

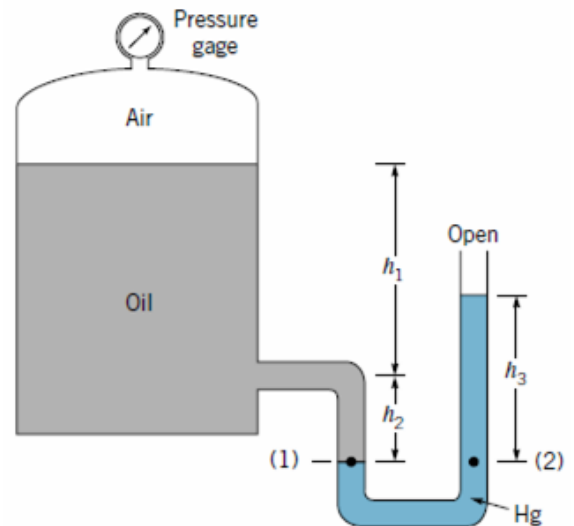


Answer the following questions:

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 ($\gamma_{oil} = 0.9$) 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:

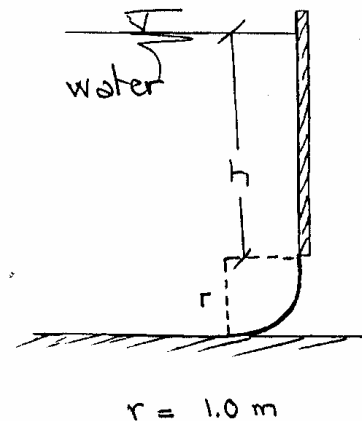
- U-tube with one leg enlarged and U-tube with an inclined leg.
 - Hydraulic Jack and Hydraulic Press.
 - Friction and Eddy Losses.
- b) A solid circular cylinder of radius "r" and height "h" has sp.gr. 0.6. Find the minimum ratio r/h for which the cylinder will float in water with its axis vertical.

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° to the horizontal. Calculate the height of water in the tank 'h' and the 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 ($\epsilon = 0.25$ 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° bends (k for each= 0.8) and four 45° 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.