1. A thin flat circular disc of radius 4.5 cm is placed gently over the surface of water. If surface tension of water is 0.07 Nm^{-1}, then the excess force required to take it away from the surface is. **(2024)**

(a) 198 N (b) 1.98 mN
(c) 99 N (d) 19.8 mN

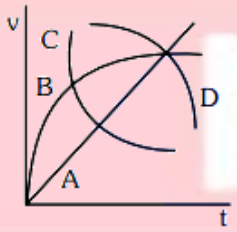
2. The amount of energy required to form a bubble of radius 2 cm from a soap solution is nearly: (surface tension of soap solution = 0.03 N m^{-1}) **(2023)**

(a) 50.1×10^{-4} J (b) 30.1×10^{-4} J
(c) 5.06×10^{-4} J (d) 3.01×10^{-4} J

3. The venturi-meter works on: **(2023)**

(a) The principle of perpendicular axes
(b) Huygen's principle
(c) Bernoulli's principle
(d) The principle of parallel axes

4. A spherical ball is dropped in a long column of a highly viscous liquid. The curve in the graph shown, which represent the speed of the ball (v) as a function of time (t) is: **(2022)**



(a) B (b) C
(c) D (d) A

5. If a soap bubble expands, the pressure inside the bubble: **(2022)**

(a) Increases
(b) Remains the same
(c) Is equal to the atmospheric pressure
(d) Decreases

6. A capillary tube of radius r is immersed in water and water rises in it to a height h. The mass of the water in the capillary is 5g. Another capillary tube of radius 2r is immersed in water. The mass of water that will rise in this tube is: **(2020)**

(a) 5.0 g (b) 10.0 g
(c) 20.0 g (d) 2.5 g

7. A liquid does not wet the solid surface if angle of contact is: **(2020 Covid Re-NEET)**

(a) Equal to 60°
(b) Greater than 90°
(c) Zero
(d) Equal to 45°

8. A barometer is constructed using a liquid (density = 760 kg/m^3). What would be the height of the liquid column, when a mercury barometer reads 76 cm? (density of mercury = 13600 kg/m^3) **(2020 Covid Re-NEET)**

(a) 13.6 m (b) 136 m
(c) 0.76 m (d) 1.36 m

9. A soap bubble, having radius of 1 mm, is blown from a detergent solution having a surface tension of 2.5×10^{-2} N/m. The pressure inside the bubble equals at a point Z_0 below the free surface of water in a container. Taking g = 10 m/s^2, density of water = 10^3 kg/m^3, the value of Z_0 is: **(2019)**

(a) 100 cm (b) 10 cm
(c) 1 cm (d) 0.5 cm

10. A small hole of an area of cross-section 2 mm^2 is present near the bottom of a fully filled open tank of height 2 m. Taking g = 10 m/s^2, the rate of flow of water through the open hole would be nearly **(2019)**

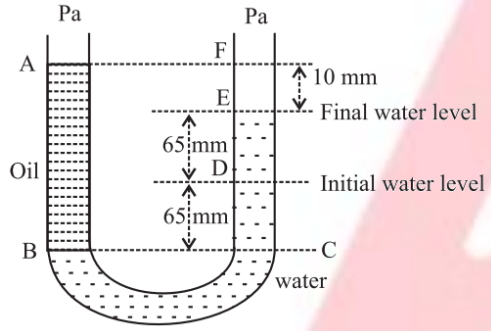
(a) $12.6 \times 10^{-6}\ m^3/s$
(b) $8.9 \times 10^{-6}\ m^3/s$
(c) $2.23 \times 10^{-6}\ m^3/s$
(d) $6.4 \times 10^{-6}\ m^3/s$

11. A small sphere of radius 'r' falls from rest in a viscous liquid. As a result, heat is produced due to viscous force. The rate of production of heat when the sphere attains its terminal velocity, is proportional to : **(2018)**

