Force and Pressure

1) What is force?

Ans:- Force is that cause which changes the state of the body (either the state of rest or the state of motion) or changes the size or shape of the body.

2) What is the unit of force?

Ans:- The SI unit of force is Newton. It is denoted by 'N'.

3) What is 1 Newton?

Ans:- One Newton is defined as the force which when applied on a moving body of mass 1 Kg in the direction of the motion, increases its speed by 1 m in 1 second.

4) What is the weight of the body?

Ans:- The force of attraction exerted on a body by earth is called the weight of the body or the force of gravity that acts on the body.

5) What is 1 Kgf?

Ans:- At a place, the force of gravity on a body of mass 1 Kg is called 1 Kgf. or 10 N.

6) State the two effects of force when applied on the body?

Ans:- When a force is applied on a body then —

a) It can change the state of the body (Either the state of rest or the state of motion)

b) It can change the size and shape of the body.

7) What are the limitations of force?

Ans:- The limitations of force are—

a) A force does not change the mass of the body on which it is applied.

b) We cannot see force. However, we can see or feel the effect of a force.

8) Force is which quantity?

Ans:- Force is a Vector quantity. which is expressed by stating both its magnitude and direction.

9) How a force can represent?

Ans:- A force is represented by an arrow (→). The length of the arrow is a measure of its magnitude and the arrow head shows the direction.

10) What is called Axis of Rotation?

Ans:- If a body is not free to move and it is pivoted at a point, then the force applied on that body can turn it about the pivot point. The vertical axis passes through the point about which the body turns is called the axis of rotation.

11) Which factors are effecting the Turning Force of a body?

Ans:- The turning force of a body depends on the following factors -

a) The magnitude of the force applied

Longer the magnitude of the force applied, more is the turning effect on the body

b) The perpendicular distance of the force from the pivoted point

Larger the perpendicular distance of the point at which the force is applied from the pivoted point, more is the turning effect of the body.

12) What is Moment of Force or Torque? Describe.

Ans:- ~~The Moment of Force is equal~~

The turning effect of a body depends on the product of both the magnitude of force and the perpendicular distance of the force from the pivoted point. This product is called the Moment of Force or Torque.

Consider a body which is pivoted at a point O. If the force F is applied on the body in the direction FP, the force is unable to produce the liner motion of the body ~~due to~~ because the body is not free to move. But this force turns the body about the point O in the direction shown in the figure.

Now the perpendicular distance of the force F from the pivoted point O is OP.

Now the Moment of the force or torque about the point O is = ~~Force~~ Force × Perpendicular distance of force from the point O.

$\Rightarrow \boxed{\tau = F \times OP}$

13) What is the unit of Torque?

Ans:- The SI unit of Torque is Nm (Newton × Metre)
& the CGS unit of torque is dyne × cm

14) What is the relation between Nm and dyne × cm?

Ans:- We know

$$1\ Nm = 10^5\ dyne \times 10^2\ cm$$

$$\Rightarrow \boxed{1\ Nm = 10^7\ dyne\ cm.}$$

15) What is the relation between Kgf and Nm?

Ans:- If the force is measured in gravitational unit then the unit of Torque in SI system is Kgfm and in CGS system is gf cm

$$\boxed{1\ Kgf\ m = 10\ N\ m}$$

&

$$\boxed{1\ gf\ cm = 1000\ dyne\ cm}$$

16) State one way to decrease or increase the moment of a given force about a given axis of rotation.

Ans:- We know the moment of force or Torque =

= Force applied on the body × the perpendicular distance between the pivot point and the point where the force is applied.

Now for a given force if the perpendicular distance is increased then the Moment of force or torque also increase and the perpendicular distance is decreased then the moment of force or torque also decreased.

17) What is anti-clockwise moment and clockwise moment?

Ans:- Anti-clockwise moment - If the effect on the body is to turn it anticlockwise, moment of force is called anticlockwise moment and it is taken positive.

Clockwise moment - If the effect on the body is to turn it clockwise, moment of force is called clockwise moment and it is taken negative.

18) What is called Thrust?

Ans:- If the force is applied on a surface in the direction normal (perpendicular) to the surface, the force is called Thrust.

19) What is the CGS and SI unit of Thrust?

Ans:- The CGS unit of Thrust = gmf

SI Unit of Thrust = Kgf.

20) On what factors does the effect of thrust on a surface depends.

Ans:- The effect of thrust depends on the area of the surface on which it acts.

