College of Engineering & Technology

Department: Mechanical Engineering   Marks: 20
Lecturer: Dr. Rola Afify   Time: 11:30 – 12:10
Course Code: ME361   Date: 8/7/2015

Name: R. N.:

Answer the following questions:
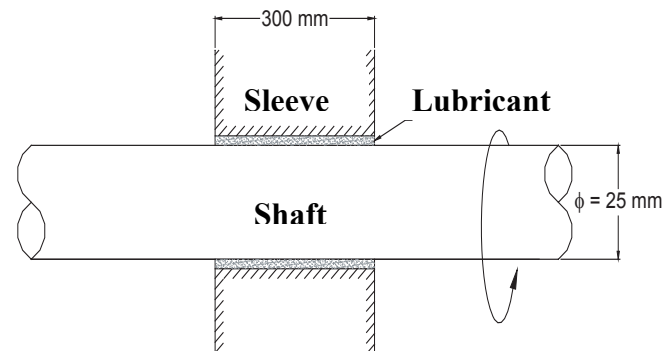**Question one (8 marks)**
A) Define:
- Specific weight:

- Vapor pressure of liquid:

- Viscosity:

B) A 25mm diameter shaft is rotated in a 26.2mm diameter 300mm long sleeve containing oil ($\mu = 0.44$ Pa.s) as shown in Figure. Estimate the torque required to rotate the shaft at a speed of 1800 rpm. Also, determine the power lost in viscous friction.

Question two (8 marks)
A) State the relation between absolute, atmospheric and gage pressure.

B) 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.
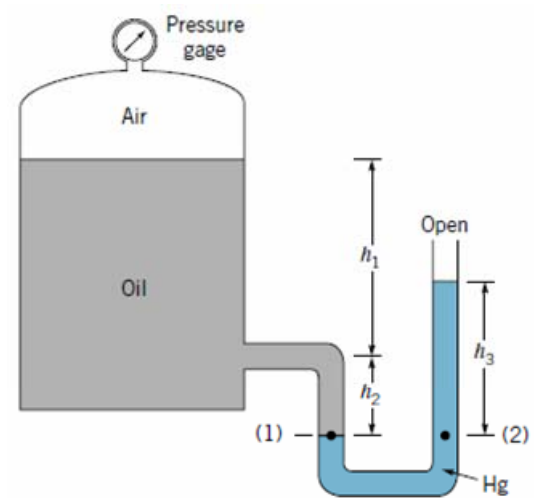
Question three (4 marks)

Water discharged from a large tank into atmosphere through a pipe 50 mm diameter and 45 m long which is sharp edge at entry, after which there is a sudden enlargement to a pipe of 75 mm diameter and 30 m long. The point of delivery is 6 m below the surface of water in the tank. Determine the discharge in m^3/sec. Assume f = 0.02 for both pipes.