

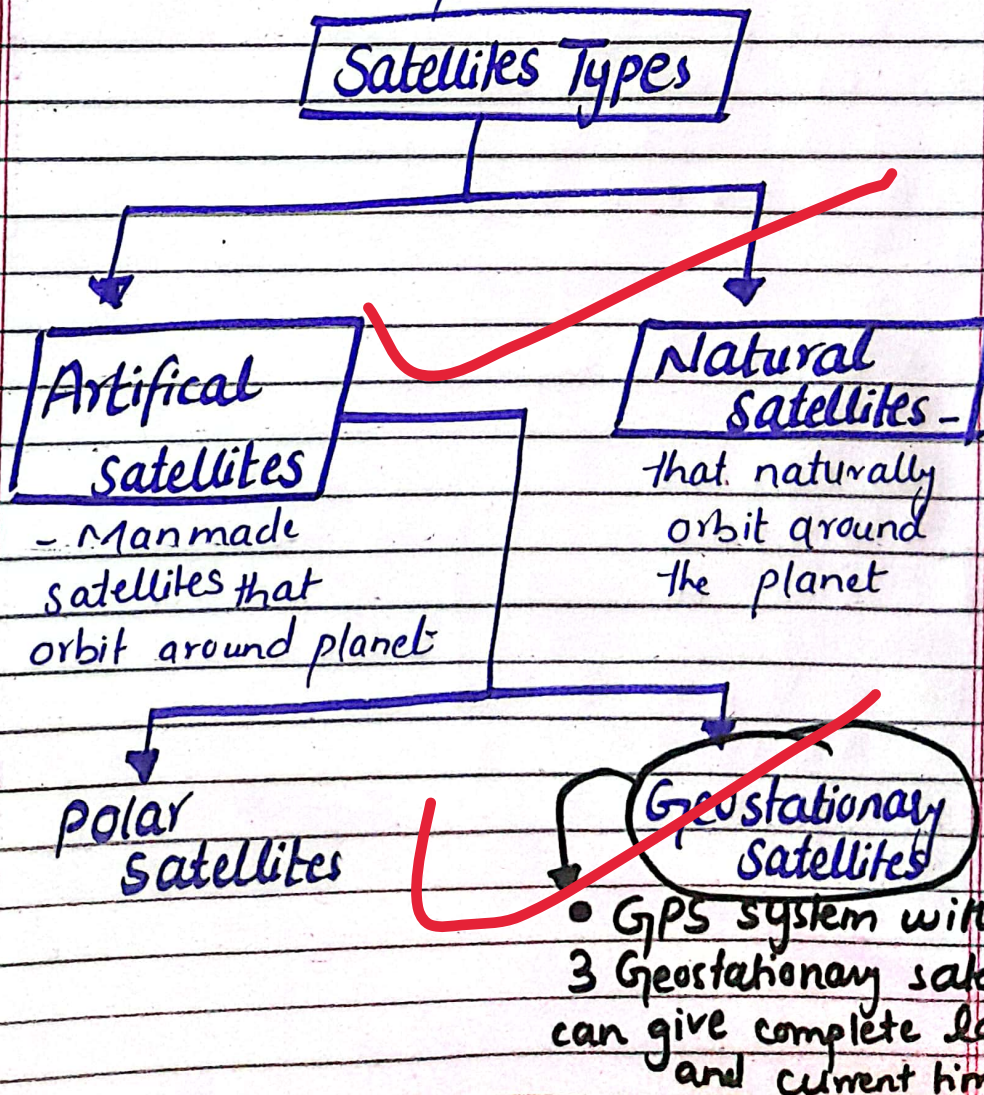
GPS - short note and how does it work? - (Past paper topic)

GPS

• GPS stands for Global Positioning System.

• GPS is a system of navigation in space. This navigation system consists of constellations of 24 satellites orbiting around the Earth.

Satellites: Any object surrounding around the planet.



Facts about GPS:

GPS system was introduced by the U.S army defense system.

The purpose of it was to use for military purpose. But in 1980's it started to use for civil works as well.

- First satellite of GPS was introduced in space in 1974.
- Constellation of 24 satellites was introduced in space in 1994.
- GPS satellites provides information anytime and anywhere in 24 hours, irrespective of weather conditions.
- Each GPS satellite is launched to last for 10 years but variations can be installed in the orbit.
- The weight of GPS system was 2,000 pounds and 17 feet across the solar with power of 50kw or less.
- It consists of system of 24 satellites orbiting around the Earth. It provides information of location and current time.

GPS
can
provide
information

2D - 2 dimensional
(longitudinal and
latitudinal)

↳ When the
receiver system of
GPS uses 3 or two
satellites signals
to collect information -
we get 2D information
of current location & time.

3D

(longitude, latitude and altitude) of location.

↳ When the receiver system of GPS
uses more than 3 satellites^{signals} to
collect information - we get 3D
information of current location and
time.

Parts of GPS

(3 parts)

Control system

User System

Receiver System

under the supervision of
US, Air force

~ Working of GPS ~

The space based satellite navigation system, GPS, comprising of 24 or 32 satellites in the middle orbit of the Earth.

→ GPS ~~orbital~~ satellites orbits around the Earth ~~two~~ times a day.

→ GPS send signals from the space which is received by receiver system of GPS.

The receiver system uses triangulations to calculate user's exact location.

→ Basically, the GPS receiver compares the time a signal transmitted by the satellite and the time it was received.

By the time difference, one can found how far the satellite is. Once the distance is found, the information about user current location and time

can be found along with other information including speed, bearing velocity, distance from destination, sunrise, sunset time etc.

→ GPS can provide 2D and 3D information on electronic map of unit:

A GPS receiver when uses the signals of atleast 3 satellites it can calculate the 2D position (longitude and latitude) and track movement.

With four or more satellites in view, receiver can determine user's 3D position (longitude, latitude and altitude)

→ Once the position of user is determined, other information like speed, bearing track, distance from destination, sunrise and sunset time and more can be determined.

In GPS, 3 Geostationary satellites can be sufficient to obtain information as one Geostationary satellite covers 120° angle and three Geostationary satellites will cover $(120^\circ + 120^\circ + 120^\circ = 360^\circ)$ 360° angle - So whole Earth can be covered by just 3 Geostationary satellites

Diagram showing 3 Geostationary Satellites

