Practice Problems

Problems based on Pressure

Basic level

1. The pressure at the bottom of a tank containing a liquid does not depend on **[Kerala (Engg.) 2002]**
   (a) Acceleration due to gravity (b) Height of the liquid column
   (c) Area of the bottom surface (d) Nature of the liquid

2. When a large bubble rises from the bottom of a lake to the surface. Its radius doubles. If atmospheric pressure is equal to that of column of water height *H*, then the depth of lake is **[AIIMS 1995; AFMC 1997]**
   (a) *H* (b) 2*H* (c) 7*H* (d) 8*H*

3. The volume of an air bubble becomes three times as it rises from the bottom of a lake to its surface. Assuming atmospheric pressure to be 75 *cm* of *Hg* and the density of water to be 1/10 of the density of mercury, the depth of the lake is **[AMU 1995]**
   (a) 5 *m* (b) 10 *m* (c) 15 *m* (d) 20 *m*

4. The value of *g* at a place decreases by 2%. The barometric height of mercury
   (a) Increases by 2% (b) Decreases by 2%
   (c) Remains unchanged (d) Sometimes increases and sometimes decreases

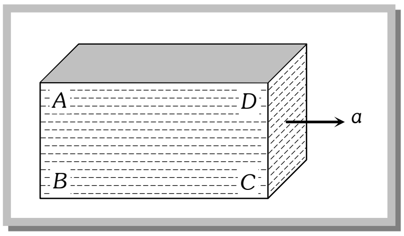
5. Two stretched membranes of area 2 cm^2 and 3 cm^2 are placed in a liquid at the same depth. The ratio of pressures on them is
   (a) 1 : 1 (b) 2 : 3 (c) 3 : 2 (d) $2^2 : 3^2$

6. Three identical vessels are filled to the same height with three different liquids *A*, *B* and *C* $(\rho_A > \rho_B > \rho_C)$. The pressure at the base will be
   (a) Equal in all vessels (b) Maximum in vessel *A* (c) Maximum in vessel *B* (d) Maximum in vessel *C*

7. Three identical vessels are filled with equal masses of three different liquids *A*, *B* and *C* $(\rho_A > \rho_B > \rho_C)$. The pressure at the base will be
   (a) Equal in all vessels (b) Maximum in vessel *A* (c) Maximum in vessel *B* (d) Maximum in vessel *C*

8. A barometer kept in a stationary elevator reads 76 *cm*. If the elevator starts accelerating up the reading will be
   (a) Zero (b) Equal to 76 *cm* (c) More than 76 *cm* (d) Less than 76 *cm*

9. A closed rectangular tank is completely filled with water and is accelerated horizontally with an acceleration *a* towards right. Pressure is (i) maximum at, and (ii) minimum at



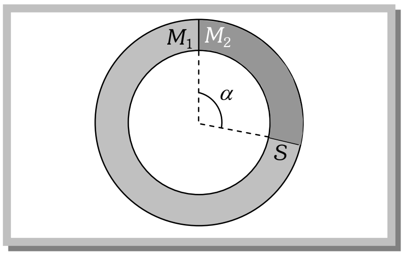
   (a) (i) *B* (ii) *D*
   (b) (i) *C* (ii) *D*
   (c) (i) *B* (ii) *C*
   (d) (i) *B* (ii) *A*

10. A beaker containing a liquid is kept inside a big closed jar. If the air inside the jar is continuously pumped out, the pressure in the liquid near the bottom of the liquid will
    (a) Increases (b) Decreases (c) Remain constant (d) First decrease and then increase

11. A barometer tube reads 76 *cm* of mercury. If the tube is gradually inclined at an angle of 60° with vertical, keeping the open end immersed in the mercury reservoir, the length of the mercury column will be: (a) 152 *cm* (b) 76 *cm* (c) 38 *cm* (d) $38\sqrt{3}cm$

➤➤ Advance level

12. A ring shaped tube contains two ideal gases with equal masses and molar masses $M_1 = 32$ and $M_2 = 28$. The gases are separated by one fixed partition and another movable stopper S which can move freely without friction inside the ring. The angle α in degrees is **[IIT-JEE 1997]**



