# JEE Main Fluid Mechanics Previous Year Questions 2024

**Q1: A solid sphere of radius R acquires a terminal velocity $v_1$ when falling (due to gravity) through a viscous fluid having a coefficient of viscosity η. The sphere is broken into 27 identical spheres. If each of these acquires a terminal velocity $v_2$, when falling through the same fluid, the ratio ($v_1/v_2$) equals**

(a) 9

(b) 1/27

(c) 1/9

(d) 27

**Answer: (a) 9**

**Q2: Spherical balls of radius R are falling in a viscous fluid of viscosity with a velocity v. The retarding viscous force acting on the spherical ball is**

(a) directly proportional to R but inversely proportional to v

(b) directly proportional to both radius R and velocity v

(c) inversely proportional to both radius R and velocity v

(d) inversely proportional to R but directly proportional to velocity v

**Answer: (b) directly proportional to both radius R and velocity v**

**Q3: A long cylindrical vessel is half-filled with a liquid. When the vessel is rotated about its own vertical axis, the liquid rises up near the wall. If the radius of the vessel is 5 cm and its rotational speed is 2 rotations per second, then the difference in the heights between the centre and the sides, in cm, will be**

(a) 0.4

(b) 2.0

(c) 0.1

(d) 1.2

**Answer: (b) 2.0**

**Q4: Water is flowing continuously from a tap having an internal diameter 8 × $10^{-3}$ m. The water velocity as it leaves the tap is 0.4 $ms^{-1}$. The diameter of the water stream at a distance 2 × $10^{-1}$ m below the tap is close to**

(a) 5.0 × $10^{-3}$ m

(b) 7.5 × $10^{-3}$ m

(c) 9.6 × $10^{-3}$ m

(d) 3.6 × $10^{-3}$ m

**Q5: A 20 cm long capillary tube is dipped in water. The water rises up to 8 cm. If the entire arrangement is put in a freely falling elevator the length of the water column in the capillary tube will be**

(a) 4 cm

(b) 20 cm

(c) 8 cm

(d) 10 cm

**Q6:Water flows into a large tank with a flat bottom at the rate of $10^{-4}$ $m^3s^{-1}$. Water is also leaking out of a hole of area 1 $cm^2$ at its button. If the height of the water in the tank remains steady, then this height is**

(a) 5 cm

(b) 7 cm

(c) 4 cm

(d) 9 cm

**Answer: (a) 5 cm**

**Q7: A submarine experiences a pressure of 5.05 x$10^6$ Pa at depth of $d_1$ in a sea. When it goes further to a depth of $d_2$, it experiences a pressure of 8.08 x $10^6$ Pa. Then $d_1 - d_2$ is approximately (density of water = $10^3$ $ms^{-2}$ and acceleration due to gravity = 10 $ms^{-2}$)**

(a) 300 m

(b) 400 m

(c) 600 m

(d) 500 m

**Answer: (a) 300 m**

**Q8: Water from a pipe is coming at a rate of 100 litres per minute. If the radius of the pipe is 5 cm, the Reynolds number for the flow is of the order (density of water = 1000 kg/$m^3$, coefficient of viscosity of water = 1 mPa s)**

(a)$10^3$

(b)$10^4$

(c)$10^2$

(d)$10^6$

**Answer : (b)$10^4$**

**Q9: The top of a water tank is open to the air and its water level is maintained. It is giving out 0.74 $m^3$ water per minute through a circular opening of 2 cm radius in its wall. The depth of the centre of the opening from the level of water in the tank is close to**

(a) 6.0 m

(b) 4.8 m

(c)9.6 m

(d) 2.9 m

**Answer: (b) 4.8 m**