Lunar Polar Exploration Mission (LUPEX)

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Why in news?

India's **National Space Commission** has officially approved the**Lunar Polar Exploration Mission (Lupex)**, marking the country's fifth lunar mission.

This mission follows the successful landing of**Chandrayaan-3**in August 2023, which made India the fourth nation to land on the Moon.

Lupex is a collaborative endeavor between India's**ISRO**and Japan's**JAXA**, aimed at exploring the Moon's resources, particularly **water in its polar regions**.

Goal of the LUPEX mission:

The primary goal of the **LUPEX mission, a collaborative effort between ISRO and JAXA**, is to **explore the moon's surface** and **subsurface** to **detect and analyze water**.

This involves **confirming the presence of water**, **assessing its quantity**, and understanding its **distribution and form** on and beneath the lunar surface.

Who is responsible for the different components of the mission?

ISRO is developing the lander that will carry the rover to the moon, while **JAXA is in charge of the rover and the launch vehicle**.

Additionally, the mission will include **instruments from NASA and the European Space Agency (ESA)** to enhance its scientific capabilities.

Scientific Instruments: The lander will be equipped with sophisticated scientific tools, including:

- **Ground-penetrating radar**
- **Mid-infrared spectrometer**
- **Raman spectrometer**
- **PRATHIMA payload for lunar resource scouting**

Expected launch:

The **launch is planned for a few years from now**, contingent upon the approval of ISRO's lander project by the government of India.

Technological innovations of the mission :

The mission aims to demonstrate **advanced lunar exploration technologies** such as **high-precision soil excavation, direct measurement of water ice, and enhanced rover mobility and survivability** in challenging lunar environments.

Mission Challenges:

Key challenges for the LUPEX mission include the **technical intricacies of measuring water content directly**, **excavating lunar soil** with precision, **navigating diverse and rugged lunar terrain**, and ensuring the rover can operate effectively in areas that receive no sunlight.

Benefits:

The data gathered from this mission could be **crucial for future lunar expeditions and potential habitation**, aiding in the **development of ISRO technologies for water extraction** and hydrogen production, crucial for **long-term lunar missions**.