(a) 192

(b) 291

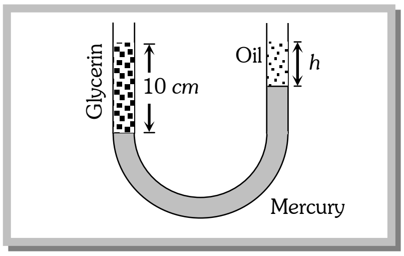
(c) 129

(d) 219

13. The height to which a cylindrical vessel be filled with a homogeneous liquid, to make the average force with which the liquid presses the side of the vessel equal to the force exerted by the liquid on the bottom of the vessel, is equal to

(a) Half of the radius of the vessel
(b) Radius of the vessel
(c) One-fourth of the radius of the vessel
(d) Three-fourth of the radius of the vessel

14. A vertical U-tube of uniform inner cross section contains mercury in both sides of its arms. A glycerin (density = 1.3 g/cm^3) column of length 10 cm is introduced into one of its arms. Oil of density 0.8 gm/cm^3 is poured into the other arm until the upper surfaces of the oil and glycerin are in the same horizontal level. Find the length of the oil column, Density of mercury = 13.6 g/cm^3



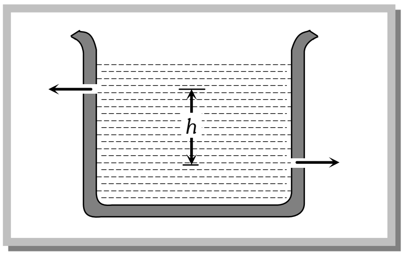
(a) 10.4 cm

(b) 8.2 cm

(c) 7.2 cm

(d) 9.6 cm

15. There are two identical small holes of area of cross-section a on the opposite sides of a tank containing a liquid of density ρ. The difference in height between the holes is h. Tank is resting on a smooth horizontal surface. Horizontal force which will has to be applied on the tank to keep it in equilibrium is



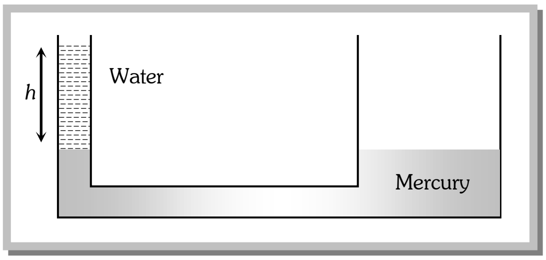
(a) $gh\rho a$

(b) $\dfrac{2gh}{\rho a}$

(c) $2\rho agh$

(d) $\dfrac{\rho gh}{a}$

16. Two communicating vessels contain mercury. The diameter of one vessel is n times larger than the diameter of the other. A column of water of height h is poured into the left vessel. The mercury level will rise in the right-hand vessel (s = relative density of mercury and ρ = density of water) by



(a) $\dfrac{n^2h}{(n+1)^2 s}$

(b) $\dfrac{h}{(n^2+1)s}$

(c) $\dfrac{h}{(n+1)^2 s}$

(d) $\dfrac{h}{n^2 s}$

17. A triangular lamina of area A and height h is immersed in a liquid of density ρ in a vertical plane with its base on the surface of the liquid. The thrust on the lamina is

(a) $\frac{1}{2}A\rho gh$
(b) $\frac{1}{3}A\rho gh$
(c) $\frac{1}{6}A\rho gh$
(d) $\frac{2}{3}A\rho gh$

Problems based on Pascal's law

18. Pressure applied to an enclosed fluid is transmitted undiminished to every portion of the fluid and the walls of the containing vessel. This law was first formulated by

(a) Bernoulli (b) Archimedes (c) Boyle (d) Pascal

19. A piston of cross-section area 100 cm^2 is used in a hydraulic press to exert a force of 10^7 dynes on the water. The cross-sectional area of the other piston which supports an object having a mass 2000 kg. is

(a) 100 cm^2 (b) $10^9 cm^2$ (c) $2 \times 10^4 cm^2$ (d) $2 \times 10^{10} cm^2$

Problems based on Archimedes principle

20. A block of steel of size 5 *cm* × 5 *cm* × 5 *cm* is weighed in water. If the relative density of steel is 7, its apparent weight is **[AFMC 1997]**

