

JEE MAIN MECHANICAL PROPERTIES OF FLUIDS — PYQS

Max. Marks: 260

Questions: 65

Section A (MCQ) — 44 questions

- Q.1** A liquid of density 600 kg/m^3 flowing steadily in a tube of varying cross-section. The cross-section at a point A is 1.0 cm^2 and that at B is 20 mm^2 . Both the points A and B are in same horizontal plane, the speed of the liquid at A is 10 cm/s . The difference in pressures at A and B points is _____ Pa.

[JEE Main 2026 (Online) 8th April Evening Shift]

- (1) 18 (2) 144 (3) 36 (4) 72

Scan or tap for the full solution



- Q.2** A spherical liquid drop of radius R acquires the terminal velocity v_1 when falls through a gas of viscosity η . Now the drop is broken into 64 identical droplets and each droplet acquires terminal velocity v_2 falling through the same gas. The ratio of terminal velocities v_1/v_2 is _____.

[JEE Main 2026 (Online) 8th April Evening Shift]

- (1) 4 (2) 0.25 (3) 32 (4) 16

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- Q.3** A cylindrical vessel of 40 cm radius is completely filled with water and its capacity is 528 dm^3 (dm : decimeter). The vessel is placed on a solid block of exactly same height as vessel. If a small hole is made at 70 cm below the top of water level, then horizontal range of water falling on the ground in the beginning is _____ cm.

[JEE Main 2026 (Online) 6th April Evening Shift]

- (1) $120\sqrt{2}$ (2) $140\sqrt{2}$
(3) $140\sqrt{3}$ (4) $120\sqrt{3}$

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- Q.4** Eight mercury drops, each of radius r , coalesce to form a bigger drop. The surface energy released in this process is _____. (S is the surface tension of mercury).

[JEE Main 2026 (Online) 5th April Evening Shift]

- (1) $8\pi^2 S$ (2) $16\pi^2 S$ (3) $64\pi^2 S$ (4) $4\pi^2 S$

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- Q.5** A water spray gun is attached to a hose of cross sectional area 30 cm^2 . The gun comprises of 10 perforations each of cross sectional area of 15 mm^2 . If the water flows in the hose with the speed of 50 cm/s , calculate the speed at which the water flows out from each perforation. (Neglect any edge effects) [JEE Main 2026 (Online) 4th April Evening Shift]

- (1) 100 m/s (2) 10 m/s
(3) 1000 m/s (4) $15 \times 10^2 \text{ m/s}$

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- Q.6** A liquid drop of diameter 2 mm breaks into 512 droplets. The change in surface energy is $\alpha \times 10^{-6} \text{ J}$. The value of α is _____. (Take surface tension of liquid = 0.08 N/m)

[JEE Main 2026 (Online) 2nd April Morning Shift]

- (1) 10 (2) 7 (3) 8 (4) 11

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- Q.7** The surface tension of a soap bubble is 0.03 N/m . The work done in increasing the diameter of bubble from 2 cm to 6 cm is $\alpha\pi \times 10^{-4} \text{ J}$. The value of α is _____. (Take $\pi = 3.14$)

[JEE Main 2026 (Online) 2nd April Evening Shift]

- (1) 0.86 (2) 0.64 (3) 1.92 (4) 7.68

Scan or tap for the full solution



- Q.8** If an air bubble of diameter 2 mm rises steadily through a liquid of density 2000 kg/m^3 at a rate of 0.5 cm/s , then the coefficient of viscosity of liquid is _____ Poise. (Take $g = 10 \text{ m/s}^2$)

[JEE Main 2026 (Online) 2nd April Evening Shift]

- (1) 0.88 (2) 8.8 (3) 88.8 (4) 0.088

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- Q.9** A cubical block of density $\rho_b = 600 \text{ kg/m}^3$ floats in a liquid of density $\rho_l = 900 \text{ kg/m}^3$. If the height of block is $H = 8.0 \text{ cm}$, then height of the submerged part is _____ cm.

