Chandrayaan-3 Propulsion Module Returns to Earth's Orbit

Source: IE

Why in News?

Recently, scientists successfully brought the **Propulsion Module (PM)** of the **Chandrayaan-3 mission,** which brought the **Vikram lander** within **100 km** of the **Moon's surface** before detaching.

- This historic event involved a controlled descent to the **lunar surface** and a successful return to **Earth orbit.**

What is Mission Chandrayan?

- India has launched a total of three Chandrayaan Missions i.e., **Chandrayan-1, Chandrayaan-2** and **Chandrayan-3.**
- **Chandrayaan-1**:
  - India's **first mission to the Moon** was **Chandrayaan-1** launched successfully in **2008.** It was designed to orbit the Moon and make observations with instruments on board.
  - **Key Findings of Chandrayaan-1:**
    - Confirmed presence of **lunar water.**
    - Evidence of **lunar caves** formed by an ancient lunar lava flow.
    - **Past tectonic activity** was found on the lunar surface.
    - The faults and fractures discovered could be features of **past interior tectonic activity** coupled with meteorite impacts.
- **Chandrayan-2:**
  - **Chandrayaan-2** is an integrated **3-in-1 spacecraft** consisting of an orbiter of the **Moon, Vikram (after Vikram Sarabhai)** the lander and **Pragyan (wisdom)** the rover, all equipped with scientific instruments to study the moon.
  - **Launched: 22th July 2019**
    - **Lander Vikram:** It remains stationary after touching down, and mainly studies the moon’s atmosphere and seismic activity.
    - **Rover Pragyan:** The Rover, a **six-wheeled solar-powered vehicle,** detaches itself and slowly crawls on the surface, making observations and collecting data.
    - Chandrayaan-2's lander had **crashed,** or made a **hard landing,** on the **Moon's surface** because of its **high velocity.**
      - However, its **orbiter** is functioning very well and this will communicate with **Chandrayaan-3 lander.**
- **Chandrayaan-3:**
  - It was **India's third lunar mission** and second attempt at achieving a **soft landing** on the **moon's surface.**
  - **Launched:** July 14, 2023.
  - **Objectives:**
    - To demonstrate Safe and Soft Landing on Lunar Surface
    - To demonstrate Rover roving on the moon
    - To conduct In-situ scientific experiments.
  - It consists of an indigenous **Lander module (LM), Propulsion module (PM)** and a Rover with an objective of developing and demonstrating new technologies required for

Interplanetary missions.

What is the Chandrayaan-3 Propulsion Module?

- **Chandrayaan-3:** It utilized a lightweight **Propulsion Module** for the **lander's journey** to the Moon instead of a complete orbiter.
- **SpectroPolarimetry of Habitable Planet Earth (SHAPE):** The **Chandrayaan-3 propulsion module** carried a single instrument called **SHAPE**.
    - It was an experimental payload designed to study **Earth's characteristics** that make it habitable, aiming to identify habitable exoplanets.
- **Pragyaan Rover:** The **propulsion module** separated from the **lander,** which carried the **Pragyaan rover.** It was anticipated to orbit the Moon for an additional **six months**, with **SHAPE** observing Earth.

How Does the Propulsion Module Return to Earth Orbit?

- The experiment allows **ISRO** to work towards developing a **software module** to plan going forward.
- Taking **fuel availability** and **safety** into account, designed the best trajectory for the Earth return.
- The **SHAPE payload** is operated whenever Earth is visible, including a special operation.

UPSC Civil Services Examination, Previous Year Question (PYQ)

Prelims

Q. Consider the following statements: (2016)

The Mangalyaan launched by ISRO

1. is also called the Mars Orbiter Mission
2. made India the second country to have a spacecraft orbit the Mars after USA
3. made India the only country to be successful in making its spacecraft orbit the Mars in its very first attempt

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) 1, 2 and 3

Ans: (c)

Mains

Q. Discuss India’s achievements in the field of Space Science and Technology. How the application of this technology has helped India in its socio-economic development? **(2016)**