

PYQSide

NEET MECHANICAL PROPERTIES OF FLUIDS — PYQS

Max. Marks: 116

Questions: 29

Section A (MCQ)

- Q.1** A submarine is designed to withstand an absolute pressure of 100 atm. How deep can it go below the water surface ?

(Consider the density of water = 1000 kg m^{-3} , $1 \text{ atm} = 1 \times 10^5 \text{ Pa}$ and gravitational acceleration $g = 10 \text{ m/s}^2$) [NEET (UG) 2026]

- (1) 9900 m (2) 990 m (3) 9000 m (4) 99 m

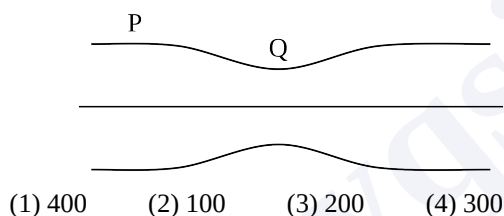
Scan or tap for the full solution



- Q.2** Water flows in a streamline motion through a horizontal pipe of circular cross-section as shown in the figure. The pressure difference of water between P and Q is 15 N m^{-2} . The area of cross-section at P and Q are 40 cm^2 and 20 cm^2 , respectively. The rate of flow of water through the pipe, in $\text{cm}^3 \text{ s}^{-1}$, is:

[Take density of water = 1000 kg m^{-3}]

[RE-NEET (UG) 2026]

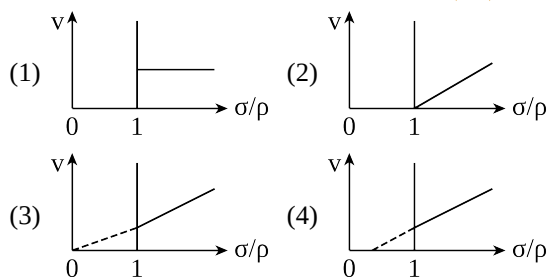


Scan or tap for the full solution



- Q.3** In the measurement of viscosity of liquids using terminal velocity experiment, spherical balls of same radius but having different densities are used. The variation of the terminal velocity (v) with the ratio of density of spherical ball (σ) to density of the liquid (ρ), is best represented by:

[RE-NEET (UG) 2026]



Scan or tap for the full solution



- Q.4** A balloon is made of a material of surface tension S and its inflation outlet (from where gas is filled in it) has small area A . It is filled with a gas of density ρ and takes a spherical shape of radius R . When the gas is allowed to flow freely out of it, its radius r changes from R to 0 (zero) in time T . If the speed $v(r)$ of gas coming out of the balloon depends on r as r^a and T as $S^\alpha A^\beta \rho^\gamma R^\delta$ then [NEET (UG) 2025]

(1) $a = -\frac{1}{2}$, $\alpha = -\frac{1}{2}$, $\beta = -1$, $\gamma = \frac{1}{2}$, $\delta = \frac{7}{2}$

(2) $a = \frac{1}{2}$, $\alpha = \frac{1}{2}$, $\beta = -\frac{1}{2}$, $\gamma = \frac{1}{2}$, $\delta = \frac{7}{2}$

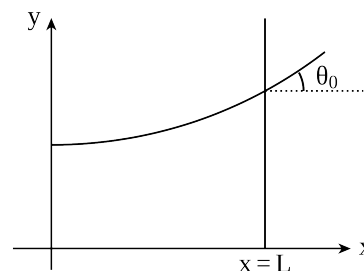
(3) $a = \frac{1}{2}$, $\alpha = \frac{1}{2}$, $\beta = -1$, $\gamma = +1$, $\delta = \frac{3}{2}$

(4) $a = -\frac{1}{2}$, $\alpha = -\frac{1}{2}$, $\beta = -1$, $\gamma = -\frac{1}{2}$, $\delta = \frac{5}{2}$

Scan or tap for the full solution



- Q.5** Consider a water tank shown in the figure. It has one wall at $x = L$ and can be taken to be very wide in the z direction. When filled with a liquid of surface tension S and density ρ , the liquid surface makes angle θ_0 ($\theta_0 \ll 1$) with the x -axis at $x = L$. If $y(x)$ is the height of the surface then the equation for $y(x)$ is:



