College of Engineering & Technology

Department: Mechanical Engineering Marks: 20
Lecturer: Dr. Rola Afify Time: 4:00 – 5:00
Course Code: ME362 Date: 6/5/2015

Name: **Model Answer** R. N.:

Answer the following questions:
Question one (10 marks)

A) Define:

- Fluid:

Fluid: is a substance which deforms continuously under the action of shearing forces, however small they are. This deformation is permanent even if the force is removed.

- Specific gravity:

* specific gravity: $\gamma = \frac{\text{sp. weight of fluid}}{\text{sp. weight of water}}$

$= \frac{\omega_f}{\omega_w} = \frac{\rho_f g}{\rho_w g} = \frac{\rho_f}{\rho_w}$

γ dimensionless ليس لها ابعاد

for water $\gamma_w = 1$

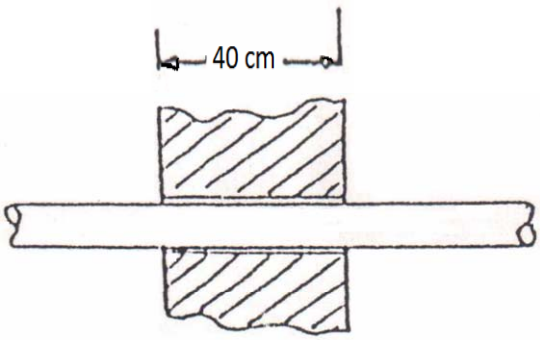
- Vapor pressure of liquid:

* Vapour pressure of liquids ($P_{vap.}$): It is the pressure at which a liquid starts to boil at working temperature.

Boiling temp. increases by increasing pressure on liq. surface
~ ~ decreases ~ decreasing ~ ~ ~ ~

P	0.3	0.5	1	4	10	atm
boiling temp	40	70	100°	120	180	°C

B) A shaft 6.00 cm in diameter is being pushed axially through a bearing sleeve 6.02 cm in diameter and 40 cm long. The clearance, assumed uniform, is filled with oil Problems whose properties are $\nu = 0.003\ m^2/s$ and $\gamma = 0.88$. Estimate the force required to pull the shaft at a steady velocity of 0.4 m/s.



steady velocity of 0.4 m/s.

$d = 6 * 10^{-2}$ m $D = 6.02 * 10$ m

$l = 40 * 10^{-2}$ m $\nu = \frac{\mu}{\rho}$

$\mu = \rho \nu = 0.88 * 1000 * 0.003 =$

$v = 0.4$ m/sec $y = \frac{D-d}{2} = ($

$= 0.01 * 10^{-}$

$F_{vis} = \mu A \frac{v}{y}$

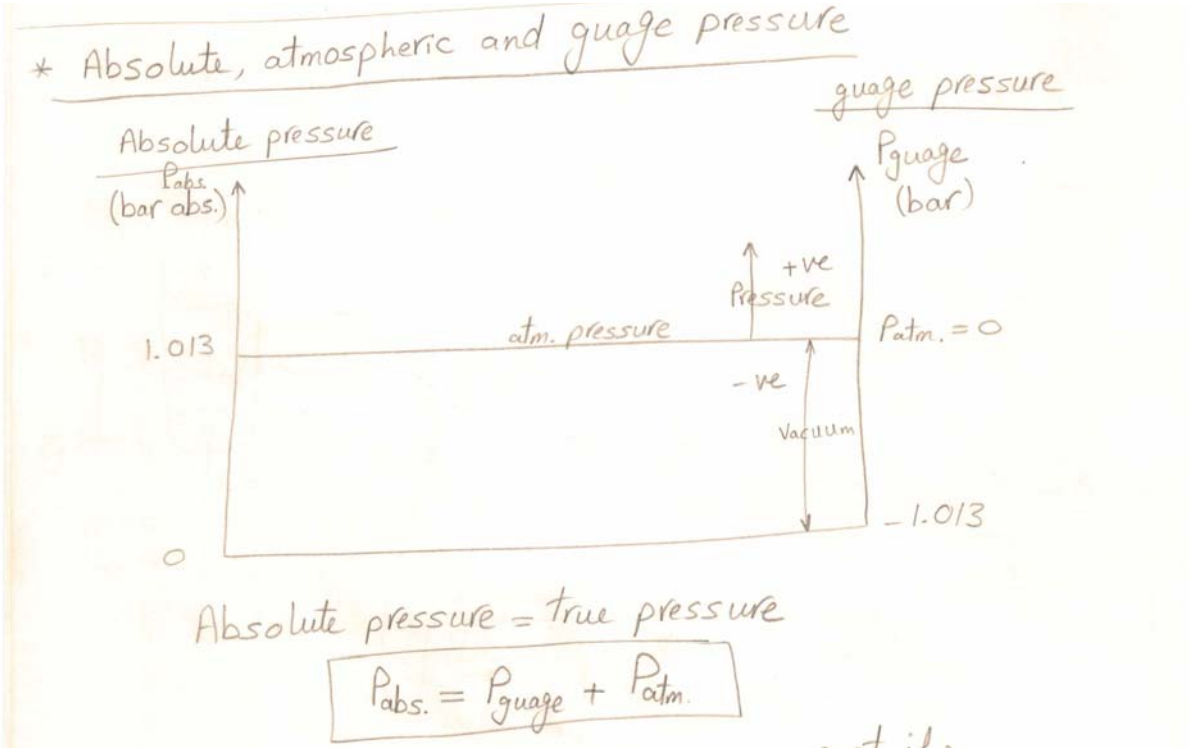
$= 2.64 * \pi d l * \frac{0.4}{0.01 * 10^{-2}}$

