

NEET MECHANICAL PROPERTIES OF FLUIDS — SURFACE TENSION AND SURFACE ENERGY — PYQS

Max. Marks: 24
Questions: 6

Section A (MCQ) — 6 questions

Q.1 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 $T \propto S^a A^b \rho^c R^d$ then [NEET (UG) 2025]

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

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

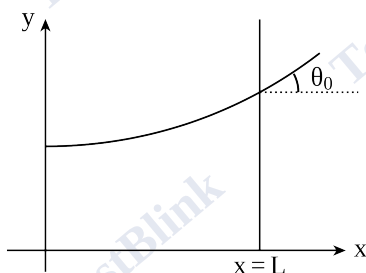
(3) $a = \frac{1}{2}$, $\alpha = \frac{1}{2}$, $\beta = -1$, $\gamma = +1$, $\delta = \frac{3}{2}$

(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.2 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.3 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.4 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.5 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.6 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



ANSWER KEY

Ques.	1	2	3	4	5	6					
Ans.	1	4	1	2	2	3					