



Chapter : MECHANICAL PROPERTIES OF FLUIDS

Assignment 3

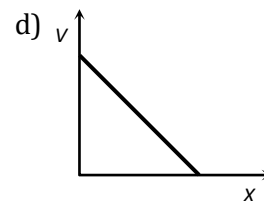
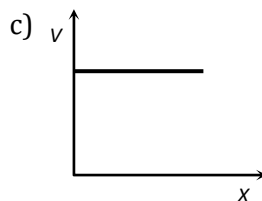
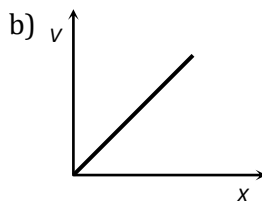
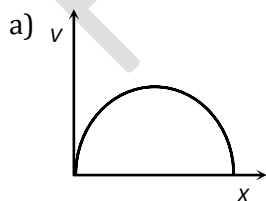
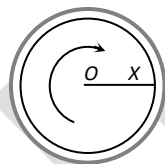
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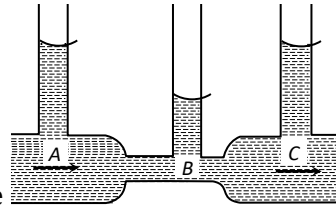
SUBJECT : PHYSICS
DPP NO. :3

Topic :- MECHANICAL PROPERTIES OF FLUIDS

- Water rises in a capillary tube to a height h . Choose false statement regarding capillary rise from the following.
 - On the surface of Jupiter, height will be less than h
 - In a lift moving up with constant acceleration height is less than h
 - On the surface of moon the height is more than h
 - In a lift moving down with constant acceleration height is less than h
- Water is in streamline flow along a horizontal pipe with nonuniform cross-section. At a point in the pipe where the area of cross-section is 10 cm^2 , the velocity of water is 1 ms^{-1} and the pressure is 2000 Pa . The pressure at another point where the cross-sectional area is 5 cm^2 is
 - 4000 Pa
 - 2000 Pa
 - 1000 Pa
 - 500 Pa
- An iron sphere of mass $20 \times 10^{-3} \text{ kg}$ falls through a viscous liquid with terminal velocity 0.5 ms^{-1} . The terminal velocity (in ms^{-1}) of another iron sphere of mass $54 \times 10^{-2} \text{ kg}$ is
 - 4.5
 - 3.5
 - 2.5
 - 1.5
- The diagram shows a cup of tea seen from above. The tea has been stirred and is now rotating without turbulence. A graph showing the speed v with which the liquid is crossing points at a distance X from O along a radius XO would look like



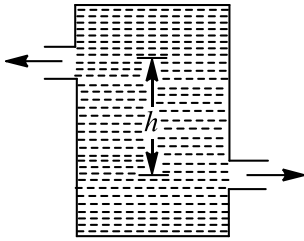
5. In the following fig. is shown the flow of liquid through a horizontal pipe. Three tubes A , B and C are connected to the pipe. The radii of the tubes A , B and C at the junction are respectively



2 cm, 1 cm and 2 cm. It can be said that the

- Height of the liquid in the tube A is maximum
 - Height of the liquid in the tubes A and B is the same
 - Height of the liquid in all the three tubes is the same
 - Height of the liquid in the tubes A and C is the same
6. If the length of tube is less and cannot accommodate the maximum rise of liquid then
- liquid will form fountain
 - liquid will not rise
 - the meniscus will adjust itself so that the water does not spill
 - none of the above
7. What is the ratio of surface energy of 1 small drop and 1 large drop if 1000 drops combined to form 1 large drop?
- 100 : 1
 - 1000 : 1
 - 10 : 1
 - 1 : 100
8. Determine the energy stored in the surface of a soap bubble of radius 2.1 cm if its surface tension is $4.5 \times 10^{-2} \text{ Nm}^{-1}$.
- 8 mJ
 - 2.46 mJ
 - $4.93 \times 10^{-4} \text{ J}$
 - None of these
9. Two capillaries of same length and radii in the ratio 1:2 are connected in series. A liquid flows through them in streamlined condition. If the pressure across the two extreme ends of the combination is 1 m of water, the pressure difference across first capillary of
- 9.4 m
 - 4.9 m
 - 0.49 m
 - 0.94 m
10. A raindrop with radius 1.5 mm falls from a cloud at a height 1200 m from ground. The density of water is 1000 kg/m^3 and density of air is 1.2 kg/m^3 . Assume the drop was spherical throughout the fall and there is no air drag. The impact speed of the drop will be
- 27 km/h
 - 550 km/h
 - Zero
 - 129 km/h
11. A piece of wax weighs 18.03 g in air. A piece of metal is found to weigh 17.03 g in water. It is tied to the wax and both together weigh 15.23 g in water. Then, the specific gravity of wax is
- $\frac{18.03}{17.03}$
 - $\frac{17.03}{18.03}$
 - $\frac{18.03}{19.83}$
 - $\frac{15.03}{17.03}$

12. There are two identical small holes on the opposite sides of a tank containing a liquid. The tank is open at the top. The difference in height between the two holes is h . As the liquid comes out of the two holes, the tank will experience a net horizontal force proportional to

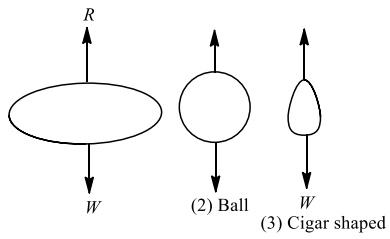


- a) $h^{1/2}$ b) $h^{3/2}$ c) h d) h^2
13. If two soap bubble of different radii are connected by a tube
- Air flows from the bigger bubble to the smaller bubble till the sizes become equal
 - Air flows from bigger bubble to the smaller bubble till the sizes are interchanged
 - Air flows from the smaller bubble to the bigger
 - There is no flow of air
14. The surface tension of soap solution is 0.03 Nm^{-1} . the work done in blowing to from a soap bubble of surface area 40 cm^2 , (in J), is
- 1.2×10^{-4}
 - 2.4×10^{-4}
 - 12×10^{-4}
 - 24×10^{-4}
15. A sniper fires a rifle bullet into a gasoline tank making a hole 53.0 m below the surface of gasoline. The tank was sealed at 3.10 atm . The stored gasoline has a density of 660 kgm^{-3} . The velocity with which gasoline begins to shoot out of the hole is
- 27.8 ms^{-1}
 - 41.0 ms^{-1}
 - 9.6 ms^{-1}
 - 19.7 ms^{-1}
16. 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
- + 10%
 - + 46%
 - 10%
 - 40%
17. When a pinch of salt or any other salt which is soluble in water is added to water, its surface tension
- Increases
 - Decreases
 - May increase or decrease depending upon salt
 - None of the above
18. Two pieces of metal when immersed in a liquid have equal upthrust on them; then
- Both pieces must have equal weights
 - Both pieces must have equal densities
 - Both pieces must have equal volumes
 - Both are floating to the same depth

19. A hollow sphere of volume V is floating on water surface with *half* immersed in it. What should be the minimum volume of water poured inside the sphere so that the sphere now sinks into the water

- a) $V/2$ b) $V/3$ c) $V/4$ d) V

20. When a body falls in air, the resistance of air depends to a great extent on the shape of the body. 3 different shapes are given. Identify the combination of air resistances which truly represents the physical situation? (The cross-sectional areas are the same)



- a) $1 < 2 < 3$ b) $2 < 3 < 1$ c) $3 < 2 < 1$ d) $3 < 1 < 2$