Date
22-07-2020

Science & Tech. Class - 5

Topics – Space Technology, Basic Terminology
Concepts of Orbits.

ENERGY

- Govt. Scheme & Programme – Social Issue
- Nuclear Diplomacy – IR

} Material (S&T)

In Last Lecture (Lect-1B)

Space Technology + ICT + Defance

Dual Tech

Terminology:

- Satellite
- Shuttle
- Space craft ← Those object, we send in space
- Launch Vehicle
- Rocket
- Missile

Satellite

- always defined in the respect of orbit.
- orbit – attraction
  ↓
  gravity.

Shuttle

↓

- Reusable
- Astronaut / Cosmonaut
- used for space delivery system

(2)

Orbit

- Inner Orbit (upto 36,000 km)
- Outer Orbit (>36,000 km)

→ Satellite never comeback.

→ ISS (Inter Space Station)

→ eg: EVA / Space walk

Extra vehicular Activity

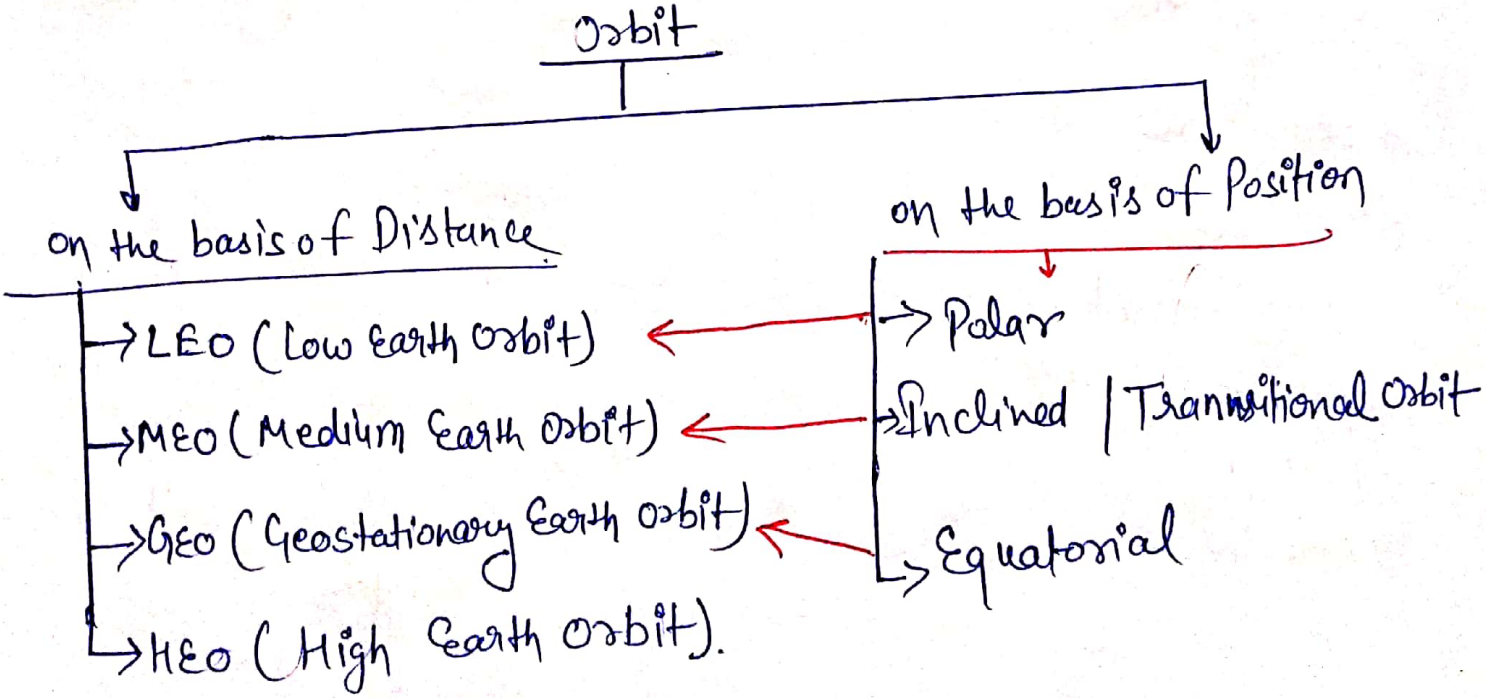
- Tethered EVA
- Untethered EVA
  - ↓
  - Astronaut independent and free from shuttle.

Kessler Syndrome —— space debrises

Rocket - It is a kind of delivery Engine / Motor used in Launch vehicle & Missile.

Missile — carried warhead.

