Semi-Cryogenic Propellant Tank

Why in News

Recently, **Hindustan Aeronautics Ltd** (HAL) delivered the **heaviest semi-cryogenic propellant tank** (SC120- LOX) to the **Indian Space Research Organization (ISRO).**

In 2020, HAL delivered the **biggest ever cryogenic Liquid Hydrogen tank** (C32-LH2) to ISRO.

Key Points

- **About:**
  The **semi cryo-liquid oxygen (LOX) tank -** the first developmental welded hardware - **is a part of the SC120 stage intended for payload enhancement** by replacing the L110 stage **in the existing Mk-III launch vehicle.**
    GSLV Mk III is a three-stage heavy-lift launch vehicle developed by ISRO. The vehicle has two solid strap-ons, a core liquid booster and a cryogenic upper stage.
- **Cryogenic Engine:**
  - A cryogenic engine/cryogenic stage is the **last stage of space launch vehicles which makes use of Cryogenics.**
    Cryogenics is the study of the production and behaviour of materials at extremely low temperatures (below -150 degree Centigrade) to lift and place heavier objects in space.
  - A cryogenic engine provides **more force with each kilogram of cryogenic propellant it uses** compared to other propellants, such as **solid and liquid propellant rocket engines** and is more efficient.
  - It uses **Liquid Oxygen (LOX)** and **Liquid Hydrogen (LH2)** as propellants which liquefy at -183 deg C and -253 deg C respectively.

- **Semi Cryogenic Engine:**
    - Unlike a Cryogenic engine, a Semi Cryogenic engine **uses Refined kerosene instead of liquid hydrogen.**
    - The liquid oxygen is used as a Oxidiser.
        That's the advantage of using a Semi Cryogenic engine as it requires Refined Kerosene which is lighter than liquid fuel and can be stored in a normal temperature.
    - Kerosene combined with liquid oxygen **provide a higher thrust to the rocket.**
    - Refined Kerosene occupies less space, **making it possible to carry more propellant** in a Semi Cryogenic engines fuel compartment.
    - A semi cryogenic engine is **more powerful, environment friendly and cost effective** as compared to a cryogenic engine.

Source: ET