**10-MECHANICAL PROPERTIES OF FLUIDS**

**1. Thrust and Pressure**

1. Thrust = Total force exerted by a liquid on the surface in contact

2. Pressure =  or 

**2. Pascal’s Law and Hydraulic Lift**

1. According to Pascal’s law, pressure applied at any point of an enclosed mass of fluid is transmitted equally in all directions. 2. For a hydraulic lift, 

**3. Pressure Exerted by a Liquid Column and Gauge Pressure**

1. Pressure exerted by a liquid column of height *h* and densityis P = *h*g 2. Absolute pressure = Atmospheric pressure + Gauge pressure 

**4. Archemedes’ Principle and Law of Floatation**

1. According to Archemedes’ principle, Loss in weight of a body in a liquid = Weight of liquid displaced = Volume x Density of liquid x *g*

2. Apparent weight of solid in a liquid = True weight – Weight of liquid displaced,  where’ is the density of the liquid and that of solid. 3. What a body just floats. Weight of the body = Weight of liquid displaced or  or  4. Relative density =  5. Relative density of a solid  6. Relative density of a liquid 

**5. Coefficient of Viscosity**

1. Velocity gradient =  2. Newton’s formula for viscous force between two parallel layers is 

**6. Poiseuille’s Formula**

Poiseuille’s formula for the volume of a liquid flowing out per second through a narrow pipe is 

**7. Stokes’s law and Terminal Velocity**

1. According to Stokes’ law, force of viscosity acting on a spherical body of radius *r* moving with velocity *v* through a fluid of viscosityis  2. Terminal velocity of a spherical body of densityand radius *r* moving through a liquid of density’ is 

**8. Reynold’s Number**

1. For a liquid of viscosity, densityand flowing through a pipe of diameter D, Reynold’s number is given by  2. Flow is laminar for Re between 0 and 2000. The fluid velocity corresponding to Re = 2000 is called critical velocity.  3. Flow is turbulent for Re above 3000. 4. Flow is unstable for Re between 2000 and 3000.

**9. Equation of Continuity and Bernoulli’s Theorem**

1. Volume of a liquid flowing per second through a pipe of cross-section *a* with velocity *v*, *Q = av* 2. Equation of continuity, *av* = constant or  3. First form of Bernoulli’s theorem, = constant or Pressure energy per unit mass + P.E. per unit mass + K.E. per unit mass = constant 4. Second form of Bernoulli’s theorem constant or Pressure head + Gravitational head + Velocity head = constant 5. Volume of a liquid flowing out per second through a venturimeter,  where *a1* and *a2* are the areas of cross-section of bigger and smaller tubes respectively. 6. Torricell’s theorem, velocity of efflux of a liquid through an orifice at depth *h* from the liquid surface 

**10. Surface Tension and Surface Energy**

1. Surface tension = or 

2. Increase in surface energy or work done, W = surface tension x increase in area of the liquid surface

**11. Excess Pressure in Drops & Bubbles**

1. Excess pressure inside a liquid drop, (with one free surface). 2. Excess pressure inside a soap bubble, (with two free surface) 3. Excess pressure in an air bubble, (with one free surface)

**12. Capillarity: Ascent Formula**

1. When a capillary tube of radius *r* is dipped in a liquid of densityand surface tension, the liquid rises or falls through a distance,  whereis the angle of contact. 