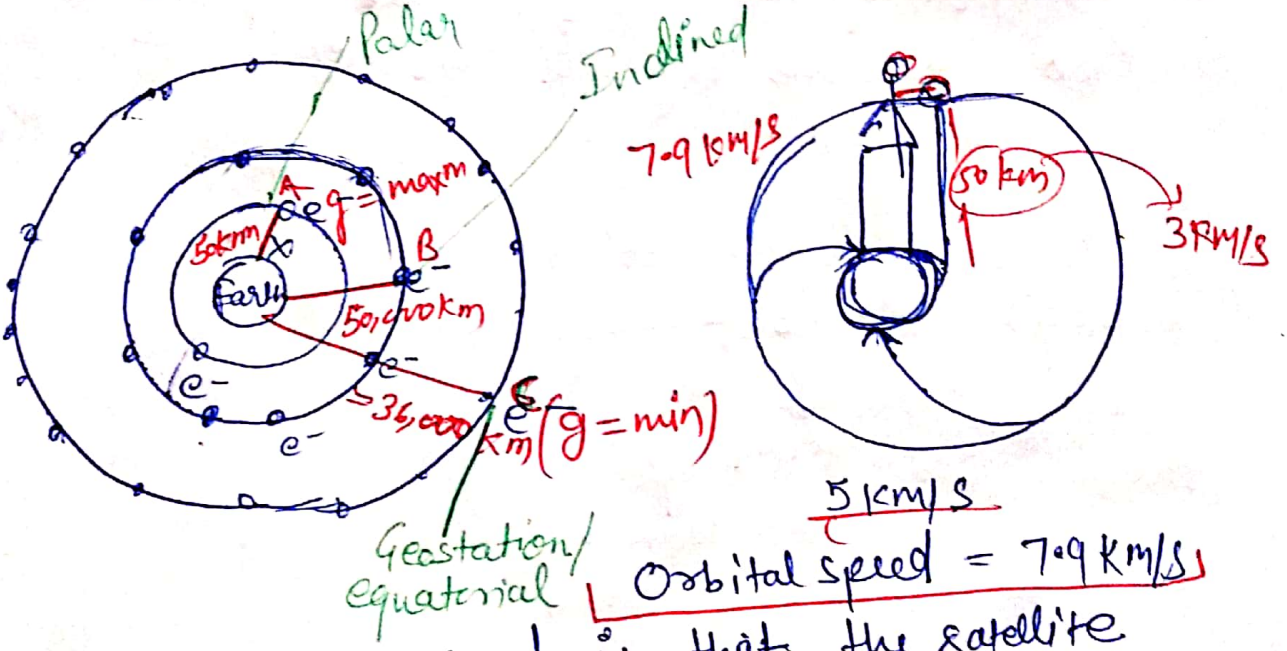
Orbit



LEO – (50 – 2000 km)
MEO – (5000 – 20000 km)
GEO – (approx ≤ 36,000 km)
HEO – (> 36,000 km)

} Inner Orbit
} Outer Orbit

Q. Why satellite not fall down to the surface of Earth ? (2011 Prelims)



Orbital speed = 7.9 km/s

⇒ A certain speed is required in that the satellite orbital not fall down to the surface of Earth.

⇒

Distance (km)	Orbital speed (km/sec)	Orbital Period
50	7.9 km/s	90 min
36,000	3.1 km/s	24 hrs

④

Types of Orbit

① Polar Orbit
② Polar sunsynchronous orbit
③ GPS orbit
④ Geostationary Earth Orbit (GEO)
⑤ Geosynchronous orbit
⑥ Geosynchronous Transfer Orbit (GTO)

Types/Name of Satellites

① Experimental Satellite
② University Satellite
③ Remote Sensing Satellite
④ Earth observation Satellite
⑤ INSAT / GSAT

Polar orbit

(LEO) Dist – 50 — 1500 km — 2000 km

90 min

120 min (2 hour)

Polar Sun synchronous Orbit – is the best orbit for remote sensing satellite.

(Dawn & Dusk Orbit)

798 km
98.6° Inclination

every moment of time it is living like that satellite follow path of sun.

#Geostationary Earth Orbit

→ Communication and Navigation are possible in this orbit.
→ 24X7
→ This is that orbit where earth rotation and revolutionary time period of satellite both same as 24 hours.

Geosynchronous orbit

Earth together time two

→ In the respect of earth and satellite both timing are same.
→ Time Specific
→ Complete revolution - 24 hr
→ W → E ✓
E → W ✗ not for communication.
→ 36000 km ± 5000 - 6000 km
→ Circular to Elliptical.

Geostationary Earth orbit

→ Location Specific
→ Complete revolution - 24 hrs
→
→ W → E
= 36,000 km
→ In circular orbit

Note Point

* Geostationary satellite are Geosynchronous satellite, but all Geosynchronous are not Geostationary.

IRNSS → Regional GPS of India.

Total 7 Constellations

3 GEO 4 GTO

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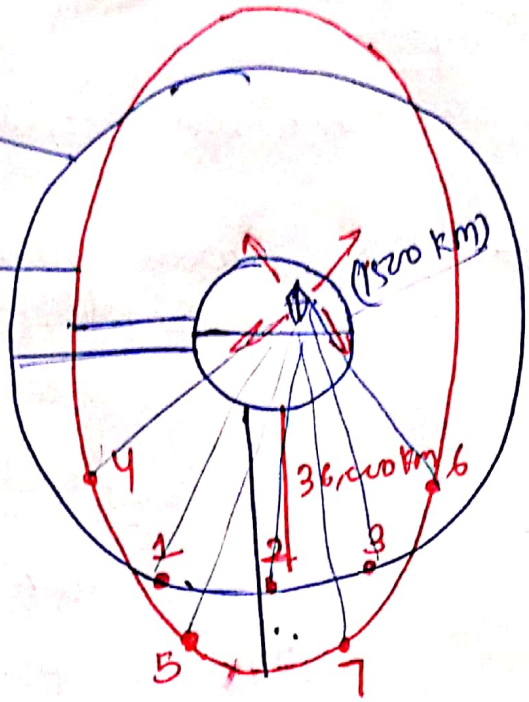
Geo synchronous → Circular (GEO) + GTO Elliptical



GEO
1, 2, 3

GTO
└ 4, 5, 6, 7

GPS

Global GPS
×

Regional GPS
↳ 18+ Satellite

International launching Station

Those site which is used to launch any satellite.

That is - Kourou (French Guyana) - S. America.

* Location → Close to equator → g - minimum
→ Eastern Coast so easy to uplift

other place

* Cape Canaveral
NASA in Florida USA
↳ (Launch Vehicle)

W → E (in respect of rotation of earth)