(a) $6 \times 5 \times 5 \times 5\ gf$ (b) $4 \times 4 \times 4 \times 7\ gf$ (c) $5 \times 5 \times 5 \times 7\ gf$ (d) $4 \times 4 \times 4 \times 6\ gf$

21. A body is just floating on the surface of a liquid. The density of the body is same as that of the liquid. The body is slightly pushed down. What will happen to the body **[AIIMS 1980]**

(a) It will slowly come back to its earlier position (b) It will remain submerged, where it is left

(c) It will sink (d) It will come out violently

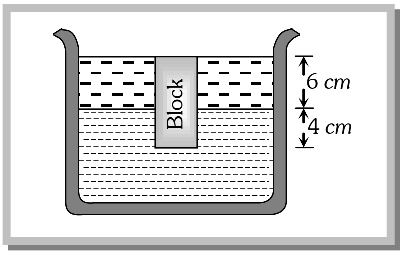
22. A uniform rod of density ρ is placed in a wide tank containing a liquid of density $\rho_0 (\rho_0 > \rho)$. The depth of liquid in the tank is half the length of the rod. The rod is in equilibrium, with its lower end resting on the bottom of the tank. In this position the rod makes an angle θ with the horizontal

(a) $\sin\theta = \frac{1}{2}\sqrt{\rho_0 / \rho}$ (b) $\sin\theta = \frac{1}{2} . \frac{\rho_0}{\rho}$ (c) $\sin\theta = \sqrt{\rho / \rho_0}$ (d) $\sin\theta = \rho_0 / \rho$

23. A cork is submerged in water by a spring attached to the bottom of a bowl. When the bowl is kept in an elevator moving with acceleration downwards, the length of spring

(a) Increases (b) Decreases (c) Remains unchanged (d) None of these

24. A cubical block of wood 10 cm on a side floats at the interface between oil and water with its lower surface horizontal and 4 cm below the interface. The density of oil is $0.6 gcm^{-1}$. The mass of block is



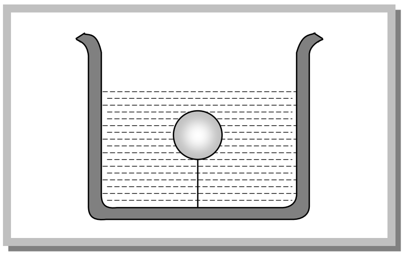
(a) 706 *g*

(b) 607 *g*

(c) 760 *g*

(d) 670 *g*

25. A solid sphere of density η (> 1) times lighter than water is suspended in a water tank by a string tied to its base as shown in fig. If the mass of the sphere is *m* then the tension in the string is given by



(a) $\left(\frac{\eta - 1}{\eta}\right) mg$

(b) ηmg

(c) $\frac{mg}{\eta - 1}$

(d) $(\eta - 1) mg$

26. A spherical ball of radius *r* and relative density 0.5 is floating in equilibrium in water with half of it immersed in water. The work done in pushing the ball down so that whole of it is just immersed in water is : (where ρ is the density of water)

(a) $\frac{5}{12}\pi r^4 \rho g$ (b) $0.5 \rho r g$ (c) $\frac{4}{3}\pi r^3 \rho g$ (d) $\frac{2}{3}\pi r^4 \rho g$

27. A hollow sphere of volume V is floating on water surface with *half* immersed in it. What should be the minimum volume of water poured inside the sphere so that the sphere now sinks into the water

(a) $V/2$ (b) $V/3$ (c) $V/4$ (d) V

28. A rectangular block is 5 *cm* × 5 *cm* × 10*cm* in size. The block is floating in water with 5 *cm* side vertical. If it floats with 10 *cm* side vertical, what change will occur in the level of water?