(take $\theta(x) = \sin \theta(x) = \tan \theta(x) = \frac{dy}{dx}$, g is the acceleration due to gravity) [NEET (UG) 2025]

(1) $\frac{d^2y}{dx^2} = \sqrt{\frac{\rho g}{S}}$ (2) $\frac{dy}{dx} = \sqrt{\frac{\rho g}{S}} x$

(3) $\frac{d^2y}{dx^2} = \frac{\rho g}{S} x$ (4) $\frac{d^2y}{dx^2} = \frac{\rho g}{S} y$

Scan or tap for the full solution



- Q.6** 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 N m^{-1} , then the excess force required to take it away from the surface is

[NEET (UG) 2024]

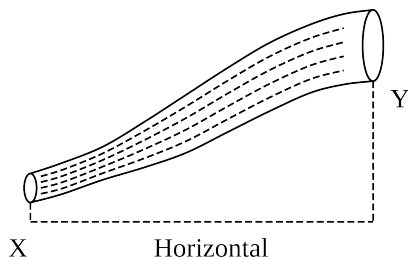
- (1) 19.8 mN (2) 198 N
(3) 1.98 mN (4) 99 N

Scan or tap for the full solution



- Q.7** An ideal fluid is flowing in a non-uniform cross-sectional tube XY (as shown in the figure) from end X to end Y. If K_1 and K_2 are the kinetic energy per unit volume of the fluid at X and Y respectively, then the correct option is :

[RE-NEET (UG) 2024]



- (1) $K_1 = K_2$ (2) $2K_1 = K_2$
(3) $K_1 > K_2$ (4) $K_1 < K_2$

Scan or tap for the full solution



- Q.8** The amount of energy required to form a soap bubble of radius 2 cm from a soap solution is nearly: (surface tension of soap solution = 0.03 N m^{-1})

[NEET (UG) 2023]

- (1) $5.06 \times 10^{-4} \text{ J}$ (2) $3.01 \times 10^{-4} \text{ J}$
(3) $50.1 \times 10^{-4} \text{ J}$ (4) $30.16 \times 10^{-4} \text{ J}$

Scan or tap for the full solution



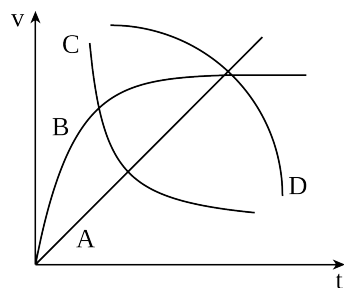
- Q.9** The venturi-meter works on : [NEET (UG) 2023]

- (1) Bernoulli's principle
(2) The principle of parallel axes
(3) The principle of perpendicular axes
(4) Huygens' principle

Scan or tap for the full solution



- Q.10** A spherical ball is dropped in a long column of a highly viscous liquid. The curve in the graph shown, which represents the speed of the ball (v) as a function of time (t) is [NEET (UG) 2022]



- (1) A (2) B (3) C (4) D

Scan or tap for the full solution



- Q.11** If a soap bubble expands, the pressure inside the bubble [NEET (UG) 2022]

- (1) Decreases
(2) Increases
(3) Remains the same
(4) Is equal to the atmospheric pressure

Scan or tap for the full solution



- Q.12** Two copper vessels A and B have the same base area but of different shapes. A takes twice the volume of water as that B requires to fill upto a particular common height. Then the correct statement among the following is :

[NEET (UG) 2022 (Phase 2)]

- (1) Vessel B weighs twice that of A.
(2) Pressure on the base area of vessels A and B is same.
(3) Pressure on the base area of vessels A and B is not same.
(4) Both vessels A and B weigh the same.

