

PSLV Orbital Experimental Module (POEM)

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In news– Recently, ISRO has successfully launched the PSLV Orbital Experimental Module or 'POEM'.

About POEM-

- It is a platform that will **help perform in-orbit experiments** using the Polar Satellite Launch Vehicle (PSLV).
- **The PSLV is a four-stage rocket where the first three spent stages fall back into the ocean**, and the final stage (PS4) – after launching the satellite into orbit – ends up as space junk.
- However, in **PSLV-C53 mission, the spent final stage will be utilised as a “stabilised platform”** to perform experiments.
- **It is the first time that the PS4 stage would orbit the earth as a stabilised platform.** After the primary mission, the fourth stage will “write some poems in orbit”.
- **POEM is carrying six payloads, including two from Indian space start-ups Digantara and Dhruva Space.**
- According to ISRO, **POEM has a dedicated Navigation Guidance and Control (NGC) system** for attitude stabilisation, which stands for controlling the orientation of any aerospace vehicle within permitted limits.
- **The NGC will act as the platform’s brain to stabilize it with specified accuracy.**
- **POEM will derive its power from solar panels mounted around the PS4 tank, and a Li-Ion battery.** It will

navigate using “four sun sensors, a magnetometer, gyros & NavIC”.

- It carries dedicated control thrusters **using Helium gas storage**. It is enabled with a telecommand feature.
- **ISRO first demonstrated the capability of using PS4 as an orbital platform in 2019** with the PSLV-C44 mission that injected Microsat-R and Kalamsat-V2 satellites into their designated orbits.
- The fourth stage in that mission was kept alive as an orbital platform for space-based experiments.
- After the successful PSLV-C44 launch, ISRO had said that the fourth stage (PS4) of the vehicle was moved to a higher circular orbit of 453 km after two restarts of the stage, to establish an orbital platform for carrying out experiments.
- **Kalamsat-V2, a student payload, first to use PS4 as an orbital platform.**
- While in that mission, the fourth stage had **Li-Ion batteries, solar panels are an addition this time**. The latest repurposing and upgrade of the fourth stage of the PSLV rocket involves stabilization of the orbital platform.

Timeline of launch vehicles in India-

- **Sounding rockets** are one or two stage solid propellant rockets used for probing the upper atmospheric regions and for space research.
- The **launch of the first sounding rocket** from Thumba near Thiruvananthapuram, Kerala on 21 **November 1963, marked the beginning of the Indian Space Programme**.
- ISRO started launching **indigenously made sounding rockets from 1965**.
- **Satellite Launch Vehicle-3 (SLV-3) was India’s first experimental satellite launch vehicle**, which was an all solid, four stage vehicle.

- **SLV** was launched in 1980 , when Rohini satellite, RS-1, was placed in orbit, thereby making India the sixth member of an exclusive club of space-faring nations.
- Under **Augmented Satellite Launch Vehicle (ASLV)** programme, first developmental flight took place on March 24, 1987 and the second on July 13, 1988.
- **Polar Satellite Launch Vehicle (PSLV)** is the third generation launch vehicle of India. It is the **first Indian launch vehicle to be equipped with liquid stages.**
- After its **first successful launch in October 1994**, PSLV emerged as the reliable and versatile workhorse launch vehicle of India.



- **Geosynchronous Satellite Launch Vehicle Mark II (GSLV Mk II)** is the **largest launch vehicle** developed by **India**, which is currently in operation. First satellite under this vehicle was launched in India.
- **GSLV MkIII, chosen to launch Chandrayaan-2 spacecraft**, is a three-stage heavy lift launch vehicle developed by ISRO.
- The **first experimental flight of GSLV MkIII conducted in December 2014.**
- **Reusable Launch Vehicle – Technology Demonstrator (RLV-TD)** is one of the most technologically challenging endeavors of ISRO towards developing essential technologies for a fully reusable launch vehicle to enable low cost access to space.

- **RLV-TD was successfully flight tested on May 23, 2016.**
- **The first experimental mission of ISRO's Scramjet Engine towards the realisation of an Air Breathing Propulsion System was successfully conducted on August 28, 2016 from Satish Dhawan Space Centre SHAR, Sriharikota.**