Additional Problems For Self Practice (APSP)

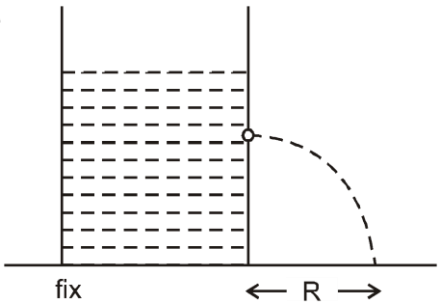
PART-I : PRACTICE TEST PAPER

Max. Marks : 120 **Max. Time : 1 Hr.**

Important Instructions :

1. The test is of **1 hour** duration and max. marks 120.
2. The test consists **30** questions, **4 marks** each.
3. Only one choice is correct **1 mark** will be deducted for incorrect response. No deduction from the total score will be made if no response is indicated for an item in the answer sheet.
4. There is only one correct response for each question. Filling up more than one response in any question will be treated as wrong response and marks for wrong response will be deducted accordingly as per instructions 3 above.

1. A large tank is filled with water ($\rho = 10^3$ kg/m^3). A small hole is made in the side wall of tank at depth 10m below water surface. A water jet emerges horizontally from the hole and falls at a horizontal distance R from it. The amount of extra pressure that must be applied on the water surface, so that range becomes 2R on the ground. Cross section area of hole is negligible : (1 atm = 10^5 Pa and g = 10 m/s^2) :

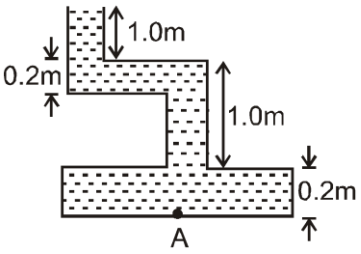


(1) 9 atm (2) 4 atm
(3) 5 atm (4) 3 atm

2. An ornament weighing 36g in air, weighs only 34g in water. Assuming that some copper mixed with gold to prepare the ornament, then the amount of copper is :(specific gravity of gold is 21 and that of copper is 9). (Take acceleration due to gravity g)
(1) 4g (2) 4.5 g (3) 5g (4) 5.5g

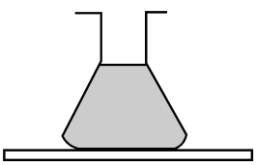
3. A cuboidal vessel of square base of side a is to be filled by a homogenous liquid of density d. Find to what height h should the vessel be filled so that the force exerted on one wall of the vessel is equal to the force exerted on the bottom of the vessel by the liquid ? (Neglect atmospheric pressure)
(1) $h = \frac{a}{3}$ (2) $h = \frac{2a}{3}$ (3) $h = \frac{a}{2}$ (4) h = 2a

4. A vessel has the shape shown in figure. Water, which has density 10^3 kg/m^3, is filled in the vessel. The pressure at the point A, ignoring the atmospheric pressure, is (g = 10 m/s^2)



(1) 1.2×10^4 N/m^2
(2) 1.0×10^4 N/m^2
(3) 2.2×10^4 N/m^2
(4) 2.4×10^4 N/m^2

5. A massless conical flask filled with a liquid is kept on a table in a vacuum. the force exerted by the liquid on the base of the flask is W_1. The force exerted by the flask on the table is W_2.



(1) $W_1 = W_2$ (2) $W_1 > W_2$ (3) $W_1 < W_2$
(4) the force exerted by the liquid on the walls of the flask is $(W_1 - W_2)$.

