sheet # 2: FLUID STATICS

1- Sketch the relation between gauge , absolute and atmospheric pressure . show on the sketch what is meant by vacuum.

2- What is the minimum permissible head in a hydraulic circuit using a liquid of specific gravity 0.85 and vapor pressure 6.2 KN/m^2 at the working temp.

3- A diver is working at a depth of 18 m below the sea surface . Determine the pressure in N/m^2 at this depth if the specific weight of the sea water is $10000N/m^3$.

4- At what depth of oil , sp.gr. 0.8 the pressure is 3 bar . What is the equivalent depth of water that would produce the same pressure .

5- Convert a pressure head of 15 m of water to meters of carbon tetra chloride of sp.gr. is 1.6 .

6- Convert a pressure head of 70 cm mercury to meters of oil of sp.gr. 0.8

7- A mercury U-tube manometer is used to measure the pressure of water in a pipe , the water being in contact with mercury in the left hand limb . If the mercury is 30 cm below (A) in the left hand limb and 20 cm above (A) in the right hand limb . What is the gauge pressure at (A) ?

8- Consider a manometer connected as shown . Calculate the pressure difference between A and B .
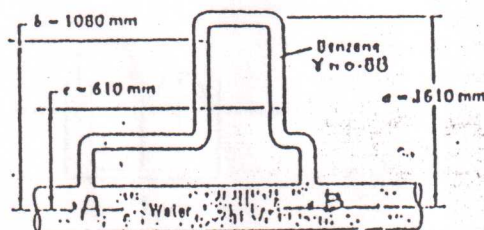
The manometer shown contains three liquids . When $P_1 = 10kPa$, determine the deflection distance d .
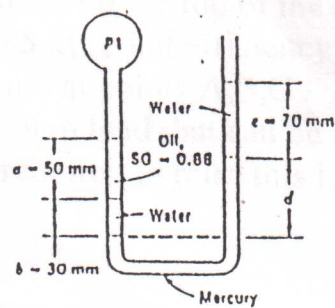
10 - In the shown figure , the liquid at A and B is water and the manometer liquid is oil with sp.gr $= 0.8$, $h_1 = 300\ mm$, $h_2 = 200\ mm$, $h_3 = 600\ mm$
a) Determine $P_A - P_B$
b) If $P_B = 50$ kPa and the barometer reading is 730 mmHg ,find the absolute pressure at A in meters of water .
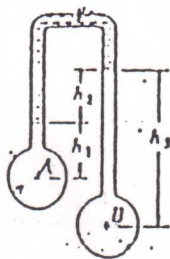
11 - A force of 850 N is applied to the smaller cylinder of a hydraulic jack. The area (a) of the small piston is 15 cm^2 and the area (A) of the larger piston is 150 cm^2 . What load (W) can be lifted on the larger piston if the pistons are in the same level.
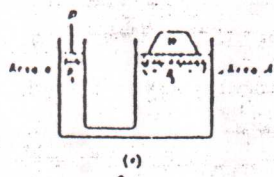
12 - In a hydraulic jack , a force (F) is applied to the small piston to lift the load on the large piston . If the diameter of the small piston is 15 mm and that of the large piston is 180 mm , calculate the value of (F) required to lift 1000 kg .

3 - A motor operated hydraulic Press has a small piston area 10 cm^2,
and large piston ram area of 500 cm^2.
If the force applied on the top of the small piston is 100 N , motor
power equals 0.5 kw , and efficiency of the Press is 0.8 .Determine :
  a) The pressure at points A,B,C .
  b) The maximum load that can be raised .
  c) The time required to raise this loads a distance of 2 m .