(a) No change (b) It will rise

(c) It will fall (d) It may rise or fall depending on the density of block

29. A ball whose density is $0.4 \times 10^3\ kg/m^3$ falls into water from a height of 9 *cm* . To what depth does the ball sink

(a) 9 *cm* (b) 6 *cm* (c) 4.5 *cm* (d) 2.25 *cm*

30. Two solids A and B float in water. It is observed that A floats with $\frac{1}{2}$ of its body immersed in water and B floats with $\frac{1}{4}$ of its volume above the water level. The ratio of the density of A to that of B is

(a) 4 : 3 (b) 2 : 3 (c) 3 : 4 (d) 1 : 2

31. A boat carrying steel balls is floating on the surface of water in a tank. If the balls are thrown into the tank one by one, how will it affect the level of water

(a) It will remain unchanged (b) It will rise (c) It will fall (d) First it will first rise and then fall

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

(a) Both pieces must have equal weights (b) Both pieces must have equal densities

(c) Both pieces must have equal volumes (d) Both are floating to the same depth

33. A wooden cylinder floats vertically in water with half of its length immersed. The density of wood is

(a) Equal of that of water (b) Half the density of water

(c) Double the density of water (d) The question is incomplete

34. If W be the weight of a body of density ρ in vacuum then its apparent weight in air of density σ is

(a) $\frac{W\rho}{\sigma}$ (b) $W\left(\frac{\rho}{\sigma}-1\right)$ (c) $\frac{W}{\rho}\sigma$ (d) $W\left(1-\frac{\sigma}{\rho}\right)$

Problems based on Density

35. A block of ice floats on a liquid of density 1.2in a beaker then level of liquid when ice completely melt **[IIT-JEE 1994]**

(a) Remains same (b) rises (c) Lowers (d) (A), (B) or (c)

36. If two liquids of same masses but densities ρ_1 and ρ_2 respectively are mixed, then density of mixture is given by

(a) $\rho = \frac{\rho_1+\rho_2}{2}$ (b) $\rho = \frac{\rho_1+\rho_2}{2\rho_1\rho_2}$ (c) $\rho = \frac{2\rho_1\rho_2}{\rho_1+\rho_2}$ (d) $\rho = \frac{\rho_1\rho_2}{\rho_1+\rho_2}$

37. If two liquids of same volume but different densities ρ_1 and ρ_2 are mixed, then density of mixture is given by

(a) $\rho = \frac{\rho_1+\rho_2}{2}$ (b) $\rho = \frac{\rho_1+\rho_2}{2\rho_1\rho_2}$ (c) $\rho = \frac{2\rho_1\rho_2}{\rho_1+\rho_2}$ (d) $\rho = \frac{\rho_1\rho_2}{\rho_1+\rho_2}$

38. The density ρ of water of bulk modulus B at a depth y in the ocean is related to the density at surface ρ_0 by the relation

(a) $\rho = \rho_0\left[1-\frac{\rho_0 gy}{B}\right]$ (b) $\rho = \rho_0\left[1+\frac{\rho_0 gy}{B}\right]$ (c) $\rho = \rho_0\left[1+\frac{B}{\rho_0 hgy}\right]$ (d) $\rho = \rho_0\left[1-\frac{B}{\rho_0 gy}\right]$

39. With rise in temperature, density of a given body changes according to one of the following relations

(a) $\rho = \rho_0[1+\gamma\, d\theta]$ (b) $\rho = \rho_0[1-\gamma\, d\theta]$ (c) $\rho = \rho_0\gamma d\theta$ (d) $\rho = \rho_0/\gamma d\theta$

40. Three liquids of densities $d, 2d$ and $3d$ are mixed in equal volumes. Then the density of the mixture is

(a) d (b) $2d$ (c) $3d$ (d) $5d$

41. Three liquids of densities $d, 2d$ and $3d$ are mixed in equal proportions of weights. The relative density of the mixture is

(a) $\frac{11d}{7}$ (b) $\frac{18d}{11}$ (c) $\frac{13d}{9}$ (d) $\frac{23d}{18}$

Problems based on Streamlined & turbulent flow

42. Stream-line flow is more likely for liquids with **[Pb. CET 1997]**

(a) Low density and low viscosity (b) High viscosity and high density

(c) High viscosity and low density (d) Low viscosity and high density

43. In a laminar flow the velocity of the liquid in contact with the walls of the tub is

(a) Zero (b) Maximum

(c) In between zero and maximum (d) Equal to critical velocity

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

(a) Zero (b) Maximum

(c) Equal to critical velocity (d) May have any value

45. Which of the following is NOT the characteristic of turbulent flow

(a) Velocity more than the critical velocity (b) Velocity less than the critical velocity

