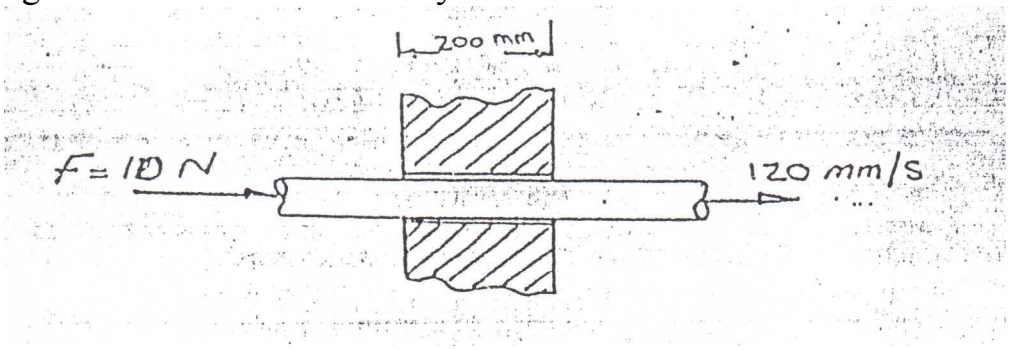
	Alexandria Higher Institute of Engineering & Technology (AIET)		
	Industrial Department		2nd Year
	ME251	Fluid Mechanics	Final, Dec., 30, 2012
	Examiners:	Dr. Rola Afify and committee	Time: 3 hours

Answer the following questions:

Question one (12 marks)

a) Define: Viscosity – Vapour pressure of liquids.

b) A 75 mm diameter shaft slides at 120 mm/s through 200 mm long sleeve with radial clearance of 0.075 mm when a 10 N force is applied, as shown in figure. Determine the viscosity of fluid between the shaft and sleeve.



Question two (12 marks)

a) Illustrate, using neat sketches, the hydraulic jack.

b) A rectangular tank (3 m long, 2 m wide, and 2.5 m high) contains oil of specific gravity $\gamma = 0.9$. Calculate the magnitude, direction, and line of action of the pressure force on the following:
   i. The sides of the tank.
   ii. The tank's bottom.

Question three (12 marks)

a) Compare, using neat sketches, between:
   i. Ideal and real flow.
   ii. Steady and unsteady flow.

b) 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.

Question Four (12 marks)

a) Explain why all pumps are usually installed near suction tank and in the lowest possible position with respect to suction level.

b) Calculate the volumetric and mechanical efficiencies of gear pump rotating at 1200 rpm and discharging 1.27 lit/sec using 0.7 hp. The gear is 6cm diameter and 4 cm thick. Suction pressure is 0.2 bar, delivery pressure is 2.3 bar when one gear was put in a vessel full of water 80 cm^3 of the water was split.

Question Five (12 marks)

For the hydraulic circuit shown in figure:-

a) Write the name of each component.

b) What will happen to (6) when:-

i- the left solenoid in (5) is activated (draw the circuit).

ii- the right solenoid in (5) is activated (use different pen in the previous drawing).