Physicsaholics

DPP – 1

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Q 1. 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) $38\sqrt{3}$

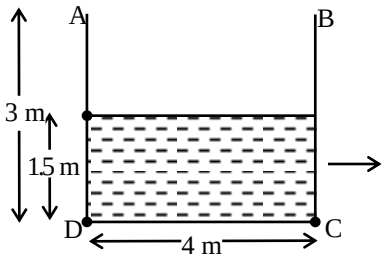
Q 2. Equal mass of three liquids are kept in three identical cylindrical vessels A, B and C. The densities are ρ_A, ρ_B, ρ_C with $\rho_A < \rho_B < \rho_C$. The force on the base will be -
(a) maximum in vessel A
(b) maximum in vessel B
(c) maximum in vessel C
(d) equal in all the vessels

Q 3. A satellite revolves round the earth. Air pressure inside the satellite is maintained at 76 cm of mercury. What will be the height of mercury column in a barometer tube 90 cm long placed in the satellite?
(a) 76 cm (b) 90 cm (c) zero (d) None

Q 4. The pressure in a liquid at two points in the same horizontal plane are equal. Consider an elevator accelerating upward and a car accelerating on a horizontal road. The above statement is correct in -
(a) the car only (b) the elevator only
(c) both of them (d) neither of them

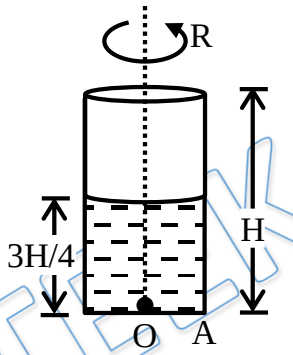
Q 5. A beaker containing a liquid is kept inside a big closed jar. If the air inside the jar is continuously pumped out, the pressure in the liquid near the bottom of the liquid will -
(a) increase
(b) decrease
(c) remain constant
(d) first decrease and then increase

Q 6. A container having dimensions 5m × 4m × 3m is accelerated along its breadth in horizontal. Container is filled with water up to the height of 1.5 m. Container is accelerated with 7.5 m/s^2. in accelerated container
(Take g = 10m/s^2, density of water is 10^3 kg/m^3)



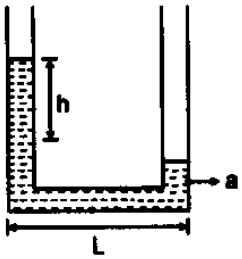
(a) Gauge pressure at point C is 10^4 Pascal
(b) Gauge pressure at point D is 3×10^4 Pascal
(c) Gauge pressure at the middle of the base is 1.5×10^4 Pascal
(d) Remaining volume of liquid inside the container is $20m^3$

Q 7. A liquid of density r filled in the vessel as shown is rotated with constant angular velocity 'w' about the axis passing through the middle. The radius of cylinder is R. Then –



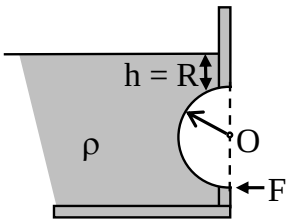
(a) The minimum value of 'w' for which the liquid comes out is $\sqrt{\frac{gH}{R^2}}$
(b) The value of 'w' for which the base of container is just exposed is $\sqrt{\frac{2gH}{R^2}}$
(c) Volume of liquid remaining in the container in option(b) is $\frac{\pi R^2 H}{2}$
(d) Gauge pressure at point A in the container in option(b) is rgH

Q 8. When at rest, a liquid stands at the same level in the U tubes. But as indicated a height difference h occurs when the system is given an acceleration a towards the right. Here, h is equal to:



(a) $\frac{aL}{2g}$ (b) $\frac{gL}{2a}$ (c) $\frac{gL}{a}$ (d) $\frac{aL}{g}$

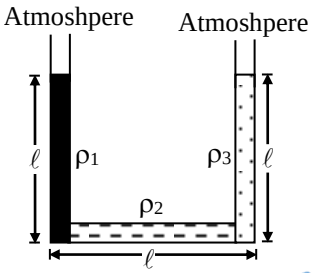
Q 9. The figure shows a semi-cylindrical massless gate pivoted at the point O holding a stationary liquid of density r. A horizontal force F is applied at its lowest position to keep it stationary. The magnitude of the force is –



(a) $\frac{9}{2}\rho g R^2$ (b) $\frac{3}{2}\rho g R^2$

(c) rgR^2 (d) Zero

Q 10. Three liquids having densities ρ_1, ρ_2 and ρ_3 are filled in a U-tube. Length of each liquid column is equal to l. $\rho_1 > \rho_2 > \rho_3$ and liquids remain at rest (relative to the tube) in the position shown in figure. It is possible that–



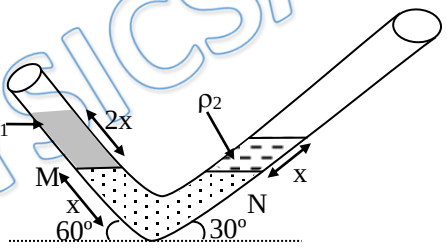
(a) U-tube is accelerating leftwards

(b) U-tube is accelerating upwards with acceleration g

(c) U-tube is moving with a constant velocity

(d) None of these

Q 11. liquids of density ρ_1 and ρ_2 stand in the bent tube as shown. Density of lowermost liquid is ρ. Point M and N are at same horizontal level and system is in equilibrium. Then –



(a) $P_M = P_N$ (b) $\rho_2 = 2\sqrt{3}\,\rho_1$

(c) $\rho_1 = 2\sqrt{3}\,\rho_2$ (d) None of these

Q 12. A cubical open vessel of diameter 5 m is filled with a liquid. The vessel is accelerated horizontally in such a way that the height of the liquid becomes 5 m and the pressure at the mid point of the vessel becomes equal the atmospheric pressure. Then the acceleration of the vessel will be

(a) g (b)3g (c) 2g (d) 3g/2

Answer Key

Q.1 a	**Q.2 d**	**Q.3 b**	**Q.4 b**	**Q.5 b**
Q.6 b, c	**Q.7 a, b, c, d**	**Q.8 d**	**Q.9 d**	**Q.10 d**
Q.11 a, b	**Q.12 c**			