DPP – 3

Video Solution on Website:- https://physicsaholics.com/home/courseDetails/83

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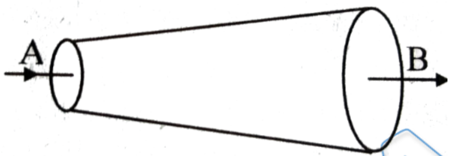
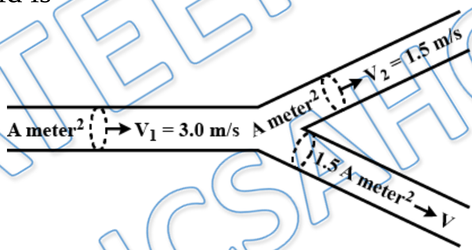
Q 1. An ideal fluid flows through a pipe of circular cross section with diameter 5cm and 10cm as shown. The ratio of velocities of fluid at A and B is



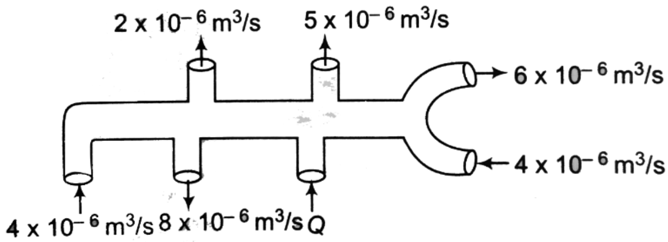
(a) 4 : 1 (b) 1 : 4
(c) 2 : 1 (d) 1 : 2

Q 2. An incompressible liquid flows through a horizontal tube as shown in figure. Then the velocity 'v' of the fluid is



(a) 3 m/s (b) 1.5 m/s
(c) 1 m/s (d) 2.25 m/s

Q 3. The pipe shows the volume flow rate of an ideal liquid at certain time and its direction. What is the value of Q in m^3/s? (Assume steady state and equal area of cross section at each opening)



(a) 10×10^{-6} (b) 11×10^{-6}
(c) 13×10^{-6} (d) 18×10^{-6}

Q 4. Water is moving with a speed of 5.18 m/s through a pipe with a cross-sectional area of 4.20 cm^2. The water gradually descends 9.66 m as the pipe increase in area to 7.60 cm^2. The speed of flow at the lower level is

(a) 3 m/s (b) 5.7 m/s
(c) 3.82 m/s (d) 2.86 m/s

Q 5. The cross-sectional area of water pipe entering the basement is $4 \times 10^{-4}\ m^2$. The pressure at this point is $3 \times 10^5\ N/m^2$ and the speed of water is 2 m/s. This pipe tapers to a cross-sectional area of $2 \times 10^{-4}\ m^2$ when it reaches the second floor 8 m above the basement. Calculate the speed and pressure of water flow at the second floor (g = 10 m/s^2)

(a) 4 m/s, $2.14 \times 10^5\ N/m^2$
(b) 2 m/s, $1.05 \times 10^5\ N/m^2$
(c) 4 m/s, $1.05 \times 10^5\ N/m^2$
(d) 2 m/s, $2.05 \times 10^5\ N/m^2$

Q 6. Water from a tap emerges vertically downward with an initial speed of 1.0 m/s. The cross-sectional area of the tap is $10^{-4}\ m^2$. Assume that the flow is steady. What is the cross-sectional area of the stream 0.15 m below the tap? Use g = 10 m/s^2

(a) $5 \times 10^{-5}\ m^2$ (b) $4 \times 10^{-4}\ m^2$
(c) $3 \times 10^{-3}\ m^2$ (d) $2 \times 10^{-2}\ m^2$

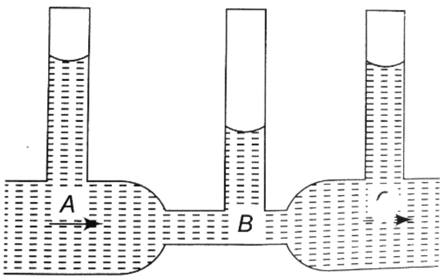
Q 7. A horizontal pipeline carries water in a streamline flow. At a point along the pipe, where the cross-sectional area is 10 cm^2, the water velocity is 1 m/s and the pressure is 2000 Pa. The pressure of water at another point where the cross-sectional area is 5 cm^2, is........Pa. (Density of water = 10^3 kg/m^3)

(a) 200 Pa (b) 1000 Pa
(c) 500 Pa (d) 800 Pa

Q 8. Water flowing steadily through a horizontal pipe of non-uniform cross-section. If the pressure of water is $4 \times 10^4\ N/m^2$ at a point where cross-section is 0.02 m^2 and velocity of flow is 2m/s. The pressure at a point where cross-section reduces to 0.01 m^2 is 3.4×10^n Pa. What is the value of n ?

