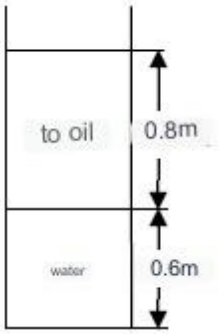
Department of Automatics **(TD 02: Statics of fluids-1)**
2nd Year Electromechanical License
Hydraulics & Pneumatics

Exercise No. 1:

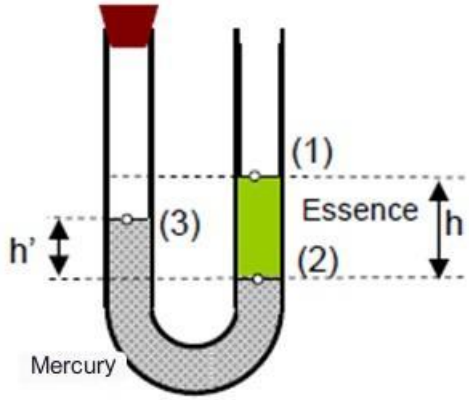
Determine the pressure on the bottom of an open container filled with two liquids; a lower layer of water and an upper layer of oil of ρ=760 kg.m $^{-3}$ and P_{atm} =1,013.10 ^{5} Pa.



Exercise No. 2:

Consider a U-tube closed at one end which contains two liquids not miscible.

1) Calculate the pressure P_2 (in mbar) at the level of the surface of separation (2) knowing that h= 728 mm, ($\rho_{gasoline}$ =700 kg/m ^{3}).
2) For mercury, calculate the pressure P_3 (in mbar) at the level of the surface (3) knowing that h'= 15 mm, ($\rho_{mercury}$ =13600 kg/m ^{3}).

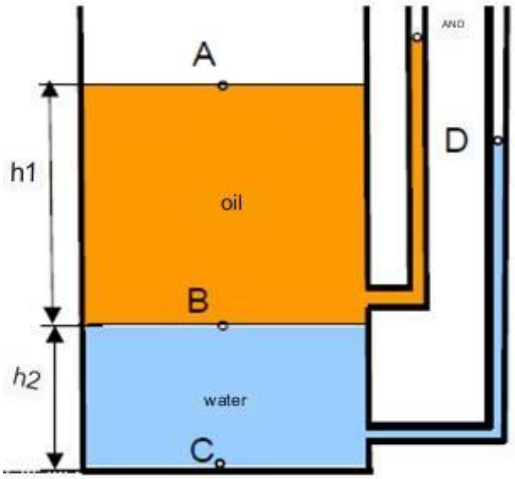


Exercise No. 3:

An open reservoir, equipped with two piezometric tubes and filled with two immiscible liquids:

- oil (ρ_1 =850 kg/m ^{3}) over a height h_1 =6 m,
- water (ρ_2 =1000 kg/m ^{3}) over a height h_2 =5 m.

1) Deduce the pressure P_B (in bar) at point B.
2) Deduce the oil level Z_E in the piezometric tube.
3) Deduce the pressure P_C (in bar) at point C.
4) Deduce the water level Z_D in the piezometric tube.



Exercise No. 4:

We consider a U-shaped tube containing three liquids:

- water having a density ρ_{water} = 1000 kg/m ^{3} ,
- mercury having a density $\rho_{mercury}$ = 13600 kg/m ^{3} ,
- gasoline having a density $\rho_{gasoline}$ = 700 kg/m ^{3} .

We give :

$Z0 - Z1 = 0.2m$
$Z3 - Z2 = 0.1m$
$Z1 + Z2 = 1.0m$

We ask to calculate Z_0 , Z_1 , Z_2 and Z_3 .