SpaDeX MISSION

Why in News?

ISRO plans to launch SpaDeX (Space docking experiment) in December 2024.

- **SpaDeX mission** – *2 satellites/spacecrafts will be launched* into orbit around the earth, where they will demonstrate various technologies while in motion.
  - **Primary objective** – Demonstration of *Docking manoeuvre*
  - **Secondary objectives** – Demonstration of the *transfer of electric power* between the docked spacecraft.

***Docking** specifically refers to joining of 2 separate free-flying space vehicles.*
***Power transfer technology**, also known as wireless power transfer (WPT), is a technology that allows electrical energy to be transmitted without the use of physical wires or connectors.*

- **Spacecraft & Technology –** SpaDeX spacecraft were designed and realised by the *UR Rao Satellite Centre*.
- The full integration and testing of the satellite were carried out at Ananth Technologies, Bengaluru.
- **Launched by** – ***PSLV C-60***
- **Launch specifications** – Both spacecraft will be launched simultaneously but independently into a
  - 470-km wide circular orbit at 55° inclination
  - With a local time cycle of about 66 days
- **Docking manoeuvre** – It is made up of *2 small spacecraft*
  - **Chaser** - SDX01
  - **Target**- SDX02
- It involves various stages like
  - **Rendezvous** – Aligning orbits of 2 spacecraft
  - **Docking** – Connecting 2 spacecraft
  - **Undocking** – Disconnecting the 2 spacecraft.
- It requires very precise control of the spacecraft's attitude and velocity to ensure a safe connection.

- **Significance –** It is vital for
  - **Assembly and maintenance of the space stations** – Bharatiya Antariksh Station (BAS)
  - **Crew transfer** – Gaganyaan human space flight mission
  - **Suppling fuel to missions** – Chandrayaan-4 mission, for sample return from the Moon.
  - cost-effective indigenous

*India will be the **4th country in the world** to have space docking technology if the mission is successfully completed.*

Reference

1. Business Line | SpaDeX Mission
2. The Hindu| Orbital Docking