- **Solve all questions and assume any missing data**
- **Assume that water density and viscosity equal 1000kg/m^3, and 0.001 pa.s, respectively.**

Problem No (1) (14 points):

As shown in **Fig. (1),** a plate **0.5mm** thick is moving vertically downward under its own weight between two parallel plates filled with oil in between. The plate area is **1m^2**.The oil has viscosity of **0.15 kg/m.s**. The plate moves with uniform velocity of **0.4 m/s** at **equal** distances **(*h*)** from each of the fixed plates. The fixed plates are **2.5mm** apart. Evaluate the **weight** of the plate.

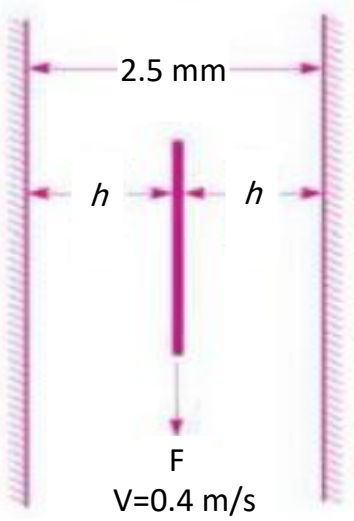

Fig. (1)

Problem No (2) (12 points):

An open tank is filled with water to the depth indicated as shown in **Fig. (2)**. Atmospheric pressure acts on all outer surfaces of the tank. Determine the **magnitude** and **line of action** of the **horizontal** and **vertical** components of the force of the water on the **cylindrical** part of the tank bottom.

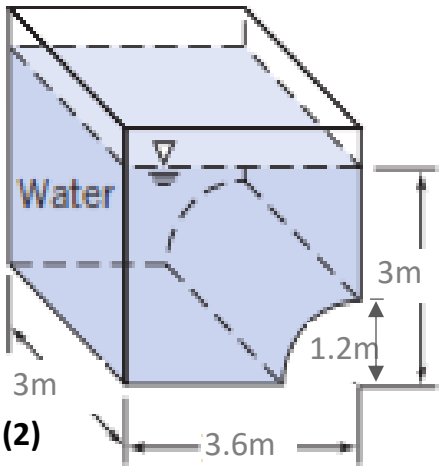

Fig. (2)

Problem No (3) (12 Points):

For the system shown in **Fig. (3). Neglect** all losses and **find** the value of the **depth *H*** and the **pressure reading *P*** if ***h= 18cm***. Draw the ***T.E.L.*** and ***H.G.L.*** for the system.

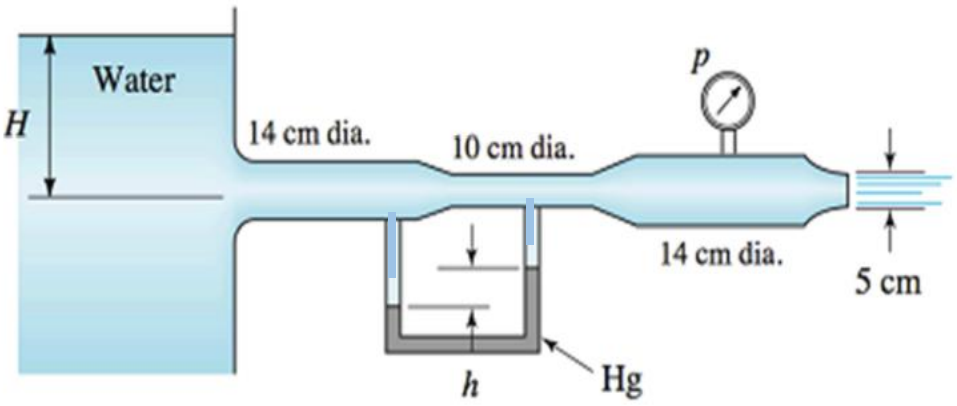

Fig. (3)

Problem No (4) (12 Points):

The circular dish shown in **Fig. (4)**, has an outside **diameter** of **0.15 m**. A water jet strikes the dish concentrically and then flows outward along the **frictionless** surface of the dish. The jet **speed** is **45 m/s** and the dish **moves** to the left at **10 m/s**. **Neglecting** the gravitational effect of water on the dish, **find** the **horizontal force** required to maintain dish motion, and **find** the **thickness** of the jet sheet at radius of **75mm**.

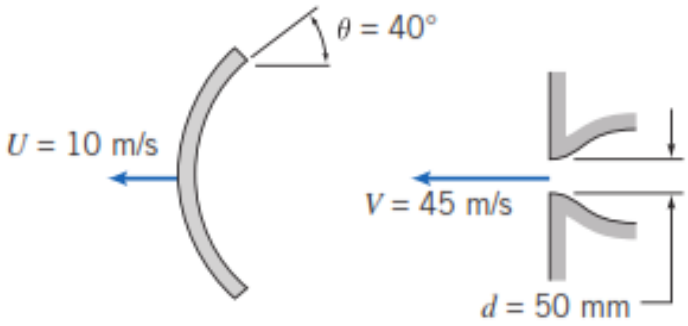

Fig. (4)

Good Luck