6. A piece of cork of mass m and density ρ is completely immersed in a liquid of density ρ_0, where $\rho_0 > \rho$. It is attached to the bottom of the vessel containing the liquid by a light string. The whole system moves up with an acceleration = a. The tension in the string is

(1) $m(g + a)\left(1 - \frac{\rho_0}{\rho}\right)$ (2) $m(g + a)\left(\frac{\rho_0}{\rho} - 1\right)$ (3) $mg\left(\frac{\rho_0}{\rho} - 1\right)$ (4) $m(g - a)\left(\frac{\rho_0}{\rho} - 1\right)$

7. There is a small hole in the bottom of a fixed container containing a liquid upto height 'h'. The top of the liquid as well as the hole at the bottom are exposed to atmosphere. As the liquid comes out of the hole. (Area of the hole is 'a' and that of the top surface is 'A') :

(1) the top surface of the liquid accelerates with acceleration = g

(2) the top surface of the liquid accelerates with acceleration = $g\frac{a^2}{A^2}$

(3) the top surface of the liquid retards with retardation = $g\frac{a}{A}$

(4) the top surface of the liquid retards with retardation = $\frac{ga^2}{A^2}$

8. The centre of buoyancy of a floating object is

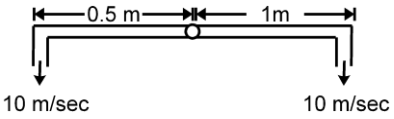
(1) at the centre of gravity of the object.

(2) at the centre of gravity of the submerged part of the object.

(3) at the centre of gravity of the remaining part outside the fluid of the object.

(4) at the centre of gravity of the fluid displaced by the submerged part of the object.

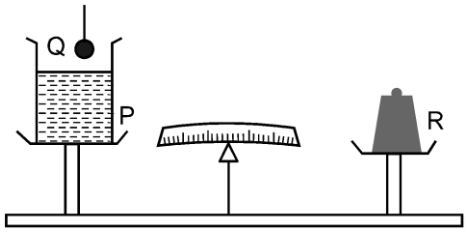
9. An unsymmetrical sprinkler shown in the top view of the setup has frictionless shaft and equal fluid flows through each nozzle with a velocity of 10 m/sec relative to nozzle. Its angular speed of rotation is (in radian/sec) :



(1) 3 (2) 4

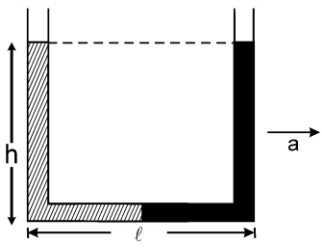
(3) 2 (4) 10

10. Figure shows a weigh-bridge, with a beaker P with water on one pan and a balancing weight R on the other. A solid ball Q is hanging with a thread outside water. It has volume 40 cm^3 and weighs 80 g. If this solid is lowered to sink fully in water, but not touching the beaker anywhere, the balancing weight R' will be



(1) same as R (2) 40 g less than R (3) 40 g more than R (4) 80 g more than R

11. A U-tube of base length "l" filled with same volume of two liquids of densities ρ and 2ρ is moving with an acceleration "a" on the horizontal plane. If the height difference between the two surfaces (open to atmosphere) becomes zero, then the height h is given by:



(1) $\frac{a}{2g}\ell$ (2) $\frac{3a}{2g}\ell$

(3) $\frac{a}{g}\ell$ (4) $\frac{2a}{3g}\ell$

12. A manometer connected to a closed tap reads 3.5×10^5 N/m^2, When the value is opened, the reading of manometer falls to 3.0×10^5 N/m^2, then velocity of flow of water is

(1) 100 m/s (2) 10 m/s (3) 1 m/s (4) $10\sqrt{10}$ m/s

13. A cylindrical tank of height 0.4 m is open at the top and has a diameter 0.16 m. Water is filled in it up to a height of 0.16 m. how long it will take to empty the tank through a hole of radius 5×10^{-3} m in its bottom.

(1) 46.26 sec. (2) 4.6 sec. (3) 462.6 sec. (4) .46 sec.

