Gaganyaan Mission – Second Integrated Air Drop Test (IADT-02)

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Why in News?

Recently, ISRO successfully conducted the second Integrated Air Drop Test (IADT-02) for India's first human spaceflight mission.

- **Mission Name –** Gaganyaan
- **Aim –** To demonstrate India's capability to send humans to space and bring them back safely.
- **Crew –** 3 Vyomnauts (space sailors) to Low Earth Orbit (LEO) at 400 km altitude.
- **Mission Duration –** 3 days.
- **Return –** Safe splashdown in the Indian Ocean.
- **Launch Vehicle –** Human-rated GSLV Mk III (HLV), renamed LVM3.
- **Launch Site –** Satish Dhawan Space Centre, Sriharikota.
- **Planned Timeline –** Early 2027.
- India will join the US, Russia, and China as nations with human spaceflight capability.
- **Orbital Module (OM) –** It is the spacecraft that will orbit Earth in the Gaganyaan mission.
- It has 2 main parts.
    - **Crew Module (CM) –** Astronauts' living capsule, survives re-entry.
    - Habitable space with Earth-like environment, double-walled with Thermal Protection System (TPS), houses crew interfaces, life support, avionics, and deceleration systems.
    - **Service Module (SM) –** Provides propulsion, power, thermal management, and avionics support.
- **Test Procedure –** Lifted by an *Indian Air Force Chinook helicopter* to 3 km altitude and released over a designated drop zone in the sea near Sriharikota coast.
- **Parachute Deployment –** 10 parachutes of 4 types deployed in sequence to reduce velocity for safe touchdown.
- **Recovery –** Coordinated successfully with the Indian Navy.

Key Technical Tests	
Pad Abort Test (PAT), 2018	Validated Crew Escape System.
Test Vehicle Abort Missions (TV-D series), 2023-25	Demonstrated escape system under varied flight conditions.

IADT-01, Aug 2025	Validated parachute deployment sequence.
IADT-02, Apr 2026	Full parachute-based deceleration test with 5.7 tonne simulated Crew Module dropped from 3 km altitude

Human Space Flight Centre (HSFC)

- **HSFC –** It is the lead division of the ISRO responsible for implementing the Indian Human Spaceflight Programme, specifically the Gaganyaan mission.
- **Mission led –** Primary hub managing the Gaganyaan project for crewed orbital flight.
- **Crew Management –** Handles astronaut selection, health monitoring, and training in Bengaluru.
- **Life Support –** Develops ECLSS technology to provide air, water, and pressure in space.
- **Safety Testing –** Manages the Vyommitra humanoid robot to test systems before human flight.
- **Future Vision –** Leads planning for the Indian Space Station and crewed lunar missions.
- **Agencies Involved**
  - **ISRO** – Mission lead.
  - **Indian Air Force** – Helicopter support.
  - **Indian Navy** – Recovery operations.
  - **DRDO** – Technical support.

References

1. ISRO | Gaganyaan
2. The Hindu | Gaganyaan

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