

1.Introduction of basic concepts

Hydraulics:It may be defined as the branch of Engineering-Science, which deals with water(at rest or in motion).

Fluid Mechanics :The subject of Fluid Mechanics may be defined as the mechanics of Fluids (including water).

Hydraulics machines:It is the branch of Engineering-Science which deals with machines run by water with some head.

- **FUNDAMENTAL UNIT:**

a) Length(L) b) Mass (M) c) Time(T)

- Density- Kg/m^3 ,
- Specific Weight- kN/m^3 ,
- Force-N,
- Pressure- N/m^2 ,
- Dynamic Viscosity- Ns/m^2 ,
- Kinematic Viscosity- m^2/s
- Work Done- Joule(J)=N-m,
- Power- Watt(W)=J/s.

PROPERTIES OF FLUID

- **Density:** The density of a liquid may be defined as the mass per unit volume at a standard temperatures and pressure and is denoted as (ρ) , **Mathematically,**
 $(\rho) = \text{Mass/Volume}$.
- **Specific Weight:** The specific Weight of a liquid may be defined as the weight per unit volume at the standard temperature and pressure and usually denoted as (w) . **Mathematically,** $(w) = \text{Weight/Volume}$.
- **Specific Gravity:** The specific Gravity of a liquid may be defined as the ratio of its specific weight to that of a standard substance at a standard temperature and is denoted as (s) . For liquid pure water is takes as standard substances at 4°C .
Mathematically, specific gravity is $(s) = \text{Sp.Wt of Liquid/Sp.Wt of pure water}$
- **Compressibility of liquid:** The Compressibility of a liquid may be defined as the variation in its volume, with the variation of pressure. In practical field it is very negligible, hence water is considered as incompressible liquid.
- **Surface Tension of liquid:** The surface Tension of a liquid is its property, which enables it to resist tensile stress. It is due to the cohesion between molecules at the surface of liquid.
- **Capillarity of liquid:** When a narrow tube is dipped in liquid body, a concave or convex surface is experienced .This is due to capillarity of liquid. When Adhesion is more or less than cohesion ,then concave or convex surface is formed.
- **Viscosity of liquid:** Each liquid possesses a property ,which controls the rate of flow. This property is termed as Viscosity of liquid.