

Unit 6 - Week 5 : APPLICATIONS OF FLUID STATICS AND DYNAMICS

Course outline

How to access the portal

Week 1 : INTRODUCTION

Week 2 : FLUID STATICS

Week 3 : FLUID DYNAMICS

Week 4 : FLUID DYNAMICS

Week 5 : APPLICATIONS OF FLUID STATICS AND DYNAMICS

Fluid Statics Applications: Problems Solving

Conservation of Momentum: Problems Solving

Bernoulli's Equation Problems Solving on Blackboard

Quiz : Assignment 5

Feedback form

Week 6 : FLUID KINEMATICS

Week 7 : DIMENSIONAL ANALYSIS

Week 8 : INCOMPRESSIBLE VISCOUS FLOW IN PIPES

Live Session

Assignment 5

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment.

Due on 2019-10-02, 23:59 IST.

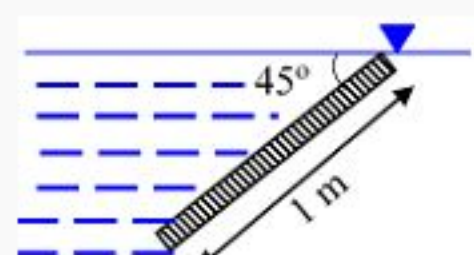
1) A triangular gate, base 2 m height 1.5 m lies in a vertical plane. The top vertex is 1.5 m below the surface of a tank which contains oil of specific gravity 0.8. Considering density of water and acceleration due to gravity to be 1000 kg/m^3 and 9.81 m/s^2 respectively. The hydrostatic force (in kN) exerted by oil on the gate is **2 points**

- a. 294.30
 b. 29430
 c. 2.943
 d. 29.43

No, the answer is incorrect. Score: 0

Accepted Answers:
d. 29.43

2) The force per unit width on the rectangular door submerged in a liquid of density ρ (figure shown below is) **1 point**



- a. $\sqrt{2}\rho g$
 b. $\rho g/2$
 c. $\rho g/2\sqrt{2}$
 d. $2/\rho g$

No, the answer is incorrect. Score: 0

Accepted Answers:
c. $\rho g/2\sqrt{2}$

3) Determine the position of centre of pressure of a circular plate of diameter 1.5 m which is placed vertically in water in such a way that the centre of plate is 3 m below the free surface of water. **2 points**

- a. 3.0468
 b. 2.9854
 c. 3.4680
 d. 3.0968

No, the answer is incorrect. Score: 0

Accepted Answers:
a. 3.0468

4) Calculate the pressure due to a column of 0.3 of (i) water, (ii) an oil of specific gravity 0.8 and (iii) mercury of specific gravity 13.6. Take density of water, $\rho = 1000 \text{ kg/m}^3$. **3 points**

- a. Water: 0.2943 N/cm²; Oil: 0.2354 N/cm²; Mercury: 4.002 N/cm².
 b. Water: 0.2354 N/cm²; Oil: 0.2943 N/cm²; Mercury: 4.002 N/cm².
 c. Water: 2.354 N/cm²; Oil: 0.2943 N/cm²; Mercury: 4.002 N/cm².
 d. Water: 0.2943 N/cm²; Oil: 2.354 N/cm²; Mercury: 4.002 N/cm².

No, the answer is incorrect. Score: 0

Accepted Answers:
a. Water: 0.2943 N/cm²; Oil: 0.2354 N/cm²; Mercury: 4.002 N/cm².

5) A simple U-tube manometer containing mercury is connected to a pipe in which a fluid of specific gravity 0.8 and having vacuum pressure is flowing. The other end of the manometer is open to atmosphere. Find the vacuum pressure in pipe, if the difference of mercury level in the two limbs is 40 cm and height of the fluid in the left from the centre of pipe is 15 cm below. Given specific gravity of mercury is 13.6 **2 points**

- a. -5.454 N/m²
 b. -5.454 N/cm²
 c. -5454.36 N/m²
 d. -54.543 N/m²

No, the answer is incorrect. Score: 0

Accepted Answers:
b. -5.454 N/cm²

6) A horizontal water jet with a velocity of 10 m/s and cross-sectional area of 10 mm^2 strikes a fixed plate held normal to the flow direction. Find the total force acting on the plate. (Take density of water, $\rho = 1000 \text{ kg/m}^3$). **2 points**

- a. 1 kN
 b. 1 N
 c. 10 kN
 d. 10 N

No, the answer is incorrect. Score: 0

Accepted Answers:
b. 1 N

7) The diameters of a pipe at the sections 1 and 2 are 10 cm and 15 cm respectively. Given velocity of water flowing through the pipe at section 1 is 5 m/s. Determine velocity at section 2 and discharge flowing through the pipe **4 points**

- a. 2.22 m/s and 39.27 lit/s
 b. 39.27 lit/s and 2.22 m/s
 c. 3.22 m/s and 44.58 lit/s
 d. 39.27 lit/s and 3.22 m/s

No, the answer is incorrect. Score: 0

Accepted Answers:
a. 2.22 m/s and 39.27 lit/s

8) A pitot-static tube is used to measure the velocity of water in a pipe. The stagnation pressure head is 6 m and static pressure head is 5 m. calculate the velocity of flow assuming the coefficient of pitot-tube equal to 0.98. **2 points**

- a. 3.34 m/s
 b. 2.24 m/s
 c. 3.24 m/s
 d. 4.34 m/s

No, the answer is incorrect. Score: 0

Accepted Answers:
d. 4.34 m/s

9) A pipe of constant diameter 400 mm carries water at velocity of 25 m/s. The pressures at points A and B are given as 29.43 N/cm^2 and 22.563 N/cm^2 respectively while the datum head at A and B are 28 m and 30 m. Find the loss of head between A and B. **1 point**

- a. 3 m
 b. 4 m
 c. 5 m
 d. 6 m

No, the answer is incorrect. Score: 0

Accepted Answers:
c. 5 m