[JEE Main 2026 (Online) 24th January Evening Shift]

- (1) 6.3 (2) 4.3 (3) 7.3 (4) 5.3

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Q.10 A small metallic sphere of diameter 2 mm and density 10.5 g/cm^3 is dropped in glycerine having viscosity 10 Poise and density 1.5 g/cm^3 respectively. The terminal velocity attained by the sphere is _____ cm/s.

$$\left(\pi = \frac{22}{7} \text{ and } g = 10 \text{ m/s}^2\right)$$

[JEE Main 2026 (Online) 23rd January Evening Shift]

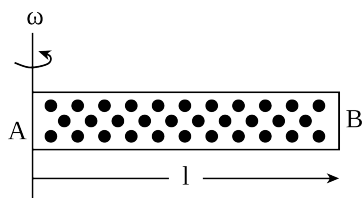
- (1) 1.0 (2) 1.5 (3) 3.0 (4) 2.0

Scan or tap for the full solution



Q.11 A cylindrical tube AB of length l , closed at both ends contains an ideal gas of 1 mol having molecular weight M . The tube is rotated in a horizontal plane with constant angular velocity ω about an axis perpendicular to AB and passing through the edge at end A, as shown in the figure. If P_A and P_B are the pressures at A and B respectively, then (Consider the temperature is same at all points in the tube)

[JEE Main 2026 (Online) 22nd January Morning Shift]



- (1) $P_B = P_A e^{\left(\frac{M\omega^2 l^2}{3RT}\right)}$ (2) $P_B = P_A$
 (3) $P_B = P_A e^{\left(\frac{M\omega^2 l^2}{2RT}\right)}$ (4) $P_B = P_A e^{\left(\frac{M\omega^2 l^2}{RT}\right)}$

Scan or tap for the full solution



Q.12 Given below are two statements :

Statement-I: Pressure of a fluid is exerted only on a solid surface in contact as the fluid-pressure does not exist everywhere in a still fluid.

Statement-II: Excess potential energy of the molecules on the surface of a liquid, when compared to interior, results in surface tension.

In the light of the above statements, choose the correct answer from the options given below

[JEE Main 2026 (Online) 22nd January Morning Shift]

- (1) Statement-I is false but Statement-II is true
 (2) Statement-I is true but Statement-II is false
 (3) Both Statement-I and Statement-II are false
 (4) Both Statement-I and Statement-II are true

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Q.13 When a part of a straight capillary tube is placed vertically in a liquid, the liquid rises up to certain height h . If the inner radius of the capillary tube, density of the liquid and surface tension of the liquid decrease by 1% each, then the height of the liquid in the tube will change by _____ %.

[JEE Main 2026 (Online) 22nd January Evening Shift]

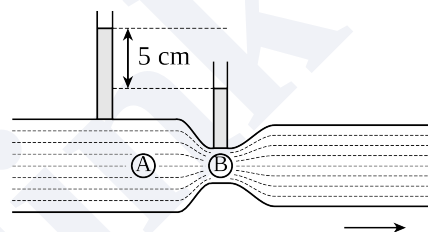
- (1) +3 (2) +1 (3) -1 (4) -3

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Q.14 Water flows through a horizontal tube as shown in the figure. The difference in height between the water columns in vertical tubes is 5 cm and the area of cross-sections at A and B are 6 cm^2 and 3 cm^2 respectively. The rate of flow will be _____ cm^3/s . (take $g = 10 \text{ m/s}^2$)

[JEE Main 2026 (Online) 21st January Morning Shift]



- (1) $100\sqrt{3}$ (2) $\frac{200}{\sqrt{3}}$
 (3) $200\sqrt{6}$ (4) $200\sqrt{3}$

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Q.15 Surface tension of two liquids (having same densities), T_1 and T_2 , are measured using capillary rise method utilizing two tubes with inner radii of r_1 and r_2 where $r_1 > r_2$. The measured liquid heights in these tubes are h_1 and h_2 respectively. [Ignore the weight of the liquid above the lowest point of meniscus]. The heights h_1 and h_2 and surface tensions T_1 and T_2 satisfy the relation :

[JEE Main 2026 (Online) 21st January Evening Shift]