Scan or tap for the full solution



- Q.13** The terminal velocity of a copper ball of radius 5 mm falling through a tank of oil at room temperature is 10 cm s^{-1} . If the viscosity of oil at room temperature is $0.9 \text{ kg m}^{-1} \text{ s}^{-1}$, the viscous drag force is : [NEET (UG) 2022 (Phase 2)]

- (1) $4.23 \times 10^{-6} \text{ N}$ (2) $8.48 \times 10^{-3} \text{ N}$
(3) $8.48 \times 10^{-5} \text{ N}$ (4) $4.23 \times 10^{-3} \text{ N}$

Scan or tap for the full solution



- Q.14** The velocity of a small ball of mass M and density d , when dropped in a container filled with glycerin becomes constant after some time. If the density of glycerin is $\frac{d}{2}$, then the viscous force acting on the ball will be : [NEET (UG) 2021]

- (1) $2Mg$ (2) $\frac{Mg}{2}$ (3) Mg (4) $\frac{3}{2}Mg$

Scan or tap for the full solution



- Q.15** 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 5 g. Another capillary tube of radius $2r$ is immersed in water. The mass of water that will rise in this tube is :

[NEET (UG) 2020]

- (1) 5.0 g (2) 10.0 g (3) 20.0 g (4) 2.5 g

Scan or tap for the full solution



Q.16 A small hole of area of cross-section 2 mm^2 is present near the bottom of a fully filled open tank of height 2 m . Taking $g = 10 \text{ m/s}^2$, the rate of flow of water through the open hole would be nearly :

[NEET (UG) 2019]

- (1) $8.9 \times 10^{-6} \text{ m}^3/\text{s}$ (2) $2.23 \times 10^{-6} \text{ m}^3/\text{s}$
 (3) $6.4 \times 10^{-6} \text{ m}^3/\text{s}$ (4) $12.6 \times 10^{-6} \text{ m}^3/\text{s}$

Scan or tap for the full solution



Q.17 A soap bubble, having radius of 1 mm , is blown from a detergent solution having a surface tension of $2.5 \times 10^{-2} \text{ N/m}$. The pressure inside the bubble equals the pressure at a point Z_0 below the free surface of water in a container. Taking $g = 10 \text{ m/s}^2$, density of water $= 10^3 \text{ kg/m}^3$, the value of Z_0 is :

[NEET (UG) 2019]

- (1) 1 cm (2) 10 cm (3) 100 cm (4) 0.5 cm

Scan or tap for the full solution



Q.18 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

[NEET 2018]

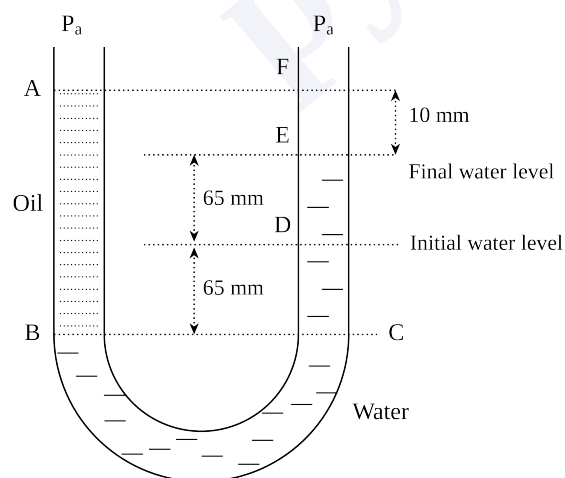
- (1) r^3 (2) r^2 (3) r^5 (4) r^4

Scan or tap for the full solution



Q.19 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

[NEET 2017]



- (1) 425 kg m^{-3} (2) 800 kg m^{-3}
 (3) 928 kg m^{-3} (4) 650 kg m^{-3}

Scan or tap for the full solution



Q.20 Two non-mixing liquids of densities ρ and $n\rho$ ($n > 1$) 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

[NEET 2016 (Phase 1)]

- (1) $\{2 + (n - 1)p\}\rho$ (2) $\{1 + (n - 1)p\}\rho$
 (3) $\{1 + (n + 1)p\}\rho$ (4) $\{2 + (n + 1)p\}\rho$

Scan or tap for the full solution



Q.21 A rectangular film of liquid is extended from $(4 \text{ cm} \times 2 \text{ cm})$ to $(5 \text{ cm} \times 4 \text{ cm})$. If the work done is $3 \times 10^{-4} \text{ J}$, the value of the surface tension of the liquid is

