# Mission Gaganyaan

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The Prime Minister of India in his Independence Day address announced that an Indian astronaut would go into space by 2022, when India celebrates her 75th year of Independence.

- If India does launch the Gaganyaan mission, it will be the fourth nation to do so after the United States, Russia and China.
- In 1984, India's first astronaut Wing Commander (retd.) Rakesh Sharma orbited Earth as part of a Soviet mission.
- In pursuance of this, in July 2018, ISRO conducted an experiment for emergency escape of astronauts called the **Pad Abort Test** which demonstrated the safe recovery of the crew module in case of any emergency at the launch pad.

The **'pad abort' test or Crew Escape System** is an emergency escape measure that helps pull the crew away from the launch vehicle when a mission has to be aborted.

## The Mission

- R. Lalithambika, a specialist in advanced launcher technologies, will helm the project as Director of the Human Space Flight Project.
- The mission is estimated at Rs.9000 crore.
- The plans in the "demonstration phase" includes undertaking two unmanned flights and one human flight using Indian technology to put a crew of three into a low earth orbit for 5-7 days.
- A manned space mission is very different from all other missions that ISRO has so far completed.
- In terms of complexity and ambition, even the missions to the Moon (Chandrayaan) and Mars (Mangalyaan) are nowhere in comparison.
- For a manned mission, the key distinguishing capabilities that ISRO has had to develop include the ability to bring the spacecraft back to Earth after flight – For this, ISRO, in 2014, successfully tested the Crew module Atmospheric Reentry Experiment (CARE) that came back to Earth after being taken into space.

- Also to build a spacecraft in which astronauts can live in space, the **Environmental Control & Life Support System (ECLSS)** is meant to ensure that conditions inside the crew module are suitable for humans to live comfortably.
- One of the most important requirements is the development of a launch vehicle that can carry heavy payloads into space.
    - The spacecraft carrying human beings, called crew module, is likely to weigh in excess of 5 to 6 tonnes.
    - ISRO's main launch vehicle, the PSLV (Polar Satellite Launch Vehicle), which carried the Chandrayaan and Mangalyaan missions too, can carry payloads that are barely up to 2 tonnes.
    - That is why the development of GSLV Mk-III, a launch vehicle with capabilities to deliver much heavier payloads much deeper into space, was necessary.
- Most of the critical technologies and hardware required for the Human Space Flight Programme (HSP) are ready or have been demonstrated.
- ISRO would now stitch them up into a complete project and present a comprehensive project report to get a formal approval of the government.

**GSLV MK-III**

- The Geosynchronous Satellite Launch Vehicle (GSLV)-III is a launch vehicle conceived and designed to make ISRO fully self reliant in launching heavier satellites.
- It is designed to be a three stage **vehicle**, with the first stage comprising two Large Solid Booster with solid propellant, that are strapped on to the second stage, the re-startable liquid stage. The third stage is the Liquid Oxygen/ Liquid Hydrogen cryogenic stage.
- ISRO successfully tested GSLV Mk-III, now called **LVM-3 (Launch Vehicle Mark-3)**, in an experimental flight in December 2014.
- Then, in June 2017, ISRO successfully launched the first "developmental" flight of LVM-3, which carried the GSAT-19 satellite into space.
- The LVM-3 is the declared launch vehicle for taking the manned crew module into space.
- Over the next few years, many more flights of GSLV are scheduled. These will help ISRO in perfecting the cryogenic technology for sending up heavier and heavier payloads.
- In fact, in June 2018, the government approved the funding for the next 10 flights of GSLV Mk-III at an estimated cost of Rs 4,338.2 crore. This was supposed to take care of GSLV Mk-III missions till 2024.