	Alexandria Higher Institute of Engineering & Technology (AIET)	
	Mechatronic Department	3rd Year
	EME312 Fluid Mechanics	Final, June, 2, 2012
	Examiners: Dr. Rola Afify and committee	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 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) 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 two (12 marks)

a) Compare between Piezometer tube and U-tube with one leg enlarged.

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 and sketch TEL and HG for the pipe. All changes in pipe diameter are sudden. Take $\mu = 0.001$ N.s/m^2.

Question three (12 marks)

a) Compare between Diaphram pump and Parallel cylinder pump.

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 Four (12 marks)

a) Explain how to avoid cavitation for positive displacement pump.

b) A centrifugal pump has the following performance:

Q (m³/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 m³/hr.
- Calculate the discharge and shaft power of the pump when (h_{st}) decreases to 35 m.

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).