College of Engineering & Technology

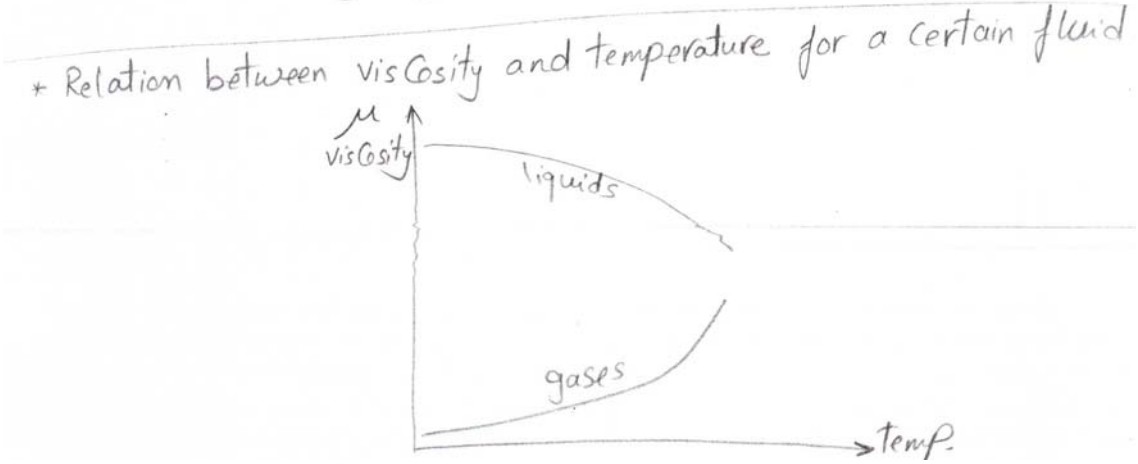
Department: Mechanical Engineering Marks: 10
Lecturer: Dr. Rola Afify Time: 11:30 – 12:10
Course Code: ME362 Date: 25/3/2015

Name: Model Answer R. N.:

Answer the following questions:

Question one (5 marks)

A) Discuss the relation between Viscosity and Temperature for a certain fluid.



B) Choose the correct answer:

An oil has a kinematic viscosity of 1.25 *10-4 m^2/s and a specific gravity of 0.80. What is its dynamic (absolute) viscosity in kg/(m.s)?

(a)0.08, (b) 0.10, (c) 0.125, (d) 1.0, (e) 1.25

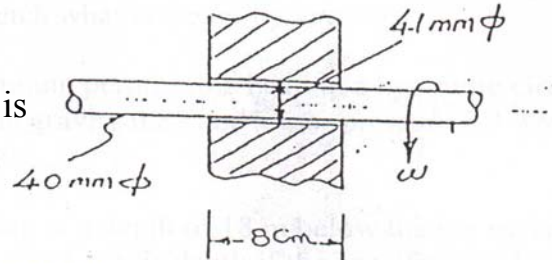
$\nu = \frac{\mu}{\rho}$ $\gamma = \frac{\rho}{\rho_w}$ $\rho = 0.8 * 1000 = 800\ Kg/m^3$

$\mu = \nu \rho = 1.25 * 10^{-4} * 800$

$= 0.1\ Kg/m.s$

(b) the answer

C) The shaft turning inside a stationary journal as shown, with a rotating speed 20 rps the torque is 0.0036 N.m. Estimate the viscosity of oil.



