

GSLV-Mk3/LVM3: ISRO's Launch Vehicle

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Why in News?

- Indian Space Research Organisation's (ISRO) GSLV-Mk3/LVM3 successfully put into space **36 satellites of Bharti-backed OneWeb** enabling the completion of the UK firm's first generation (Gen-1) Low Earth Orbit (LEO) constellation.
- The mission was the **second (1st - GSAT-24) dedicated commercial satellite mission** undertaken by Space PSU NewSpace India Limited (NSIL) for Network Access Associates Ltd (OneWeb).

What is the Geosynchronous Satellite Launch Vehicle (GSLV)?

- It is a (49 meters tall) is a 3-stage **space launch vehicle** designed, developed and operated by the ISRO to launch satellites and other space objects into Geosynchronous Transfer Orbits (GTO ~37,000 km).
 - The 1st stage (S139) **generates maximum thrust**.
 - The 2nd stage uses a **liquid** rocket engine which is known as Vikas engine.
 - The 3rd stage uses a **Cryogenic engine**, which uses liquefied oxygen and hydrogen as fuel.
- GSLV has the capability to put **a heavier payload** (up to 5,000 kg up to 37,000 km) in orbit than the Polar Satellite Launch Vehicle (PSLV can carry up to 2000 kg into space up to 600-900 km).
 - PSLV is designed mainly to deliver earth observation or remote sensing satellites, whereas GSLV has been designed for launching **communication satellites**.
 - GSLV delivers satellites into a **higher elliptical orbit** – GTO.
- **GSLV-D5** – launched in 2014 – was the first successful flight of the GSLV using the indigenous cryogenic engine (CE-7.5).
- The current configuration of GSLV with a CE-7.5 cryogenic engine, can put a payload of up to –
 - 2500 kg in the GTO
 - 5000 kg in Low Earth Orbits (LEO – altitude 2000 km or less)

What is the GSLV MkIII?

- GSLV MkIII Project was approved in **2002**, with a mandate of achieving the capability to launch a 4-ton (4000 kg) class satellite to Geo-Synchronous orbit, by realizing an indigenously developed launch vehicle.
- GSLV MkIII (43.5 m height and a gross lift-off weight of 640 tonnes) is configured as **a three-stage vehicle** with two solid strap-on motors (S200), one liquid core stage (L110) and a high thrust CUS (configured with the fully indigenous cryogenic engine – CE20).
- **Characteristics of GSLV MkIII:**
 - Performance capability of 4.3 ton to GTO
 - Payload capability to support 10 ton to LEO missions
 - Cost effective
 - Improved reliability, operability and redundancy management
 - **Future growth potential of payload with minimal design changes**
 - To support manned missions (like Gaganyaan mission) of Indian Space Programme
- The maiden operational flight of GSLV MkIII has successfully launched **Chandrayaan-2 spacecraft** into the Super Geo-Synchronous Transfer Orbit in 2019.

What Exactly is the LVM3 Mission?

- NSIL – a central public sector enterprise (CPSE) under the Department of Space and the commercial arm of the ISRO, has signed two launch service contracts with M/s OneWeb, **United Kingdom**.
 - **OneWeb** is a (Bharti group-backed) global communications network, powered from space, enabling connectivity for governments, businesses, and communities.
- As part of this contract, **36 communication satellites** were placed into orbit by LVM3 – ISRO’s heaviest launcher, from Satish Dhawan Space Centre, under the **OneWeb India-1 Mission**.
- This is the **first** LVM3 dedicated commercial launch (earning the agency upwards of Rs 1,000 crore) and through this launch LVM3 is making its entry into the **Global commercial launch service market**.
- This is the **second flight** of the GSLV MkIII, since it carried India’s second lunar mission Chandrayaan-2.
- **The OneWeb has set a significant benchmark** for the Indian space industry in downstream application of satellite communication in India.
- It will pave the way for India **to move towards benefiting from remarkable capabilities of LEO connectivity** and the spread of **space-based internet**, bridging the digital divide in the country’s most remote areas.

What are ISRO’s Future Endeavours?

- The space agency is looking at a PSLV commercial mission, GSLV-Mk3 (for **Chandrayaan-3**) mission and a GSLV-Mk2 mission (for **Nisar**) in the coming months.
- The LVM3 mission has also given ISRO more confidence about the rocket which will be used for **Gaganyaan mission** (Human Spaceflight Programme).

Q1) What is Chandrayaan-3 mission?

Chandrayaan-3 is India’s third moon mission and is a follow-on mission to Chandrayaan-2 to demonstrate end-to-end capability in safe landing and roving on the lunar surface. The mission is slated to be launched later this year by Launch Vehicle Mark 3 (LMV3) from the Satish Dhawan Space Centre at Sriharikota.

Q2) What is Gaganyaan mission?

Gaganyaan project envisages demonstration of human spaceflight capability by launching a crew of 3 members to an orbit of 400 km for a 3 days mission and bring them back safely to earth, by landing in Indian sea waters.

Source: [ISRO successfully launches 36 satellites, completing OneWeb constellation](#) | [IE](#)

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