**Answer the following questions:**

Question one (7 marks)
A) Define: Density, Bulk modulus of elasticity and viscosity.
B) Sketch the relation between viscosity and temperature for a certain fluid.

C) A 25 mm diameter shaft is pulled through a cylindrical bearing as shown in Figure. The lubricant that fills the 0.3 mm gap between the shaft and bearing is oil having a kinematic viscosity of 8×10^{-4} m^2/s and a specific gravity of 0.91. Determine the force P required to pull the shaft at a velocity of 3 m/s. Assume the velocity distribution in the gap is linear.
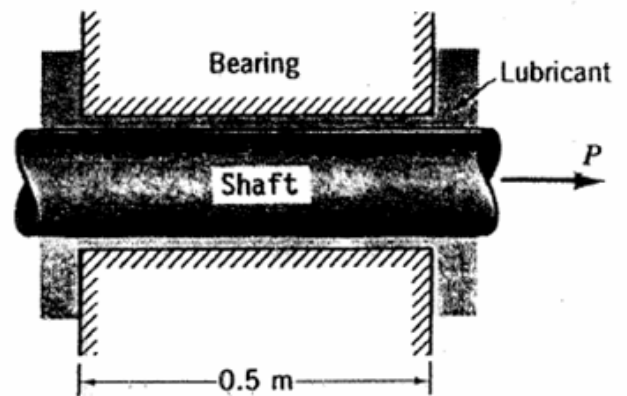
Question two (7 marks)
A) State the relation between absolute, atmospheric and gage pressure.
B) Differentiate between Piezometer and U-tube with one leg enlarged.

C) A manometer is connected between two pipelines, A and B shown in figure. What is the pressure difference between A and B expressed as meters of water?
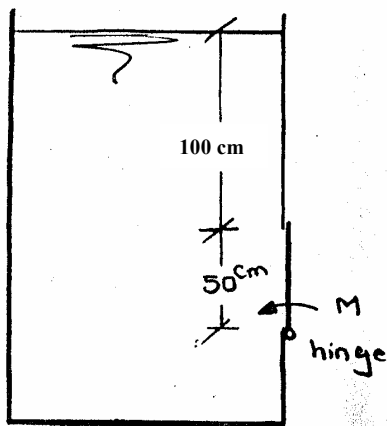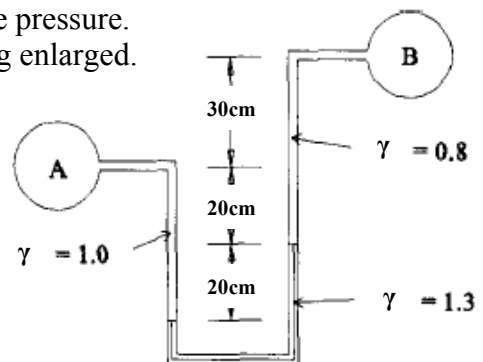
Question three (6 marks)
A tank contains oil of sp. gr. 0.9 and has a rectangular hole in one of its vertical sides. The hole is 50 cm high and 70 cm wide and is covered from the outside with a plate hinged at the lower horizontal edge of the hole as shown in Fig. Find the required moment 'M' to keep the hole closed.

Good Luck   1/1
Dr. Rola Afify and committee