14. A liquid is kept in a cylindrical vessel which is rotated along its axis. The liquid rises at the sides. If the radius of the vessel is 0.05 m and the speed of rotation is 2 rev/s, The difference in the height of the liquid at the centre of the vessel and its sides will be ($\pi^2 = 10$) :

(1) 3 cm (2) 2 cm (3) 3/2 cm (4) 2/3 cm

15. Air is streaming past a horizontal air plane wing such that its speed in 120 m/s over the upper surface and 90 m/s at the lower surface. If the density of air is 1.3 kg per metre^3 and the wing is 10 m long and has an average width of 2 m and negligible height difference, then the difference of the presure on the two sides of the wing of

(1) 4095.0 Pascal (2) 409.50 Pascal (3) 40.950 Pascal (4) 4.0950 Pascal

16. A log of wood of mass 120 Kg floats in water. The weight that can be put on the raft to make it just sink, should be (density of wood = 600 Kg/m^3)

(1) 80 Kg (2) 50 Kg (3) 60 Kg (4) 30 Kg

17. If a sphere is inserted in water, then it flows with $\frac{1}{3}$ rd of it outside the water, When it is inserted in an unknown liquid then it flows with $\frac{3}{4}$ th of it outside, then density of unknown liquid is :

(1) 4.9 gm/c.c (2) $\frac{9}{4}$ gm/c.c (3) $\frac{8}{3}$ gm/c.c (4) $\frac{3}{8}$ gm/c.c

18. Water is flowing inside a tube of an uniform radius ratio of radius of entry and exit terminals of the tube is 3 : 2. Then the ratio of velocities at entry and exit terminals will be :

(1) 4 : 9 (2) 9 : 4 (3) 8 : 27 (4) 1 : 1

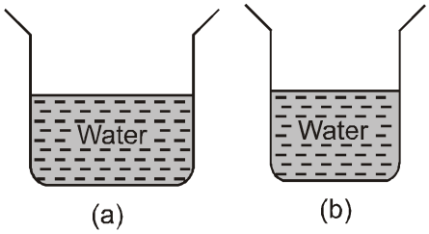
19. An ice-cube of density 900 kg/m^3 is floating in water of density 1000 kg/m^3. The percentage of volume of ice-cube outside the water is :

(1) 20% (2) 35% (3) 10% (4) 25%

20. At what speed, the velocity head of water is equal to pressure head of 40 cm of hg ?

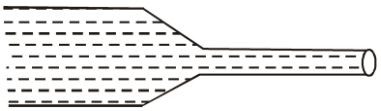
(1) 10.3 m/s (2) 2.8 m/s (3) 5.6 m/s (4) 8.4 m/s

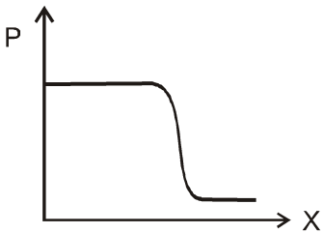
21. From the adjacent figure, the correct observation is

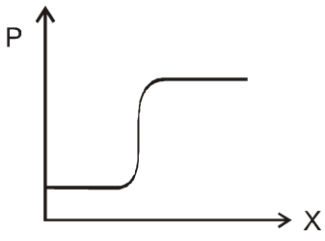


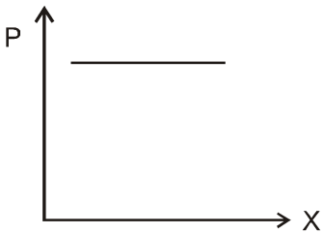
(1) The pressure on the bottom of tank (a) is greater than at the bottom of (b)
(2) The pressure on the bottom of the tank (1) is smaller than at the bottom of (b)
(3) The pressure depend on the shape of the container
(4) The pressure on the bottom of (a) and (b) is the same

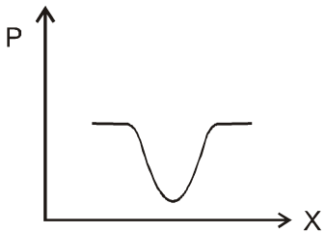
22. Water flows through a frictionless duct with a cross-section varying as shown in fig. Pressure p at points along the axis is represented by



