

**KLS Gogte Institute of Technology**  
**Department of Civil Engineering**  
**INTERNAL ASSESSMENT TEST – I**

**Subject: Fluid Mechanics**

**Semester: III**

**Max. Marks: 25**

**Div: C**

**Subject Code: 16CV32**

**Test Date: 16/10/2018**

**Duration: 01hour**

**Instructions: Q.1 is compulsory. Answer any two from Q.2, 3 and 4.**

Q1. Prove that the rate of increase of pressure in a vertically downward direction must be equal to the specific weight of the fluid at that point. ( Level[ 3 ], CO[ 1 ], PO[ 1 ] )	05 M
Q2. The dynamic viscosity of an oil, used for lubrication between a shaft and sleeve is 6 poise. The shaft is of diameter 0.4 m and rotates at 190 r.p.m. Calculate the power lost in the bearing for a sleeve length of 90 mm. The thickness of the oil film is 1.5 mm. ( Level[ 3 ], CO[ 1 ], PO[1,5 ] )	10 M
Q3. An inverted U-tube manometer is connected between horizontal pipes A and B. In pipe A $\text{CCl}_4$ of specific gravity 1.6 is flowing and in pipe B, water is flowing. The vertical distance between centerlines of pipe A and B is 30cms. When oil of specific gravity 0.8 is used as gauge liquid, the vertical height of respective liquid column measured from the centerline of pipes is same and equal to 40cms. Pipe A is lying below pipe B. Determine the difference of pressure between the pipe A and B. ( Level[ 3 ], CO[ 1 ], PO[1,5 ] )	10 M
Q.4 Define and give the formula for a) Specific Gravity b) Viscosity c) Mass Density d) Specific weight ( Level[ 1 ], CO[ 1 ], PO[ 1 ] )	10 M

