Year End Review 2019: Department of Space

Important Missions and Programmes

UNNATI programme

- UNISPACE Nanosatellite Assembly & Training (UNNATI) is a programme launched by **ISRO.**
- It is a capacity building programme on **nanosatellite development.**

YUVIKA

- YuvaVIgyaniKAryakram (YUVIKA) is a program primarily aimed at imparting basic knowledge on Space Technology, Space Science and Space Applications.

Microsat-R and Kalamsat-V2

- PSLV-C44 successfully launched Microsat-R and Kalamsat-V2 on January 24, 2019 from Sriharikota.
- Microsat-R is a military imaging satellite.
- Kalamsat is the **world's smallest and lightest communication satellite.**

EMISAT

- EMISAT was successfully launched onboard PSLV-C45 on April 01, 2019 from Sriharikota.
- The EMISAT satellite is aimed at **electromagnetic spectrum measurement.**
- It is an electronic intelligence satellite for the **Defence Research and Development Organisation (DRDO).**

RISAT-2B

- RISAT-2B radar imaging earth observation satellite was successfully launched onboard PSLV-C46 from Sriharikota.
- It is an earth observation satellite which has been built to work for at least five years and would replace the RISAT-2 that has been in use for monitoring activities.

GSLV-MK III M1

- GSLV-MK III M1, India's most powerful launch vehicle, was launched in July 2019.
- It 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.
- It is designed to carry 4 ton class of satellites into Geosynchronous Transfer Orbit (GTO) or about 10 tons class of satellites to Low Earth Orbit (LEO), which is about twice the capability of GSLV Mk II.
- This launch vehicle is capable of launching 04 ton of satellites into Geosynchronous Transfer Orbit (GTO). The mission carried Chandrayaan-2 Orbiter spacecraft to its intended orbit.

Cartosat-3

- Cartosat-3, a third generation agile advanced satellite having high resolution imaging capability

was successfully launched by PSLV-C47.
- Cartosat-3 is an earth-observation remote sensing satellite which will replace Indian Remote Sensing (IRS) series. So far, ISRO has orbited 8 Cartosats since 2005.
    - Remote sensing is the science of obtaining information about objects or areas from a distance, typically from aircraft or satellites.
- The Cartosat satellites are used mainly for large-scale mapping of the Earth through high-resolution cameras.
- They also help to detect changes in natural geographical or man-made features. As their cameras can `look back and forth' in an angle to generate continuous spot images.

Mars Orbiter Mission (MOM)

- India's first inter-planetary mission "Mars Orbiter Mission (MOM)" completed five years in Martian orbit in September 2019.
- Also known as (Mangalyaan), the truly maiden interplanetary mission of ISRO, launched on November 5, 2013, successfully got inserted into Martian orbit on September 24, 2014 in its first attempt.

Astrosat

- Astrosat, the first Indian multi-wavelength space observatory, completed four years in orbit in Sept 2019.
- AstroSat, was launched on September 28, 2015, by PSLV-C30 from Sriharikota.
- It is the first dedicated Indian astronomy mission aimed at studying celestial sources in X-ray, optical and UV spectral bands simultaneously.
- One of the unique features of AstroSat mission is that it enables the simultaneous multi-wavelength observations of various astronomical objects with a single satellite.

Important Facts

- Global Standards body **3rd Generation Partnership Project (3GPP),** which develops protocols for mobile telephony, has approved India's regional navigation system NavIC.
    - **Navigation in Indian Constellation (NavIC)** is India's regional navigation satellite system.
    - IRNSS consists of eight satellites, three satellites in geostationary orbit and five satellites in **geosynchronous orbit.**
- **Human Space Flight Centre:** A new center namely Human Space Flight Centre (HSFC) is created within ISRO/DOS with the responsibility to act as the lead center for **Human Space Flight Program, Gaganyaan.**
    - The Gaganyaan project has the objective of demonstrating human space flight capability to Low Earth Orbit (LEO) with 3 crew members for 5-7 days in orbit and to safely recover them after the mission.
- **Technology transfer of Li-ion to Indian industries:** 10 industries were selected for the transfer of the Li-ion cell technology from ISRO.

Li-ion batteries

- A lithium-ion battery or Li-ion battery is a type of rechargeable battery.
- Li-ion batteries use an intercalated (Intercalation is the reversible inclusion or insertion of a molecule into materials with layered structures) lithium compound as one electrode material, compared to the metallic lithium used in a non-rechargeable lithium battery.
- The battery consists of electrolyte, which allows for ionic movement, and the two electrodes are the constituent components of a lithium-ion battery cell.
    - Lithium ions move from the negative electrode to the positive electrode during discharge and back when charging.

- They are one of the most popular types of rechargeable batteries used for military, battery electric vehicle and aerospace applications.
- The **2019 Nobel Prize in Chemistry** has been jointly awarded to **John B Goodenough, M Stanley Whittingham and Akira Yoshino** for the development of **lithium-ion batteries.**

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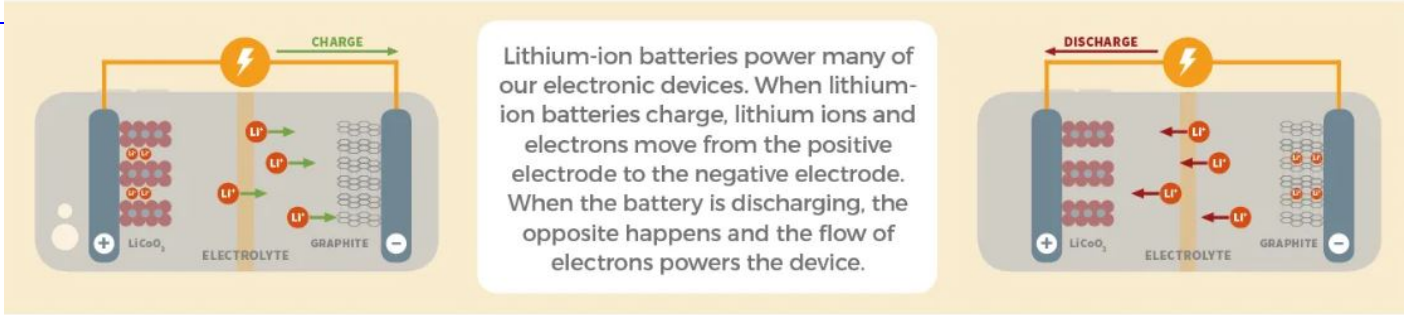

National Mission on Transformative Mobility and Battery Storage

- National Mission on Transformative Mobility and Battery Storage aims to promote clean, connected, shared, sustainable and holistic mobility initiatives.
- A Phased Manufacturing Program (PMP) will be launched to localize production across the entire EV value chain which will be valid for 5 years until 2024.
- The multi-disciplinary programme with an Inter-Ministerial Steering Committee will be chaired by CEO NITI Aayog.
- The details of the value addition that can be achieved with each phase of localization will be finalized by the Mission with a clear Make in India strategy for the electric vehicle components as well as battery.
- The Mission will coordinate with key stakeholders in Ministries/ Departments and the states to integrate various initiatives to transform mobility in India.

- **Wasteland Atlas-2019:** The Department of Land Resources in collaboration with ISRO has published the fifth edition of Wasteland Atlas-2019. The new wastelands mapping exercise is carried out by ISRO using Indian Remote Sensing Satellites.
    - Wastelands are a barren and uncultivated land lying unproductive or which is not being utilized to its potential.
    - It includes degraded forests, overgrazed pastures, drought-struck pastures, eroded valleys, hilly slopes, waterlogged marshy lands, barren land, etc.