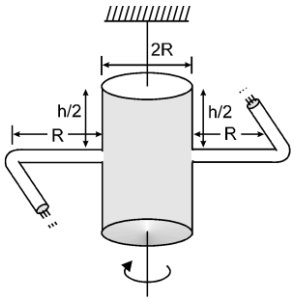
(1) 

(2) 

(3) 

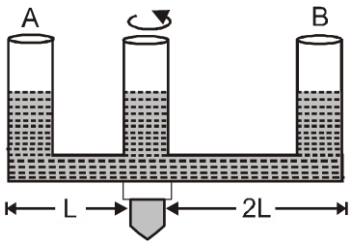
(4) 

23. A cylindrical container of radius ' R ' and height ' h ' is completely filled with a liquid. Two horizontal L shaped pipes of small cross-section area ' a ' are connected to the cylinder as shown in the figure. Now the two pipes are opened and fluid starts coming out of the pipes horizontally in opposite directions. Then the torque due to ejected liquid on the system is:



(1) 4 a g h ρ R (2) 8 a g h ρ R
(3) 2 a g h ρ R (4) none of these

24. A given shaped glass tube having uniform cross section is filled with water and is mounted on a rotatable shaft as shown in figure. If the tube is rotated with a constant angular velocity ω then :



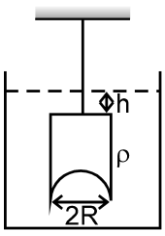
(1) Water levels in both sections A and B go up

(2) Water level in Section A goes up and that in B comes down

(3) Water level in Section A comes down and that in B it goes up

(4) Water levels remains same in both sections

25. A hemispherical portion of radius R is removed from the bottom of a cylinder of radius R. The volume of the remaining cylinder is V and its mass M. It is suspended by a string in a liquid of density ρ where it stays vertical. The upper surface of the cylinder is at a depth h below the liquid surface. The force on the bottom of the cylinder by the liquid is



(1) Mg (2) Mg – Vρg
(3) Mg + $\pi R^2 h\rho g$ (4) $\rho g(V + \pi R^2 h)$

26. Water is filled in a container upto height 3m. A small hole of area 'a' is punched in the wall of the container at a height 52.5 cm from the bottom. The cross sectional area of the container is A. If a/A = 0.1 then v^2 is : (where v is the velocity of water coming out of the hole) ($g = 10\ m/s^2$)

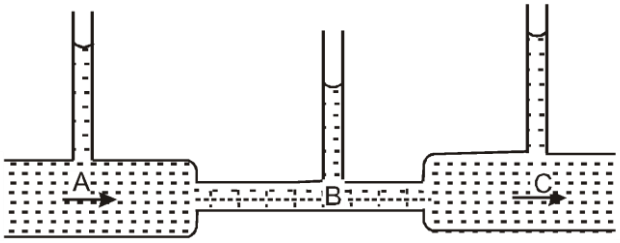
(1) 50 (2) 51 (3) 48 (4) 51.5

27. Two pieces of metal when immersed in a liquid have equal upthrust on them; then

(1) Both pieces must have equal weights (2) Both pieces must have equal densities

(3) Both pieces must have equal volumes (4) Both are floating to the same depth

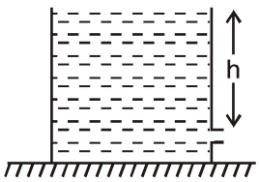
28. In the following flg. Is shown the flow of liquid through a horizontal pipe. Three tubes A, B and C are connected to the pipe. The radii of the tubes A, B and c at the junction are respectively 2 cm, 1 cm and 2cm. It can be said that the



(1) Height of the liquid in the tube A is maximum
(2) Height of the liquid in the tubes A and B is the same
(3) Height of the liquid in all three tubes is the same
(4) Height of the liquid in the tubes A and C is the same

29. A bot carrying steel balls is floating on the surface of water in a tank. If the ball are thrown into the tank one by one how will it affect the level of water
(1) It will remain unchanged (2) It will rise
(3) It will fall (4) First it will first rise and then fall

