



## Mains Practice Question

**Q.** What is the main task of India's third moon mission which could not be achieved in its earlier mission? List the countries that have achieved this task. Introduce the subsystems in the spacecraft launched and explain the role of the Virtual Launch Control Centre' at the Vikram Sarabhai Space Centre which contributed to the successful launch from Sriharikota. (Answer in 250 words, UPSC Mains 2023)

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### Approach

- Start with a brief introduction to Chandrayaan-3.
- Mention its components and their functions and how it could be a game changer for India.
- Conclude with the significance of Chandrayaan-3's success.

### Introduction

The Chandrayaan-3 created history for India and the world by doing the first soft landing on the south pole of the moon. India joined the United States, Russia, and China to become the 4th nation to land on the moon.

### Body

The Chandrayaan-3 comprised the Vikram Lander and Pragyaan Rover. The rover aims to move around the landing site conducting experiments and sending data to the lander which in turn will send data to the orbiter that will eventually be communicated back to the earth.

The Chandrayaan-3 could become a game-changer because the 'permanently shadowed regions' near the South Pole may contain potential water-ice and resources. For this, the various subsystems onboard Chandrayaan-3 seek to undertake several experiments.

### Lander payloads

- **Chandra's Surface Thermophysical Experiment (ChaSTE):** It measures thermal conductivity and temperature.
- **Instrument for Lunar Seismic Activity (ILSA):** It measures the seismic frequencies around the landing site.
- **Langmuir Probe (LP):** It estimates the plasma density and its changes over time.

### Rover payloads

- **Alpha Particle X-ray Spectrometer (APXS):** It determines elemental composition of lunar soil and rocks.
- **Laser Induced Breakdown Spectroscopy (LIBS):** It derives chemical composition and infers mineralogical composition of lunar surface.

### Propulsion module payload

- **Spectro-polarimetry of HAbitable Planet Earth (SHAPE):** It aims to study exo-planets for habitability.

### **Role of Virtual Launch Control Centre**

- **Nerve centre of the operation:** All procedures and operations of the launch and the mission are controlled from this place.
- **Master control:** In case of any abnormalities, safety protocols or the final abortion of the mission can be initiated from here.

### **Conclusion**

Chandrayaan-3 achieves India's first soft landing on the moon's south pole, showcasing advanced space capabilities and bolstering global influence. The mission yields vital data on lunar geology and mineralogy, influencing future projects like LuPEX with Japan (Chandrayaan 4). The success fosters international collaboration and inspires the next generation in space exploration.

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