- (1) $h_1 > h_2$ and $T_1 = T_2$ (2) $h_1 < h_2$ and $T_1 = T_2$
 (3) $h_1 > h_2$ and $T_1 < T_2$ (4) $h_1 = h_2$ and $T_1 = T_2$

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Q.16 A capillary tube of radius 0.1 mm is partly dipped in water (surface tension 70 dyn/cm and glass water contact angle $\approx 0^\circ$) with 30° inclined with the vertical. The length of water risen in the capillary is _____ cm. (Take $g = 9.8 \text{ m/s}^2$)

[JEE Main 2025 (Online) 7th April Evening Shift]

- (1) $\frac{82}{5}$ (2) $\frac{68}{5}$ (3) $\frac{57}{2}$ (4) $\frac{71}{5}$

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Q.17 Two liquids A and B have θ_A and θ_B as contact angles in a capillary tube. If $K = \cos \theta_A / \cos \theta_B$, then identify the correct statement:

[JEE Main 2025 (Online) 4th April Morning Shift]

- (1) K is negative, then liquid A and liquid B have convex meniscus.
- (2) K is negative, then liquid A and liquid B have concave meniscus.
- (3) K is zero, then liquid A has convex meniscus and liquid B has concave meniscus.
- (4) K is negative, then liquid A has concave meniscus and liquid B has convex meniscus.

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Q.18 Consider a completely full cylindrical water tank of height 1.6 m and of cross-sectional area 0.5 m^2 . It has a small hole in its side at a height 90 cm from the bottom. Assume, the cross-sectional area of the hole to be negligibly small as compared to that of the water tank. If a load 50 kg is applied at the top surface of the water in the tank then the velocity of the water coming out at the instant when the hole is opened is:

($g = 10 \text{ m/s}^2$)

[JEE Main 2025 (Online) 3rd April Morning Shift]

- (1) 2 m/s (2) 5 m/s (3) 3 m/s (4) 4 m/s

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Q.19 A solid steel ball of diameter 3.6 mm acquired terminal velocity $2.45 \times 10^{-2} \text{ m/s}$ while falling under gravity through an oil of density 925 kg m^{-3} . Take density of steel as 7825 kg m^{-3} and g as 9.8 m/s^2 . The viscosity of the oil in SI unit is

[JEE Main 2025 (Online) 3rd April Evening Shift]

- (1) 2.18 (2) 1.68 (3) 2.38 (4) 1.99

Scan or tap for the full solution 

Q.20 Two water drops each of radius 'r' coalesce to form a bigger drop. If 'T' is the surface tension, the surface energy released in this process is :

[JEE Main 2025 (Online) 2nd April Evening Shift]

- (1) $4\pi r^2 T [2 - 2^{1/3}]$ (2) $4\pi r^2 T [1 + \sqrt{2}]$
 (3) $4\pi r^2 T [2 - 2^{2/3}]$ (4) $4\pi r^2 T [\sqrt{2} - 1]$

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Q.21 Consider following statements:

- A. Surface tension arises due to extra energy of the molecules at the interior as compared to the molecules at the surface, of a liquid.
- B. As the temperature of liquid rises, the coefficient of viscosity increases.

- C. As the temperature of gas increases, the coefficient of viscosity increases.
- D. The onset of turbulence is determined by Reynolds number.
- E. In a steady flow two stream lines never intersect. Choose the correct answer from the options given below:

[JEE Main 2025 (Online) 28th January Morning Shift]

- (1) B, C, D Only (2) C, D, E Only
 (3) A, D, E Only (4) A, B, C Only

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Q.22 A 400 g solid cube having an edge of length 10 cm floats in water. How much volume of the cube is outside the water?