30. In the figure shown, a light container is kept on a horizontal rough surface of coefficient of friction $\mu = \frac{Sh}{V}$. A very small hole of area S is made at depth 'h'. Water of volume 'V' is filled in the container. The friction is not sufficient to keep the container at rest. The acceleration of the container initially is



(1) $\frac{V}{Sh}g$ (2) g (3) zero (4) $\frac{Sh}{V}g$

Practice Test (JEE-Main Pattern)

OBJECTIVE RESPONSE SHEET (ORS)

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

PART - II : PRACTICE QUESTIONS

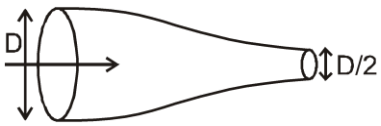
1. Three liquids of densities d, 2d and 3d are mixed in equal volumes. Then the density of the mixture is
(1) d (2) 2d (3) 3d (4) 5d

2. Three liquids of densities d, 2d and 3d are mixed in equal proportions of weights. The relative density of the mixture is
(1) $\frac{11d}{7}$ (2) $\frac{18d}{11}$ (3) $\frac{13d}{9}$ (4) $\frac{23d}{18}$

3. We have two different liquids A and B whose relative densities are 0.75 and 1.0, respectively. If we dip solid objects P and Q having relative densities 0.6 and 0.9 in these liquids, then :
(1) P floats in A and Q sinks in B (2) P sinks inA and Q floats in B
(3) P floats in B and Q sinks in A (4) P sinks in A and Q floats in A

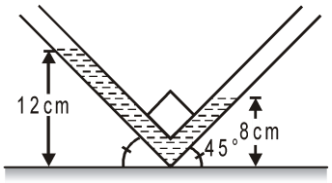
4. A large open tank is filled with water upto a height H. A small hole is made at the base of the tank. It takes T_1 time to decrease the height of water to $\frac{H}{n}$ (n > 1) and it takes T_2 time to take out the remaining water. If $T_1 = T_2$, then the value of n is :
(1) 2 (2) 3 (3) 4 (4) $2\sqrt{2}$

5. Non viscous water flows through a horizontal nozzle of inlet diameter D and outlet diameter D/2. The water flow rate is m and density of water is ρ. The horizontal component of the force required to hold the tube is
(1) Zero (2) toward right (3) towards left
(4) towards right or left depending upon the magnitude m.

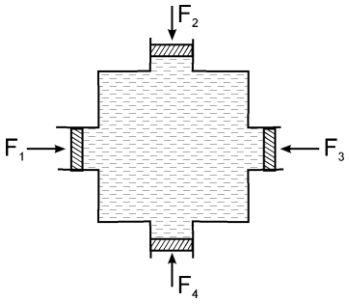


6. For a fluid flow through a divergent pipe of length L having inlet and outlet radii of R_1 and R_2 respectively and a constant volume flow rate of Q, assuming the velocity to be axial and uniform at any cross–section, the acceleration at the exit is :
(1) $\frac{2Q(R_1 - R_2)}{\pi L R_2^3}$ (2) $\frac{2Q^2(R_1 - R_2)}{\pi^2 L R_2^3}$
(3) $\frac{2Q^2(R_1 - R_2)}{\pi^2 L R_2^5}$ (4) $\frac{2Q^2(R_2 - R_1)}{\pi^2 L R_2^5}$

7. An L shaped glass tube is kept inside a bus that is moving with constant acceleration. During the motion, the level of the liquid in the left arm is at 12 cm whereas in the right arm, it is at 8 cm when the orientation of the tube is as shown. Assuming that the diameter of the tube is much smaller than levels of the liquid and neglecting effect of surface tension, acceleration of the bus will be (g = 10 m/s^2).
(1) 1 m/s^2 (2) 2 m/s^2
(3) 4 m/s^2 (4) 5 m/s^2



8. In the figure shown water is filled in a symmetrical container. Four pistons of equal area A are used at the four opening to keep the water in equilibrium. Now an additional force F is applied at each piston. The increase in the pressure at the centre of the container due to this addition is



