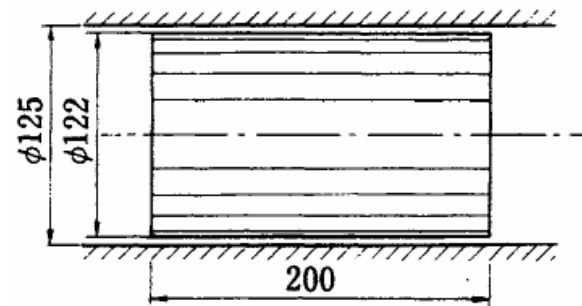
	Alexandria Higher Institute of Engineering & Technology (AIET)		
	Mechatronic Department		3 rd Year
	EME312	Fluid Mechanics	Final, June, 14, 2014
	Examiners:	Dr. Rola Afify and Dr. Mohamed Zena	Time: 3 hours

Answer the following questions:

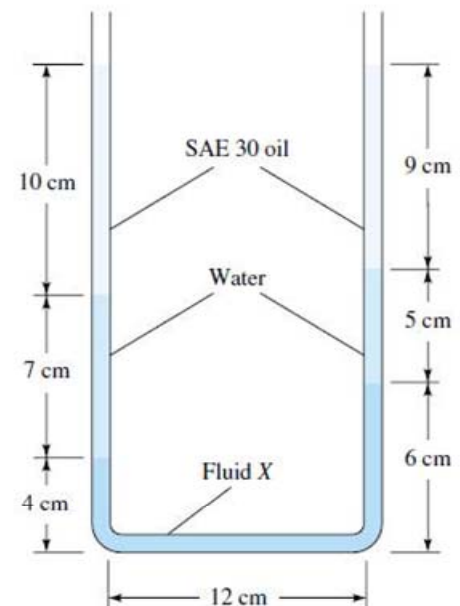
Question one (12 marks)

- a) Discuss the relation between:
- Viscosity and Temperature for a certain fluid.
 - Absolute, Atmospheric and gauge pressure.
- b) A cylinder of diameter 122 mm and length 200 mm, shown in figure, is placed inside a concentric long pipe of diameter 125 mm. An oil film is introduced in the gap between the pipe and the cylinder. What force is necessary to move the cylinder at a velocity of 1 m/s? Assume that the dynamic viscosity of oil is 0.728 Pa.s and the specific gravity is 0.9.



Question two (12 marks)

- a) Differentiate between:-
1. U-tube and Inverted U-tube manometers.
 2. Piezometer tube and U-tube with one leg enlarged.
- b) A diver is working at a depth of 18 m under sea water surface; calculate the pressure at this depth in gauge and absolute values if the specific gravity of sea water is 1.02.
- c) In Figure, both ends of the manometer are open to the atmosphere. If the specific gravity of SAE 30 oil is 0.85 estimate the specific gravity of fluid X.



Question three (12 marks)

- a) Differentiate between:-
- i. Ideal and Real flow.
 - ii. Uniform flow and Non-Uniform flow
 - iii. Venturi and Orifice meters.
 - iv. Friction and Eddy Losses.

- b) A horizontal water pipeline ABC transmits 40 lit/s between two tanks. The pipe material is commercial steel, the part AB is 15 cm diameter and 200 m long and the part BC is 18 cm diameter and 300 m long. Calculate the difference in water levels between the two tanks. All changes in pipe diameter are sudden. Take $\mu = 0.001 \text{ N.s/m}^2$.

Question Four (12 marks)

- a) Compare between Piston and Diaphragm pumps.
- b) Calculate the volumetric and mechanical efficiencies of gear pump rotating at 1200 rpm and discharging 1.27 lit/sec using 0.7 hp electric motor. The gear is 6 cm diameter and 4 cm thick. The pump is working against head 21.41 m of water, area between teeth equals 1.655 cm^2 and each gear has five teeth.

Question Five (12 marks)

- a) Describe, with neat sketches, Axial flow Pump.
- b) Explain how to discover cavitation in the installed pumps.
- c) A centrifugal pump has the following performance:

Q (m ³ /hr)	0	15	30	45	60	75
hm (m)	75	72	65	53	38	19
η (%)	0	43	69	73	65	49

When this pump is used in a system where the difference between delivery and suction levels (h_{st}) is 42 m, it gives a discharge of $47 \text{ m}^3/\text{hr}$. Calculate the discharge and shaft power of the pump when (h_{st}) decreases to 35 m.