3. Force and Pressure

Practice questions

Q.1 Answer the following-

1) What is Newton's first law of motion and write its examples.

Ans: A stationary object on which no force is acting, remains stationary. An object in motion continues to move with the same speed and direction when no force is acting on the object. Ex.1) Passengers sitting in the bus are pushed in the backward direction if the bus suddenly starts.

2) When the branch of a tree is moved/ shaken then it comes in motion, but as the fruit is in a state of rest, it falls down.

3) A revolving electric fan continues to revolve even after it is switched off.

4) Passengers have to run along with the bus while getting out from the running bus.

5) More force is needed to pull the roller used to flatten the cricket ground, but less force is needed, once it comes in motion.

2) What is inertia? Explain the types of inertia and give its examples.

Ans: The tendency of an object to remain in its existing state is called its inertia.

Types of inertia: 1) Inertia of the state of rest of the object: An object in the state of rest cannot change its state of rest due to its inherent property and this property is called the inertia of the state of rest.

Ex. 1) When the branch of tree is moved/ shaken then it comes in motion but the fruit is in a state of rest so it falls down.

2) When the carpet is shaked then it comes in motion and the dust in it remains stable and carpet becomes clean.

2) Inertia of the motion of the object: The inherent property of an object due to which its state of motion cannot change, is called its inertia of motion.

Ex: 1) A revolving electric fan continues to revolve even after it is switched off.

2) Passengers sitting in the running bus get pushed in forward direction if the bus suddenly stops.

3) Directional inertia of the object: The inherent property of an object due to which the object cannot change the direction of its motion, is called directional inertia.

Ex: 1) The mud stuck to the wheels of car flies in the backward direction from the wheels in motion.

2) While sharpening the knife, sparkles from the knife fly in the same direction.

3) What is force? Write types of the force.

Ans: The physical quantity which brings the change in the state of rest of an object and also in the state of motion in the straight line is called as force.

Types of force – 1) Balanced force – the force which does not cause the displacement of an object or there is no change in speed or the direction does not change is called as balanced force.

2) Unbalanced force – the force which causes the displacement of an object in the direction of the force is called as unbalanced force. Unbalanced force causes the displacement of an object or change in the speed of an object or change in the direction of motion. As long as unbalanced force acts on an object, its speed keep varying continuously.

3) Frictional force – When one object opposes the speed of another moving object, it is called frictional force. Ex. If you throw a ball on the ground it stops after going at some distance because its speed is opposed by the frictional force of the ground.

4) Gravity force – All objects in the universe and the earth are attracted towards each other. The earth attracts all things to its own centre this is called as earth's gravity force.

5) Electromagnetic force – the force keeping all atoms and molecules of substance or object together is called as electromagnetic force.

6) Central force – The force working to keep together the proton and neutron in nucleus of each atom is called as central force.

7) Weak force – the force which is produced in the radioactive elements present in the nature due to the action taking place in proton, neutron and electron is called as weak force.

4) What is Archemedes Principle? Write the uses of Archemedes Principle.

Ans: If a solid substance is fully or partially immersed in a fluid, it displaces the fluid equal to the volume of the substance immersed in it. At this time weight of the substance decreases, which is equal to the weight of the fluid displaced by the substance.

Use of the Archemedes principle – 1) This principle has been used in the construction of ships and submarines.

2) The instruments such as lactometer, hygrometer work on this principle.

Lactometer is used to determine the purity or density of milk and hygrometer is used to measure the density of liquid in the air.

Q. 2) Write a note on.

1) Atmospheric Pressure:

Ans: The force per unit area exerted by an atmospheric column on the surface of the earth is called as atmospheric pressure. The atmosphere exists to about 16km height.

1) The atmospheric pressure of a place depends on its height from the sea level. This pressure on the sea level is an atmospheric pressure, same pressure belts are found on the sea level.

2) There are different pressure belts at different places on the earth. They are called as pressure belts. There is low pressure at the equator and high pressure belt at the poles.

3) There are belts of high pressure on 30^{o} north and 30^{o} south latitudes.

4) The atmospheric pressure decreases, as we go high in the atmosphere.

5) The atmospheric pressure on the earth surface at the sea level is about 10^{5}Pascal.

2) Buoyant Force:

Ans: The upward force acting on the object in water or other fluid or gas is called buoyant force. Buoyant force depends on the following.

1) Volume of the object – The buoyant force is more if the volume of the dipping object is more.

2) Density of liquid – More the density of liquid, more is the force of buoyancy.

The object left in liquid will float on the surface or will float inside the liquid is decided by the buoyant force.

a) The object floats if the buoyant force is larger than its weight.

b) The object sinks if the buoyant force is smaller than its weight.

c) The object floats inside the liquid if the buoyant force is equal to its weight.

3) Balanced force and Unbalanced force

Ans: Balanced force – A force where two force acting in opposite directions on a body with equal size in a straight line are known as balanced forces. At this time the effective force is equal to zero.

Unbalanced force – If two or more forces act on the object and the effective force is equal to zero, then that effective force is called as unbalanced force. The object moves in the direction of the side where there is more force.

Ex. 1) Children playing tug of war pull the rope in their respective directions. If the pull of the force is equal on the two sides, the rope does not move. If the force is more on one side, the rope moves in that direction. This means that initially, the two forces are balanced the rope moves in the

direction of higher force when the forces become unbalanced.

2) When big grain storage container is required to slide on the ground, it becomes easier if two persons push it rather than one person. When the force is applied by both in the same direction, the movement is easy.

