COLLEGE OF ENGINEERING & TECHNOLOGY

Department: Mechanical Engineering

Lecturer : **Dr. Rola Afify**

Course : **Fluid Mechanics** I.

Course No .: **ME 361**   **Marks** : **40**.

**Date** : **4 - 8 - 2015**   **Time: 2 hours**

# FINAL Examination Paper

Answer the following questions:

Question No. 1. [10 marks]

a) A 25 mm diameter shaft is pulled through a cylindrical bearing as shown in Figure. The lubricant that fills the 0.3 mm gap between the shaft and bearing is oil having a kinematic viscosity of 8×10^{-4} m²/s and a specific gravity of 0.91. Determine the force P required to pull the shaft at a velocity of 3 m/s. Assume the velocity distribution in the gap is linear. [4M]
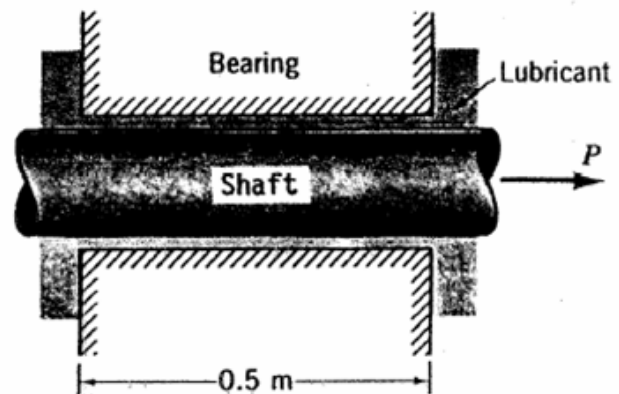
b) A diver is working at a depth of 18 m under sea water surface; calculate the pressure at this depth in gauge and absolute values if the specific gravity of sea water is 1.02. [2M]

b) In Figure, pipe (A) contains gasoline (sp. gr. = 0.7), pipe (B) contains oil (sp. gr. = 0.9), and the manometer fluid is mercury (sp. gr. = 13.6). Determine the pressure difference between A and B. [4M]
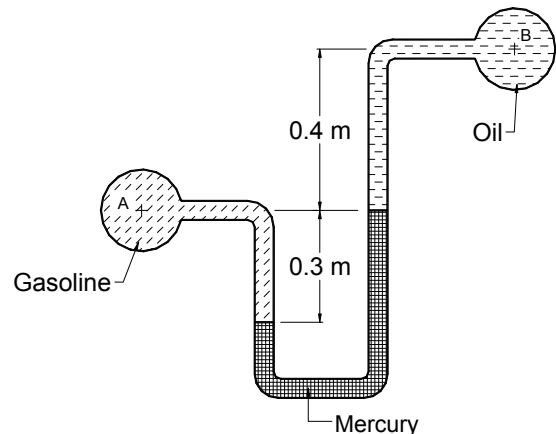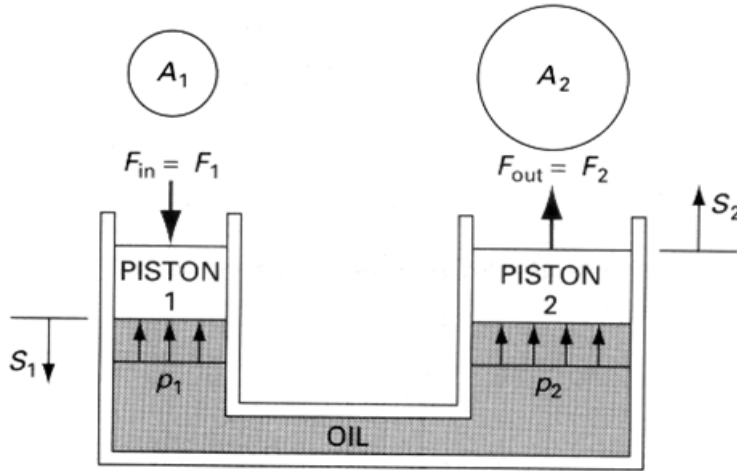

Question No. 2. [10 marks]

a) State whether the following statements are true or false? For wrong statement, write down the correct one. [4M]
  I.   The flow is always from the point of higher pressure to the point of lower pressure.
 II.   The only energy loss for a flow in a pipe is friction loss.
III.   In laminar flow, the fluid moves in parallel layers.
 IV.   For a viscous flow in a small diameter pipe, the flow expected to be turbulent.

b) Water discharged from a large tank into atmosphere through a pipe 50 mm diameter and 45 m long which is sharp edge at entry, after which there is a sudden enlargement to a pipe of 75 mm diameter and 30 m long. The point of delivery is 6 m below the surface of water in the tank. Determine the discharge in m³/sec. Assume f = 0.02 for both pipes. [6M]

Question No. 3. [10 marks]

a) For the Hydraulic jack shown in Figure, the following data are gives:-

$A_1 = 25cm^2$, $A_2 = 100cm^2$, $F_1 = 200N$, and $S_1 = 5cm$.

Determine: F_2 and S_2. [5M]

b) A gear pump has a 75mm outside diameter, a 50 mm inside diameter, and a 25mm width. If the volumetric efficiency is 90% at rated pressure, what is the corresponding actual flow rate? The pump speed is 1000 rpm. [5M]
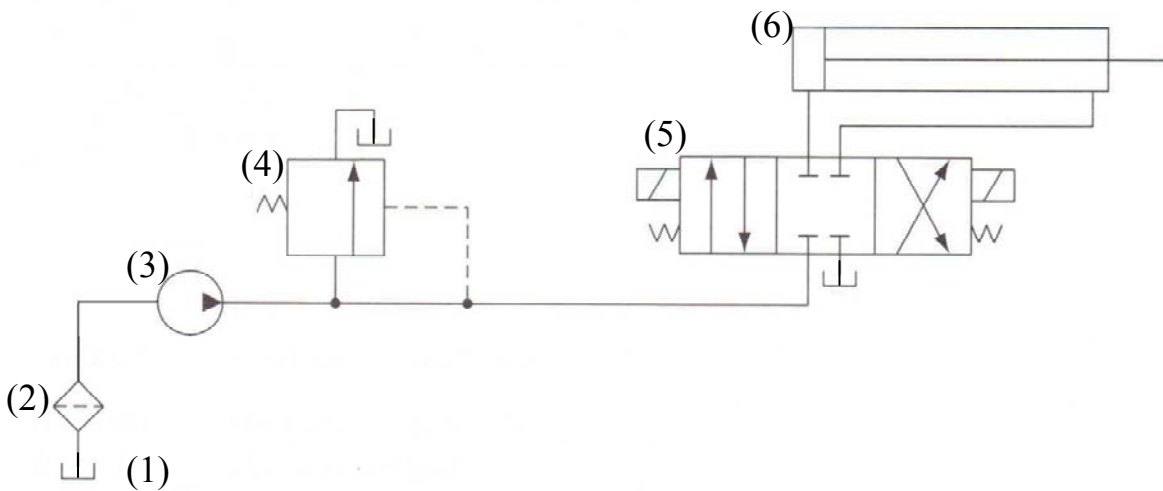
Question No. 4. [10 marks]

For the hydraulic circuit shown in figure:-
a) Write the name of each component and its function. [6M]
b) What will happen to (6) when:-
    i- the left solenoid in (5) is activated. [2M]
    ii- the right solenoid in (5) is activated. [2M]

Exam committee

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