$= 2.64 * (\pi * 6 * 10^{-2} * 40 * 10^{-2})$

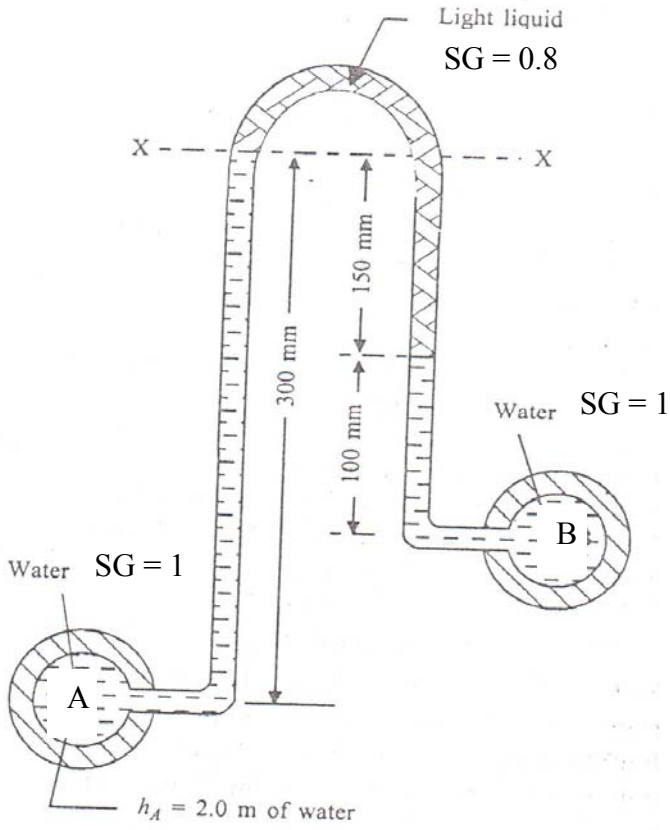
$= 796.21$ Newton

Question two (10 marks)

A) State the relation between absolute, atmospheric and gage pressure.



B) The inverted differential manometer have an oil of specific gravity 0.8 connected to two different pipes carrying water under pressure. Determine the pressure in the pipe B. The pressure in pipe A is 2.0 meters of water.



water.

$$P_I = P_{II}$$

$$P_A - \rho_w g * 0.3 = P_B - \rho_w g * 0.1 - 0.8 \rho_w * g * 0.15$$

$$P_B = P_A + \rho_w g [0.1 + 0.8 * 0.15 - 0.3]$$

$$= \rho_w g [2 + 0.1 + 0.12 - 0.3]$$

$$= 9800 * 1.92$$

$$= 18816 \text{ Pa}$$

Good Luck 3/3

Dr. Rola Afify