2020

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20th January - 25th January

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1. Vyom Mitra

Why in News?

The ISRO Unveiled its first woman astronaut named Vyom Mitra which will ride to space in the first test flight of Gaganyaan.

Vyom Mitra

- Vyom Mitra is a spacefaring humanoid robot that looks and talks like a human, while also conducting experiments aboard the rocket.
- Vyom Mitra is a half-humanoid robot as the robot only has the top half of the body, without any legs.
- It will perform switch panel operations, ECLSS functions (Environment Control and Life Support Systems) and respond to astronauts during flight.
- The humanoid has been developed by the ISRO Inertial Systems Unit, Thiruvananthapuram.

2. Submarine-launched Ballistic Missile: K-4

Why in News?

Recently, India successfully test-fired the **3,500-km range submarine-launched ballistic missile, K-4.**

- The test was carried out by the Defence Research and Development Organisation (DRDO) from a submerged pontoon off Visakhapatnam coast.
- A pontoon simulates the situation of a launch from a submarine.

Key Points

- K-4 is one of the two underwater missiles that have been developed by India for its submarine force.
    - The other one is the over 700-kilometre strike range BO-5.
- The **Circular Error Probability (CEP)** of the missile is much more sophisticated than Chinese missiles.
    - The **CEP determines the accuracy of a missile.**
    - The lower the CEP, the more accurate the missile is.
- These missiles, once inducted, will be the mainstay of the Arihant class of **indigenous ballistic missile nuclear submarines (SSBN).**
- It will give India the **standoff capability to launch nuclear weapons** submerged in Indian waters.
    - **INS Arihant,** the first and only operational SSBN, is armed with **K-15 Sagarika missiles** with a range of 750 km.
    - This means the submarine has to venture far away from the Indian waters and move closer to the adversary's coast to launch the missile.
    - The K-4 will do away with that need.

- The missile ejecting from a submerged platform is a **technological breakthrough.**
- **Significance:**
    - Given India's position of **'No-First-Use' (NFU)** in launching nuclear weapons, the SSBN is the most dependable platform for a second-strike.
    - These submarines can stay underwater indefinitely without the adversary detecting it because they are powered by nuclear reactors.
    - The other two platforms- land based and air launched are far easier to detect.

3. Thirty Metre Telescope (TMT)

Why in News?

India, a partner in the construction of TMT, has said it wants the project to be moved out of the proposed site at Mauna Kea, a dormant volcano in Hawaii.

- The project has been witnessing protests for over a decade, as the proposed site is considered sacred to the island's indigenous people.
- Mauna Kea is considered a superior site for telescope establishment because of its:
    - stable weather conditions, and
    - necessary infrastructure (as it already hosts several telescopes)

Thirty Metre Telescope

- The TMT or Thirty Metre Telescope, one of the largest telescopes in the world, is a $2 billion joint venture (JV) project involving five countries:
    - India
    - Canada
    - United States
    - China
    - Japan
- The TMT will enable scientists to study fainter objects far away in the universe.
    - It will give information about the early stages of evolution of the universe.
- Also, it will give finer details of not-so-far-away objects like undiscovered planets and other objects in the Solar System and planets around other stars.
- The next best site to locate the telescope is the Observatorio del Roque de los Muchachos (ORM) on La Palma in the Canary Islands, Spain.

Concerns

- The project has been delayed by nearly five years and should have begun operations by 2025.

- India has committed $200 million, which is about a tenth of the proposed cost.
- The telescope needs 492 precisely polished mirrors and India is to contribute 83 of them.
- The project delay has meant that these manufacturing contracts have also been delayed.

- The level of contribution by member countries determines the amount of viewing time, or slots, that the member-countries' scientists get on the machine.
  - Thus India, in a given year, stands to get 10% of the available slots; any downtime could potentially eat into those.

4. Sukhoi-30 MKI Equipped with the BrahMos Missile

Why in News?