(1) $\frac{F}{A}$ (2) $\frac{2F}{A}$

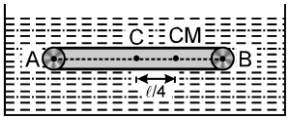
(3) $\frac{4F}{A}$ (4) 0

9. In a turbulent flow, the velocity of the liquid molecules in contact with the walls of the tube is

(1) Zero (2) Maximum

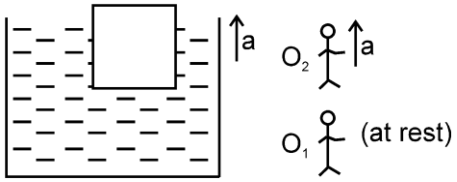
(3) Equal to critical velocity (4) May have any value

10. A non uniform cylinder of mass m, length ℓ and radius r is having its centre of mass at a distance $\ell/4$ from the centre C and lying on the axis of the cylinder. The cylinder is kept in a liquid of uniform density ρ. The moment of inertia of the cylinder perpendicular to its axis and about its centre of mass is I. The angular acceleration of point A relative to point B just after the rod is released from the horizontal position shown in figure is



(1) $\frac{\pi\rho g\ell^2 r^2}{I}$ (2) $\frac{\pi\rho g\ell^2 r^2}{4I}$ (3) $\frac{\pi\rho g\ell^2 r^2}{2I}$ (4) $\frac{3\pi\rho g\ell^2 r^2}{4I}$

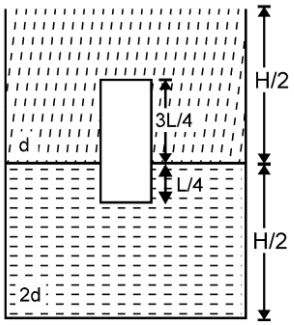
11. A block is partially immersed in a liquid and the vessel is accelerating upwards with an acceleration "a". The block is observed by two observers O_1 and O_2 , one at rest and the other accelerating with an acceleration "a" upward. The total buoyant force on the block is :



(1) same for O_1 and O_2 (2) greater for O_1 than O_2

(3) greater for O_2 than O_1 (4) data is not sufficient

12. A container of a large uniform cross-sectional area A resting on a horizontal surface holds two immiscible, non-viscous and incompressible liquids of densities ' d ' and ' 2 d ' each of height (1/2)H as shown. The smaller density liqu`id is open to atmosphere. A homogeneous solid cylinder of length L $\left(< \frac{1}{2}H\right)$ cross-sectional area (1/5) A is immersed such that it floats with its axis vertical to the liquid-liquid interface with length (1/4) L in denser liquid. If D is the density of the solid cylinder then :



(1) D = $\frac{3d}{2}$ (2) D = $\frac{d}{2}$ (3) D = $\frac{2d}{3}$ (4) D = $\frac{5d}{4}$

13. A body of uniform cross-sectional area floats in a liquid of density thrice its value. The fraction of exposed height will be :

(1) $\frac{2}{3}$ (2) $\frac{5}{6}$ (3) $\frac{1}{6}$ (4) $\frac{1}{3}$

14. A tank is filled with water upto height H. When a hole is made at a distance h below the level of water, what will be the horizontal range of water jet ?

(1) $2\sqrt{h(H-h)}$ (2) $4\sqrt{h(H+h)}$ (3) $4\sqrt{h(H-h)}$ (4) $2\sqrt{h(H+h)}$

15. A raft of wood of mass 120 kg floats in water. The weight that can be put on the raft to make it just sing, should be : (d_{raft} = 600 kg/m^3)

(1) 80 kg (2) 50 kg (3) 60 kg (4) 30 kg

16. A hole is in the bottom of the tank having water. If total pressure at the bottom is 3 atm (1 atm = 10^5 Nm^{-2}), then velocity of water flowing from hole is :

