SAFE HANDS

Assignment for Revision by NKO on :

1. Two bodies are in equilibrium when suspended in water from the arms of a balance. The mass of one body is 36 g and its density is 9 g / cm^3. If the mass of the other is 48 g, its density in g / $cm^3$is
2. A hemispherical bowl just floats without sinking in a liquid of density $1.2 \times 10^3 kg/m^3$. If outer diameter and the density of the bowl are 1 m and $2 \times 10^4 kg/m^3$ respectively, then the inner diameter of the bowl will be
3. A vessel contains oil (density = 0.8 gm/cm^3) over mercury (density = 13.6 gm/cm^3). A homogeneous sphere floats with half of its volume immersed in mercury and the other half in oil. The density of the material of the sphere in gm/cm^3 is
4. A manometer connected to a closed tap reads $3.5 \times 10^5 N/m^2$. When the valve is opened, the reading of manometer falls to $3.0 \times 10^5 N/m^2$, then velocity of flow of water is
5. A large tank filled with water to a height 'h' is to be emptied through a small hole at the bottom. The ratio of times taken for the level of water to fall from h to $\frac{h}{2}$ and from $\frac{h}{2}$ to zero is
6. A cylindrical tank has a hole of 1 cm^2 in its bottom. If the water is allowed to flow into the tank from a tube above it at the rate of 70 cm^3/sec. then the maximum height up to which water can rise in the tank is
7. A square plate of 0.1 m side moves parallel to a second plate with a velocity of 0.1 m/s, both plates being immersed in water. If the viscous force is 0.002 N and the coefficient of viscosity is 0.01 poise, distance between the plates in m is
8. A capillary tube is attached horizontally to a constant head arrangement. If the radius of the capillary tube is increased by 10% then the rate of flow of liquid will change nearly by
9. An ideal fluid flows through a pipe of circular cross-section made of two sections with diameters 2.5 cm and 3.75 cm. The ratio of the velocities in the two pipes is
10. A metal ball B_1 (density $3.2\ g\ cm^{-3}$) is dropped in water while another metal ball B_2 (density $6.0\ g\ cm^{-3}$) is dropped in a liquid of density $1.6\ g\ cm^{-3}$ If both the balls have the same diameter and attain the same terminal velocity, the ratio of viscosity of water to that of the liquid is
11. Water is conveyed through a uniform tube of 8 cm in diameter and 3140 m in length at the rate $2 \times 10^{-3}\ m^3$ per second. The pressure required to maintain the flow is (Viscosity of water $= 10^{-3}$ SI units)
12. A square plate 0.1 m side moves parallel to second plate with a velocity of $0.1\ m\ s^{-1}$, both plates being immersed in water. If the viscous force is 0.002 N and the coefficient of viscosity 0.001 poise, distance between the plates is
13. A 50 kg girls wearing heel shoes balances on a single heel. The heel is circular with a diameter 1 cm. The pressure exerted by the heel on the horizontal floor in terms of Pa is (Take $g = 10\ m\ s^{-2}$)
14. The flow of blood in a large artery of an anesthetised dog is diverted through a venturimeter. The wider part of the meter has a cross-sectional area equal to that of the artery, i.e.,$10\ mm^2$ The narrower part has an area 5 mm^2 The pressure drop in the artery is 22 Pa. Density of the blood is $1.06 \times 10^3\ kg\ m^{-3}$ The speed of the blood in the artery is
15. Mercury has an angle of contact equal to 140^o with soda lime glass. A narrow tube of radius l mm made of this glass is dipped in a trough containing mercury. The surface tension of mercury at the temperature of the experiment is $0.465\ N\ m^{-1}$ The distance by which the mercury dip down in the tube relative to the mercury surface outside in mm is

    (Density of mercury $= 13.6 \times 10^3\ kg\ m^{-3}$)

SAFE HANDS ***Assignment 8*** (Physics) [Chetan Sir]

Mechanical Properties of Fluids

01. The terminal velocity V_T of a spherical ball of lead of radius r falling through a viscous liquid varies with r such that (K is a constant)
(1) $V_T/r = K$ (2) $V_T r = K$ (3) $V_T = K$ (4) $V_T/r^2 = K$

02. In Bernoulli's theorem, which of the following is conserved
(1) linear momentum (2)angular momentum
(3) Energy (4) None of above

03. A tank of height 5 m is full of water. There is a hole of cross-sectional area 1 cm^2 in its bottom. The initial volume of water that will come out of this hole per second is (in m^3/s)
(1) 10^{-3} (2) 10^{-4} (3) 10 (4) 10^{-2}

04. In a streamline flow if the gravitational head is h, then velocity and pressure heads are
(1) v^2/g and P/ρ (2) $v^2/2g$ and $P/\rho g$
(3) $v^2/2$ and P/ρ (4) $v^2/2$ and $P/\rho g$

