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Class 11Sc.

Sub Physics

## KINEMATICS

\*rest and Motion are relative terms, nobody can exist in a state of absolute rest or of absolute motion.

\*One dimensional motion:- The motion of an object is said to be one dimensional motion if only one out of three coordinates specifying the position of the object change with time. In such a motion an object move along a straight line path.

\*Two dimensional motion:- The motion of an object is said to be two dimensional motion if two out of three coordinates specifying the position of the object change with time. In such motion the object moves in a plane.

\*Three dimensional motion:- The motion is said to be three dimensional motion if all the three coordinates specifying the position of an object change with respect to time ,in such a motion an object moves in space.

\*The magnitude of displacement is less than or equal to the actual distance travelled by the object in the given time interval.

$$\text{Displacement} \leq \text{Actual distance}$$

\*Speed:- It is rate of change of distance covered by the body with respect to time.

$$\text{Speed} = \text{Distance travelled} / \text{time taken}$$

Speed is a scalar quantity .Its unit is meter /sec. and dimensional formula is  $[M^0L^1T^{-1}]$  .It is positive or zero but never negative.

\*Uniform Speed:- If an object covers equal distances in equal intervals of time than the speed of the moving object is called uniform speed. In this type of motion, position – time graph is always a straight line.

\*Instantaneous speed:-The speed of an object at any particular instant of time is called instantaneous speed. In this measurement, the time  $\Delta t \rightarrow 0$ .

When a body is moving with uniform speed its instantaneous speed = Average speed = uniform speed.

\*Velocity:- The rate of change of position of an object in a particular direction with respect to time is called velocity. It is equal to the displacement covered by an object per unit time.

$$\text{Velocity} = \text{Displacement} / \text{Time}$$

Velocity is a vector quantity, its SI unit is meter per sec. Its dimensional formula is  $[M^0L^1T^{-1}]$ . It may be negative, positive or zero.

\*When a body moves in a straight line then the average speed and average velocity are equal.

\*Acceleration:- The rate of change of velocity of an object with respect to time is called its acceleration.

$$\text{Acceleration} = \text{Change in velocity} / \text{time taken}$$

It is a vector quantity, Its SI unit is meter/ sec.<sup>2</sup> and dimension is  $[M^0L^1T^{-2}]$ , It may be positive ,negative or zero.

\*Positive Acceleration:- If the velocity of an object increases with time, its acceleration is positive .

\*Negative Acceleration :-If the velocity of an object decreases with time, its acceleration is negative . The negative acceleration is also called retardation or deacceleration.

\*Formulas of uniformly accelerated motion along straight line:-

For accelerated motion,

$$V = u + at$$

$$S = ut + \frac{1}{2} at^2$$

$$V^2 = u^2 + 2as$$

$$Sn = u + \frac{a}{2}(2n - 1)$$

For deceleration motion

$$v = u - at$$

$$S = ut - \frac{1}{2} at^2$$

$$V^2 = u^2 - 2as$$

$$Sn = u - \frac{a}{2}(2n - 1)$$