[NEET 2016 (Phase 2)]

- (1) 0.250 N m^{-1} (2) 0.125 N m^{-1}
 (3) 0.2 N m^{-1} (4) 8.0 N m^{-1}

Scan or tap for the full solution



Q.22 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

[NEET 2016 (Phase 2)]

- (1) $\frac{\pi}{2} > \theta_1 > \theta_2 > \theta_3 \geq 0$
 (2) $0 \leq \theta_1 < \theta_2 < \theta_3 < \frac{\pi}{2}$
 (3) $\frac{\pi}{2} < \theta_1 < \theta_2 < \theta_3 < \pi$
 (4) $\pi > \theta_1 > \theta_2 > \theta_3 > \frac{\pi}{2}$

Scan or tap for the full solution



Q.23 The heart of a man pumps 5 litres of blood through the arteries per minute at a pressure of 150 mm of mercury. If the density of mercury be $13.6 \times 10^3 \text{ kg/m}^3$ and $g = 10 \text{ m/s}^2$ then the power (in watt) is

[AIPMT 2015]

- (1) 3.0 (2) 1.50 (3) 1.70 (4) 2.35

Scan or tap for the full solution



Q.24 The cylindrical tube of a spray pump has radius R , one end of which has n fine holes, each of radius r . If the speed of the liquid in the tube is V , the speed of the ejection of the liquid through the holes is

[AIPMT 2015]

- (1) $\frac{VR^2}{n^3r^2}$ (2) $\frac{V^2R}{nr}$ (3) $\frac{VR^2}{n^2r^2}$ (4) $\frac{VR^2}{nr^2}$

Scan or tap for the full solution



Q.25 Water rises to a height h in capillary tube. If the length of capillary tube above the surface of water is made less than h , then [AIPMT 2015]

- (1) water rises upto a point a little below the top and stays there.
- (2) water does not rise at all.
- (3) water rises upto the tip of capillary tube and then starts overflowing like a fountain.
- (4) water rises upto the top of capillary tube and stays there without overflowing.

Scan or tap for the full solution



Q.26 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 ($\rho_{\text{air}} = 1.2 \text{ kg/m}^3$) [AIPMT 2015 (Cancelled)]

- (1) $2.4 \times 10^5 \text{ N}$, upwards
- (2) $2.4 \times 10^5 \text{ N}$, downwards
- (3) $4.8 \times 10^5 \text{ N}$, downwards
- (4) $4.8 \times 10^5 \text{ N}$, upwards

Scan or tap for the full solution



Q.27 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 [AIPMT 2014]

- (1) energy $= 4VT\left(\frac{1}{r} - \frac{1}{R}\right)$ is released.
- (2) energy $= 3VT\left(\frac{1}{r} + \frac{1}{R}\right)$ is absorbed.
- (3) energy $= 3VT\left(\frac{1}{r} - \frac{1}{R}\right)$ is released.
- (4) energy is neither released nor absorbed.

Scan or tap for the full solution



Q.28 The wettability of a surface by a liquid depends primarily on [NEET 2013]

- (1) density
- (2) angle of contact between the surface and the liquid
- (3) viscosity
- (4) surface tension

Scan or tap for the full solution



Q.29 A fluid is in streamline flow across a horizontal pipe of variable area of cross section. For this which of the following statements is correct? [NEET 2013 (Karnataka)]

- (1) The velocity is maximum at the narrowest part of the pipe and pressure is maximum at the widest part of the pipe.
- (2) Velocity and pressure both are maximum at the narrowest part of the pipe.
- (3) Velocity and pressure both are maximum at the widest part of the pipe.
- (4) The velocity is minimum at the narrowest part of the pipe and the pressure is minimum at the widest part of the pipe.

Scan or tap for the full solution



ANSWER KEY

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	2	1	2	1	4	1	3	2	1	2	1
Ques.	12	13	14	15	16	17	18	19	20	21	22
Ans.	2	2	2	2	4	1	3	3	2	2	2
Ques.	23	24	25	26	27	28	29				
Ans.	3	4	4	1	3	2	1				