Indian Innovation

Mangalyaan

Introduction

India's first interplanetary space mission is Mangalyaan, also known as MOM – Mars Orbiter Mission. It was launched by the Indian Space Research Organization (ISRO) on November 5, 2013, at Satish Dhawan Space Centre, Sriharikota, India.

Mangalyaan was launched by Polar Satellite Launch Vehicle PSLV-C25 and the Mars Orbit Insertion was held on September 24, 2014. It was designed for a 6-month mission, but it lasted over 8 years and in September 2022, the mission was declared closed.

Objectives

The Primary goal of Mangalyaan is to demonstrate India's capability to reach and orbit Mars, i.e., as a technology demonstrator project, it is to develop the technologies for designing, planning, management, and operations of an interplanetary mission.

The scientific objectives are to study Martian surface features, morphology, and atmosphere, explore Mars' mineral composition, and measure methane levels in the Martian atmosphere.

Scientific Instruments loaded in MoM

- **Mars Colour Camera (MCC):** It captures the Mars surface.
- **Methane Sensor for Mars (MSM):** Identifies and detects methane presence (a potential indicator of life).
- **Thermal Infrared Imaging Spectrometer (TIS):** Perfectly analyzes thermal emissions.
- **Mars Exospheric Neutral Composition Analyser (MENCA):** It studies the upper atmosphere of Mars, the Solar wind, and radiation effects.
- **Lyman Alpha Photometer (LAP):** Measures hydrogen and deuterium.

The spacecraft weighed just 1,337 kg, using minimal fuel with maximum efficiency. To save fuel, it used a clever slingshot trajectory (Earth orbit maneuvers). It used remote sensing techniques to capture data on Mars. It captured stunning high-resolution images of Mars, including its full disk and atmospheric features. It also offered first views of the far side of the Martian Moon Deimos.

Achievements

- Mangalyaan is completely developed, designed, and managed by ISRO. It demonstrated India's space capabilities.
- It was designed and launched in just 15 months, which is incredibly fast for an interplanetary mission.
- Mangalyaan is the most economical Mars mission at a cost of $74 million, cheaper than a Hollywood movie budget.
- The mission life is extended, originally planned for 6 months, it lasted over 8 years in Mars orbit.
- ISRO became the fourth space agency (after NASA, Roscosmos, and ESA) to reach Mars. India became the first country to succeed in its maiden Mars mission.