05. To calculate the rate of flow of liquid, which of the following is used
(1) Stokes' law (2)Bernoulli's theorem
(3) Poiseuille law (4) conservation of pressure

06. If the velocity head of a stream of water is equal to 10 cm, then its speed of flow is (in m/s)
(1) 10√2 (2) 140 (3) 0.1 (4) 1.4

07. The blood is flowing at the rate of 100 cm^3/s. If the area of cross-section of capillaries is 0.25 m^2, then the average velocity of blood through capillaries is (in mm/s)
(1) 0.4 (2) 4 (3) 25 (4) 400

08. After terminal velocity is reached, the acceleration of a body falling through a fluid is
(1) equal to g (2) Zero
(3) less than g (4) more than g

09. A cylinder is filled with a non-viscous liquid of density d to a height h_0 & the hole is made at a height h_1 from the bottom of the cylinder. The velocity of liquid passing out of the hole is
(1) $\sqrt{2gh_0}$ (2) $\sqrt{2gh_1}$
(3) $\sqrt{dgh_1}$ (4) $\sqrt{2g(h_0 - h_1)}$

10. Two hail stones with radii in the ratio of 1:2 fall from a great height through the atmosphere. Then their terminal velocities are in the ratio of
(1) 1:2 (2) 2:1 (3) 1:4 (4) 4:1

11. A solid of density D is floating in a liquid of density d. If v is the volume of solid submerged in the liquid & V is the total volume of the solid, then v/V is
(1) d/D (2) D/d (3)D/(D+d) (4)(D+d)/D

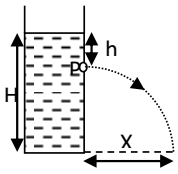
12. A gale blows over a house. The force due to the gale on the roof is in the
(1) downward direction (2) upward direction
(3) horizontal direction (4) Zero

13. A wooden block is floating in a bucket of water. If bucket falls freely, the upward thrust on the wooden block will be
(1) Same as before
(2) More than earlier
(3) Equal to weight of block in air
(4) Zero

14. What will be the height of liquid of the density 3.4 gm/cm^3 in the barometer at a place where it is 70 cm of mercury barometer (in cm)
(1) 70 (2) 140 (3) 280 (4) None

15. A boat having a length 3 m & breadth 2 m is floating on a lake. The boat sinks by 1 cm when a man gets on it. The mass of the man is (in kg)
(1) 60 (2) 62 (3) 12 (4) 128

16. A tank is filled with water upto a height H. water is allowed to come out of a hole P as shown in fig. at a depth h below the free surface of water. Then



(1) $X = \sqrt{h(H-h)}$
(2) $X = \sqrt{\frac{h(H-h)}{2}}$
(3) $X = 2\sqrt{h(H-h)}$
(4) $X = 4\sqrt{h(H-h)}$

17. Two pipes P & Q having diameters 2 x 10^{-2} m and 4 x 10^{-2} m respectively are joined in series with the main supply line of water. The velocity of water flowing in pipe P is
(1) 4 times that of Q (2) 2 times that of Q
(3) 1/2 times that of Q (4)1/4 times that of Q

18. The density of ice is 0.9 g/c.c. and that of sea water is 1.1 g/c.c. An iceberg of volume V is floating in sea water. The fraction of iceberg above water level is
(1) 9/11 (2) 3/11 (3) 2/11 (4) 1/11

19. The weight of a block is 120N. When immersed completely in water, the weight becomes 80N. What is the relative density of material of block
(1) 3 (2) 1/3 (3) 6/4 (4) 4/6

20. A body floats with 1/3 of its volume outside water and 3/4 of its volume outside another liquid. The density of the other liquid is
(1) 8/9 (2) 4/9 (3) 4/3 (4) 8/3

21. A large open tank has two holes in the wall. One is a square hole of side L at a depth x from the top & the other is a circular hole of radius R at a depth of 4x from the top. When the tank is completely filled with water the flow of water from both holes per second is same. Then R is
(1) $\frac{L}{\sqrt{2\pi}}$ (2) $2\pi L$ (3) L (4) $\frac{L}{22}$

22. A solid of density D has weight W. If it is completely immersed in a liquid of density d, the apparent weight of the solid is
(1) $W(1-\frac{d}{D})$ (2) $W(1-\frac{D}{d})$
(3) $W(1+\frac{d}{D})$ (4) $W(1+\frac{D}{d})$

23. A sample metal weighs 210 g in air, 180 g in water & 120 g in unknown liquid. Density of metal
(1)3 g/cm^3 (2)7 g/cm^3 (3) 6 g/cm^3 (4)None

24. A piece of ice floats in liquid of density ρ_l ($\rho_l > \rho_w$). When ice melts then level of water
(1) rises (2) falls (3) unchanged (4)none

25. A fisherman hooks an old log of wood of weight 12 N & volume 1000 cm^3. He pulls the log half way out of the water. The tension on his line is
(1) 12N (2) 8N (3) 5N (4) 7N