(c) Irregular flow (d) Molecules crossing from one layer to another

46. The Reynolds number of a flow is the ratio of

(a) Gravity to viscous force (b) Gravity force to pressure force

(c) Inertia forces to viscous force (d) Viscous forces to pressure forces

Problems based on Equation of Continuity

47. Water is flowing through a tube of non-uniform cross-section ratio of the radius at entry and exit end of the pipe is 3 : 2. Then the ratio of velocities at entry and exit of liquid is **[RPMT 2001]**

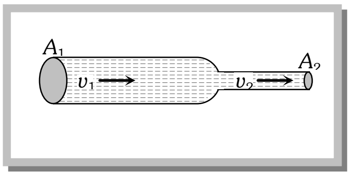
(a) 4 : 9 (b) 9 : 4 (c) 8 : 27 (d) 1 : 1

48. Water is flowing through a horizontal pipe of non-uniform cross-section. At the extreme narrow portion of the pipe, the water will have **[MP PMT 1992]**

(a) Maximum speed and least pressure (b) Maximum pressure and least speed

(c) Both pressure and speed maximum (d) Both pressure and speed least

49. A liquid flows in a tube from left to right as shown in figure. A_1 and A_2 are the cross-sections of the portions of the tube as shown. Then the ratio of speeds v_1 / v_2 will be



(a) A_1 / A_2 (b) A_2 / A_1

(c) $\sqrt{A_2} / \sqrt{A_1}$ (d) $\sqrt{A_1} / \sqrt{A_2}$

50. In a streamline flow

(a) The speed of a particle always remains same

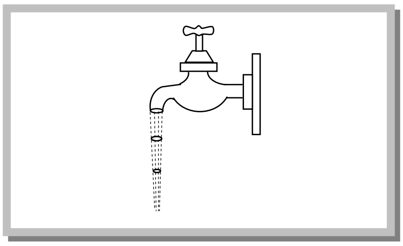
(b) The velocity of a particle always remains same

(c) The kinetic energies of all the particles arriving at a given point are the same

(d) The moments of all the particles arriving at a given point are the same

51. Water coming out of the mouth of a tap and falling vertically in streamline flow forms a tapering, column, *i.e.*, the area of cross-section of the liquid column decreases as it moves down. Which of the following is the most accurate explanation for this

(a) As the water moves down, its speed increases and hence its pressure decreases. It is then compressed by the atmosphere



(b) Falling water tries to reach a terminal velocity and hence reduces the area of cross-section to balance upward and downward forces

(c) The mass of water flowing past any cross-section must remain constant. Also, water is almost incompressible. Hence, the rate of volume flow must remain constant. As this is equal to velocity × area, the area decreases as velocity increases

(d) The surface tension causes the exposed surface area of the liquid to decrease continuously

Problems based on Equation of Bernoulli's Theorem

52. An application of Bernoulli's equation for fluid flow is found in **[IIT-JEE (Screening) 1994]**

(a) Dynamic lift of an aeroplane (b) Viscosity meter

(c) Capillary rise (d) Hydraulic press

53. The Working of an atomizer depends upon **[MP PMT 1992]**

(a) Bernoulli's theorem (b) Boyle's law (c) Archimedes principle (d) Newton's law of motion

54. The pans of a physical balance are in equilibrium. Air is blown under the right hand pan; then the right hand pan will

(a) Move up (b) Move down (c) Move erratically (d) Remain at the same level

55. According to Bernoulli's equation

$$\frac{P}{\rho g}+h+\frac{1}{2}\frac{v^2}{g}=\text{constant}$$

The terms *A*, *B* and *C* are generally called respectively:

(a) Gravitational head, pressure head and velocity head (b) Gravity, gravitational head and velocity head

(c) Pressure head, gravitational head and velocity head (d) Gravity, pressure and velocity head

56. At what speed the velocity head of a stream of water be equal to 40 *cm* of *Hg*

(a) 1032.6 *cm/sec* (b) 432.6 *cm/sec* (c) 632.6 *cm/sec* (d) 832.6 *cm/sec*

57. The weight of an aeroplane flying in air is balanced by

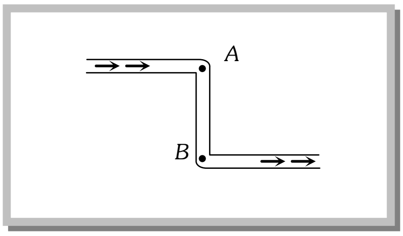
(a) Upthrust of the air which will be equal to the weight of the air having the same volume as the plane