(1) $\sqrt{400}$ ms^{-1} (2) $\sqrt{600}$ ms^{-1}

(3) $\sqrt{60}$ ms^{-1} (4) none of these

17. If pressure at half the depth of a lake is equal to 2/3 pressure at the bottom of the lake then what is the depth of the lake :

(1) 10 m (2) 20 m (3) 60 m (4) 30 m

18. The pressure at the bottom of a tank containing a liquid does not depend on

(1) Acceleration due to gravity (2) Height of the liquid column

(3) Area of the bottom surface (4) Nature of the liquid

19. Construction of submarines is based on

(1) Archimedes principle (2) Bernoulli's theorem

(3) Pascal's law (4) Newton's laws

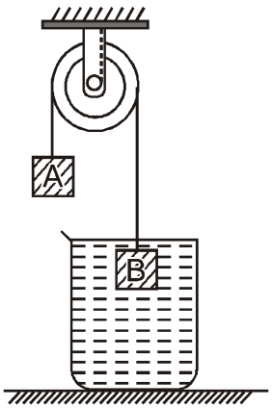
20. In the arrangement shown in figure $\frac{m_A}{m_B} = \frac{2}{3}$ and the ratio of density of block B and of liquid is 2 : 1. The system is released from rest. Then:

(1) block B will oscillate but not simple harmonically

(2) block B will oscillate simple harmonically

(3) the system will remain in equilibrium

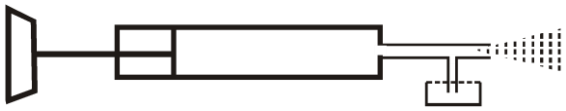
(4) none of the above



Comprehension # 1

A spray gun is shown in the figure where a piston pushes air out of a nozzle. A thin tube of uniform cross section is connected to the nozzle. The other end of the tube is in a small liquid container. As the piston

pushes air through the nozzle, the liquid from the container rises into the nozzle and is sprayed out. For the spray gun shown, the radii of the piston and the nozzle are 20 mm and 1mm respectively. The upper end of the container is open to the atmosphere.

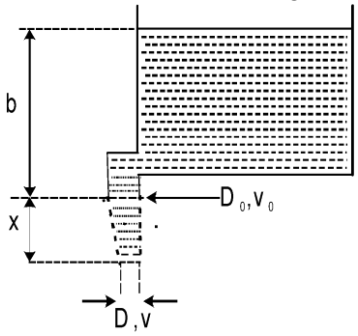


21. If the piston is pushed at a speed of $5 mms^{-1}$, the air comes out of the nozzle with a speed of
(1) $0.1 ms^{-1}$ (2) $1 ms^{-1}$ (3) $2 ms^{-1}$ (4) $8 ms^{-1}$

22. If the density of air is ρ_a and that of the liquid ρ, then for a given piston speed the rate (volume per unit time) at which the liquid is sprayed will be proportional to
(1) $\sqrt{\frac{\rho_a}{\rho_\ell}}$ (2) $\sqrt{\rho_a \rho_\ell}$ (3) $\sqrt{\frac{\rho_\ell}{\rho_a}}$ (4) ρ_ℓ

Comprehension # 2

The figure shows the commonly observed decrease in diameter of a water stream as it falls from a tap. The tap has internal diameter D_0 and is connected to a large tank of water. The surface of the water is at a height b above the end of the tap.
By considering the dynamics of a thin "cylinder" of water in the stream answer the following: (Ignore any resistance to the flow and any effects of surface tension, given ρ_w = density of water)



23. Equation for the flow rate, i.e. the mass of water flowing through a given point in the stream per unit time, as function of the water speed v will be
(1) $v \rho_w \pi D^2 / 4$ (2) $v \rho_w (\pi D^2 / 4 - \pi D_0^2 / 4)$
(3) $v \rho_w \pi D^2 / 2$ (4) $v \rho_w \pi D_0^2 / 4$