A squadron of fourth-generation fighter jets **Sukhoi-30 MKI equipped with the BrahMos missile** was inducted in the Southern Air Command, Thanjavur.

- The induction will help India to maintain its air and maritime dominance in the **Indian Ocean Region (IOR).**
- Sukhoi 30 jets have been modified to carry **BrahMos air-to-surface missiles** giving them the **capacity to conduct long-range precision strikes.**

Integration of Su-30 MKI and BrahMos

- **Hindustan Aeronautics Limited (HAL)** and BrahMos Aerospace Pvt Ltd (BAPL) in 2014 signed a contract to modify two Su-30 MKI aircraft for integrating with the missile.
- It was for the **first time in the world** that such a heavyweight missile was integrated on a fighter aircraft.
- All weather Brahmos gives the Sukhois a combat radius of almost 1,500 km without mid-air refuelling.
- Brahmos is the **heaviest weapon** to be deployed on Su-30 MKI fighter aircraft, with a weight of 2.5 tonnes.

BrahMos Missiles

- BrahMos missile is a **supersonic cruise missile** which features Indian propulsion system, airframe, power supply, and other major indigenous components.
- **BrahMos** is a **joint venture** between the **Defence Research and Development Organisation of India (DRDO)** and the NPOM of Russia.
  - Brahmos is named on the rivers Brahmaputra and Moskva.
- It is a two-stage (solid propellant engine in the first stage and liquid

ramjet in second) air to surface missile with a flight range of around 300 km.
    - However, India's entry into the **Missile Technology Control Regime (MTCR)** has extended the range of the **BrahMos** missile to reach 450 km-600km.
- Brahmos is a multiplatform i.e it can be launched from land, air, and sea and multi capability missile with pinpoint accuracy that works in both day and night irrespective of the weather conditions.
- It operates on the "Fire and Forgets" principle i.e it does not require further guidance after launch.
- Brahmos is one of the fastest cruise missiles currently operationally deployed with a speed of Mach 2.8, which is 3 times more than the speed of sound.

5. Wings India 2020

Why in News?

Wings India 2020, **a flagship event of the Indian Civil Aviation industry** will be held at Begumpet Airport, Hyderabad from 12-15 March 2020.

Wings India 2020

- Wings India 2020 is an international exhibition and conference on the Civil Aviation sector.
- It provides a congenial forum catering to the rapidly changing dynamics of the sector.
- It will be jointly organized by the Ministry of Civil Aviation, Govt. of India, **Airport Authority of India (AAI)** and the **Federation of Indian Chambers of Commerce and Industry (FICCI).**
- The theme of Wings 2020 is: ***"Flying for All".***
- Wings India 2020 will focus on:
    - New business acquisition
    - Investments
    - Policy formation
    - Regional connectivity
- Wings India 2020 is also **Asia's largest and most popular gathering** in the industry.

6. Xenobot

Why in News?

Scientists in the United States have developed the world's first living machine (tiny robot) built from the cells of African clawed frogs. They have named it as xenobot — after the species of aquatic frog Xenopus laevis.

Xenobot

- Xenobots have been made by repurposing living cells scraped from frog embryos and creating a living, programmable organism.
- These can be used to -
    - Detect radioactive contamination
    - Gather microplastic in the oceans
    - Scrape out plaque from arteries

Xenopus Laevis

- **Habitat:** Sub-Saharan Africa
- Xenopus is a genus of African frogs that are commonly known as the African clawed frogs.
- Two species of Xenopus are regularly used by biologists, Xenopus laevis and Xenopus tropicalis.
- Xenopus is a valuable tool because they are:
    - Hardy, fully aquatic and easy to maintain in the laboratory
    - Produce eggs year-round
    - Eggs are a reliable and flexible material for research
    - Embryos are a good model for vertebrate development
    - Genetically similar to humans thus a good model for human disease