



COLLEGE OF ENGINEERING & TECHNOLOGY

Department: Mechanical Engineering

Lecturer : Dr. Rola Afify

Course : Fluid Mechanics I.

Course No : ME 361

Marks : 40

Date : 3 - 8 - 2013

Time: 2 hours

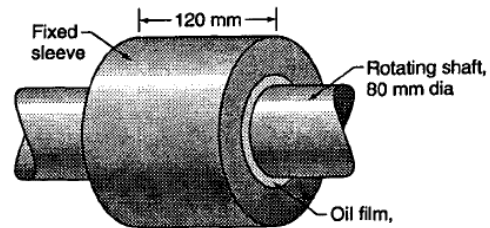
FINAL Examination Paper

Answer the following questions:

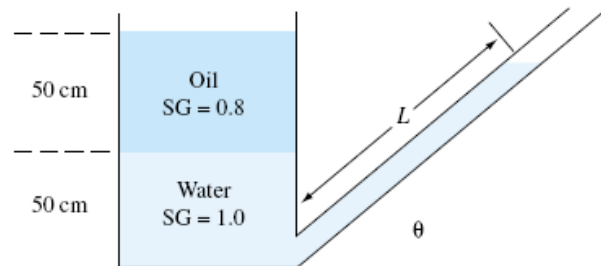
Question No. 1. [10 marks]

a) The pressure of 1 m^3 of a fluid is increased 10 to 20 bar at a constant temperature, calculate the final volume of water ($k = 2 \times 10^9 \text{ N/m}^2$). [3M]

b) A journal bearing consists of an 80mm diameter shaft in an 80.4mm diameter and a 120mm long sleeve, the clearance space is assumed to be uniform and is filled with oil having an absolute viscosity of 0.11 N.s/m^2 . Calculate the needed power to overcome viscosity when the shaft turns at 150 rpm. [4M]



c) Both the tank and the tube are opened to atmosphere. If $L = 2.13 \text{ m}$, what is the angle of tilt θ of the tube? [3M]



Question No. 2. [10 marks]

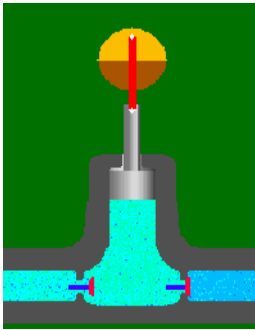
a) State the scientific expression of the following:- [5M]

- Weight per unit volume
- It is a substance which deforms continuously under the action of shearing forces.
- It is the pressure at which a liquid start to boil at working temperature.
- The fluid property that is measured by m^2/s .
- It means frictionless flow, no energy is lost, and viscosity is considered Zero.

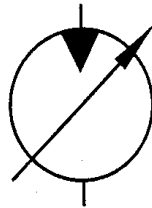
b) Two reservoirs are connected by a pipeline which is 150 mm diameter for the first 6 m and 225 mm diameter for the remaining 15 m. The entrance and exit are sharp and the change of section is sudden. The water surface in the upper reservoir is 6 m above that in the lower. Each pipe contains a bend ($k = 0.8$), take $f = 0.03$ for the 150 mm pipe and $f = 0.02$ for the 225 mm pipe. Calculate the discharge. [5M]

Question No. 3. [10 marks]

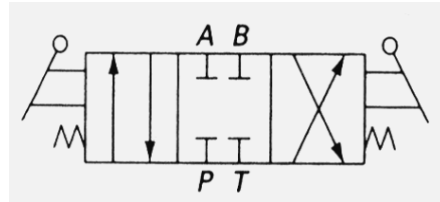
a) Write down the words that represent each of the following: [5M]



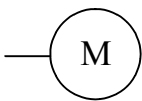
(i)



(ii)



(iii)



(iv)



(v)

b) Write the functions of:-

- i. Oil tank. [2M]
- ii. Valves. [2M]
- iii. Piping. [1M]

Question No. 4. [10 marks]

a) Draw a complete hydraulic circuit used to move a cylinder forward and backward with a controllable velocity. This circuit contains:- [7M]

- i. Vented reservoir with line under oil surface.
- ii. Single variable displacement hydraulic pump.
- iii. Electric motor.
- iv. Filter.
- v. Check valve.
- vi. Relief valve.
- vii. Directional control valve two envelopes four ways using solenoid actuated.
- viii. Variable flow control valve.
- ix. Differential double acting cylinder.

b) Mention how the previous hydraulic circuit works. [3M]

Exam committee

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Course coordinator	Prof. Ahmed Hanafy	
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