(b) Force due to the pressure difference between the upper and lower surfaces of the wings, created by different air speeds on the surface

(c) Vertical component of the thrust created by air currents striking the lower surface of the wings

(d) Force due to the reaction of gases ejected by the revolving propeller

58. In this figure, an ideal liquid flows through the tube, which is of uniform cross-section. The liquid has velocities v_A and v_B, and pressure P_A and P_B at points A and B respectively



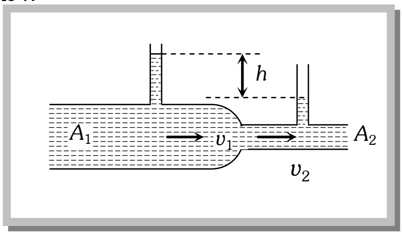
(a) $v_A = v_B$

(b) $v_B > v_A$

(c) $P_A = P_B$

(d) $P_B > P_A$

59. A liquid flows through a horizontal tube. The velocities of the liquid in the two sections, which have areas of cross-section A_1 and A_2, are v_1 and v_2 respectively. The difference in the levels of the liquid in the two vertical tubes is h



(a) The volume of the liquid flowing through the tube in unit time is $A_1 v_1$

(b) $v_2 - v_1 = \sqrt{2gh}$

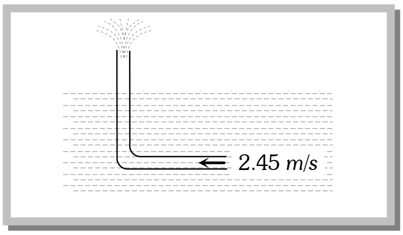
(c) $v_2^2 - v_1^2 = 2gh$

(d) The energy per unit mass of the liquid is the same in both sections of the tube

60. A sniper fires a rifle bullet into a gasoline tank making a hole 53.0 *m* below the surface of gasoline. The tank was sealed at 3.10 *atm*. The stored gasoline has a density of 660 kgm^{-3}. The velocity with which gasoline begins to shoot out of the hole is

(a) $27.8 ms^{-1}$ (b) $41.0 ms^{-1}$ (c) $9.6 ms^{-1}$ (d) $19.7 ms^{-1}$

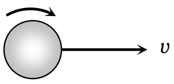
61. An L-shaped tube with a small orifice is held in a water stream as shown in fig. The upper end of the tube is 10.6 *cm* above the surface of water. What will be the height of the jet of water coming from the orifice? Velocity of water stream is 2.45 *m/s*

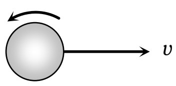


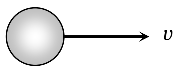
(a) Zero (b) 20.0 *cm*

(c) 10.6 *cm* (d) 40.0 *cm*

62. To get the maximum flight, a ball must be thrown as

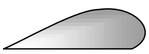
(a) 

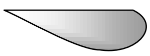
(b) 

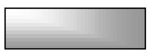
(c) 

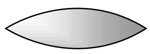
(d) Any of (a), (b) and (c)

63. Fig. represents vertical sections of four wings moving horizontally in air. In which case is the force upwards

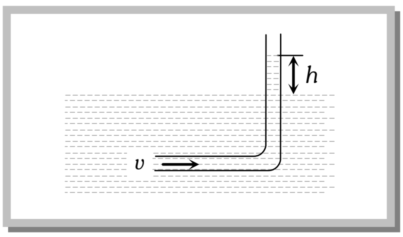
(a) 

(b) 

(c) 

(d) 

64. An L-shaped glass tube is just immersed in flowing water such that its opening is pointing against flowing water. If the speed of water current is v, then



(a) The water in the tube rises to height $\frac{v^2}{2g}$

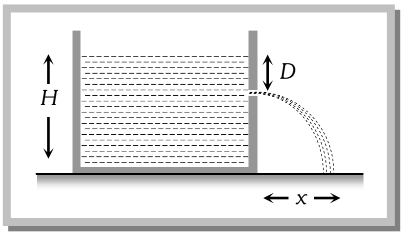
(b) The water in the tube rises to height $\frac{g}{2v^2}$

