Green Propulsion System

Source: PIB

Why in News?

A **Green Propulsion System,** developed under the **Technology Development Fund (TDF)** scheme of the **Defence Research and Development Organisation (DRDO)**, has successfully demonstrated in-orbit functionality on a payload launched by the **Polar Satellite Launch Vehicle (PSLV) - C58 Mission.**

- This is a major achievement for the Indian space sector, as it showcases the **potential of green and indigenous technologies** for enhancing the country's defence capabilities.

Note

- The TDF is a flagship programme of the Ministry of Defence which is being executed by the DRDO under the **"Make in India" initiative** for funding **innovation in defence and aerospace**, especially to startups and MSMEs.

What is the Green Propulsion System?

- The Green Propulsion System was developed by a Bengaluru-based start-up Bellatrix Aerospace Pvt Ltd (Development Agency).
- This project uses a **1N Class Green Monopropellant** for altitude control and orbit keeping of microsatellites.
- The system consists of **indigenously-developed propellant**, fill and drain valves, latch valve, solenoid valve, catalyst bed, drive electronics, etc.
- This innovative technology has resulted in a **non-toxic and environment-friendly propulsion system** for low orbit space, unlike the conventional **hydrazine-based propulsion systems** that are hazardous and polluting.
    - The system is ideal for space missions with **high thrust requirements.**

Propulsion System

- Propulsion means to **push forward or drive an object forward.** A propulsion system is a machine that produces thrust to push an object forward.
- A propellant is a substance that is expelled or expanded **to create thrust.** Propellants can be gases, liquids, or solids.
    - In rockets, propellants are **chemical mixtures that produce thrust.** They consist of fuel and an oxidizer.
- **The Indian Space Research Organisation (ISRO)** is developing green propellants for use in future rocket & satellite propulsion systems.
    - ISRO has made a beginning by developing an **eco-friendly solid propellant based on Glycidyl Azide Polymer (GAP)** as fuel and **Ammonium Di-Nitramide (ADN)** as oxidizer at the laboratory level, which will eliminate the emission of chlorinated exhaust products

from rocket motors.

What is the PSLV-C58 Mission?

- ISRO's PSLV-C58 launched an **X-ray Polarimeter Satellite (XPOSAT)** into an Eastward low inclination orbit on 1st January 2024.
- XPoSat is the first dedicated scientific satellite from ISRO to carry out research in **space-based polarisation measurements of X-ray emission** from celestial sources.
    - This mission aims to investigate the polarization of intense X-ray sources.
    - **X-rays, with wavelengths of 0.01-10 nanometers**, are **electromagnetic radiation** characterized by perpendicular electric and magnetic fields.
        - Measuring X-ray polarization, aids astronomers in studying **magnetic field orientations and strengths in celestial bodies,** crucial for understanding pulsars, **black hole regions**, and other X-ray-emitting cosmic phenomena.

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Prelims

Q. With reference to India's satellite launch vehicles, consider the following statements: (2018)

1. PSLVs launch the satellites useful for Earth resources monitoring whereas GSLVs are designed mainly to launch communication satellites.
2. Satellites launched by PSLV appear to remain permanently fixed in the same position in the sky, as viewed from a particular location on Earth.
3. GSLV Mk III is a four-staged launch vehicle with the first and third stages using solid rocket motors; and the second and fourth stages using liquid rocket engines.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 and 3
(c) 1 and 2
(d) 3 only

Ans: (a)

Q.2 In the context of space technology, what is "Bhuvan", recently in the news? (2010)

(a) A mini satellite launched by ISRO for promoting the distance education in India
(b) The name given to the next Moon Impact Probe, for Chandrayan-II
(c) A geoportal of ISRO with 3D imaging capabilities of India
(d) A space telescope developed by India

Ans: (c)

Mains:

Q.1 India has achieved remarkable successes in unmanned space missions including the Chandrayaan and Mars Orbiter Mission, but has not ventured into manned space mission. What are the main obstacles to launching a manned space mission, both in terms of technology and logistics? Examine critically. **(2017)**

Q.2 Discuss India's achievements in the field of Space Science and Technology. How the application of this

technology has helped India in its socio-economic development? **(2016)**

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