Smaller the area of surface on which a thrust acts, larger is its effect. But the effect of thrust is less on a larger area.

21) What is called Pressure?

Ans:- Pressure is defined as the thrust per unit area.

$$\text{Thus Pressure} = \frac{\text{Thrust}}{\text{Area}}.$$

* It is denoted by a letter 'P'.

* If a thrust F acts on an area A, the pressure P is-

$$\boxed{P = \frac{F}{A}}$$

22) What is the Unit of Pressure?

Ans:- The SI unit of Pressure is Nm^{-2}.

It is denoted by Pa (Pascal)

$$\boxed{1\ Pa = 1\ Nm^{-2}}$$

* The biggest unit of pressure is Kilo Pascal (KPa)

$$\boxed{1\ KPa = 1000\ Pa}$$

23) What is 1 Pascal?

Ans:- 1 pascal is a pressure exerted by a thrust of 1 Newton on a surface of area 1 metre^2.

$$\text{i.e } 1\ \text{Pascal} = \frac{1\ \text{Newton}}{1\ \text{metre}^2} = 1\ Nm^{-2}$$

24) What is Atmospheric Pressure?

Ans:- The Atmospheric Pressure is generally expressed by 'atm'

1 atm = 76cm of mercury column

$$\Rightarrow \boxed{1\ \text{atm} = 1.013 \times 10^5\ Pa}$$

25) On what factors does the effects of pressure depends.

Ans:- The pressure on a surface depends on the following factors-

a) On the area of the surface on which the thrust acts

We know the pressure = Force / Area.

Now on a given force is when the surface area increases then the pressure acts on the body decreases. and when the surface area decrease the pressure also increase.

b) On the magnitude of thrust acting on the surface

On a given area ~~per unit~~ when the magnitude of thrust increases the pressure also increase and the magnitude of the thrust decrease the pressure also decrease..

26) What are the difference between Thrust and pressure.

Thrust	Pressure
a) Thrust is the sum total of force acting perpendicular to a surface.	a) Pressure is the thrust acting per unit area.
b) It is independent of the area over which the force is applied.	b) It depends on the area on which the force acts.
c) SI unit of thrust is (N)	c) SI unit of Pressure is Nm^{-2} or Pa.

27) What is Liquid Pressure ?

Ans:- If a force is ~~acting~~ acting at the bottom of any liquid column due to the weight of that Liquid is Called Liquid pressure.

If W is the weight of ~~water~~ Liquid column and A is the area of the bottom.

Then $$\text{Liquid pressure} = \frac{\text{Weight}}{\text{Area}} = \frac{W}{A}$$

28) On what factors ~~does the~~ on which the pressure at a point in the liquid depends.

Ans:- The pressure at a point in a liquid depends on the following factor

a) The height of the liquid column

The Liquid pressure increase with the height of the liquid column above the point.

b) The density of the Liquid

Liquid pressure increases with the increase in the density of the liquid.

29) What is atmospheric Pressure.

Ans:- Air has weight. The weight of air exerts a thrust on earth. The thrust on unit area of the earth surface due to the column of air is called the atmospheric pressure.

The atmospheric pressure

1 atm = 10^5 Nm^{-2}

30) What is the standard value of atmospheric pressure?

Ans:- At sea level on earth surface,

the atmospheric pressure = 76 cm or 760mm of mercury colu

which is equal to 1 atm or 1.013×10^5 Pa.

31) On which factors the atmospheric pressure depends?

Ans:- The atmospheric pressure decreases with increasing altitude i.e as we go higher above the earth surface, the air pressure decreases.

32. **Define Pascal's Law**

Ans. According to the Pascal's Law, Any force applied to a confined fluid is transmitted uniformly in all directions throughout the fluid regardless of the shape of the container.

33. How can we drink any liquid through straw from any glass?

Ans. The drinking straw is a very thin pipe which is used to drink any liquid from glass. The drinking straw works on the exercise of atmospheric pressure. This can be explained as follows: The lower end of drinking straw is dipped in the soft drink (see figure). When we suck at the upper end of the straw with our mouth, the pressure of air inside the straw and in our mouth is reduced. But the pressure acting on the surface of the soft drink is equal to atmospheric pressure so the greater atmospheric pressure acting on the surface of the soft drink pushes the soft drink up the straw into our mouth.

34. How a syringe work?

Ans. From Book

35. How a dropper work?

Ans. From Book