



ISRO: GAGANYAAN AND CHANDRAYAAN-3 IN MISSION MODE

Mission

Gaganyaan:

- Under the Gaganyaan schedule, three flights will be sent in orbit. Of the three, there will be two unmanned flights and one human spaceflight.
- The human space flight programme, called the Orbital Module will have three Indian astronauts, including a woman.
- It will circle Earth at a low-earth-orbit at an altitude of 300-400 km from earth for 5-7 days.
- The payload will consist of:
 - Crew module - spacecraft carrying human beings.
 - Service module - powered by two liquid propellant engines.
- It will be equipped with emergency escape and emergency mission abort.
- GSLV Mk III, also called the LVM-3 (Launch Vehicle Mark-3) the three-stage heavy lift launch vehicle, will be used to launch Gaganyaan as it has the necessary payload capability.

Challenges

- India does not even have the facilities to train astronauts.
- India is yet to perfect fool-proof launch vehicle technology, the basic requirement for a manned space mission.
- The Polar Satellite launch vehicle and the Geosynchronous Launch vehicle, the two Indian spacecraft deployed to launch satellites and modules into space, are yet to be man-rated.



(Man-rating is the term used to measure the safety and integrity of launch vehicles with zero failure.)

- ISRO has not been able to put in place India's own Global Positioning System in spite of completing the NAVIC due to dysfunctional atomic clocks in the satellites, rendering the fleet a dud.
- While the launch vehicle, crew module, re-entry technology, crew escape system are in place, monitoring and tracking systems, Environmental Control & Life Support System (ELCSS), space suit and crew support systems are still in the developmental phase.
- The launchpad at the Sriharikota spaceport, the Satish Dhawan Space Centre, will have to be enhanced for the human mission.

Chandrayaan

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- As the name suggests, the Chandrayaan-3 is the **successor to the Chandrayaan-2 mission and it will likely attempt another soft-landing on the lunar surface.**
- It will be almost a repetition of the July 2019 Chandrayaan-2 mission in the configuration of spacecraft, the landing spot on the moon and the experiments to be conducted on the lunar surface.
- Although scores of landers sent by Russia, the U.S. and the Chinese have explored the moon's surface, so far, no other agency has landed in the southern hemisphere of the moon. ISRO hopes to be the first to do so.
- As per ISRO, the total cost of Chandrayaan-3 mission will be over Rs 600 crores. In comparison, the total cost of the Chandrayaan-2 mission was Rs 960 crores.

Second Spaceport in Tamil Nadu

- The Tamil Nadu government has started acquiring 2,300 acres of land in **Thoothukudi** district for ISRO's second launch port. Currently satellites are launched from



the **Sriharikota launch centre in Andhra Pradesh.**

- Thoothukudi offers a **locational advantage** to launch towards India's South. When ready, the new port will handle mainly the **Small Satellite Launch Vehicle (SSLV)** that is under development. SSLVs are meant to put a payload of up to 500 kg in space.
- The space agency ISRO preferred its second spaceport at Thoothukudi, located on the east coast and near the equator for the following reasons:
 - **Speed Boost To Rockets:** The **Earth's rotation provides a speed boost to rockets launched in the eastward direction**, and headed for an equatorial orbit around the planet.
 - **Save Lives:** If there is a failure during the launch, then the debris from an explosion would fall directly into the Bay of Bengal instead of land, which would have less impact on damaging property or taking lives. Further, a southern spaceport reduces the distance to the South Pole and ensures access to a vast, unpopulated area below the flight path.
 - **Fuel Efficiency**
 - Another advantage of the new spaceport include **straight southward launches** as the current rockets have to be maneuvered around Sri Lanka.
 - At present, once the rocket lifts off from Sriharikota, it flies further east to avoid Sri Lanka and then steers itself back towards the South Pole. This manoeuvre requires more fuel, and for a smaller rocket like the SSLV, this could hamper its limited payload capacity and reduce the rocket's value for Antrix, ISRO's commercial ventures operator.
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