24. Which of the following equation expresses the fact that the flow rate at the tap is the same as at the stream point with diameter D and velocity v (i.e. D in terms of D_0, v_0 and v will be) :
(1) $D = \frac{D_0 v_0}{v}$ (2) $D = \frac{D_0 v_0^2}{v^2}$ (3) $D = \frac{D_0 v}{v_0}$ (4) $D = D_0 \sqrt{\frac{v_0}{v}}$

25. The equation for the water speed v as a function of the distance x below the tap will be :
(1) $v = \sqrt{2gb}$ (2) $v = [2g (b + x)]^{1/2}$ (3) $v = \sqrt{2gx}$ (4) $v = [2g (b - x)]^{1/2}$

26. Equation for the stream diameter D in terms of x and D_0 will be :

(1) $D = D_0 \left(\frac{b}{b+x}\right)^{1/4}$ (2) $D = D_0 \left(\frac{b}{b+x}\right)^{1/2}$

(3) $D = D_0 \left(\frac{b}{b+x}\right)$ (4) $D = D_0 \left(\frac{b}{b+x}\right)^{2}$

27. A student observes after setting up this experiment that for a tap with D_0 = 1 cm at x = 0.3 m the stream diameter D = 0.9 cm. The heights b of the water above the tap in this case will be :
(1) 5.7 cm (2) 57 cm (3) 27 cm (4) 2.7 cm

Comprehension – 3

One way of measuring a person's body fat content is by "weighing" them under water. This works because fat tends to float on water as it is less dense than water. On the other hand muscle and bone tend to sink as they are more dense. Knowing your "weight" under water as well as your real weight out of water, the percentage of your body's volume that is made up of fat can easily be estimated. This is only an estimate since it assumes that your body is made up of only two substances, fat (low density) and everything else (high density). The "weight" is measured by spring balance both inside and outside the water. Quotes are placed around weight to indicate that the measurement read on the scale is not your true weight, i.e. the force applied to your body by gravity, but a measurement of the net downward force on the scale.

28. Ram and Shyam are having the same weight when measured outside the water. When measured under water, it is found that weight of Ram is more than that of Shyam, then we can say that
(1) Ram is having more fat content than Shyam.
(2) Shyam is having more fat content that Ram.
(3) Ram and Shyam both are having the same fat content.
(4) None of these.

29. Ram is being weighed by the spring balance in two different situations. First when he was fully immersed in water and the second time when he was partially immersed in water, then
(1) Reading will be more in the first case.
(2) Reading will be more in the second case.
(3) Reading would be same in both the cases.
(4) Reading will depend upon experimental setup.

30. Salt water is denser than fresh water. If Ram is immersed fully first in salt water and then in fresh water and weighed, then
(1) Reading would be less in salt water.
(2) Reading would be more in salt water.
(3) Reading would be the same in both the cases.
(4) reading could be less or more.

31. A person of mass 165 Kg having one fourth of his volume consisting of fat (relative density 0.4) and rest of the volume consisting of everything else (average relative density $\frac{4}{3}$) is weighed under water by the spring balance. The reading shown by the spring balance is -
(1) 15 N (2) 65 N (3) 150 N (4) 165 N

32. In the above question if the spring is cut, the acceleration of the person just after cutting the spring is
(1) zero (2) 1 m/s^2 (3) 9.8 m/s^2 (4) 0.91 m/s^2

PART – I

1.	(4)	**2.**	(2)	**3.**	(4)	**4.**	(3)	**5.**	(2, 4)	**6.**	(2)	**7.**	(4)
8.	(4)	**9.**	(2)	**10.**	(3)	**11.**	(2)	**12.**	(2)	**13.**	(1)	**14.**	(2)
15.	(1)	**16.**	(1)	**17.**	(3)	**18.**	(1)	**19.**	(3)	**20.**	(1)	**21.**	(4)
22.	(1)	**23.**	(1)	**24.**	(1)	**25.**	(4)	**26.**	(1)	**27.**	(3)	**28.**	(4)
29.	(3)	**30.**	(4)										

PART – II

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