$d = 40 * 10^{-3}\ m$

$D = 41 * 10^{-3}\ m$ $y = \frac{D-d}{2} = 0.5$

$L = 8 * 10^{-2}\ m$ $\omega = 2\pi * 20 = 40\pi\ rad/sec$

$T = 0.036\ N.m$ $\mu = ??$

$$T = F * r = \mu A \frac{du}{dr} * r$$

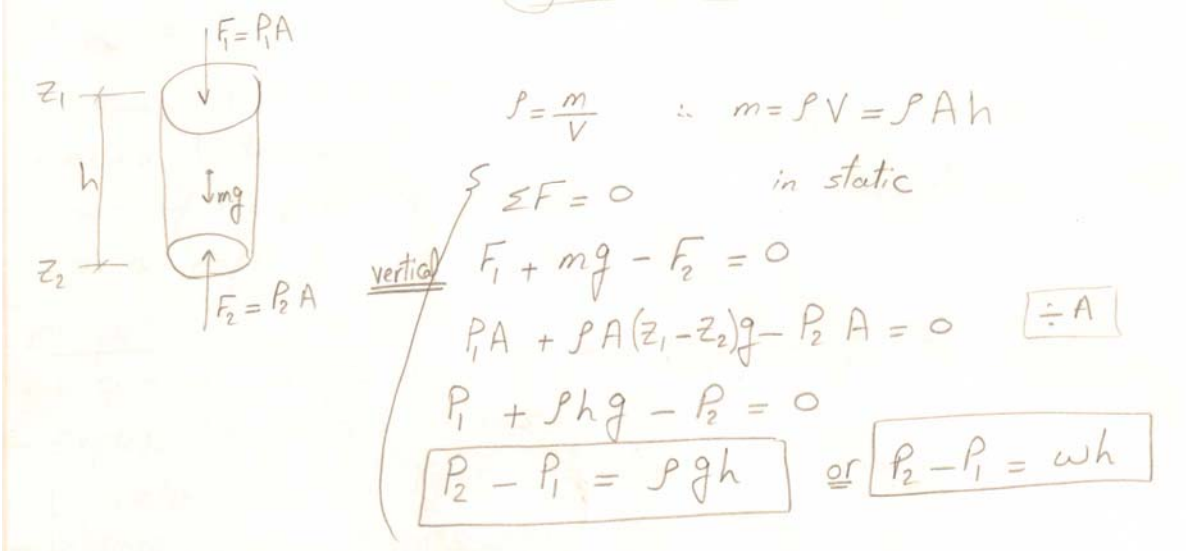
$$0.036 = \mu * (\pi * 40 * 10^{-3} * 8 * 10^{-2}) * \frac{40\pi * \frac{40}{2} * 10^{-3}}{0.5 * 10^{-3}}$$

$$0.036 = \mu * 50.53$$

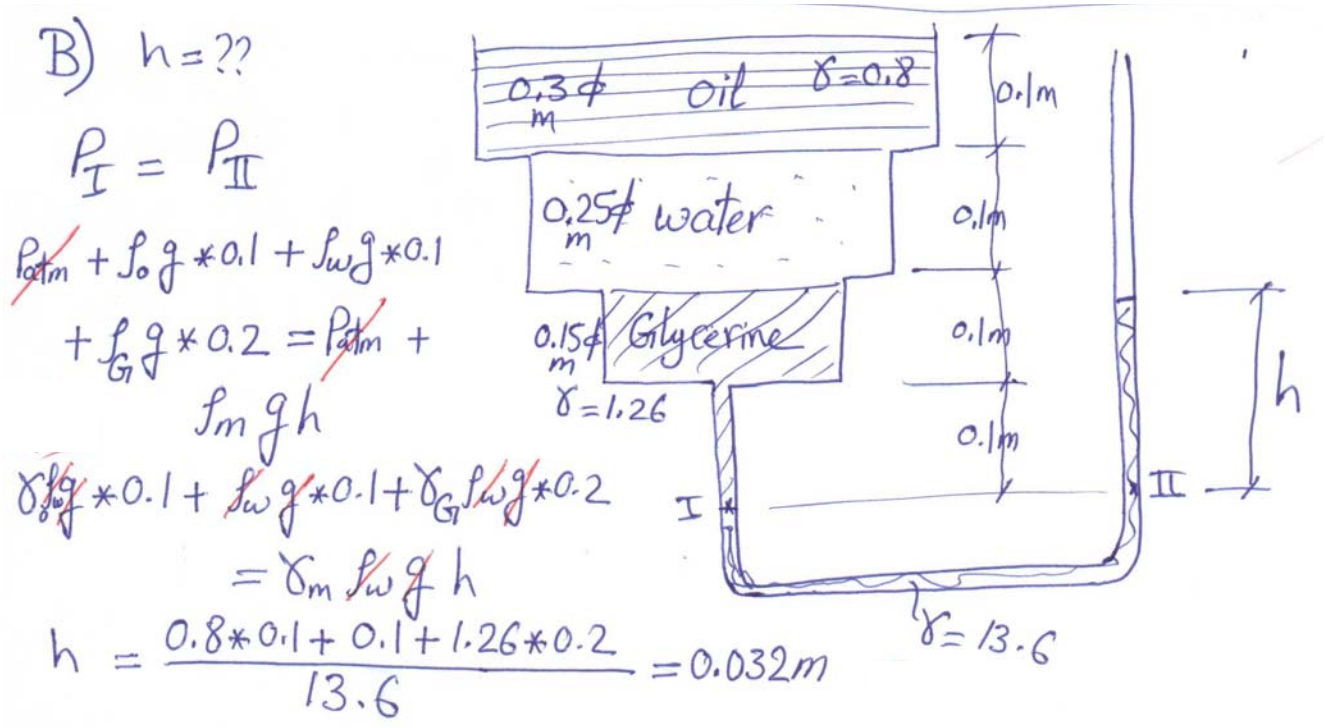
$$\mu = 7.124 * 10^{-4} \ Pa.s.$$

Question two (5 marks)

A) Prove that the pressure changes in the vertical direction.



B) A tank is constructed of a series of cylinders having diameters of 0.30, 0.25, and 0.15 m as shown in figure. The tank contains oil (sp.gr. = 0.8), water, and glycerin (sp.gr. = 1.26). A mercury manometer is attached to bottom. Calculate the manometer reading, h.



Good Luck 2/2

Dr. Rola Afify