Syllabus subtopic: Awareness in the fields of IT, Space, Computers, robotics, nanotechnology, bio-technology and issues relating to intellectual property rights.

News: SpaceX, the world’s leading private company in space technology, has launched 60 satellites into the low earth orbit, under the Starlink network project.

Prelims focus: Different orbits, about the Starlink network project.

Mains focus: Significance of the project and challenges present.

About Starlink Project:

- The Starlink network is one of several ongoing efforts to start beaming data signals from space.

- Under the project, the company intends to evolve into a constellation of nearly 12,000 satellites.

- The aim is to provide low-cost and reliable space-based Internet services to the world.

- The project announced in 2015, has now 122 satellites in the orbit.

Significance of the project:

The project ensures that reliable and uninterrupted Internet services are universally available in every part of the globe.

- Currently, about 4 billion people, more than half the world’s population, do not have access to reliable Internet networks.
- And that is because the traditional ways to deliver the Internet — fibre-optic cables or wireless networks — cannot take it everywhere on Earth.
- In many remote areas, or places with difficult terrain, it is not feasible or viable to set up cables or mobile towers.
- Signals from satellites in space can overcome this obstacle easily.

Why use low earth orbit (LEO) instead of geostationary?

Geostationary orbit is located at a height of 35,786 km over the Earth’s surface, directly
above the Equator. Satellites in this orbit move at speeds of about 11,000 km per hour, and complete one revolution of the Earth in the same time that the earth rotates once on its axis. To the observer on the ground, therefore, a satellite in geostationary orbit appears stationary.

**Advantages:** Signals from geostationary orbit can cover a very large part of the Earth. Signals from one satellite can cover roughly a third of the planet — and three to four satellites would be enough to cover the entire Earth. Also, because they appear to be stationary, it is easier to link to them.

**Issue**

- There is a **time lag** — called latency — between a user seeking data, and the server sending that data.
- And because data **transfers cannot happen faster than the speed of light** (in reality, they take place at significantly lower speeds), the longer the distance that needs to be covered the greater is the time lag, or latency.
- A transmission from a **satellite in geostationary orbit has a latency of about 600 milliseconds**.

**How low earth orbit seeks to solve this issue?**

A satellite in the lower orbit, 200-2,000 km from the Earth’s surface, can bring the lag down to 20-30 milliseconds, roughly the time it takes for terrestrial systems to transfer data.

**Concerns over LEOs:**

Owing to their lower height, **their signals cover a relatively small area**. As a result, many more satellites are needed in order to reach signals to every part of the planet.

**Other issues include:** Increased space debris, increased risk of collisions, and the concern of astronomers that these constellations of space Internet satellites will make it difficult to observe other space objects, and to detect their signals.