(Given: density of water = 1000 kg m^{-3})

[JEE Main 2025 (Online) 28th January Evening Shift]

- (1) 400 cm^3 (2) 600 cm^3
 (3) 1400 cm^3 (4) 4000 cm^3

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Q.23 An air bubble of radius 0.1 cm lies at a depth of 20 cm below the free surface of a liquid of density 1000 kg/m^3 . If the pressure inside the bubble is 2100 N/m^2 greater than the atmospheric pressure, then the surface tension of the liquid in SI unit is (use $g = 10 \text{ m/s}^2$)

[JEE Main 2025 (Online) 24th January Morning Shift]

- (1) 0.02 (2) 0.05 (3) 0.25 (4) 0.1

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Q.24 The amount of work done to break a big water drop of radius 'R' into 27 small drops of equal radius is 10 J. The work done required to break the same big drop into 64 small drops of equal radius will be

[JEE Main 2025 (Online) 24th January Morning Shift]

- (1) 20 J (2) 10 J (3) 5 J (4) 15 J

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Q.25 Given below are two statements:

Statement-I: The hot water flows faster than cold water

Statement-II: Soap water has higher surface tension as compared to fresh water

In the light of the above statements, choose the correct answer from the options given below

[JEE Main 2025 (Online) 23rd January Morning Shift]

- (1) Both Statement-I and Statement-II are false
- (2) Both Statement-I and Statement-II are true
- (3) Statement-I is false but Statement-II is true

(4) Statement-I is true but Statement-II is false

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Q.26 Water flows in a horizontal pipe whose one end is closed with a valve. The reading of the pressure gauge attached to the pipe is P_1 . The reading of the pressure gauge falls to P_2 when the valve is opened. The speed of water flowing in the pipe is proportional to

[JEE Main 2025 (Online) 23rd January Evening Shift]

- (1) $(P_1 - P_2)^2$ (2) $\sqrt{P_1 - P_2}$
(3) $P_1 - P_2$ (4) $(P_1 - P_2)^4$

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Q.27 A tube of length L is shown in the figure. The radius of cross section at the point (1) is 2 cm and at the point (2) is 1 cm, respectively. If the velocity of water entering at point (1) is 2 m/s, then velocity of water leaving the point (2) will be

[JEE Main 2025 (Online) 22nd January Evening Shift]



- (1) 4 m/s (2) 6 m/s (3) 2 m/s (4) 8 m/s

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Q.28 A small rigid spherical ball of mass M is dropped in a long vertical tube containing glycerine. The velocity of the ball becomes constant after some time. If the density of glycerine is half of the density of the ball, then the viscous force acting on the ball will be (consider g as acceleration due to gravity)

[JEE Main 2025 (Online) 22nd January Evening Shift]

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

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Q.29 A sphere of relative density σ and diameter D has concentric cavity of diameter d . The ratio of $\frac{D}{d}$, if it just floats on water in a tank is :

[JEE Main 2024 (Online) 9th April Morning Shift]

- (1) $\left(\frac{\sigma-2}{\sigma+2}\right)^{1/3}$ (2) $\left(\frac{\sigma+1}{\sigma-1}\right)^{1/3}$
(3) $\left(\frac{\sigma-1}{\sigma}\right)^{1/3}$ (4) $\left(\frac{\sigma}{\sigma-1}\right)^{1/3}$

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Q.30 The excess pressure inside a soap bubble is thrice the excess pressure inside a second soap bubble. The ratio between the volume of the first and the second bubble is:

[JEE Main 2024 (Online) 9th April Evening Shift]

- (1) 1:9 (2) 1:27 (3) 1:81 (4) 1:3

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Q.31 A spherical ball of radius 1×10^{-4} m and density 10^5 kg/m³ falls freely under gravity through a distance h before entering a tank of water. If after entering in water the velocity of the ball does not change, then the value of h is approximately: (The coefficient of viscosity of water is 9.8×10^{-6} N s/m²)

[JEE Main 2024 (Online) 9th April Evening Shift]

- (1) 2518 m (2) 2396 m (3) 2249 m (4) 2296 m

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Q.32 Correct Bernoulli's equation is (symbols have their usual meaning) :

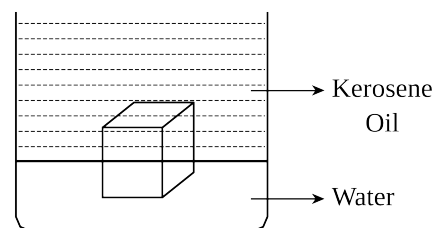
[JEE Main 2024 (Online) 8th April Morning Shift]

