Alexandria University	**جامعة الأسكندرية**
Faculty of Engineering	**كلية الهندسة**
Electromechanical Department	**قسم هندسه الكهروميكانيكا**
August, 2013	**سبتمبر 2013**
Fluid Mechanics 1 (EME206)	**ميكانيكا موائع**
1st year	**السنة الدراسية: الأولي**
Time Allowed: 2hr	**مدة الأمتحان: ساعتان**

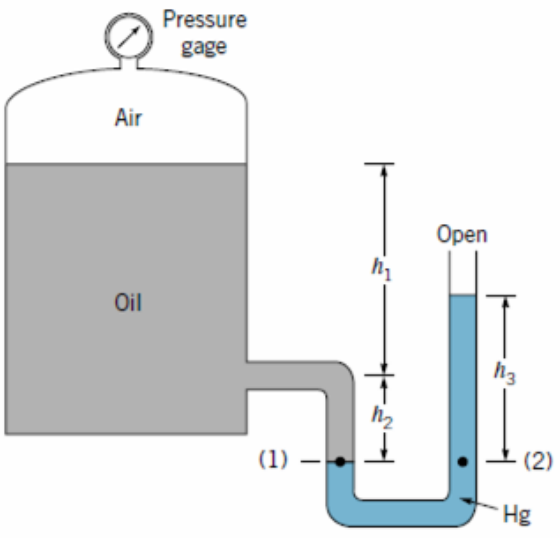
Answer the following questions:

Question one (15 marks)

a) Discuss the relation between:
- Viscosity and Temperature for a certain fluid.
- Absolute, Atmospheric and gauge pressure.

b) A diver is working at a depth of 18 m under sea water surface; calculate the pressure at this depth in gauge and absolute values if the specific gravity of sea water is 1.02.

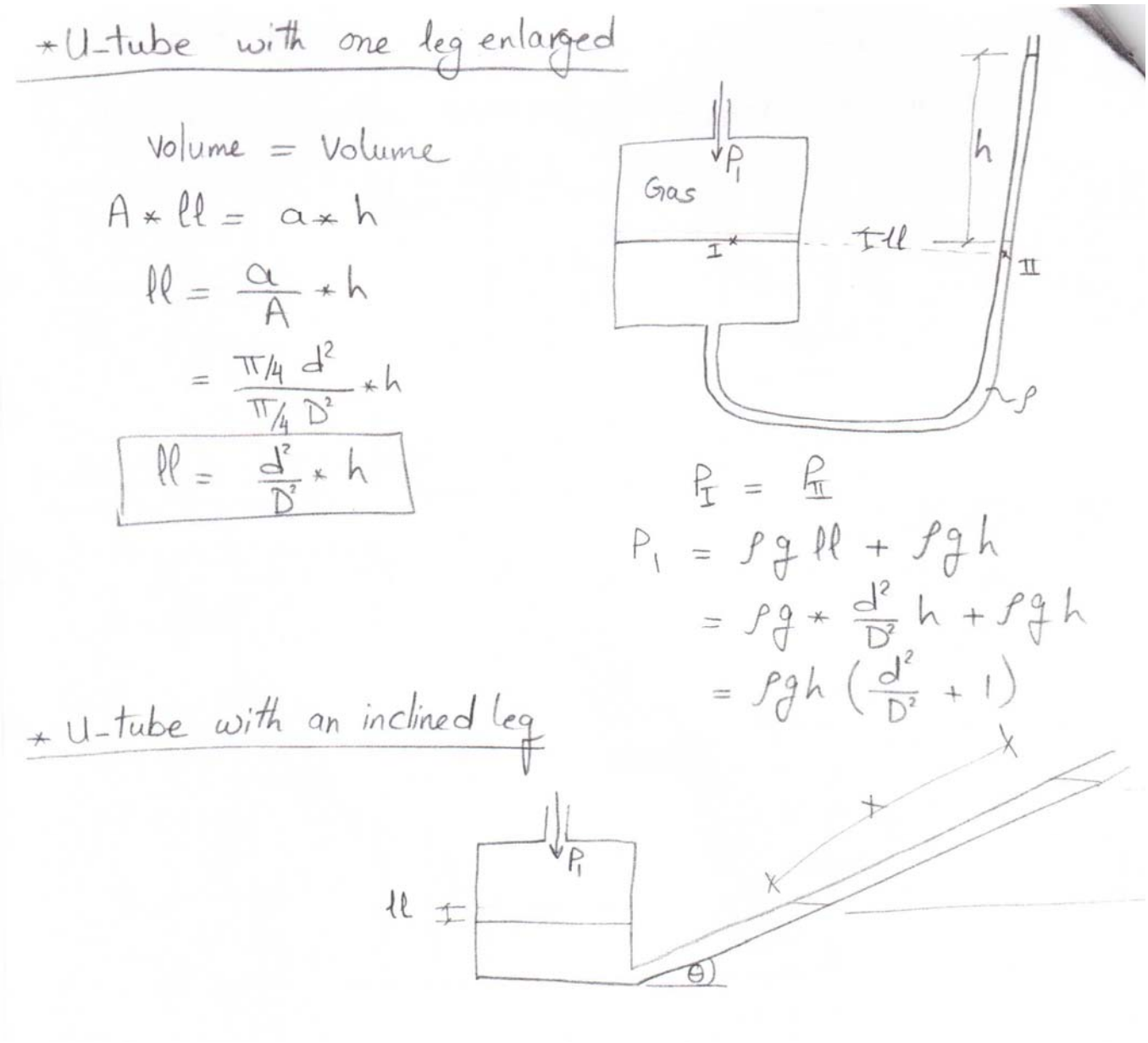
a) A closed tank contains compressed air and oil (γ_{oil} = 0.9) as shown in figure. A u-tube manometer using mercury ($\gamma_{mercury}$ = 13.6) is connected to the tank as shown. For column heights h_1 = 91 cm, h_2 = 15 cm, h_3 = 22 cm, determine the pressure gage's reading.



