

Indian Institute of Technology B. Management, Lucknow
B. Tech. Second Year (Third Semester) 2018-19
 Department of Civil Engineering

FLUID MECHANICS-BCR-06
Assignment-1 (Cell-2)

ATTEMPT ALL QUESTIONS:-

- Define the following fluid properties-
 a) Density, b) weight-density and c) specific gravity of fluid.
- What is the difference between dynamic viscosity and kinematic viscosity? State their units of measurement.
- Define surface tension. Prove the relationship between surface tension and pressure inside the droplet of liquid in excess of outside pressure is given by $p = 2\sigma/r$.
- The dynamic viscosity of an oil, used for lubrication between a shaft and sleeve is 6 poise. The shaft is of diameter 5 cm and rotates at 1900rpm. Calculate the power lost in the bearing for a sleeve length of 90mm, the thickness of the oil film is 1.5mm.
- Viscosity of a liquid having kinematic viscosity 6 Stokes and specific gravity 1.5.
- The following cases represent the two velocity components, determine the third component of velocity such that they satisfy the continuity equation.

$$u = x^2y^2 + yz^2, \quad v = xy^2 - yz^2 + yz.$$

- Determine the velocity and acceleration of a particle at position $x=1, y=2, z=5$, at $t=0.1$ sec in velocity field prescribed by: $V = (4x^2y - 2xy^2z) + (100t)k$.
- 250 litres of water is flowing in a pipe having diameter of 50mm. If the pipe bend by 135° . Find out magnitude and direction of resultant force on bend. The pressure of water flowing in the pipe is 80NPa.
- Two horizontal plates are placed 11.5mm apart the space between them being filled with oil of viscosity 14 poise. Calculate the shear stress in the oil if upper plate moves with a velocity of 1.5m/s.
- A line of crude oil weighs 5.6 N, calculate its specific weight, density and specific gravity.

****Note: Assignment will not be evaluated after last date of submission.**