- (1) $P + \frac{1}{2}\rho gh + \frac{1}{2}\rho v^2 = \text{constant}$ (2) $P + mgh + \frac{1}{2}mv^2 = \text{constant}$
(3) $P + \rho gh + \rho v^2 = \text{constant}$ (4) $P + \rho gh + \frac{1}{2}\rho v^2 = \text{constant}$

Scan or tap for the full solution 

Q.33 A cube of ice floats partly in water and partly in kerosene oil. The ratio of volume of ice immersed in water to that in kerosene oil (specific gravity of Kerosene oil = 0.8, specific gravity of ice = 0.9):

[JEE Main 2024 (Online) 8th April Evening Shift]



- (1) 5 : 4 (2) 9 : 10 (3) 8 : 9 (4) 1 : 1

Scan or tap for the full solution 

Q.34 A small ball of mass m and density ρ is dropped in a viscous liquid of density ρ_0 . After sometime, the ball falls with constant velocity. The viscous force on the ball is :

[JEE Main 2024 (Online) 6th April Morning Shift]

- (1) $mg\left(1 - \frac{\rho_0}{\rho}\right)$ (2) $mg\left(\frac{\rho_0}{\rho} - 1\right)$

(3) $mg(1 - \rho\rho_0)$ (4) $mg\left(1 + \frac{\rho}{\rho_0}\right)$

Scan or tap for the full solution



- Q.35** Pressure inside a soap bubble is greater than the pressure outside by an amount : (given : R = Radius of bubble, S = Surface tension of bubble)

[JEE Main 2024 (Online) 6th April Evening Shift]

(1) $\frac{S}{R}$ (2) $\frac{4S}{R}$ (3) $\frac{4R}{S}$ (4) $\frac{2S}{R}$

Scan or tap for the full solution



- Q.36** Given below are two statements :

Statement-I: When a capillary tube is dipped into a liquid, the liquid neither rises nor falls in the capillary. The contact angle may be 0° .

Statement-II: The contact angle between a solid and a liquid is a property of the material of the solid and liquid as well.

In the light of the above statement, choose the correct answer from the options given below.

[JEE Main 2024 (Online) 5th April Morning Shift]

- (1) Statement-I is true and Statement-II is false
 (2) Statement-I is false but Statement-II is true
 (3) Both Statement-I and Statement-II are true
 (4) Both Statement-I and Statement-II are false

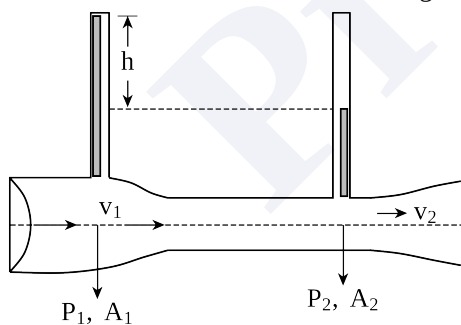
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- Q.37** Given below are two statements :

Statement-I: When speed of liquid is zero everywhere, pressure difference at any two points depends on equation $P_1 - P_2 = \rho g(h_2 - h_1)$.

Statement-II: In venturi tube shown $2gh = v_1^2 - v_2^2$



In the light of the above statements, choose the most appropriate answer from the options given below.

[JEE Main 2024 (Online) 4th April Morning Shift]

- (1) Statement-I is correct but Statement-II is incorrect.
 (2) Both Statement-I and Statement-II are correct.
 (3) Both Statement-I and Statement-II are incorrect.
 (4) Statement-I is incorrect but Statement-II is correct.

Scan or tap for the full solution



- Q.38** Given below are two statements :

Statement-I: The contact angle between a solid and a liquid is a property of the material of the solid and liquid as well.

Statement-II: The rise of a liquid in a capillary tube does not depend on the inner radius of the tube.

In the light of the above statements, choose the correct answer from the options given below :

[JEE Main 2024 (Online) 4th April Evening Shift]

- (1) Both Statement-I and Statement-II are false.
 (2) Both Statement-I and Statement-II are true.
 (3) Statement-I is false but Statement-II is true.
 (4) Statement-I is true but Statement-II is false.

