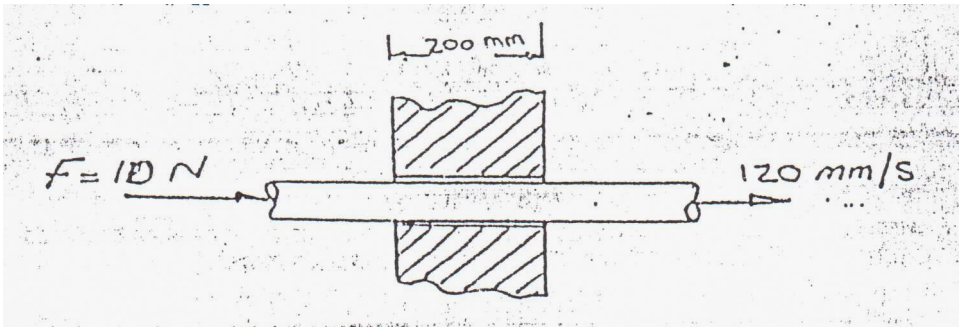
	Alexandria Higher Institute of Engineering & Technology (AIET)		
	Industrial Department		2nd Year
	ME251	Fluid Mechanics	Final, Jan., 9, 2012
	Examiners:	Dr. Rola Afify and committee	Time: 3 hours

Answer the following questions:

Question one (15 marks)

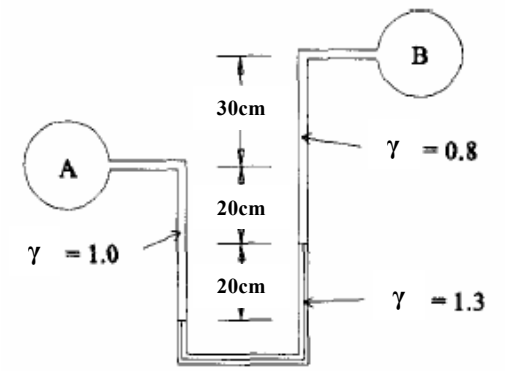
a) Define: Viscosity - Bulk modulus of elasticity.
b) Sketch the relation between viscosity and temperature for a certain fluid.
c) A 75 mm diameter shaft slides at 120 mm/s through a 200 mm long sleeve with a radial clearance of 0.075 mm as shown in figure. When a 10 N force is applied, determine the viscosity of fluid between the shaft and sleeve



Question two (15 marks)

a) Mention with full details the relation between absolute, atmosphere and gauge pressure.
b) Prove that the pressure is constant in the same horizontal level.

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?



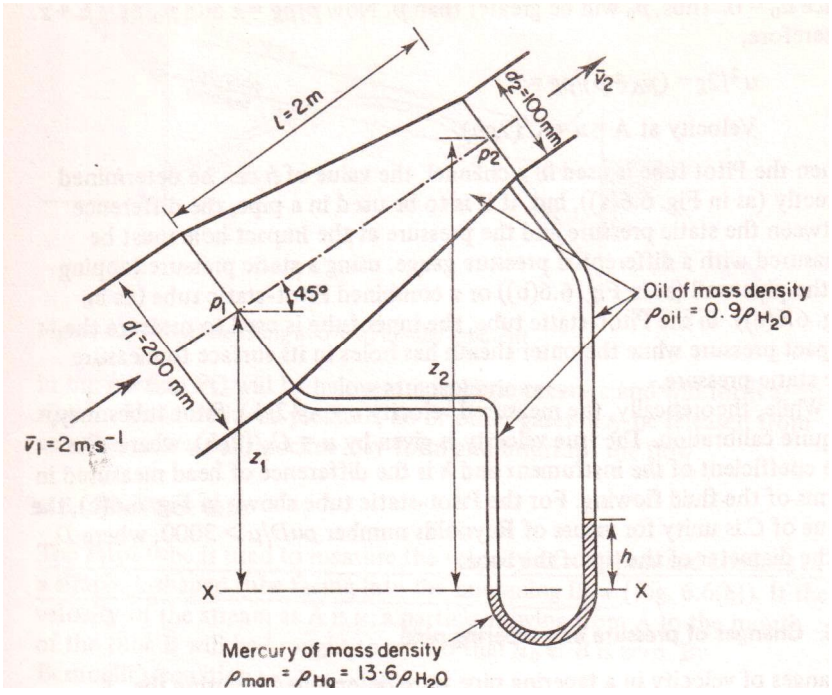
d) Sketch a hydraulic jack and write down the relation between force exerted on lever and weight to be lifted.

Question three (15 marks)

a) State whether the following statements are true or false? For wrong statement, write down the correct one.

i. The flow is always from the point of higher pressure to the point of lower pressure.
ii. The only energy loss for a flow in a pipe is friction loss.
iii. In laminar flow, the fluid moves in parallel layers.
iv. For a viscous flow in a small diameter pipe, the flow expected to be turbulent.
v. Hydraulic Gradient (H.G.) is parallel to Total Energy Line (T.E.L) if the area of pipe is constant.
vi. The actual discharge equation for venturi and orifice meter is $Q_{act} = C_d A_1 \sqrt{\frac{2gh((\rho_{man}/\rho)-1)}{(A_1/A_2)^2 - 1}}$, as $C_{dv} = 0.65$ for venturi meter and $C_{do} = 0.97$ for orifice meter.

b) A pipe inclined at 45° to horizontal converges over a length *l* of 2m from diameter d_1 of 200 mm to a diameter d_2 of 100 mm at the upper end. Oil of relative density 0.9 flows through the pipe at a mean velocity v_1 at the lower end of 2 m/s. Find the pressure difference across the 2m length ignoring any loss of energy and the difference in the level that would be shown on mercury manometer connected across this length. The relative density of mercury is 13.6 and the leads to the manometer are filled with oil. Also, Draw T.E.L. and H.G.



Question Four (15 marks)

a) Compare between Piston pump and Gear pump.
b) How to avoid cavitation in the installed pumps?