Topics Covered

- Motion, laws of motion, work energy and power, rotational motion, gravitation, simple harmonic motion, waves
- Properties of matter, electrostatics, current electricity, moving charge and magnetism.
- Ray optics, Photo electric effect, Nuclear physics, semi conductor devices
- Electromagnetic waves, communication systems , basics of computers, use of information technology in administration, e-governance and e- commerce, contributions of Indian scientists in the development of science
- States of matter, Atomic structure, chemical bonding and molecular structure, equilibriums
- Thermodynamics, kinetic theory of gases, solid state, solutions, electro chemistry, Chemical kinetics
- Characteristic feature of life
- Nutrition in organisms
- Principal of inheritance and variation
- Human health and diseases
- Biotechnology and its applications
- Biodiversity and conservation
- Ecosystems
- Agriculture, Horticulture, Forestry, Dairy and Animal Husbandry with special reference to Rajasthan.

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Motion

Motion is a change in position of an object with respect to time. Motion is typically described in terms of displacement, distance, velocity, acceleration, time and speed.

The branch of physics which deals with the study of motion of material objects is called mechanics.

Mechanics is divided into following branches.

(i) Statics : Statics is the branch of mechanics which deals with the study of motion of objects under the effect of forces in equilibrium.

(ii) Kinematics :

It is that branch of mechanics which deals with the study of motion of object without taking into account the factors (i.e. nature of forces, nature of bodies etc.) which cause motion. Here time factor plays an essential role.

(iii) Dynamics :

It is that branch of mechanics which deals with the study of motion of objects taking into account the factors whichcause motion.

Rest : An object is said to be at rest if it does not change its position with time, with respect to its surroudings.

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A book lying on a table, a person sitting in a chair are the examples of rest.

Motion : An object is said to be in motion if it changes its position with time, with respect to its surroundings.

Example : A bird flying in air, a train moving on rails, a ship sailing on water, a man walking on road are some of the examples of motion, visible to the eye. Motion of gas molecules is an example of motion, invisible to the eye.

Rest & Motion are relative terms :

When we say that an object is at rest or in motion,then this statement is incomplete and meaningless. Basically, rest & motion are relative terms. An object which is at rest can also be in motion simultaneously. This can be illustrated as follows.

The passengers sitting in a moving bus are at rest with respect to each other but they are also in motion at the same time with respect to the objects like trees, buildings on the road side. So the motion and rest are relative terms.

Rectilinear motion :

If a particle moves in a fixed direction, the motion of this type is called rectilinear motion or one dimensional motion.For example the motion of an ant on a wire is a rectilinear motion.

Two dimensional motion :

If the motion of a particle is in such a way that its position remains on a fixed plane, then the motion of a particle is called two dimensional motion.

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Laws Of Motion

First Law of Motion

A body continue to be in its state of rest or of uniform motion along a straight line, unless it is acted upon by some external force to change the state

(1) If no net force acts on a body, then the velocity of the body cannot change i.e. the body cannot

accelerate.

(2) Newton's first law defines inertia and is rightly called the law of inertia. Inertia are of three types :

Inertia of rest, Inertia of motion, Inertia of direction

(3) Inertia of rest : It is the inability of a body to change by itself, its state of rest. This means a body at

rest remains at rest and cannot start moving by its own.

Second Law of Motion

(1) The rate of change of linear momentum of a body is directly proportional to the external force applied

on the body and this change takes place always in the direction of the applied force.

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(2) If a body of mass m, moves with velocity v then its linear momentum can be given by p= mv and if force is applied on a body, then Force = mass ? acceleration

Third Law of Motion

To every action, there is always an equal (in magnitude) and opposite (in direction) reaction.

(1) When a body exerts a force on any other body, the second body also exerts an equal and opposite force

on the first.

(2) Forces in nature always occurs in pairs. A single isolated force is not possible.

(3) Any agent, applying a force also experiences a force of equal magnitude but in opposite direction. The

force applied by the agent is called 'Action' and the counter force experienced by it is called 'Reaction'.

(4) Action and reaction never act on the same body. If it were so the total force on a body would have

always been zero i.e. the body will always remain in equilibrium.

(5) If F (AB)= force exerted on body A by body B (Action) and

F(BA)= force exerted on body B by body A (Reaction) Then according to Newton's third law of motion F (AB) = F(BA)

(6) Example : (i) A book lying on a table exerts a force on the table which is equal to the weight of the book. This is the force of action.

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