Chandrayaan 2 Mission Essay

Chandrayaan Mission was launched by the Indian Space Research Organisation (ISRO) and was India's first mission to the moon. The spacecraft was launched on 22nd October 2008 by a modified version of the PSLV C-11 from Satish Dhawan Space Centre, Sriharikota, Andhra Pradesh. The vehicle was successfully inserted into lunar orbit on 8 November 2008.

ISRO is planning mission Chandrayaan-3 in late 2021 or early 2022. India launched Chandrayaan-2, from Satish Dhawan Space Centre, Sriharikota on 22nd July 2019.

Chandrayaan Mission is an important topic of the UPSC Syllabus. This article is an essay on Chandrayaan 2 and Chandrayaan 1 (India's lunar mission).

What is Chandrayaan 1?

In 1999, the Indian Academy of Sciences initiated an idea of undertaking an Indian scientific mission to Moon. This initiative was followed by a discussion with the Astronautical Society of India in 2000. Based on the recommendations, a National Lunar Mission Task Force was constituted by the Indian Space Research Organisation (ISRO). Thereafter, India's first lunar mission Chandrayaan – 1 was launched on 22nd October 2008 from Satish Dhawan Space Centre at Sriharikota, Andhra Pradesh.

Objectives of Chandrayaan 1:

- To perform high-resolution remote sensing of the moon's surface.
- To provide a three-dimensional atlas of the Moon (near and far side).
- To conduct chemical and mineralogical studies for mapping of the entire lunar surface.
- To test the impact of a sub-satellite on the lunar surface for its future soft-landing missions.

The mission successfully detected the presence of titanium and calcium along with the accurate measurements of iron, aluminium and magnesium on the moon. The Chandrayaan Mission 1 ended on 28 August 2009 after the communications to the probe were suddenly lost. The probe lasted for 312 days. The estimated cost of this project cost was Rs.386 Crore or US$60 million.

Essay on Chandrayaan 2

Chandrayaan – 2 is the second lunar mission of India after the success of Chandrayaan 1. This mission was conducted for topographical researches and mineralogical studies to have a better understanding of the Moon's origin and evolution. Chandrayaan 2 Mission was launched from the Satish Dhawan Space on July 22, 2019, by **GSLV Mk III-M1**. The main aim of Chandrayaan 2 was to trace the location and abundance of lunar water on the moon's surface.

Highlights of Chandrayaan 2

- Chandrayaan 2 fostered the findings of Chandrayaan 1 as reported by the ISRO.
- The mission targeted the "South Polar region" of the Moon which was completely unexplored.

- The mission focused on the extensive mapping of the lunar surface for studying variations in its composition and tracing the Moon's origin and evolution.
- Chandrayaan 2 was considered as a challenging mission as the South Polar Region of the Moon was totally unexplored by any space agency before.

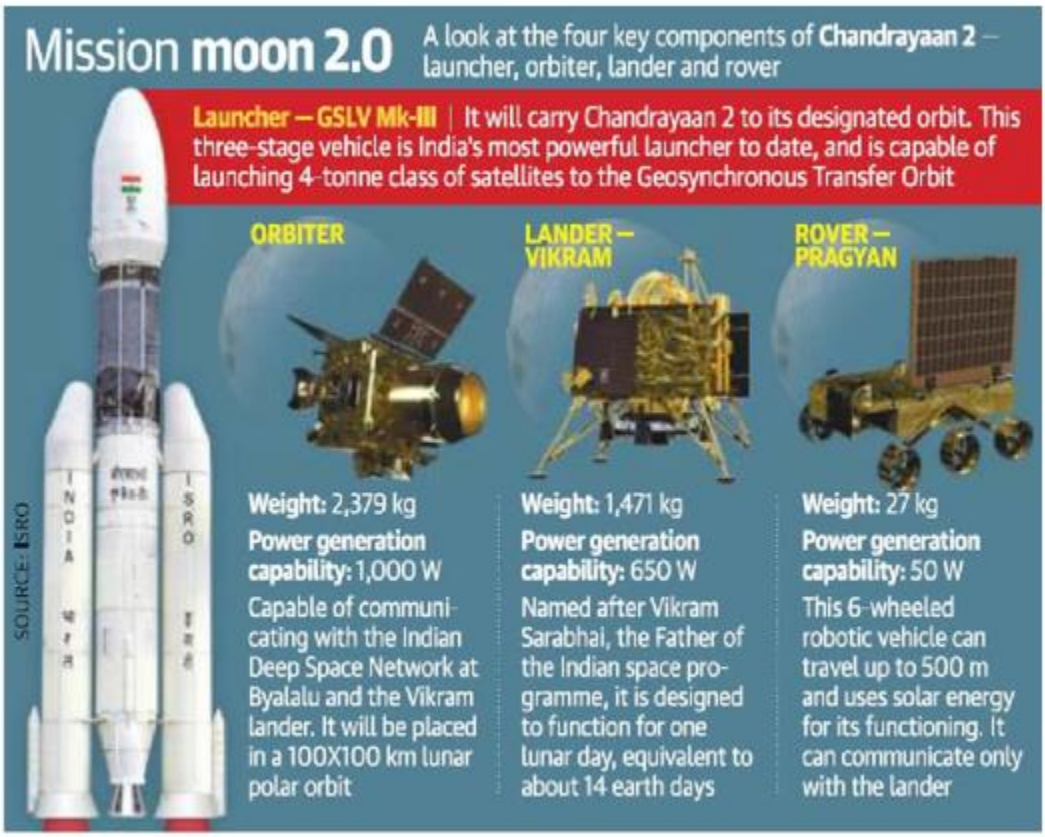
Components of Chandrayaan – 2: Launch Vehicle

