Force and Pressure

- A push or pull on an object is called a **force**.
- **Push –** When an object is moving away from the applier of force
- **Pull –** When an object is moving towards the applier of force
- Force is a push or a pull which changes or tends to change the state of rest or of uniform motion, or direction of motion or the shape or size of a body.
- Force is any action that has the tendency to change the position, shape, or size of an object.

- Interection of one object with another object results in a force between the two objects.
- The effect of force depends on the magnitude and direction of the force.
- Force applied in the same direction added to one another.
- Force applied in the opposite direction, the net force is given by the difference of two forces.

- Force is a push or pull upon an object resulting from the object's interaction with another object. The various effects of force are:
- Force can move a body initially at rest.
- Force can bring a moving body to rest.
- Force can change the direction of a moving body.
- Force can change the speed of a moving body.
- Force can change the shape of a body.
- Force can change the size of a body.

- A couple of forces are needed to rotate a body about an axis.
- Torque represents the turning force acting on an object. It can be either clockwise or anticlockwise, depending upon how the force is applied.

Torque (τ) = Force (F) × Perpendicular distance (D)

- Torque is also known as moment of force.
- A clockwise torque tends to turn an object in the clockwise direction. Similarly, an anticlockwise torque tends to turn an object in the anticlockwise direction.
- The unit of torque is Nm (newton-metre).
- **Couple:** When two equal and opposite forces act on a body and their lines of action do not coincide, then the body will not move but rotate about the given axis.

- **Thrust** – Force acting perpendicular to a surface
- **Pressure** = Perpendicular force per unit area

$$= \frac{\text{Thrust}}{\text{Area}} \left[\text{N/m}^2 = \text{Pascal (Pa)} \right]$$

    - Lesser is the area more is the pressure; this is the reason why we prefer to use sharp knives over the blunt ones to cut objects. This pressure is again the reason why it is difficult to hold a school bag having a strap made of a thin and strong string.

- Liquids exerts pressure on the walls of the container.
- Pressure exerted by liquids increases with depth.
- Liquids exert equal pressure at the same depth.
- The pressure at which water comes out of the holes is directly proportional to its depth.
- Fluid— Substance which can flow and has no fixed shape

- Pressure due to a liquid column of height h:

$$p = h\rho g$$

Where, h = Height of column

ρ = Density of fluid

g = Acceleration due to gravity

- Pressure inside a fluid increases with increase in depth and density of the fluid.

- Water and gas exert pressure on the walls of their container.
- Atmosphere exerts pressure on the surface of the Earth.
- **Atmospheric pressure** = Weight of the atmosphere per unit area.
- Pressure inside our body is equal to the atmospheric pressure and cancels the pressure from out side.
- Air surrounding the Earth – atmosphere
- Air exerts pressure on its surroundings – thrust on unit area is called atmospheric pressure