Scan or tap for the full solution



- Q.39** A big drop is formed by coalescing 1000 small droplets of water. The surface energy will become :

[JEE Main 2024 (Online) 1st February Evening Shift]

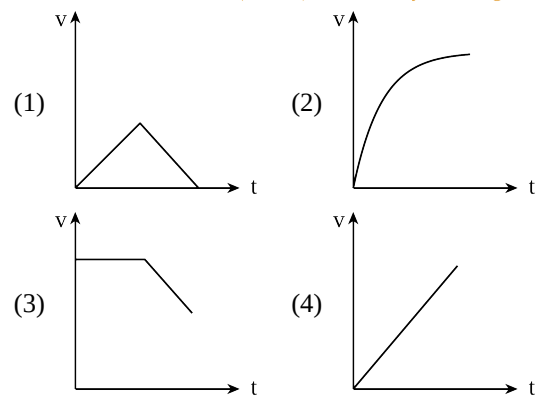
- (1) $\frac{1}{100}$ th (2) $\frac{1}{10}$ th
 (3) 100 times (4) 10 times

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- Q.40** A small steel ball is dropped into a long cylinder containing glycerine. Which one of the following is the correct representation of the velocity time graph for the transit of the ball?

[JEE Main 2024 (Online) 31st January Morning Shift]



Scan or tap for the full solution



- Q.41** A small spherical ball of radius r , falling through a viscous medium of negligible density has terminal velocity ' v '. Another ball of the same mass but of radius $2r$, falling through the same viscous medium will have terminal velocity:

[JEE Main 2024 (Online) 31st January Evening Shift]

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

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- Q.42** Given below are two statements:

Statement-I: If a capillary tube is immersed first in cold water and then in hot water, the height of capillary rise will be smaller in hot water.

Statement-II: If a capillary tube is immersed first in cold water and then in hot water, the height of capillary rise will be smaller in cold water.

In the light of the above statements, choose the most appropriate from the options given below

[JEE Main 2024 (Online) 29th January Morning Shift]

- (1) Both Statement-I and Statement-II are false
- (2) Both Statement-I and Statement-II are true
- (3) Statement-I is true but Statement-II is false
- (4) Statement-I is false but Statement-II is true

Scan or tap for the full solution



Q.43 A small liquid drop of radius R is divided into 27 identical liquid drops. If the surface tension is T , then the work done in the process will be:

[JEE Main 2024 (Online) 29th January Evening Shift]

- (1) $4\pi R^2 T$
- (2) $8\pi R^2 T$
- (3) $\frac{1}{8}\pi R^2 T$
- (4) $3\pi R^2 T$



Solution

Q.44 Given below are two statements :

Statement-I: Viscosity of gases is greater than that of liquids.

Statement-II: Surface tension of a liquid decreases due to the presence of insoluble impurities.

In the light of the above statements, choose the most appropriate answer from the options given below :

[JEE Main 2024 (Online) 27th January Morning Shift]

- (1) Statement-I is correct but statement II is incorrect
- (2) Statement-I is incorrect but Statement-II is correct
- (3) Both Statement-I and Statement-II are incorrect
- (4) Both Statement-I and Statement-II are correct

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Section B (Numerical) — 21 questions

Q.45 The surface tension of a soap solution is 3.5×10^{-2} N/m. The work required to increase the radius of a soap bubble from 1 cm to 2 cm is $\alpha \times 10^{-6}$ J. The value of α is _____.
($\pi = 22/7$)

[JEE Main 2026 (Online) 4th April Morning Shift]

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Q.46 A tub is filled with water and a wooden cube $10 \text{ cm} \times 10 \text{ cm} \times 10 \text{ cm}$ is placed in the water. The wooden cube is found to float on the water with a part of it submerged in water. When a metal coin is placed on the wooden cube, the submerged part is increased by 3.87 cm. The mass of the metal coin is _____ gram.

