

Geosynchronous and Geostationary Orbit

Ques What is Geosynchronous orbit and Geostationary Orbit.

Ans → Moving around the earth, for a satellite, if the period of revolution is equal to the period of earth's diurnal rotation, the orbit is said to be geosynchronous orbit. For such an orbit, the period must be 24 hour or, more correctly time is 23 hours 56 minutes 34.99 seconds. By Kepler's third law, the semi major axis of the geosynchronous orbit is

$$\left(\frac{GM}{4\pi^2} \right)^{1/3} T^{2/3} = 42164.2 \text{ km}$$

Here M is mass of earth.

For a geosynchronous orbit, the orbit and value can have orientation with respect to equator of the earth.

Geostationary orbit → The height of an artificial satellite at equator above the earth's surface is such that its period of revolution is exactly equal to the period of rotation of earth then the satellite would appear stationary over a point on earth's equator. Such a satellite is called geostationary satellite and its orbit is called geostationary orbit. Therefore, for a geostationary satellite, we must have the orbit (a) to be geosynchronous (b) to be circular (c) to stay over the geographical equator of the earth.

The height of geostationary satellite is
 $h = a_s - R = 35786 \text{ km}.$