FLUID

Exercise - II

(ONE OR MORE THAN ONE OPTION IS CORRECT)

1. STATIC FLUID

1. The vessel shown in the figure has two sections. The lower part is a rectangular vessel with area of cross-section A and height h. The upper part is a conical vessel of height h with base area 'A' and top area 'a' and the walls of the vessel are inclined at an angle 30° with the vertical. A liquid of density ρ fills both the sections upto a height 2h. Neglecting atmospheric pressure.



(A) The force F exerted by the liquid on the base of

the vessel is $2h\rho g \frac{(A+a)}{2}$

(B) the pressure P at the base of the vessel is $2h\rho g \frac{A}{2}$ (C) the weight of the liquid W is greater than the

force exerted by the liquid on the base

(D) the walls of the vessel exert a downward force (F–W) on the liquid.

2. ACCELERATED FLUID

2. A beaker is filled in with water is accelerated a m/s^2 in +x direction. The surface of water shall make on angle

(A) $tan^{-1}(a/g)$ backwards (B) $tan^{-1}(a/g)$ forwards (C) $cot^{-1}(g/a)$ backwards (D) $cot^{-1}(g/a)$ forwards

3. PASCAL'S LAW & ARCHIMEDE'S PRINCIPLE

3. The weight of an empty balloon on a spring balance is w_1 . The weight becomes w_2 when the balloon is filled with air. Let the weight of the air itself be w. Neglect the thickness of the balloon when it is filled with air. Also neglect the difference in the densities of air inside & outside the balloon. Then :

(A) $w_2 = w_1$ (B) $w_2 = w_1 + w$ (C) $w_2 < w_1 + w$ (D) $w_2 > w_1$ **4.** The spring balance A reads 2 kg with a block m suspended from it. A balance B reads 5 kg when a beaker with liquid is put on the pan of the balance. The two balances are now so arranged that the hanging mass is inside the liquid in the beaker as shown in the figure in this situation :



(A) the balance A will read more than 2 kg

(B) the balance B will read more than 5 kg

(C) the balance A will read less than 2 kg and B will read more than 5 kg

(D) the balances A and B will read 2 kg and 5 kg respectively

4. FLUID FLOW & BERNOULLI'S PRINCIPLE

5. Figure shows a siphon. Choose the wrong statement :



(A) Siphon works when $h_3 > 0$

(B) Pressure at point 2 is $P_2 = P_0 - \rho g h_3$

(C) Pressure at point 3 is P_0

(D) None of the above

 $(P_0 = atmospheric pressure)$

6. 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) $x_m = 1.5 h$ (C) y = h (D) y = 0.75 h

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7. Water coming out of a horizontal tube at a speed v strikes normally a vertically wall close to the mouth of the tube and falls down vertically after impact. When the speed of water is increased to 2v.

(A) the thrust exerted by the water on the wall will be doubled

(B) the thrust exerted by the water on the wall will be four times

(C) the energy lost per second by water strikeup the wall will also be four times

(D) the energy lost per second by water striking the wall be increased eight times

8. A cylindrical vessel is filled with a liquid up to height H. A small hole is made in the vessel at a distance y below the liquid surface as shown in figure. The liquid emerging from the hole strike the ground at distance x



(A) if y is increased from zero to H, x will decrease and then increase

(B) x is maximum for y = H/2

(C) the maximum value of x is H/2

(D) the maximum value of x increases with the increases in density of the liquid

9. A steady flow of water passes along a horizontal tube from a wide section X to the narrower section Y, see figure. Manometers are placed at P and Q at the sections. Which of the statements A, B, C, D, E is most correct ?



(A) water velocity at X is greater than at Y

(B) the manometer at P shows lower pressure than at Q (C) kinetic energy per m^3 of water at X = kinetic energy per m^3 at Y

(D) the manometer at P shows greater pressure than at $\, Y \,$