Q. 3) Write the reasons.

1) The bottom surfaces of camel's feet are broad.

Ans: 1) The bottom surfaces of camel's feet are broadhence, the camel'sweight is exerted on a large area.

2) The pressure of camel on the sand is reduced. This is why camel's feet do not penetrate into the sand and it becomes easy to walk.

2) It becomes easier to swim in sea water than in fresh water swimming pools.

Ans: 1) Sea water contains salt.

2) The density of sea water is higher than density of fresh water, due to salts dissolved in water.

3) Due to the buoyant force acting on the object dipped in the liquid, it seems that the weight of an object has become less. Therefore it becomes easier to swim in sea water than in fresh water swimming pools.

Q. 4) Write the answers to the following -

1) Write the effect on the object if the force is applied to it.

Ans: If you apply the force on the object then

1) If the object is stationary then it can come in motion.

Ex. If the ball on the ground is kicked then it comes in motion.

2) If the object is in motion then it can become stationary.

Ex. A bicycle can be stopped by using a brake.

3) The movement of the object can change.

Ex. When the brakes of the bicycle in motion are pressed, the movement of the bicycle decreases.

4) Both the movement of an object and the direction of speed of an object can change.

Ex. When the batsman hit the ball thrown by the bowler then both movement of ball and the direction of speed of ball changes.

5) The shape and the volume of an object can change.

Ex. If the rubber ball is pressed, its shape does not remain round, its shape changes and also the volume can get reduced.

2) What is pressure of fluid and pressure of liquid?

Ans: Pressure of fluid – the liquid and the gas collectively/ commonly are called as fluid. These substances can flow. As well as exerts the pressure on the bottom and the sides of the vessel. The pressure is also exerted on the substance if it is dipped in the fluid. The pressure exerted by the enclosed container in any fluid is same in all directions.

Pressure of liquid – the pressure of liquid is exerted on all the sides inside the vessel and it is same in all directions. The pressure near any point does not depend on the figure and size of the vessel but it depends on the height or depth of the liquid and the pressure increases according to the depth. The pressure of fluid also depends on its density.

Q. 5) Write if the following statements are true or false.

1) The revolving electric fan continues to revolve even after it is switched off.

Ans: True

2) While swimming, the weight of the body is balanced by pressure of the water.

Ans: True

3) The shape does not change due to force.

Ans: False (the shape can be changed due to force)

4) We are constantly feeling the atmospheric pressure.

Ans: False (You never feel the atmospheric pressure)

Q. 6) Give the examples.

1) Frictional Force

Ans: Appling brakes to the bicycle, walking on the ground, playing with striker.

2) Contact Force

Ans: Picking up the pen, pushing the car, pulling a bucket of water from a well, kneading a dough made from flour.

Q. 7) Solve the following examples.

1) The area of the bottom of a box placed on the steel shelf is $0.20m^2$ and weight is 60N. Calculate the pressure exerted by the box on the steel shelf.

Ans: Weight = 60N

Area = $0.20m^2$

Pressure =?

$$\text{Pressure} = \frac{\text{Force}}{\text{Area}}$$

$$= \frac{60N}{0.20m^2}$$

$$= 300N/m^2$$

∴ The pressure exerted by the box on the shelf = $300N/m^2$

2) Calculate the relative density of iron if the density of iron is $7.85 \times 10^3 kg/m^3$ and the density of water is$10^3 kg/m^3$.

Ans: Density of iron = $7.85 \times 10^3 kg/m^3$

Density of water $=10^3 kg/m^3$.

Relative density $= \frac{\text{Density of iron}}{\text{Density of water}}$

$= \frac{7.85 \times 10^3 kg/m^3}{10^3 kg/m^3}$

$= 7.85$

∴The relative density of iron = 7.85

Q. 8) Write a definition.

1) Contact force

Ans: A force is seen to act through a direct contact of the objects or via one more object, such a force is called contact force.

2) Pressure

Ans: The force exerted perpendicularly on a unit area is called pressure.

3) Atmosphere

Ans: Air surrounds the earth from all sides, this layer of air is called atmosphere.

Q. 9) Write the answers in one sentence.

1) What is Frictional force?

Ans: One object opposes the relative motion state of the other object. This opposing force is called as frictional force.

2) What is relative density?

Ans: The ratio of density of substance to the density of the water is relative density.

3) What is the hygrometer?

Ans: The instrument used to measure the relative humidity in the environment is called as a hygrometer.

4) How much is the pressure of sunlight on the earth?

Ans: The pressure of sunlight on the earth is $3.8 \times 10^{-5} dyne/cm^3$.

5) What is light pressure?

Ans: The low pressure is formed on the surface where the light is illuminated, it is called as light pressure.

Q. 10) Identify the correlation.

1) Fruit falling down from the tree: Non-contact force: : kicking the ball : _____

Ans: Contact force

2) Density: kg/m^3: : Pressure: _____

Ans: N/m^2

Q. 11) Explain the difference.

1) Force and Pressure

Force	Pressure
1)The tendency to bring the changein the state of rest or in the state of motion in the straight line of an object is called as force.	1)The force exerted perpendicularly on a unit area is called pressure.
2) Force acts on the surface in any direction.	2) Pressure acts in a direction perpendicular to the surface.
3) Force is a vector quantity.	3)Pressure is a scalar quantity.
4) The unit of force is Newton.	4) The unit of pressure is Pascal.

Q. 12) Identify the different term.

1) Electrostatic force, Gravitational force, Muscular force, Magnetic force

Ans: Muscular force (it is a form of contact force and other are the form of non-contact force.)