AstroSat

Prelims: *Current events of national and international importance | Science & Technology*

Why in news?

India's first space observatory Astro Sat completes 10 years.

- AstroSat is India's ***first dedicated multi-wavelength space observatory***.
- **Aim –** Studying celestial sources in X-ray, optical and UV spectral bands simultaneously.
- **Launched in –**2015.
- **Launch Vehicle –** PSLV-C30 (XL) rocket.
- **Launch site -** Satish Dhawan Space Centre in Sriharikota, Andhra Pradesh.
- **Launched by -** Indian Space Research Organization (ISRO).
- **Collaboration with –** International partners like Canada and UK.
- **Mission life –** 5 years, but it continues to provide valuable data till now.
- **Mass –** 1515 kg.
- **Orbit –** A near-equatorial orbit at an altitude of 650 km and an inclination of 6 degrees.
- **5 scientific payloads –**
  - Ultra Violet Imaging Telescope (UVIT),
  - Large Area X-ray Proportional Counter (LAXPC),
  - Cadmium–Zinc–Telluride Imager (CZTI),
  - Soft X-ray Telescope (SXT) and
  - Scanning Sky Monitor (SSM)
- **Features –**
  - It was designed to observe the universe in the Visible, Ultraviolet, low and high energy X-ray regions of the electromagnetic spectrum simultaneously with the help of its five payloads.
  - It enables the simultaneous multi-wavelength observations of various astronomical objects with a single satellite.

- **Key Scientific Achievements-**
  - **Earliest galaxy detected -** In 2020, AstroSat's Ultraviolet Imaging Telescope (UVIT) detected **extreme-ultraviolet (UV) light** from a galaxy called AUDFs01, located 9.3 billion light-years away.
  - **Rapidly spinning black holes -** AstroSat has provided critical **data on black holes**, including one in the binary system 4U 1630-17, found to be spinning near the maximum possible speed.
  - Its X-ray payloads have also observed the complex behavior of accretion disks around black holes.
  - **Neutron star insights** - In June 2024, AstroSat data was used to reveal new information about the internal structure of neutron stars, some of the densest objects in the universe.
  - It has also detected **X-ray bursts** from a unique magnetar (a highly magnetic neutron star).
  - **Gamma-ray bursts (GRBs) -** The Cadmium-Zinc-Telluride Imager (CZTI) detected the very first scientific result from AstroSat, recording a gamma-ray burst.
  - It has also discovered X-ray polarization from the off-pulse region of the **Crab Pulsar.**
  - **Jellyfish galaxies -** Observations have helped characterize star formation within the gas streams of "Jellyfish galaxies," which provides new clues on how galaxies and galaxy clusters interact.

References

1. The Hindu | India's AstroSat completes 10 years
2. ISRO | Celebrating a Decade of AstroSat