CIVIL ENGINEERING ORIENTATION TEST 13.12.2021

I. THEORETICAL PROBLEMS

True or false?

1. The pressure of a gas depends on its temperature
2. density = the mass of the substance x unit volume
3. Particles in a liquid are attracted to each other
4. Specific gravity usually means relative density with respect to water.
5. The interface forms between the liquid and the surrounding gas called a free surface
6. Macroscopic properties of gases: volume, pressure, temperature, mass
7. The most obvious property of fluids, their ability to flow and change their volume
8. The ideal fluid is inviscid (it's viscosity is zero)
9. Ideal gases: There are no intermolecular forces
10. In all gas equations, temperature is measured in Celsius
11. The kinetic energy of the gas molecules decreases with added temperature
12. The calculation of the specific weight: $\gamma=\rho\eta$
13. When the temperature changes from either greater or less than 4 degrees, the density will become more then 1 g/cm3

	13

14. 0.075 kg/cm^3 = ... kg/m^3

A) 75000
B) 75
C) 75000000
D) 0.000075

	2

15. An isobaric process is a thermodynamic process in which the ..... remains constant

A) volume
B) pressure
C) temperature
D) mass

	2

16. Adiabatic process

A) no change in volume
B) no change in temperature
C) no change in pressure
D) no heat transfer into or out of the system

	2

17. Charles' law

A) $V / T = \text{constant}$
B) $p \cdot V = \text{constant}$
C) $p / T = \text{constant}$
D) $(p \cdot V) / T = n \cdot R$

	2

18. In the ideal gas law, which variable represents the gas constant?

A) n
B) R
C) V
D) T

	2

19. How to Convert Kelvin to Celsius?

A) $T(°C) = T(K) - 273.15$
B) $T(°C) = T(K) - 273$
C) $T(°C) = T(K) + 273.15$
D) $T(°C) = T(K) + 273$

	1

20. The pressure at any point in a fluid is defined as the

A) intensity of pressure per unit area
B) force x area
C) force per unit area
D) intensity of pressure x unit area

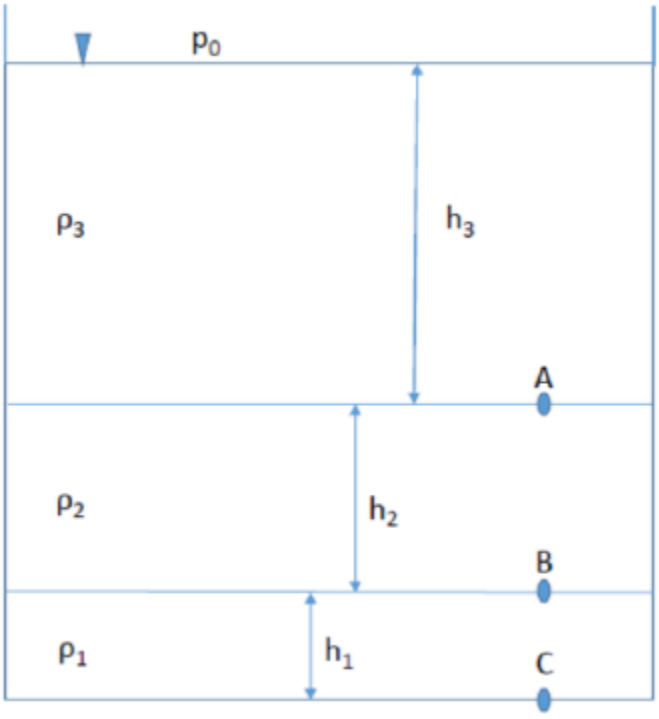
	1

II. NUMERICAL PROBLEMS

1.)

The container was filled with different fluids (densities of the fluids: ρ_1, ρ_2, ρ_3). Calculate the hydrostatic pressure and the absolute pressure in point A, B, C!

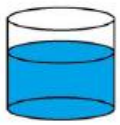
$\rho_1 = 13600\ kg/m^3$
$\rho_2 = 1000\ kg/m^3$
$\rho_3 = 0.8\ g/cm^3$
$h_1 = 0.5\ m$; $h_2 = 1.4\ m$; $h_3 = 2.7\ m$
$p_{atm} = 10^5\ Pa$



	15

2.)

Consider the three differently shaped containers, as shown. Each container is filled with water to a depth of 3 m. In which container is the absolute pressure the greatest at the bottom?

A 

B 

C 

	5

3.)

If 22.5 dm^3 of nitrogen at 755 Hgmm are compressed to 738 Hgmm at constant temperature. What is the new volume in m^3?

1 [mmHg] = 133.3224 [Pa]

	5