(c) The water in the tube does not rise at all

(d) None of these

Problems based on Velocity of Efflux

65. A tank is filled with water up to a height H. Water is allowed to come out of a hole P in one of the walls at a depth D below the surface of water. Express the horizontal distance x in terms of H and D **[MNR 1992]**



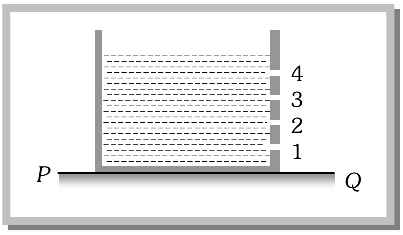
(a) $x = \sqrt{D(H-D)}$

(b) $x = \sqrt{\dfrac{D(H-D)}{2}}$

(c) $x = 2\sqrt{D(H-D)}$

(d) $x = 4\sqrt{D(H-D)}$

66. A cylindrical vessel of 90 *cm* height is kept filled upto the brim. It has four holes 1, 2, 3, 4 which are respectively at heights of 20 *cm*, 30 *cm*, 45 *cm* and 50 *cm* from the horizontal floor PQ. The water falling at the maximum horizontal distance from the vessel comes from **[CPMT 1989]**



(a) Hole number 4

(b) Hole number 3

(c) Hole number 2

(d) Hole number 1

67. A rectangular vessel when full of water takes 10 minutes to be emptied through an orifice in its bottom. How much time will it take to be emptied when half filled with water

(a) 9 *minute* (b) 7 *minute* (c) 5 *minute* (d) 3 *minute*

68. A vessel of area of cross-section A has liquid to a height H. There is a hole at the bottom of vessel having area of cross-section a. The time taken to decrease the level from H_1 to H_2 will be

(a) $\dfrac{A}{a}\sqrt{\dfrac{2}{g}}[\sqrt{H_1} - \sqrt{H_2}]$ (b) $\sqrt{2gh}$ (c) $\sqrt{2gh(H_1 - H_2)}$ (d) $\dfrac{A}{a}\sqrt{\dfrac{g}{2}}[\sqrt{H_1} - \sqrt{H_2}]$

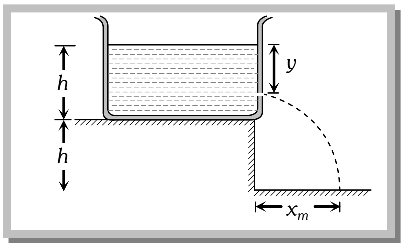
69. A streamlined body falls through air from a height h on the surface of a liquid. If d and ($D > d$) represents the densities of the material of the body and liquid respectively, then the time after which the body will be instantaneously at rest, is

(a) $\sqrt{\dfrac{2h}{g}}$ (b) $\sqrt{\dfrac{2h}{g}\cdot\dfrac{D}{d}}$ (c) $\sqrt{\dfrac{2h}{g}\cdot\dfrac{d}{D}}$ (d) $\sqrt{\dfrac{2h}{g}}\left(\dfrac{d}{D-d}\right)$

70. A large tank is filled with water to 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 $\dfrac{H}{\eta}(\eta > 1)$; and it takes T_2 time to take out the rest of water. If $T_1 = T_2$, then the value of η is

(a) 2 (b) 3 (c) 4 (d) $2\sqrt{2}$

71. A tank is filled upto a height h with a liquid and is placed on a platform of height h from the ground. To get maximum range x_m a small hole is punched at a distance of y from the free surface of the liquid. Then



(a) $x_m = 2h$

(b) $x_m = 1.5h$

(c) $y = h$

(d) $y = 0.75h$

Problems based on Viscosity

72. Velocity of water in a river is **[CBSE PMT 1988]**

(a) Same everywhere
(b) More in the middle and less near its banks
(c) Less in the middle and more near its banks
(d) Increase from one bank to other bank

73. As the temperature of water increases, its viscosity

(a) Remains unchanged
(b) Decreases
(c) Increases
(d) Increases or decreases depending on the external pressure

74. The coefficient of viscosity for hot air is

(a) Greater than the coefficient of viscosity for cold air
(b) Smaller than the coefficient of viscosity for cold air
(c) Same as the coefficient of viscosity for cold air
(d) Increases or decreases depending on the external pressure