- S200 solid rocket booster
- L110 liquid state
- C25 Upper stage

The Chandrayaan-2 mission consisted of three main modules:

1. lunar orbiter
2. Vikram lander (named after Vikram Sarabhai, the late father of India's space program)
3. lunar rover named Pragyan

All of the above parts were developed in India.



The orbiter, lander and rover collectively carried 14 scientific payloads, including a Laser Retro Reflector Array from NASA that provided precise measurements of the distance between the Moon and the Earth. Chandrayaan-2's orbiter shall continue its mission for around a year.

The Indian space programme form a part of the science and technology and current affairs segments of the UPSC syllabus and is an important topic for the UPSC exam. Aspirants can refer to the UPSC Mains Syllabus at the linked article.

Significance of Chandrayaan 2

In all the space missions, no country has ever attempted to land a spacecraft in the polar regions of the moon. This gave India a lead in space exploration on an international level.

1. Due to the moon's axis, few regions on the South Pole always remains dark especially the craters and have higher chances of containing water.
2. The craters might have never received sunlight because it at very low angles in the Polar Regions and thus, increasing the chances of presence of ice on such surfaces.
3. The lunar surface area at the south pole of the Moon that remains in shadow is much larger than the North Pole thus making moon's South Pole interesting. This also increases the probability of the existence of water in permanently shadowed areas around it.
4. The second de-orbiting manoeuvre for Chandrayaan-2 spacecraft was performed successfully today on September 04, 2019, beginning at 0342 hrs IST as planned, using the onboard propulsion system. The duration of the manoeuvre was 9 seconds.
5. On October 14, 2019, Chandrayaan-2 detected the presence of Argon-40 in the lunar exosphere.
6. On July 30th, 2020 Chandrayaan-2 imaged the Sarabhai Crater located on the north-east quadrant of the moon

Chandrayaan-2 Mission: Updates

1. The orbital insertion was achieved on 20th August 2019. The Orbiter has a life duration of 7 years and will continue its mission.
2. Vikram Lander had a mission life of 14 days. The landing on the moon's surface was planned on 7th September 2019. However, the landing failed at the final stages. Vikram lander crash-landed on the moon's surface as the velocity was higher than desired velocity (2 m/s) and the Failure Analysis Committee of ISRO concluded that a software glitch was the cause of the failure.
3. Pragyan Rover was planned for a duration of around 14 days. As the landing failed, the rover could not be deployed on the moon's surface.

(ISRO) has released the data from the country's second mission to the Moon, the Chandrayaan-2, for the general public.

- The Chandrayaan-2 data is required to be in the Planetary Data System-4 (PDS4) standard, and is required to be peer reviewed scientifically and technically before acceptance as PDS archives and declared ready for sharing with the global scientific community and the general public.
- This activity has been completed and hence the first set of data from the Chandrayaan-2 mission is now being released for the wider public use through the PRADAN portal hosted by Indian Space Science Data Centre (ISSDC).
    - ISSDC is the nodal centre of planetary data archive for the planetary missions of ISRO.

- All experiments have been performing well and the data received suggests excellent capability to deliver on the pre-launch promises.
- The ISRO Science Data Archive (ISDA) currently holds data sets acquired by Chandrayaan-2 payloads from September-2019 to February-2020 from seven instruments.
    - ISDA is the long-term archive for ISRO planetary missions.