



KAMARAJ IAS ACADEMY
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SpaDeX Mission

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Context:

ISRO successfully launched the Space Docking Experiment (SpaDeX) mission aboard a PSLV-C60 rocket from the Satish Dhawan Space Centre, located in Sriharikota, Andhra Pradesh. Along with the SpaDeX mission, 24 PS4-Orbital Experiment Module (POEM-4) payloads were also placed into orbit.

SpaDeX Mission Overview:

- **Design & Development:** The spacecraft was developed by the UR Rao Satellite Centre (URSC) in Bengaluru, ISRO's lead centre for satellite development, with contributions from other ISRO centres.
- **Orbit Details:** SpaDeX was launched into a 470 km circular orbit at a 55° inclination.
- **Mission Life:** The spacecraft is designed for a mission life of up to two years, post-docking operations.

Mission Objectives:

- **Primary Objective:** To develop and demonstrate technology for the rendezvous, docking, and undocking of two small spacecraft—SDX01 (Chaser) and SDX02 (Target)—in a low-Earth circular orbit.
- **Secondary Objective:** To transfer electrical power between the docked spacecraft and control composite spacecraft operations and payloads post-undocking.

Indigenous Technologies Developed:

- **Inter-Satellite Communication Link (ISL):** Enabling autonomous communication between spacecraft.
- **GNSS-Based Relative Orbit Determination and Propagation (RODP) Processor:** To determine the relative position and velocity of other spacecraft, using Global Navigation Satellite Systems (GNSS) like GPS and Galileo.
- **Other Technologies:** Docking mechanism, sensor suite, and an autonomous rendezvous and docking strategy for precise operations.

Significance of SpaDeX:

- **Self-Reliance:** India aspires to become the fourth nation, after China, Russia, and the United States, to successfully achieve space docking technology.
- **Future Mission Enabler:** The technologies developed through SpaDeX will be crucial for India's future space ambitions, including missions to the Moon, lunar sample return missions, and the establishment of the Bharatiya Antariksh Station (BAS).
- **Cost-Efficiency:** The mission demonstrates a cost-effective approach to space operations, where multiple rocket launches can be combined to achieve common mission objectives.

The successful launch and execution of the SpaDeX mission represents a significant milestone in India's space exploration capabilities, contributing both to its self-reliance and its growing ambitions in the global space race.

Kamaraj IAS Academy

Plot A P.127, AF block, 6 th street, 11th Main Rd, Shanthi Colony, Anna Nagar, Chennai, Tamil Nadu 600040

Phone: **044 4353 9988 / 98403 94477 / Whatsapp : 09710729833**