

sheet #1: FLUID PROPERTIES

1 - Define the following physical quantities and write down its dimensions in (SI) units :

- a) Specific gravity.
- b) Specific weight.
- c) Density.
- d) Bulk modulus of elasticity.

2 - The density of a substance is 800 kg/m^3 . What is its :

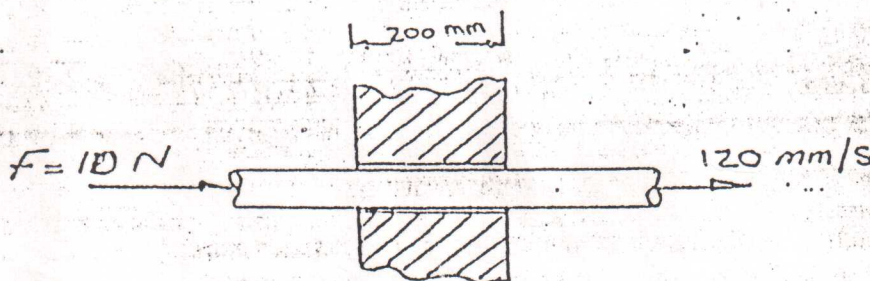
- a) Specific gravity.
- b) Specific weight.
- c) Specific volume.

3 - If the pressure of a fluid increases from 1 bar to 100 bars at constant temperature. Find the corresponding change in fluid volume if :

- a) The fluid is gas.
- b) The fluid is liquid ($k = 21000 \times 10^5 \text{ N/m}^2$).

4 - The space between two large flats and parallel walls 25 mm apart is filled with a liquid of absolute viscosity 0.7 Pa.s . Within this space a thin flat plate, 250 mm x 250 mm is moved at velocity 150 mm/s at distance of 6 mm from one wall, the plate and its movement being parallel to the walls. Assuming linear variation of velocity between the plate and the walls, determine the force exerted by the liquid on the plate.

5 - A 75 mm diameter shaft slides at 120 mm/s through a 200 mm long sleeve with radial clearance of 0.075 mm as shown in figure. When a 10 N force is applied. Determine the viscosity of fluid between the shaft and sleeve:



- 6 - The shaft turning inside a stationary journal as shown, with a rotating speed 20 rps the torque is 0.0036 N.m . Estimate the viscosity of oil .