Question two (15 marks)

Compare, using neat sketches, between the following:

i) U-tube with one leg enlarged and U-tube with an inclined leg.



ii) Hydraulic Jack and Hydraulic Press.

iii) Friction and Eddy Losses.

① Friction losses : This type of losses exists for any flow as a result of fluid viscosity and velocity difference between fluid layers. As a result of friction, part of the fluid's mechanical energy is converted into heat energy (decipated into atmosphere) and is considered as an energy loss.

② Eddy losses : occurs due to any change in the velocity vector (magnitude or direction). This change causes some of energy to be transfered from main flow to the eddies formed at corners. This part of energy is considered as energy losses.

b) A solid circular cylinder of radius "r" and height "h" has sp.gr. 0.6. Find the minimum ratio r/h for which the cylinder will float in water with its axis vertical.

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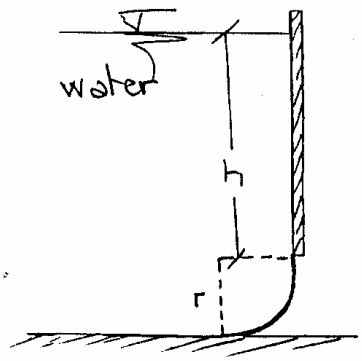
Question three (10 marks)

A) State the scientific expression of the following:-

1. Weight per unit volume
2. It is a substance which deforms continuously under the action of shearing forces.
3. It is the pressure at which a liquid start to boil at working temperature.
4. The fluid property that is measured by m^2/s.
5. It means frictionless flow, no energy is lost, and viscosity is considered Zero.

b) If the resultant pressure force on the circular gate shown in Figure is inclined 50^o to the horizontal. Calculate the height of water in the tank 'h' and the



r = 1.0 m

magnitude of the resultant pressure force on the gate. Given that gate width = 0.5 m.

Question Four (10 marks)

Two water tanks A and B are connected with a cast iron pipe (ε = 0.25 mm) 15 cm diameter and 800 m long has a coefficient of friction (f = 0.025). Along the pipe, there are a fully opened gate valve (k = 1.2), three 45^o bends (k for each= 0.8) and four 45^o bends (k for each= 0.6).

i. Find the difference in levels between water surfaces in two tanks, so that a discharge of 60 lit/s flows from tank A to tank B.
ii. If the valve is partially closed to reduce the discharge to 60% of its initial value, keeping the same difference in levels, what will be the head lost in the valve.

Good Luck 2/2

Dr. Rola Afify and committee