

## Chapter 1 : Fluid Statics And Its Applications

Important Terms  $\Rightarrow$

- ★ Pressure : Surface force exerted by a fluid against the walls of its container is called pressure.
- ★ Manometers : The manometer is an important device for measuring pressure differences.
- ★ Continuous Gravity Decantor : A gravity decanter is used for the continuous separation of two immiscible liquids of differing densities. The feed mixture enters at one end of the separator; the two liquids flow slowly through the vessel, separate into two layers, and discharge through overflow lines at the other end of the separator.
- ★ Bernoulli's Equation : It simply states that total energy per unit mass of flowing fluid, at any point in the streamline, is the sum of the kinetic, potential and fluid-pressure energies and is equal to a constant value.
- ★ Bernoulli's Principle : In fluid dynamics, it states that an increase in the speed of a fluid occurs simultaneously with a decrease in static pressure or fluid's potential energy.

Important Formulas  $\Rightarrow$

1. Barometric Equation :

$$\frac{p_b}{p_a} = \exp \left[ - \frac{gM(Z_b - Z_a)}{g_cRT} \right]$$

2. Hydrostatic Equilibrium in Centrifugal Field :

$$p_2 - p_1 = \frac{\omega^2 \rho (r_2^2 - r_1^2)}{2g_c}$$

3. Manometer : where,  $R_m$  - distance between two meniscus

$$p_a - p_b = \frac{g}{g_c} R_m (\rho_A - \rho_B)$$

4. Inclined Manometer : where,  $R_1$  - displacement of fluid

$$p_a - p_b = \frac{g}{g_c} R_1 (\rho_A - \rho_B) \sin \alpha$$

5. Continuous Gravity Decantor : where,  $Z_{A1}$  - interface height

$$Z_{A1} = \frac{Z_{A2} - Z_T (\rho_B / \rho_A)}{1 - \rho_B / \rho_A}$$

6. Centrifugal Decantor : where,  $r_i$  - interfacial radius

$$r_i = \sqrt{\frac{r_A^2 - (\rho_B / \rho_A) r_B^2}{1 - \rho_B / \rho_A}}$$