amount of water W_2. Then $W_1 < W_2$. Is this statement true or false?

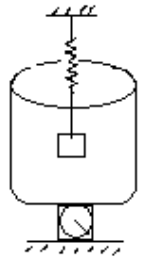
5. A man is sitting in a boat which is floating in a pond. If the man drinks some water from the pond, how will the level of water in the pond change?

6. A cubical block of ice floating in water has to support a metal piece weighing 0.5 kg. What can be the minimum edge of the block so that it does not sink in water? Sp. Gravity of ice is 0.9

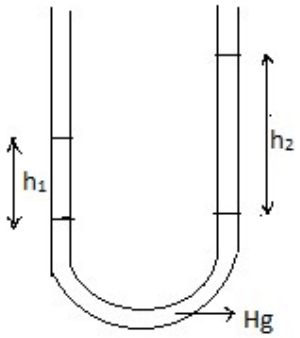
   Ans: 17 cm

7. A solid ball of density half that of water falls freely under gravity from a height of 19.6 m before entering water. Up to what depth will the ball go? How much will it take again to come to the surface? Neglect viscosity. Take g = 9.8 ms^{-2}

   Ans: 19.6 m, 4 s

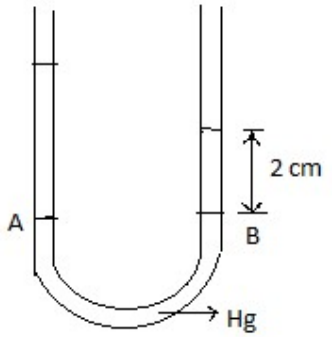
8.  A beaker of mass 1 kg contains 2 kg of water and rests on a scale. A 2 kg block of aluminium (sp. gr. 2.7) suspended from a spring balance is submerged in water. Find the readings of both the scales.

   Ans: lower scale 36.66 N, upper 12.34 N



9. Water and oil are poured into two limbs of a U-tube containing mercury. The interfaces of mercury and the two liquids are at the same height in the two limbs. Determine the height h_1 of water column if that of oil h_2 = 20 cm. The density of oil is 0.9

Ans: 18 cm



10. The liquids shown in the figure in the two arms are mercury and water. If the difference in heights of mercury column is 2 cm, find the height of h of water column.

Ans: 27 cm

11. A U-tube is partially filled with water. Oil is next poured into one side until water rises by 25 cm on the other side. If the density of oil is 0.8, the oil level will stand higher than the water level by

(A) 6.25 cm (B) 12.5 cm (C) 31.25 cm (D) 20 cm

12. A U-tube of uniform cross section is partially filled with a liquid I. Another liquid II is poured into one side. It is found that the liquid levels of the two sides of the tube are the same while the level of the liquid I has risen by 2 cm. If the specific gravity of liquid I is 1.1, that of II must be

(A) 1.12 (B) 1.1 (C) 1.05 (D) 1.0

13. A 20 N metal block is suspended by a spring balance. A beaker containing some water is placed on a weighing machine which reads 40 N. The spring balance is now lowered so that the block is immersed in water. The spring balance now reads 16 N. The reading of the weighing machine will be

(A) 36 N (B) 60 N (C) 44 N (D) 56 N

14. A solid floats in a liquid in a partially dipped position.

(A) The solid exerts a force equal to its weight on the liquid.

(B) The liquid exerts a force of buoyancy on the solid which is equal to the weight of the solid.

(C) The weight of the displaced liquid equals the weight of the solid.

(D) The weight of the dipped part of the solid is equal to the weight of the displaced liquid.

15. The weight of the empty balloon is w_1. The weight becomes w_2 when the balloon is filled with air. The weight of the air inside itself is w. Neglect the thickness of the balloon when filled with air. Also neglect the difference in densities of air inside and outside the balloon.

(A) $w_2 = w_1$ (B) $w_2 = w_1 + w$ (C) $w_2 < w_1 + w$ (D) $w_2 > w_1$

16. A solid is completely immersed in a liquid. The force exerted by the liquid on the solid will

(A) Increase if it is pushed deeper inside the liquid.

(B) Change if its orientation is changed.

(C) Decrease if it is partially taken out of the liquid.

(D) Be in the vertically upward direction.

17. The height to which a cylindrical vessel is to be filled with a homogeneous liquid to make the average force, the liquid applies on the side walls, equal to that applied on the bottom of the vessel is

(A) Half of the radius of the vessel (B) radius of the vessel

(C) ¼ Th of the radius of the vessel (D) ¾ Th of the radius of the vessel

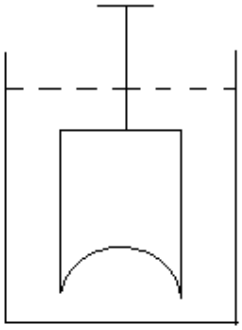
18. When a ship floats on water

(A) It displaces no water

(B) The mass of the water displaced equals the mass of the ship

(C) The mass of the water displaced < the mass of the ship.

(D) The mass of the water displaced > the mass of the ship



19. A hemispherical portion of radius R is removed from the bottom of the cylinder of the same radius. The volume of the remaining cylinder is V and its mass is M. It is suspended by a string in a liquid of density ρ where it stays vertical. The upper surface of the cylinder is at a depth of h below the liquid surface. The force on the bottom surface of the cylinder by the liquid is

(A) Mg (B) $Mg - V\rho g$ (C) $Mg + \pi r^2 h\rho g$ *(D) $\rho g (V + \pi r^2 h)$