75. A good lubricant should have

(a) High viscosity (b) Low viscosity (c) Moderate viscosity (d) High density

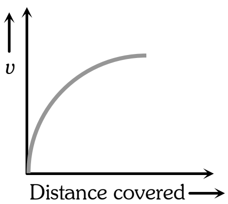
76. The relative velocity of two consecutive layers is 8 *cm/s*. If the perpendicular distance between the layers is 0.1 *cm*, then the velocity gradient will be (a) 8sec^{-1} (b) 80 sec^{-1} (c) 0.8 sec^{-1} (d) 0.08 sec^{-1}

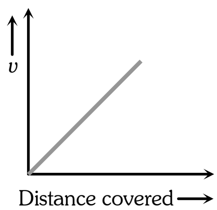
77. We have three beakers *A*, *B* and *C* containing glycerine, water and kerosene respectively. They are stirred vigorously and placed on a table. The liquid which comes to rest at the earliest is

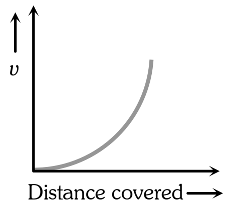
(a) Glycerine (b) Water (c) Kerosene (d) All of them at the same time

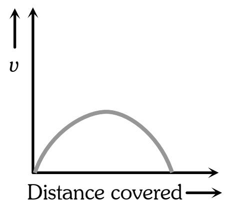
Problems based on Stoke's law and Terminal velocity

78. A lead shot of 1*mm* diameter falls through a long column of glycerine. The variation of its velocity *v*. with distance covered is represented by **[AIIMS 2003]**

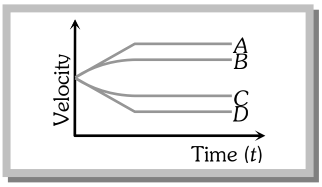
(a) 

(b) 

(c) 

(d) 

79. A small spherical solid ball is dropped from a great height in a viscous liquid. Its journey in the liquid is best described in the diagram given below by the **[CPMT 1988]**



(a) Curve *A*
(b) Curve *B*
(c) Curve *C*
(d) Curve *D*

80. A small drop of water falls from rest through a large height h in air; the final velocity is

(a) $\propto\sqrt{h}$
(b) $\propto h$
(c) $\propto(1/h)$
(d) Almost independent of *h*

Problems based on Poiseuille's law

81. The rate of flow of liquid in a tube of radius r, length l, whose ends are maintained at a pressure difference P is $V=\frac{\pi QPr^4}{\eta l}$ where η is coefficient of the viscosity and Q is (a) 8 (b) $\frac{1}{8}$ (c) 16 (d) $\frac{1}{16}$ **[DCE 2002]**

82. In Poiseuilli's method of determination of coefficient of viscosity, the physical quantity that requires greater accuracy in measurement is

(a) Pressure difference **[EAMCET 2001]**

(b) Volume of the liquid collected

(c) Length of the capillary tube

(d) Inner radius of the capillary tube

83. Two capillary tubes of the same length but different radii r_1 and r_2 are fitted in parallel to the bottom of a vessel. The pressure head is P. What should be the radius of a single tube that can replace the two tubes so that the rate of flow is same as before

(a) r_1+r_2

(b) $r_1^2+r_2^2$

(c) $r_1^4+r_2^4$

(d) None of these

84. Under a constant pressure head, the rate of flow of liquid through a capillary tube is V. If the length of the capillary is doubled and the diameter of the bore is halved, the rate of flow would become (a) $V/4$ (b) $16\,V$ (c) $V/8$ (d) $V/32$

85. Two capillaries of same length and radii in the ratio 1 : 2 are connected in series. A liquid flows through them in streamlined condition. If the pressure across the two extreme ends of the combination is 1 m of water, the pressure difference cross first capillary is

(a) 9.4 m
(b) 4.9 m
(c) 0.49 m
(d) 0.94 m

86. Water flows in a streamlined manner through a capillary tube of radius a, the pressure difference being P and the rate of flow Q. If the radius is reduced to $a/2$ and the pressure increased to $2P$, the rate of flow becomes

(a) $4Q$

(b) Q

(c) $\frac{Q}{4}$

(d) $\frac{Q}{8}$