Chandrayaan-3

Chandrayaan-3 is the third and most recent lunar Indian Space Research exploration mission under the Chandrayaan program. It consists of a lander named Vikram and a rover named Pragyan, similar to Chandrayaan-2, but does not have an orbiter. Its propulsion module behaves like a communication relay satellite. The propulsion module carries the lander and rover configuration until the spacecraft is in a 100 km lunar orbit.
Following Chandrayaan-2, where a last-minute glitch in the landing guidance software led to the lander crashing after entering lunar orbit, another lunar mission was proposed.
The launch of Chandrayaan-3 took place on July 14, 2023, at 2:35 pm IST, and lunar injection of a 100 km circular polar orbit was completed successfully as part of phase one. The lander and rover are expected to land near the lunar south pole region on August 23, 2023. The Chandrayaan-3 mission is a stepping stone towards ISRO's future interplanetary missions.

Objective

ISRO has set three main objectives for the Chandrayaan-3 mission, which include:

1. Getting a lander to land safely and softly on the surface of the moon
2. Observing and demonstrating the rover's loitering capabilities on the moon,
3. on-site observation and conducting experiments on the materials available on the lunar surface to better understand the composition of the moon.

Design

Chandrayaan-3 comprises three main components:

Propulsion Module:

The propulsion module will carry the lander and rover configuration until a 100 km lunar orbit. It is a box-like structure with one large solar panel mounted on one side and a large cylinder on top (the Intermodular Adapter Cone) that acts as a mounting structure for the lander.

Lander:

The lander is responsible for the soft landing on the Moon. It is also box-shaped, with four landing legs and four landing thrusters of 800 newtons each. It will carry the rover and various scientific instruments to perform on-site analysis.

The lander for Chandrayaan-3 will have only four throttle-able engines, unlike Vikram on Chandrayaan-2 which had five 800 Newtons engines with a fifth one being centrally mounted with a fixed thrust. Additionally, the Chandrayaan-3 lander will be equipped with a Laser Doppler Velocimeter (LDV). The impact legs are stronger compared to Chandrayaan-2 and have increased instrumentation redundancy. ISRO is working on improving the structural rigidity and adding multiple contingency systems.

Propulsion Module:

Chandrayaan-3 Rover Overview:

1. Six-wheeled design
2. Weight of 26 kilograms (57 pounds)
3. Range of 500 metres (1,600 ft)
4. Dimensions : 917 millimetres (3.009 ft) x 750 millimetres (2.46 ft) x 397 millimetres (1.302 ft)
5. Scientific instruments, including cameras, spectrometers, and a drill
6. Expected lifespan of one lunar day (14 Earth days)
7. Communication with the landing and ground control teams in India