ABBES LAGHROUR UNIVERSITY - KHENCHELA
Faculty of Sciences and Technology
Department of Science of Matter
2nd year License: Physics

Final exam in: Fluids Mechanics

25/05/2025
Duration : 1 h 30 '

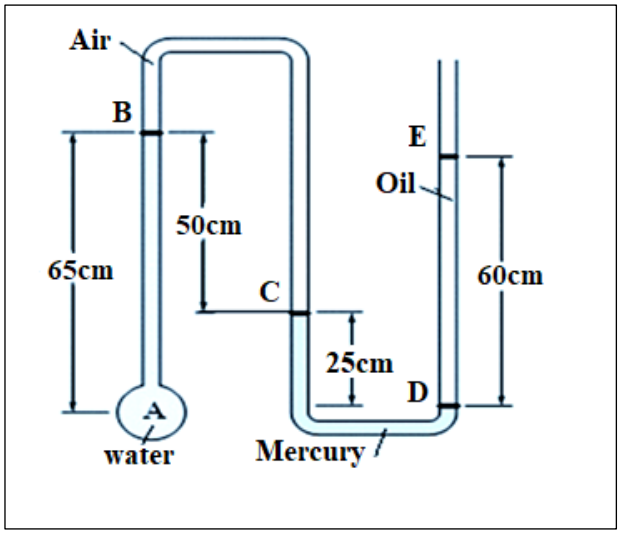
Exercise 1 : (5 pts)

1) Calculate the weight (ω), the density (ρ), and the specific gravity (SG) of a fluid that weighs 60 kg in a volume of 5 m^3.
2) Calculate the weight of a volume V = 2 liters of liquid with a density d = 0.918.
   We give: $\rho_{water} = 1000\ kg/m^3$; $g = 9.81 m / s^2$; $\gamma_{water} = 9.81\ KN/ m^3 = 9810\ N/ m^3$

Exercise 2 : (7 pts)

Calculate the pressure at point A, knowing that:

- the density of the oil is $d_{oil} = 0.85$
- the density of mercury is $d_{Hg} = 13.6$
- $P_B = P_C$



Exercise 3 : (8 pts)

In the Venturi tube represented in the diagram below. The diameter of the tube at point A is D_A = 40 cm, and at point B it is D_B= 20 cm. In order to measure the pressure P_A at point A and the pressure P_B at point B, two water column manometers are connected to the Venturi. These piezometric tubes are graduated and allow for measuring the levels $h_{A'} = 6$ m and $h_{B'} = 3$ m respectively of the free surfaces A' and B'.

We give:

- The pressure at the free surface $P_{A'} = P_{B'} = 1.01 \times 10^5$ Pa
- The density of water = $1000\ kg/m^3$

Good Luck _Dr. Grabsi. I

We assume that the fluid is perfect.

1) Apply the fundamental relationship of hydrostatics between B and B', and calculate the pressure P_B at point B.
2) Similarly, calculate the pressure P_A at point A.
3) Write the continuity equation between points A and B. Deduce the flow velocity υ_B as a function of υ_A.
4) Write Bernoulli's equation between points A and B. Deduce the flow velocity υ_B.
5) Calculate the volumetric flow rate Qv.