(a) 2 (b) 3
(c) 4 (d) 5

Q 9. In the following fig. 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 2 cm. It can be said that the

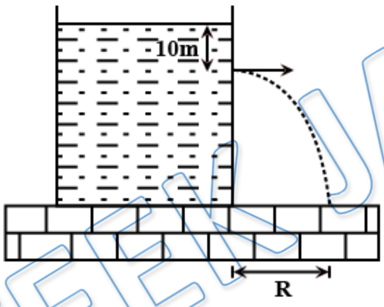


(a) Height of the liquid in the tube A is minimum

(b) Height of the liquid in the tubes A and B is the same
(c) Height of the liquid in all the three tubes is the same
(d) Height of the liquid in the tubes A and C is the same

Q 10. A manometer connected to a closed tap reads $3.5 \times 10^5\ N/m^2$. When the valve is opened, the reading of manometer falls to $3.0 \times 10^5\ N/m^2$, then velocity of flow of water is
(a) 100 m/s (b) 10 m/s
(c) 1 m/s (d) $10\sqrt{10}$ m/s

Q 11. A large tank is filled with water (density = $10^3\ kg/m^3$). A small hole is made at a depth 10m below water surface. the range of water issuing out of the hole is R on ground. What extra pressure must be applied on the water surface so that the range becomes 2R (take 1 atm = 10^5 Pa and g = 10 m/s^2)



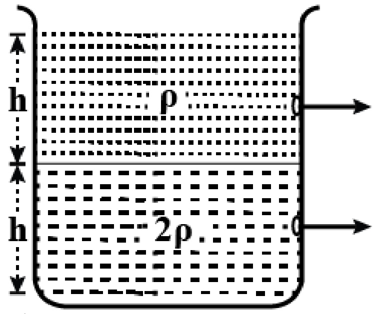
(a) 9 atm (b) 4 atm
(c) 5 atm (d) 3 atm

Q 12. There is a hole in the bottom of tank having water. If total pressure at bottom is 3 atm ($1\ atm = 10^5\ N/m^2$) then the velocity of water flowing from hole is
(a) $\sqrt{400}\ m/s$ (b) $\sqrt{600}\ m/s$
(c) $\sqrt{60}\ m/s$ (d) none of these

Q 13. There is a hole of area A at the bottom of cylindrical vessel. Water is filled up to a height h and water flows out in t second. If water is filled to a height 4h, it will flow out in time equal to
(a) t (b) 4t
(c) 2t (d) $\frac{t}{4}$

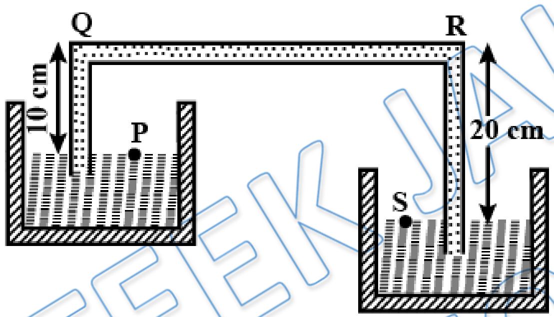
Q 14. A cylindrical tank of height 0.4m is open at the top and has a diameter 0.16m. Water is filled in it up to height of 0.16m. Find the time taken to empty the tank through a hole of radius $5\times10^{-3}\ m$ in its bottom. (g = 9.8 m/s^2)
(a) 21.2 s (b) 46.3 s
(c) 18.7 s (d) 51.1 s

Q 15. Equal volumes of two immiscible liquids of densities ρ and 2ρ are filled in a vessel as shown in figure. Two small holes are punched at depth $\frac{h}{2}$ and $\frac{3h}{2}$ from the surface of lighter liquid. If V_1 and V_2 are the velocities of a flux at these two holes, then V_1/V_2 is :



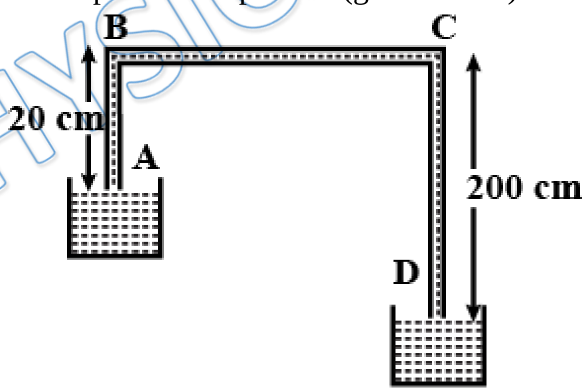
(a) $\frac{1}{2\sqrt{2}}$ (b) $\frac{1}{2}$
(c) $\frac{1}{4}$ (d) $\frac{1}{\sqrt{2}}$

Q 16. A siphon in use is demonstrated in the following figure. The density of the liquid flowing in siphon is 1.5 gm/cc. The pressure difference between the point P and S will be



(a) $10^5\ N/m$ (b) $2 \times 10^5\ N/m$
(c) zero (d) infinity

Q 17. The figure shows a siphon in action. Cross sectional area of pipe is 1sq.cm. and atmospheric pressure is 100000 Pa. The liquid flowing through the siphon has a density of 1 g/cc. Calculate the pressure at point B (g = 10 m/s^2)



(a) 0.7atm (b) 0.8atm
(c) 0.9atm (d) 0.6 atm

Answer Key

Q.1 a	Q.2 c	Q.3 c	Q.4 d	Q.5 a
Q.6 a	Q.7 c	Q.8 c	Q.9 d	Q.10 b
Q.11 d	Q.12 a	Q.13 c	Q.14 b	Q.15 d
Q.16 c	Q.17 b			