



COLLEGE OF ENGINEERING & TECHNOLOGY

Department : Mechanical Engineering

Lecturer : Prof. Kamal Abd-El Aziz & Dr. Rola Samir & Dr. Ahmed Khalifa Mehanna

Course : Hydraulics

Course No. : ME 362

Marks : 40

Date : 02/06/2016

Time : 14:00 – 16:00

FINAL Examination Paper

Answer the following questions:-

1. a. Explain clearly with a net sketch the Piezometer tube. [3 Marks]
- b. The air pressure in the sealed tanks are (-22 cm Hg) column and 20 kN/m^2 in the left and right tanks respectively, as shown in Figure 1. Determine the elevation of the manometer liquid in the right hand column at A. [7 Marks]

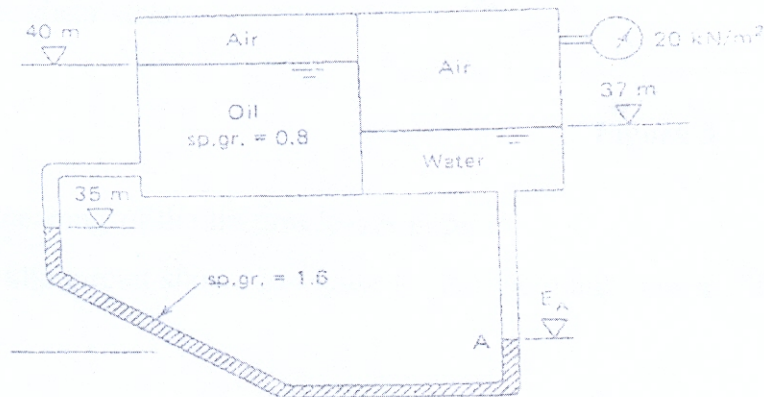


Figure 1

2. Two square gates close two openings in a conduit connected to an open tank of water as shown in Figure 2. When the water depth, h , reaches 5 m it is desired that both gates open at the same time. Determine the weight of the homogeneous horizontal gate and the horizontal force, R , acting on the vertical gate that is required to keep the gates closed until this depth is reached. The weight of the vertical gate is negligible, and both gates are hinged at one end as shown. Friction in the hinges is negligible. [10 Marks]

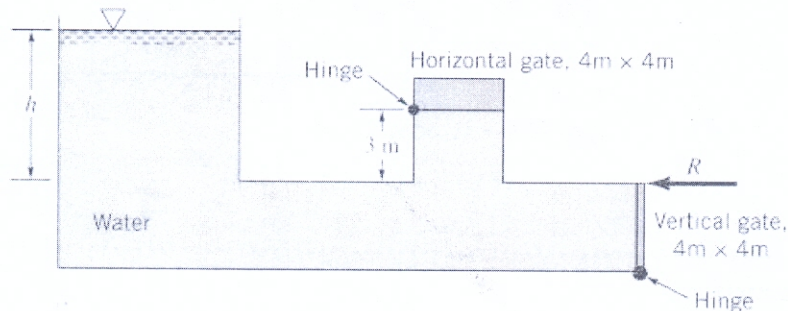


Figure 2

3. a. Explain what is the meaning by the following terms:

[4 Marks]

- i. Hydraulics.
- ii. Specific gravity of a fluid.
- iii. Specific weight of a fluid.
- iv. Viscosity.

b. A 10 kg block slides down a smooth inclined surface as shown in Figure 3 with a velocity 0.22 m/s. The gap between the block and the surface is 0.1 mm. Assume the velocity distribution in the gap is linear and the area of the block in contact with oil is 0.2 m^2 . The kinematic viscosity of the oil is $4.2 \times 10^{-4} \text{ m}^2/\text{s}$. Find for oil: [6 Marks]

- i. The mass density.
- ii. The specific gravity.
- iii. The specific weight.
- iv. The shear stress.

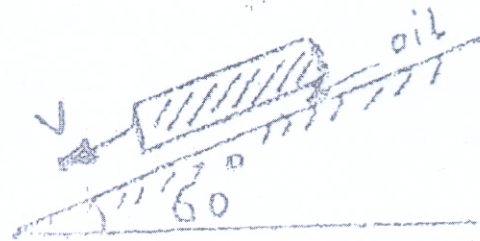


Figure 3

4. a. what is the meaning of the friction losses in pipes. [2 Marks]

b. In the hydraulic circuit shown in Figure 4, find the pump power if the pump head is 55 m water. [8 Marks]

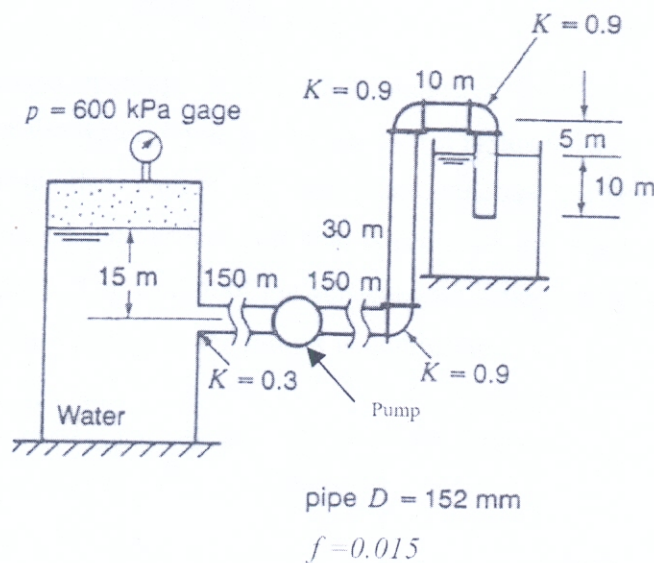


Figure 4

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With best wishes