	Alexandria Higher Institute of Engineering & Technology (AIET)		
	Industrial Department		2nd Year
	ME251	Fluid Mechanics	End-of-Semester-3 Exam., August, 28, 2011
	Examiners:	Dr. Rola Afify and committee	Time: 3 hours

Answer the following questions:

Question one (10 marks)

a) Define the following:-

i. Specific mass.

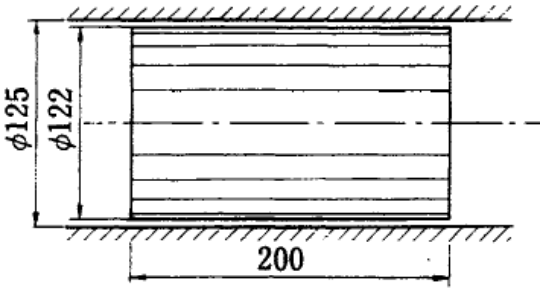
ii. Specific gravity.

iii. Bulk Modulus of Elasticity.

b) A soup bubble 62.5 mm diameter has an internal pressure in excess of the outside of 20 N/m^2. What is surface tension in the soap film?

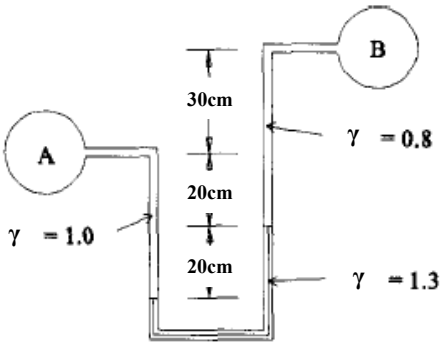
Question two (10 marks)

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 gab 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 three (10 marks)

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 Four (10 marks)

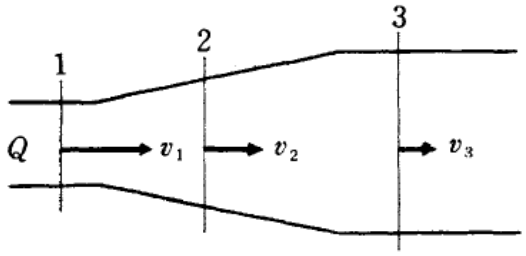
A rectangular tank (3 m long, 2 m wide, and 2.5 m high) contains oil of specific gravity $\gamma = 0.9$. Calculate the magnitude, direction, and line of action of the pressure force on the following:

i. The sides of the tank.

ii. The tank's bottom.

Question Five (10 marks)

Water is flowing in the conduit shown in figure. If the flow rate Q is 8 lit/s and the diameters d_1, d_2 and d_3 at sections 1, 2 and 3 are 50, 60 and 100 mm respectively, find the flow velocities v_1, v_2 and v_3. If the pressure P_1 at section 1 is 24.5 kPa, what is the pressure P_3 at sections 3? (Neglect losses).



Question Six (10 marks)

In order to predict the performance of a large centrifugal pump, a scale model of $\left(\frac{1}{6}\right)$ of size was made with the following specifications: Power P = 35 kW, Head h_{man} = 7 m, speed N = 1000 rpm. If the prototype has to work against a head of 22 m, calculate its working speed, the power required to drive it and the ratio of the flow rates handled by the two pumps.