Mechanical Properties of Fluids Worksheets

Multiple Choice Questions

Question 1: A bowl of soup rests on a table in the dining car of a Rajdhani train. The acceleration of the train is g/4 in the forward direction.

What angle does the surface of the soap make with the horizontal?

a) $\tan^{-1} 1/4$

b) $\tan^{-1} 4$

c) $\cos^{-1} 4$

d) $\sin^{-1} 4$

Match the column

Question 2:

A block of ice is floating in a liquid of relative density k contained in a beaker

When the ice melts completely, match the column

Column I (k values)

A) k > 1

B) k < 1

C) k=1

Column II

P) Liquid level will increase

Q) Liquid level will decrease

R) Liquid level will remain unchanged

S) No appropriate match given

Linked Type comprehensions

Question -3

A body of density ρ_1 is dropped from rest at a height h into a lake of density ρ_2 ($\rho_2 > \rho_1$)

Neglect all the dissipative effects

1) Calculate the acceleration of this body while it is in the lake

a) $g(\frac{\rho_2}{\rho_1}-1)$ Upward direction

b) $g(\frac{\rho_2}{\rho_1}-1)$ Downward direction

c) $g(1-\frac{\rho_1}{\rho_2})$ Upward direction

d) $g(1-\frac{\rho_1}{\rho_2})$ Downward direction

Question 4 The maximum depth to which the body sinks before returning to float on the surface is proportional to the height h

And it is given by

H=kh.

What is the value of k

a) $\dfrac{\rho_1}{\rho_2 - \rho_1}$

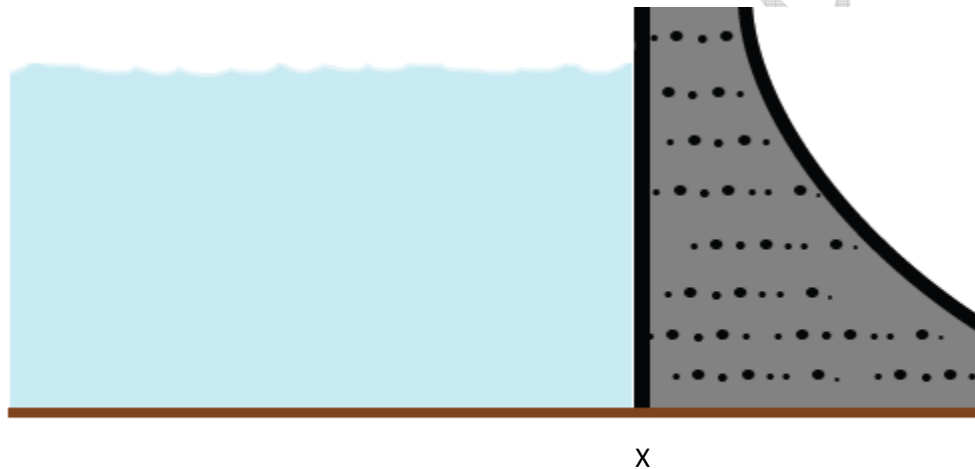b) $\dfrac{\rho_2}{\rho_2 - \rho_1}$

c) $\dfrac{\rho_1}{\rho_2 + \rho_1}$

d) None of these

Linked Type Comprehension

Question 5:

Water stands at a depth h behind the vertical face of a dam. It exerts a resultant horizontal force on the dam, tending to slide it along its foundation and a torque tending to overturn the dam about the point X. The width of the dam is L.

The density of the water is ρ

X

1) The resulting horizontal force acting on the dam due to water column

a) Proportional to h²

b) Proportional to density ρ

c) Proportional to L

d) None of these

Question 6 The torque of the forces about point X is given by

a) $\dfrac{\rho g l h^3}{3}$

b) $\dfrac{\rho g l^2 h^3}{6}$

c) $\dfrac{\rho g l h^3}{2}$

d) $\dfrac{\rho g l h^3}{6}$

Multiple Choice Questions

Question 7

A piston of Weight W has the form of circular disk with radius R_1 . The disk has a hole into which a thin walled pipe with a radius R_2 is inserted. The piston can enter a cylinder tightly and without friction and it is initially at the bottom of the cylinder. M kg of water is poured into the pipe. Find the height of the piston above the bottom

a) $H = \dfrac{1}{\pi R_1^2 \rho}\left[M + \dfrac{W}{g}\dfrac{R_2^2}{R_1^2 - R_2^2}\right]$

b) $H = \dfrac{1}{\pi R_1^2 \rho}\left[W - M\dfrac{R_2^2}{R_1^2 - R_2^2}\right]$

c) $H = \dfrac{1}{\pi R_1^2 \rho}\left[M - \dfrac{W}{g}\dfrac{R_1^2}{R_1^2 - R_2^2}\right]$

d) $H = \dfrac{1}{\pi R_1^2 \rho}\left[M - \dfrac{W}{g}\dfrac{R_2^2}{R_1^2 - R_2^2}\right]$

Question 8:

A tank contains water on top of mercury. A cube of iron .06 m along each edge is sitting upright in equilibrium in the liquid.

Density of iron $= 7.7 \times 10^3$ kg/m^3

Density of mercury $= 13.6 \times 10^3$ kg/m^3

Which one of the following is true

a) x=32mm and y=28mm

b) The pressure difference (p_2-p_1) is 4632 N/m^2

c) The weight of the mercury cube is 16.632 g

d) None of these