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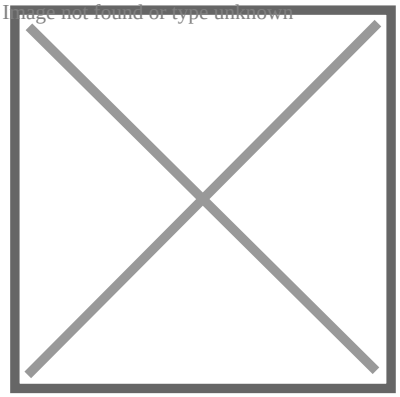


Chandrayaan-3

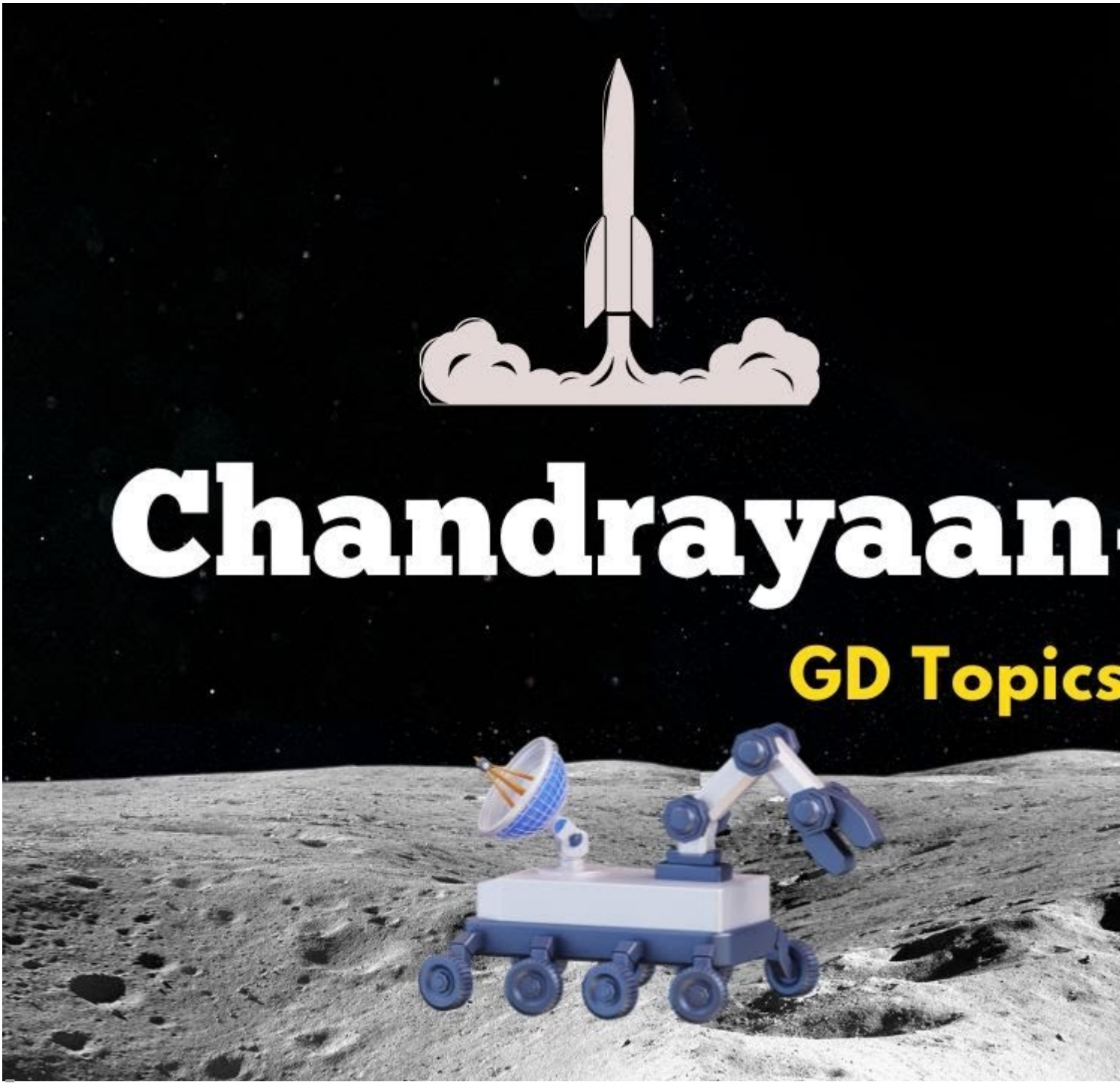
Description

Theme:

