

Geostationary Satellite.

The satellite which appears stationary relative to earth is called geostationary or geosynchronous satellite, communication satellite.

A geostationary satellite always stays over the same place above the earth such a satellite is never at rest. Such a satellite appears stationary due to its zero relative velocity w.r.t. that place on earth.

The orbit of a geostationary satellite is known as the parking orbit.

Important points

- (i) It should revolve in an orbit concentric and coplanar with the equatorial plane.
- (ii) Its sense of rotation should be same as that of earth about its own axis i.e., in anti-clockwise direction (from west to east).
- (iii) Its period of revolution around the earth should be same as that of earth about its own axis.

$$\therefore T = 24 \text{ hr} = 86400 \text{ sec}$$

(iv) Height of geostationary satellite

$$\text{As } T = 2\pi\sqrt{\frac{r^3}{GM}} \Rightarrow 2\pi\sqrt{\frac{(R+h)^3}{GM}} = 24 \text{ hr}$$

Substituting the value of G and M we get $R+h = r = 42000 \text{ km} = 7R$

\therefore Height of geostationary satellite from the surface of earth $h = 6R = 36000 \text{ km}$

(v) Orbital velocity of geostationary satellite can be calculated by $v = \sqrt{\frac{GM}{r}}$

Substituting the value of G and M we get $v = 3.08 \text{ km / sec}$