(Take water density as 1 g/cm^3 and density of wood as 0.4 g/cm^3)

[JEE Main 2026 (Online) 2nd April Morning Shift]

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Q.47 Sixty four raindrops of radius 1 mm each falling down with a terminal velocity of 10 cm/s coalesce to form a bigger drop. The terminal velocity of bigger drop is _____ cm/s.

[JEE Main 2026 (Online) 24th January Morning Shift]

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Q.48 A soap bubble of surface tension 0.04 N/m is blown to a diameter of 7 cm. If $(15000 - x) \mu\text{J}$ of work is done in blowing it further to make its diameter 14 cm, then the value of x is _____.
($\pi = 22/7$)

[JEE Main 2026 (Online) 24th January Evening Shift]

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Q.49 The terminal velocity of a metallic ball of radius 6 mm in a viscous fluid is 20 cm/s. The terminal velocity of another ball of same material and having radius 3 mm in the same fluid will be _____ cm/s.

[JEE Main 2026 (Online) 21st January Evening Shift]

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Q.50 The excess pressure inside a soap bubble A in air is half the excess pressure inside another soap bubble B in air. If the volume of the bubble A is n times the volume of the bubble B, then, the value of n is _____.
[JEE Main 2025 (Online) 3rd April Evening Shift]

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Q.51 A cube having a side of 10 cm with unknown mass and 200 gm mass were hung at two ends of a uniform rigid rod of 27 cm long. The rod along with masses was placed on a wedge keeping the distance between wedge point and 200 gm weight as 25 cm. Initially the masses were not at balance. A beaker is placed beneath the unknown mass and water is added slowly to it. At given point the masses were in balance and half volume of the unknown mass was inside the water.

(Take the density of unknown mass is more than that of the water, the mass did not absorb water and water density is 1 gm/cm^3 .)

The unknown mass is _____ kg.

[JEE Main 2025 (Online) 8th April Evening Shift]

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Q.52 A vessel with square cross-section and height of 6 m is vertically partitioned. A small window of 100 cm^2 with hinged door is fitted at a depth of 3 m in the partition wall. One part of the vessel is filled completely with water and the other side is filled with the liquid having density $1.5 \times 10^3 \text{ kg/m}^3$. What force one needs to apply on the hinged door so that it does not get opened?

(Acceleration due to gravity = 10 m/s^2)

[JEE Main 2025 (Online) 2nd April Morning Shift]

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Q.53 In a hydraulic lift, the surface area of the input piston is 6 cm^2 and that of the output piston is 1500 cm^2 . If 100 N force is applied to the input piston to raise the output piston by 20 cm, then the work done is _____ kJ.

[JEE Main 2025 (Online) 29th January Morning Shift]

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Q.54 An air bubble of radius 1.0 mm is observed at a depth 20 cm below the free surface of a liquid having surface tension 0.095 J/m^2 and density 10^3 kg/m^3 . The difference between pressure inside the bubble and atmospheric pressure is _____ N/m^2 . (Take $g = 10 \text{ m/s}^2$)

[JEE Main 2025 (Online) 23rd January Evening Shift]

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Q.55 Two soap bubbles of radius 2 cm and 4 cm, respectively, are in contact with each other. The radius of curvature of the common surface, in cm, is _____.

[JEE Main 2025 (Online) 22nd January Morning Shift]

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Q.56 A liquid column of height 0.04 cm balances excess pressure of a soap bubble of certain radius. If density of liquid is $8 \times 10^3 \text{ kg m}^{-3}$ and surface tension of soap solution is 0.28 N m^{-1} , then diameter of the soap bubble is _____ cm. (if $g = 10 \text{ m s}^{-2}$)

[JEE Main 2024 (Online) 8th April Morning Shift]

Scan or tap for the full solution



Q.57 Small water droplets of radius 0.01 mm are formed in the upper atmosphere and falling with a terminal velocity of 10 cm/s. Due to condensation, if 8 such droplets are coalesced and formed a larger drop, the new terminal velocity will be _____ cm/s.

