16 times a day). RSS is launched into LEO. Thus both experimental and operational satellites are launched into LEO. E.g. IRS series, OceanSat and TES.

- **Geostationary Equitorial Orbit** (GSO/ GEO) – It lies at the height of 36,000 km above the equator of the Earth. An orbit around the Earth above the equator from west to east with a period equal to one sidereal day, which is Earth's average rotational period of 23 hours, 56 minutes, 4.091 seconds. For a nearly circular orbit, this implies an altitude of approximately 35,786 km (22,240 miles). If both the inclination and eccentricity are zero, then the satellite will appear *stationary* from the ground. Most commercial communications satellites and broadcast satellites operate in geostationary orbits. E.g. INSAT series, MetSat.
- **Circular Orbit** – The circular path traced by a satellite around a celestial body is called a circular orbit. For example, a geostationary satellite traces a circular path.
- **Elliptical Orbit** – The oval-shaped path traced by a satellite around a celestial body is known as elliptical orbit.
- **Geostationary Transfer Orbit (GTO)** – it is an elliptical orbit that is located at the height of 200 km below the GSO. Geostationary satellites are first launched in GTO, which then lifts themselves to GSO using their propulsion system.
- **Medium Earth orbit (MEO):** Medium Earth orbit comprises a wide range of orbits anywhere between LEO and GEO. It is similar to LEO in that it also does not need to take specific paths around Earth and is used by a variety of satellites with many different applications. It is commonly used by navigation satellites like the European Galileo system.
- **Polar orbit and Sun-synchronous orbit (SSO):** Satellites in polar orbits usually travel past Earth from north to south rather than from west to east, passing roughly over Earth's poles. Polar orbits are a type of low Earth orbit, as they are at low altitudes between 200 to 1000 km. Sun-synchronous orbit (SSO) is a particular kind of polar orbit. Satellites in SSO, travelling over the polar regions, are synchronous with the Sun. This means that the satellite always visits the same spot at the same local time. Image series by these satellites are used to investigate how weather patterns emerge, to help predict weather or storms, monitoring emergencies like forest fires or flooding, etc.

Satellite-Based Internet Connectivity

Satellite-based low-bit-rate connectivity is possible using Geo stationery, Medium and Low Earth orbit Satellites.

- Indirect Model or Hybrid (LPWAN + Satellite): In such architecture, each sensor and actuator in a network may communicate with the satellite through an intermediate sink node, i.e., Low Power Wide-Area Network (LPWAN) or LPWA gateway
- Direct to Satellite Model: This type of architecture allows devices to directly communicate with the satellite without the need for any intermediate ground gateway.

Factors favouring the development of Satellite-based connectivity

- **Innovation of technologies** like AI, cloud and big data are gaining importance for exploring new prospects in the satellite Internet of Things (IoT) ecosystem.
- **Smaller and cheaper satellites:** Smaller satellites, often weighing as little as 10 kg, are replacing the larger conventional models in the range of 1,000 kg or more. Such solutions are eliminating the entry barriers for the space industry.
- **Easier to deploy and wide coverage**: Satellite networks can be rolled out and scaled up a lot faster and more cost-effectively than terrestrial mobile/broadband networks, especially to connect a sizable chunk of the population living in remote and inhospitable regions.