Max. Marks: 05

Quiz Test I

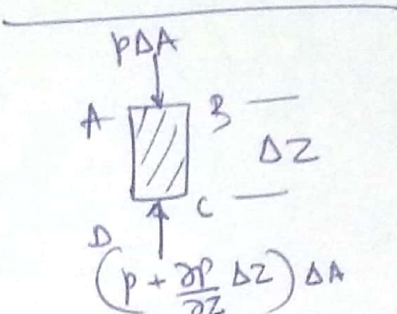
Duration: 15 min

All are compulsory

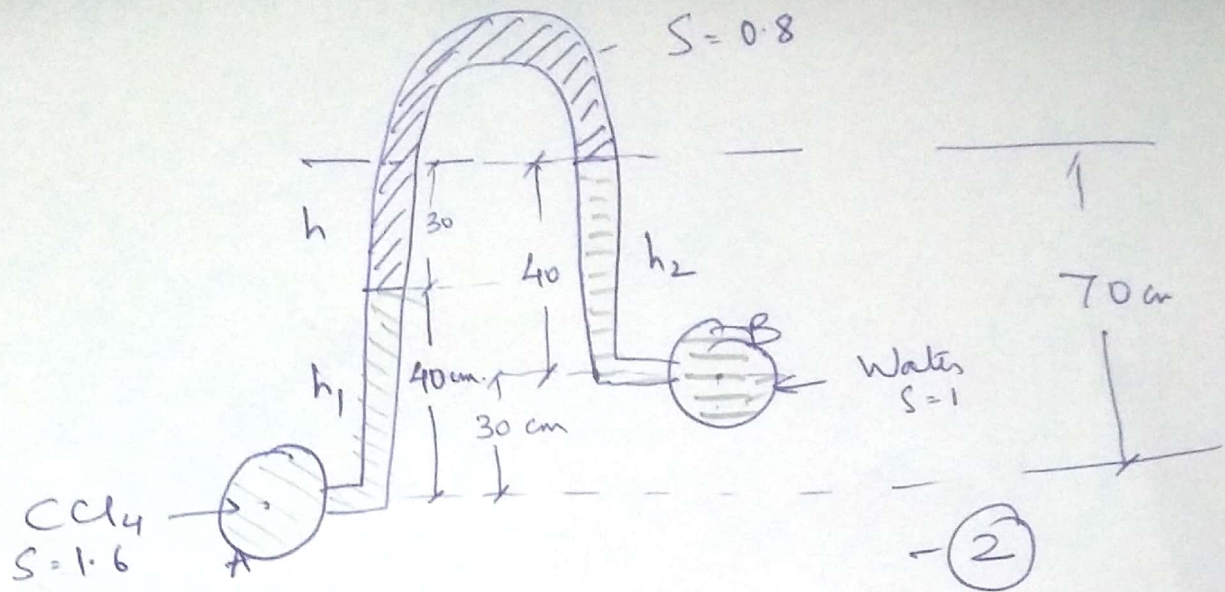
1. The viscosity of liquids D with increase in temperature
2. What is the mass density of a liquid having a volume of  $6\text{m}^3$  and weight of 44 kN  $747 \text{ kg/m}^3$
3. The point of application of the total pressure on the surface is called as Cd Pmm
4. Determine the specific gravity of a fluid having viscosity 0.05 poise and kinematic viscosity 0.035 stokes 1.428
5. Non-Newton type of real fluid in which shear stress is not proportional to rate of shear strain.
6. Find the surface tension in a soap bubble of 40mm diameter when the inside pressure is  $2.5 \text{ N/m}^2$  above atmospheric pressure.  $0.0125 \text{ N/m}$
7. If atmospheric pressure and gauge pressure are equal to  $100062 \text{ N/m}^2$  and  $45028 \text{ N/m}^2$  then Absolute pressure is equal to  $145090 \text{ N/m}^2$
8. The capillary rise in the glass tube is 0.2mm of water. Determine its diameter when surface tension for water in contact with air is  $0.0725 \text{ N/m}$   $0.148 \text{ m}$
9. Manometer Device is used for measuring the pressure
10. Pressure below atmospheric pressure is called as Vacuum



Subject: FM  
Date: 16/10/2018

Sl. No.	Answer	Marks
1.	<p>Figure</p>  $p \Delta A - \left(p + \frac{\partial p}{\partial z} \Delta z\right) \Delta A + \rho g (\Delta A \times \Delta z) = 0$ $\frac{\partial p}{\partial z} = \rho g = \omega$	<p>(2)</p> <p>(5)</p> <p>(3)</p>
2.	<p><math>\mu = 6 \text{ poise} = \frac{6}{10} \frac{\text{N-s}}{\text{m}^2} = 0.6</math> — (1)</p> <p>Tangential Vel = <math>u = \frac{\pi D N}{60} = 3.98 \text{ m/s}</math> — (1)</p> <p><math>\tau = \mu \frac{du}{dy} = 10 \times \frac{3.98}{1.5 \times 10^{-3}} = 1592 \text{ N/m}^2</math> — (2)</p> <p>Shear Force = <math>\tau \times A = \tau \times \pi D L = 180.05</math> — (2)</p> <p>Torque = Force <math>\times \frac{D}{2} = 36.01 \text{ N-m}</math> — (2)</p> <p>Power lost = <math>\frac{\text{Force} \times \text{displ}}{\text{Time}} = F \times u = 716.48 \text{ W}</math> — (2)</p>	<p>(1)</p> <p>(1)</p> <p>(2)</p> <p>(2)</p> <p>(2)</p> <p>(2)</p>

3.



$$\rho_1 = 1600$$

$$\rho_2 = 800$$

$$\rho_3 = 1000$$

$$\text{kg/m}^3$$

$$L.L. = R.L.$$

$$p_A - \rho_1 g h_1 - \rho_2 g h = p_B = \rho_1 g h_2 \quad (3)$$

$$p_A - p_B = 4708.8 \text{ N/m}^2 \quad (3) \quad \boxed{10}$$

Q4.

$$\text{Dyr \& Formula} = 2.5 \text{ each} \\ \times 4$$

$$(10)$$