[JEE Main 2024 (Online) 8th April Evening Shift]

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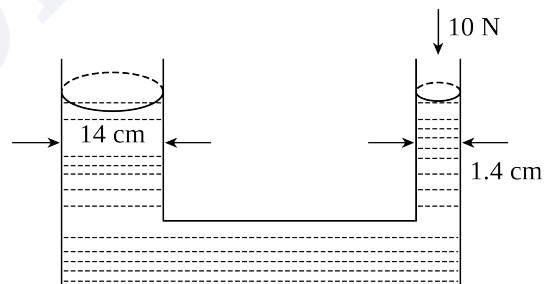
Q.58 A big drop is formed by coalescing 1000 small droplets of water. The ratio of surface energy of 1000 droplets to that of energy of big drop is $\frac{10}{x}$. The value of x is _____.

[JEE Main 2024 (Online) 6th April Morning Shift]

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Q.59



A hydraulic press containing water has two arms with diameters as mentioned in the figure. A force of 10 N is applied on the surface of water in the thinner arm. The force required to be applied on the surface of water in the thicker arm to maintain equilibrium of water is _____ N.

[JEE Main 2024 (Online) 5th April Evening Shift]

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Q.60 A soap bubble is blown to a diameter of 7 cm. 36960 erg of work is done in blowing it further. If surface tension of soap solution is 40 dyne/cm then the new radius is _____ cm. Take $\left(\pi = \frac{22}{7}\right)$.

[JEE Main 2024 (Online) 4th April Morning Shift]

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Q.61 Mercury is filled in a tube of radius 2 cm up to a height of 30 cm. The force exerted by mercury on the bottom of the tube is _____ N.

(Given, atmospheric pressure = 10^5 N m^{-2} , density of mercury = $1.36 \times 10^4 \text{ kg m}^{-3}$, $g = 10 \text{ m s}^{-2}$,

$\pi = \frac{22}{7}$) [JEE Main 2024 (Online) 4th April Evening Shift]

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Q.62 A plane is in level flight at constant speed and each of its two wings has an area of 40 m^2 . If the speed of the air is 180 km/h over the lower wing surface and 252 km/h over the upper wing surface, the mass of the plane is _____ kg.

(Take air density to be 1 kg m^{-3} and $g = 10 \text{ m s}^{-2}$)

[JEE Main 2024 (Online) 1st February Morning Shift]

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Q.63 A big drop is formed by coalescing 1000 small identical drops of water. If E_1 be the total surface energy of 1000 small drops of water and E_2 be the surface energy of single big drop of water, then $E_1:E_2$ is $x:1$ where $x =$ _____.

[JEE Main 2024 (Online) 30th January Evening Shift]

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Q.64 In a test experiment on a model aeroplane in wind tunnel, the flow speeds on the upper and lower surfaces of the wings are 70 ms^{-1} and 65 ms^{-1} respectively. If the wing area is 2 m^2 , the lift of the wing is _____ N.

(Given density of air = 1.2 kg m^{-3})

[JEE Main 2024 (Online) 29th January Morning Shift]

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Q.65 The reading of pressure metre attached with a closed pipe is $4.5 \times 10^4 \text{ N/m}^2$. On opening the valve, water starts flowing and the reading of pressure metre falls to $2.0 \times 10^4 \text{ N/m}^2$. The velocity of water is found to be $\sqrt{V} \text{ m/s}$. The value of V is _____.

[JEE Main 2024 (Online) 27th January Evening Shift]

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ANSWER KEY

Section A (MCQ) — 44 questions

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	4	4	2	2	2	2	3	2	4	4	3
Ques.	12	13	14	15	16	17	18	19	20	21	22
Ans.	1	2	4	2	1	4	4	4	3	2	2
Ques.	23	24	25	26	27	28	29	30	31	32	33
Ans.	2	4	4	2	4	3	4	2	1	4	4

Ques.	34	35	36	37	38	39	40	41	42	43	44
Ans.	1	2	2	1	4	2	2	4	3	2	2

Section B (Numerical) — 21 questions

Ques.	45	46	47	48	49	50	51
Ans.	264	387	160	11304	5	8	3
Ques.	52	53	54	55	56	57	58
Ans.	150	5	2190	4	7	40	1
Ques.	59	60	61	62	63	64	65
Ans.	1000	7	177	9600	10	810	50