Mission Gaganyaan

Why in News?

- 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.
- In pursuance of this goal, India and France have announced a working group for Gaganyaan.
- ISRO and CNES, the French space agency, will work together in the fields of space medicine, astronaut health monitoring, life support, radiation protection, space debris protection and personal hygiene systems, etc.

The Mission

- 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.
- The mission is expected to cost around Rs 10,000 crore.

Timeline

- **2004:** The ISRO Policy Planning Committee made recommendation for a manned space mission

- **2006:** Preliminary studies of Gaganyaan started under the generic name Orbital Vehicle.
- **2008:** An initial design of a fully autonomous vehicle to carry two astronauts was finalised.
- **2009:** A committee was formed to analyse the feasibility of the programme and funding was sanctioned.
- **2014:** Successful testing of experimental flight of GSLV MK-III was carried out.
- **2017:** First flight of GSLV MK-III was carried out. GSLV MK-III placed the country's heaviest satellite till date, GSAT-19, into a precise orbit. With it, India became a nation having its own indigenous cryogenic engine technology.
- **July 5, 2018:** First successful flight of the crew escape system was carried out. The crew escape system is an emergency measure designed to quickly pull the crew module along with the astronauts to a safe distance from the launch vehicle in the event of a launch abort.
- **August 15, 2018:** Prime Minister promised manned mission before 2022.

Impact

- The success of the mission will rekindle public imagination and get the young generation interested in space in particular and science in general.
- The astronauts would carry out a series of experiments, particularly microgravity experiments.
- India's quest to undertake human space flight and its earlier Moon and Mars missions proves the growing sophistication of India's space program and ensures a seat at the high table of global governance of outer space.
- The mission would create 15,000 new employment opportunities, 13,000 of them in private industry.
- If India does launch the Gaganyaan mission, it will be the fourth nation to do so after the United States, Russia and China.

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.

Way Forward

- In terms of space technology, a manned space programme is the obvious next step for India.
- India cannot afford not to develop the technological capacity for manned space flight because that will represent a major drawback in Indian space capabilities.
- Even if the direct benefits of such advancement may not be as great in the short-term, this is a necessary longer-term investment.