CLASS : XITH

SUBJECT : PHYSICS

DATE :

DPP NO. :3

Topic :- MECHANICAL PROPERTIES OF FLUIDS

1. Water rises in a capillary tube to a height h. Choose false statement regarding capillary rise from the following.
   a) On the surface of Jupiter, height will be less than h
   b) In a lift moving up with constant acceleration height is less than h
   c) On the surface of moon the height is more than h
   d) In a lift moving down with constant acceleration height is less than h

2. 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

   a) 4000 Pa   b) 2000 Pa   c) 1000 Pa   d) 500 Pa

3. An iron sphere of mass 20×10^{-3}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 54×10^{-2} kg is
   a) 4.5   b) 3.5   c) 2.5   d) 1.5

4. 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
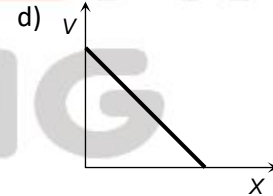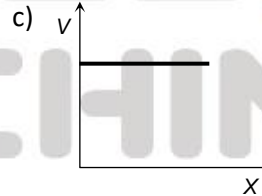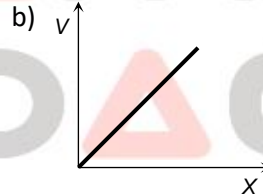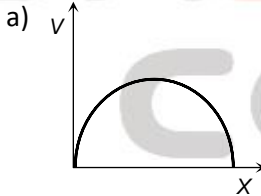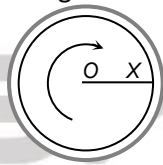

5. In the following fig. is shown the flow of liquid through a horizontal pipe. Three tubes A, B and C are connected to the pipe. The radii of the tubes A, B and C at the junction are respectively $2 \ cm, 1 \ cm$ and
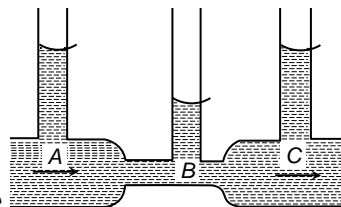
$2\ cm$. It can be said that the
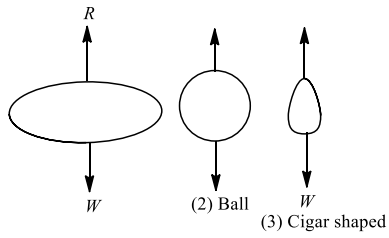
a) Height of the liquid in the tube A is maximum
b) Height of the liquid in the tubes A and B is the same
c) Height of the liquid in all the three tubes is the same
d) Height of the liquid in the tubes A and C is the same

6. If the length of tube is less and cannot accommodate the maximum rise of liquid then
   a) liquid will form fountain
   b) liquid will not rise
   c) the meniscus will adjust itself so that the water does not spill
   d) 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?
   a) 100 : 1
   b) 1000 : 1
   c) 10 : 1
   d) 1 : 100

8. Determine the energy stored in the surface of a soap bubble of radius 2.1 cm if its surface tension is 4.5×10^{-2} Nm^{-1}.
   a) 8 mJ
   b) 2.46 mJ
   c) 4.93×10^{-4} J
   d) 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
   a) $9.4\ m$
   b) $4.9\ m$
   c) $0.49\ m$
   d) $0.94\ m$

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
    a) $27\ km/h$
    b) $550\ km/h$
    c) Zero
    d) $129\ km/h$

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 id
    a) $\dfrac{18.03}{17.03}$
    b) $\dfrac{17.03}{18.03}$
    c) $\dfrac{18.03}{19.83}$
    d) $\dfrac{15.03}{17.03}$

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
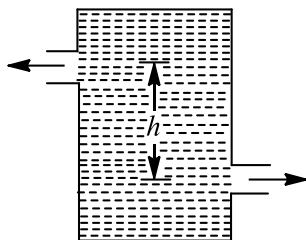
a) $h^{1/2}$ b) $h^{3/2}$ c) h d) h^2

13. If two soap bubble of different radii are connected by a tube
    a) Air flows from the bigger bubble to the smaller bubble till the sizes become equal
    b) Air flows from bigger bubble to the smaller bubble till the sizes are interchanged
    c) Air flows from the smaller bubble to the bigger
    d) 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
    a) 1.2×10^{-4} b) 2.4×10^{-4} c) 12×10^{-4} d) 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
    a) $27.8 ms^{-1}$ b) $41.0 ms^{-1}$ c) $9.6 ms^{-1}$ d) $19.7 ms^{-1}$

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
    a) + 10%   b) + 46%   c) -10% d) -40%

17. When a pinch of salt or any other salt which is soluble in water is added to water, its surface tension
    a) Increases   b) Decreases
    c) May increase or decrease depending upon salt   d) None of the above

18. Two pieces of metal when immersed in a liquid have equal upthrust on them; then
    a) Both pieces must have equal weights   b) Both pieces must have equal densities
    c) Both pieces must have equal volumes   d) 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)

R

W   (2) Ball   W

(3) Cigar shaped

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