

Crew Module-Service Module Separation Tests for Gaganyaan

Prelims: Current events of national and international importance | Space

Why in News?

The ISRO has successfully completed a series of Crew Module (CM) and Service Module (SM) separation tests for the Gaganyaan human spaceflight mission.

GAGANYAAN MISSION
India's first human spaceflight mission

- Organisation:** Indian Space Research Organisation (ISRO).
- Objective:** Demonstrate India's human spaceflight capability.
- Crew:** Three members.
- Target orbit:** Approximately 400 km above Earth.
- Mission duration:** Three days.
- Return:** Safe return to Earth, with landing in Indian sea waters.

Separation Tests

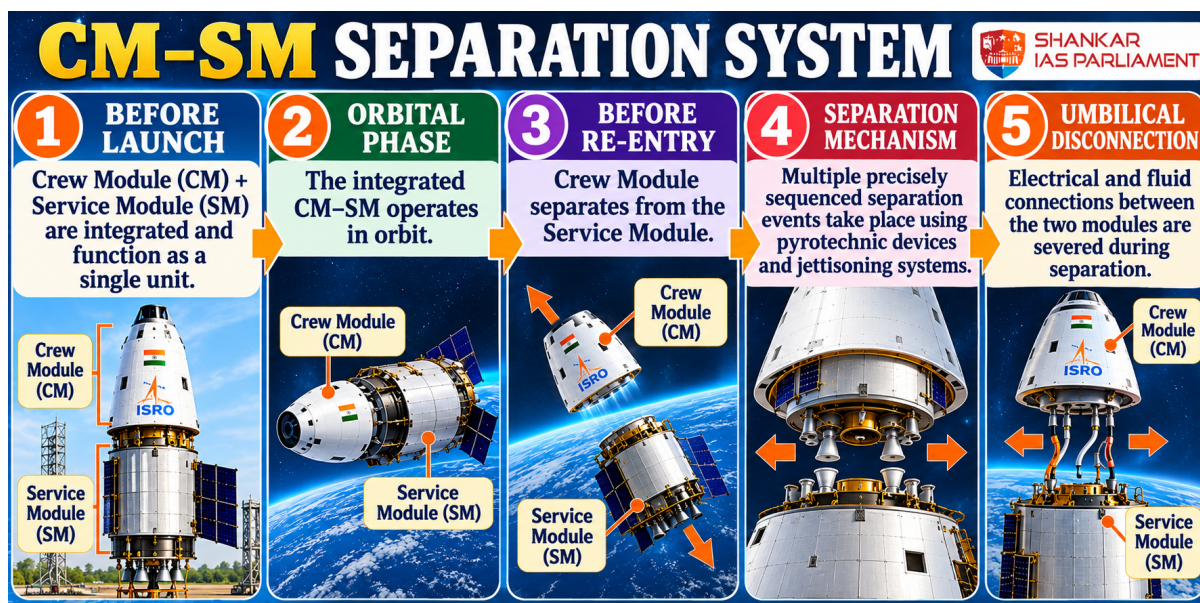
Particular	Details
Conducting organisation	Indian Space Research Organisation (ISRO)
Test location	Vikram Sarabhai Space Centre (VSSC)
Location of VSSC	Thiruvananthapuram, Kerala
Test objective	Validate the design adequacy of the CM-SM separation system
Test method	Simulated CM-SM assembly with extensive instrumentation

Key simulation	Separation involving the severing of multiple umbilical connections
Significance	Validates system robustness and shock-survivability of critical Crew Module subsystems
Mission relevance	Supports the upcoming Gaganyaan G1 uncrewed mission

- The successful tests build confidence for the first uncrewed Gaganyaan mission (G1), scheduled for launch in 2026.

Gaganyaan Orbital Module - It consists of two major components:

- **Crew Module (CM)**
 - The Crew Module accommodates astronauts throughout the mission.
 - It is engineered to safeguard the crew during both the mission and atmospheric re-entry.
 - The module incorporates essential systems, including avionics, inertial navigation, and thermal protection systems.
- **Service Module (SM)**
 - The Service Module provides support to the Crew Module throughout the orbital phase.
 - It is connected to the Crew Module via a separation system and umbilical connections.
 - The Service Module is separated from the Crew Module prior to atmospheric re-entry.



Validation of Critical Subsystems - Testing confirmed the robustness and shock-survivability of the following subsystems:

- **Avionics systems** - Electronic components responsible for spacecraft monitoring and control.
- **Inertial Navigation Systems (INS)** - Determine the spacecraft's orientation, motion, and navigation state.
- **Thermal Protection System (TPS)** - Provides protection through aft and conical

heat shields.

- **Crew Module Deployable Umbilical Shield** - Protects the umbilical interface.
- **Crew Module Uprighting System** - Utilizes pyrotechnic devices to support module uprighting operations.
- **Thermal and Humidity Control System** - Maintains appropriate environmental conditions within the Crew Module.

Reference

[ISRO | Crew Module-Service Module Separation Tests](#)

