

is not a perfect sphere. It is however flattened at poles and bulged out at the equator.

- Thus, the value of 'g' is more at the poles and lesser at the equator. However, for our convenience, we take a constant value of 'g' throughout.

Satellite

- A heavenly object which revolves around a planet is called a satellite. Natural satellites are those heavenly objects which are not manmade and revolve around the earth. Artificial satellites are those heavenly objects which are manmade and launched for some purposes revolve around the earth.
- Artificial satellites are of two types:

1. Geostationary or Parking Satellites

- A satellite which appears to be at a fixed point at a specific height to an observer on earth is known as a geostationary or parking satellite.
- Height from surface of the earth = 36000 km
- Time period = 24 h
- Orbital velocity = 3.1 km/s
- Radius of orbit = 42400 km
- Angular velocity = $2\pi / 24 = \pi / 12$ rad / h
- These satellites travel in equatorial orbits around the world. The satellite's angular velocity is the same in magnitude and direction as that of the angular velocity of the earth about its own axis. These satellites are utilized for the purpose of communication. **INSAT 2B and INSAT 2C** are India's geostationary satellites.

2. Polar Satellites

- These are those satellites which revolve in polar orbits around earth. A polar orbit is one in which the angle of inclination with the earth's equatorial plane is 90 degrees.
- Height from the surface of earth = 880 km
- Orbital velocity = 8 km / s
- Time period = 84 min
- Angular velocity = $2\pi / 84 = \pi / 42$ rad / min.
- In polar orbits, their satellites revolve around the earth.
- These satellites are used for a variety of purposes, including weather forecasting, observing the upper atmosphere, mapping, and so forth.
- The PSLV series of satellites are India's polar satellites.

Orbital Velocity

- The minimum velocity required for a satellite to enter a given orbit around the earth is its orbital velocity.

Escape Velocity

- On Earth, escape velocity is the minimum velocity at which a body must be projected vertically upwards from the earth's surface in order to simply cross the gravitational field of the earth and never return. Escape velocity does not depend upon mass, size, and shape of the body as well as the direction of projection of the body or the object.
- At Earth, the escape velocity is around