(a) r^5 (b) r^2

(c) r^3 (d) r^4

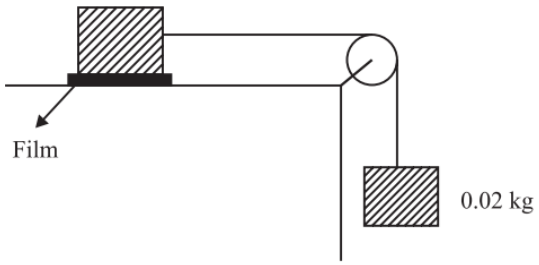
12. A U tube with both ends open to the atmosphere, is partially filled with water. Oil, which is immiscible with water, is poured into one side until it stands at a distance of 10 mm above the water level on the other side. Meanwhile the water rises by 65 mm from its original level (see diagram). The density of the oil is: **(2017-Delhi)**



(a) 425 kg m^{-3} (b) 800 kg m^{-3}

(c) 928 kg m^{-3} (d) 650 kg m^{-3}

13. A metal block of base area 0.2 m^2 is connected to a 0.02 kg mass via a string that passes over an ideal pulley as shown in figure. A liquid film of thickness 0.6 mm is placed between the block and the table. When released the block moves to the right with a constant speed of 0.17 m/s. The coefficient of viscosity of the liquid is: **(2017-Gujarat)**



(a) 3.45×10^3 Pa-s

(b) 3.45×10^{-2} Pa-s

(c) 3.45×10^{-3} Pa-s

(d) 3.45×10^2 Pa-s

14. Three liquids of densities ρ_1, ρ_2 and ρ_3 (with $\rho_1 > \rho_2 > \rho_3$) having the same value of surface tension T, rise to the same height in three identical capillaries. The angles of contact θ_1, θ_2 *and* θ_3 obey: **(2016 - II)**

(a) $\frac{\pi}{2} < \theta_1 < \theta_2 < \theta_3 < \pi$

(b) $\pi > \theta_1 > \theta_2 > \theta_3 > \frac{\pi}{2}$

(c) $\frac{\pi}{2} > \theta_1 > \theta_2 > \theta_3 \geq 0$

(d) $0 \leq \theta_1 < \theta_2 < \theta_3 < \frac{\pi}{2}$

15. A rectangular film of liquid is extended from (4 cm × 2 cm) to (5 cm × 4 cm). If the work done is 3×10^{-4} J, the value of the surface tension of the liquid is: **(2016 - II)**

(a) 0.2 Nm^{-1} (b) 8.0 Nm^{-1}

(c) 0.250 Nm^{-1} (d) 0.125 Nm^{-1}

16. Two non-mixing liquids of densities ρ and nρ (n > 1) are put in a container. The height of each liquid is h. A solid cylinder of length L and density d is put in this container. The cylinder floats with its axis vertical and length pL (p < 1) in the denser liquid. The density d is equal to: **(2016 - I)**

(a) {1 + (n + 1)p}ρ (b) {2 + (n + 1)p}ρ

(c) {2 + (n – 1)p}ρ (d) {1 + (n – 1)p}ρ

17. A wind with speed 40 m/s blows parallel to the roof of a house. The area of the roof is 250 m^2. Assuming that the pressure inside the house is atmospheric pressure, the force exerted by the wind on the roof and the direction of the force will be (P_{air} = 1.2 kg/m^3): **(2015)**

(a) 4.8×10^5N, upwards

(b) 2.4×10^5N, upwards

(c) 2.4×10^5N, downwards

(d) 4.8×10^5N, downwards

18. Water rises to height 'h' in capillary tube. If the length of capillary tube above the surface of water is made less than 'h', then: **(2015 Re)**

(a) Water does not rise at all.

(b) Water rises up to the tip of capillary tube and then starts overflowing like a fountain.

(c) Water rises up to the top of capillary tube and stays there without overflowing

(d) Water rises up to a point a little below the top and stays there

19. A certain number of spherical drops of a liquid of radius r coalesce to form a single drop of radius R and volume V. If 'T' is the surface tension of the liquid, then: **(2014)**

(a) Energy = $4VT\left(\frac{1}{r}-\frac{1}{R}\right)$ is released

(b) Energy = $3VT\left(\frac{1}{r}-\frac{1}{R}\right)$ is absorbed

(c) Energy = $3VT\left(\frac{1}{r}-\frac{1}{R}\right)$ is released

(d) Energy is neither released nor absorbed

20. The wettability of a surface by a liquid depends primarily on: **(2014)**

(a) Angle of contact between the surface and the liquid

(b) Viscosity

(c) Surface tension

(d) Density