- On August 23, 2023, India's Chandrayaan-3 spacecraft successfully soft-landed on the moon's south pole.
- The Chandrayaan-3 mission was launched on July 14, 2023, from the Satish Dhawan Space Centre in Sriharikota, Andhra Pradesh.
- The spacecraft consists of a lander, a rover, and an orbiter.
- The lander, named Vikram, successfully touched down on the moon's surface, and the rover, named Pragyan, has also been deployed from the lander and will begin exploring the lunar surface.
- With this, India has become the 4th country in the world to place a rover on the lunar surface after the US (sent astronauts in 1969), Russia (sent a rover in 1970), and China (sent a rover in 2013).
- India is the first country to soft-land on the south pole of the moon.
- Till now, most moon missions have been landed on the moon's equator because it is easier to land a rover away from the poles.

Main objectives of Chandrayaan-3:

- The Chandrayaan-3 mission is expected to last for one year.
- During this time, the Pragyan rover will explore the Moon's south pole and search for water ice and evidence of life.
- The orbiter will continue to orbit the Moon and collect data.
- The Vikram lander is also equipped with a variety of instruments that it will utilize to study the Moon's surface and perform on-site experiments.



The significance of the Moon's south pole:

- On the moon's south pole, only elevated peaks receive sunlight. Low-lying areas do not receive sunlight and remain in the dark all the time.
- Such areas have extremely low temperatures. These cold traps can be store-house of water ice.
- This region could have also preserved any organic molecules that may have been present on the moon when it formed

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- The areas on the Moon, which do not receive sunlight at all may reveal clues about the early solar system and the formation of the earth and the moon because freezing temperatures keep everything trapped.
- Exploring these areas can help establish human settlements on the moon. This can eventually lead to exploring space from the lunar surface.
- It is easier to launch rockets from the Moon's surface than from Earth's because the gravity on the Moon is 1/6th of the gravity on Earth, and there is no atmosphere on the Moon.

How did Chandrayaan-3 reach the Moon:

- The total journey consisted of three stages: Earth orbit maneuvers, Trans-Lunar injections, and Lunar orbit maneuvers. Initially, the LVM3-M4 rocket placed the Propulsion module + Vikram Lander + Pragyan Rover module in an elliptical orbit around the Earth.
- From there, the propulsion module took over and conducted orbit-raising exercises to increase the distance from Earth with each one. After that, it travelled towards the moon. This was called 'Trans Lunar injection'.
- Subsequently, it conducted Lunar orbit maneuvers to approach the moon with each maneuver. When it reached a circular orbit of 100 km x 100 km, the propulsion module was separated from the Lander + Rover module. The Lander + Rover module travelled towards the moon's surface and gradually reduced its speed to softly land on the moon.
- After landing on the moon's surface, the rover module was separated from the lander module and it will now collect samples to conduct on-site experiments.

Previous Moon missions of India:

- Chandrayaan-1 was launched in 2008. It was India's first mission to the Moon. It included a lunar orbiter and the Moon Impact Probe (MIP) and was aimed at the south pole of the moon. The orbiter orbited around the moon for 312 days. MIP discovered water molecules on the surface of the moon and crash-landed on the moon's surface as planned. This was the first moon mission in the world to discover water molecules on the moon.
- Chandrayaan-2 was launched in 2019, aiming to land on the south pole of the moon. Communication was lost with the Lander + Rover module when it was just 2km above the moon's surface. The orbiter is still revolving around the moon and is collecting data. So, this mission is only a partial failure.
- Chandrayaan-3 landed on the moon in 2023 with the goal of conducting on-site experiments.

Conclusion:

The Chandrayaan-3 mission is a significant achievement for India's space program. It is a testament to the hard work and dedication of the scientists and engineers at ISRO. It is also a reminder of India's growing capabilities in space exploration.

The Chandrayaan-3 mission will help us to better understand the Moon's south pole and its potential for future human exploration. The data collected by the Pragyan rover and Vikram lander will be a valuable resource for scientists and engineers who are working to explore and

colonize the Moon. It is a major step forward in the exploration of the Moon and could have implications for future human exploration of space.

Image source: ISRO website.

Your Turn…

What are your thoughts on the Chandrayaan-3 mission? Express your point of view through the comment section below. Subscribe to our blog to read answers to the trending GD topics.

References:

- Eenadu, The Hindu & Mint newspapers.