

RELATIVITY

• Frame of Reference:

The motion and position of any body have no meaning unless they are described with respect to some well defined co-ordinate system.

A frame of reference is a co-ordinate system relative to which the position and motion of any body may be described.

There are two types of frame of reference:

(i) Inertial Frames [Unaccelerated frames]:

The frames relative to which a body, not acted upon by any external force, remains unaccelerated, are called inertial frames.

Inertial frames may be defined as the frames in which Newton's laws are valid.

(ii) Non-Inertial [Accelerated Frames]:

The frames relative to which a body, not acted upon by any external force, is accelerated, are called Non-inertial frames.

In non-inertial frames, Newton's laws are not valid.

* A rotating frame is also a non-inertial frame.

• Example of Inertial frames:

A train moving with constant velocity $[\vec{v} = \text{constant}, \vec{a} = \frac{d\vec{v}}{dt} = 0]$, the passenger is in an inertial frame.

• Example of Non-Inertial frames:

A reference frame attached to an aircraft which is making its take-off (accelerated) run is a non-inertial frame.

Similarly, 'a rotating merry-go round is also a non-inertial frame.'