Q6

# What is India's plan to have its own space station and how will it benefit our space programme?

UPSC Civil Services Mains 2019 · GS III · 10 marks · Indian Economy

Indian Economy and issues relating to planning, mobilization of resources, growth, development and employment.

## Core demand of the question

- State India's plan for an indigenous space station after human spaceflight
- **Explain benefits for the space programme:** science, crew, industry, and strategy
- Keep a 10-mark length

## Revision summary

- **ISRO's 2019 plan:** after Gaganyaan, a 20-tonne-class Indian station in LEO around the end of the 2020s.

It is a national lab, not a copy of ISS.

Benefits are crew continuity, microgravity research, docking technology, and a vendor base.

Strategic autonomy matters as ISS ages.

Cost discipline must protect India's working satellite services.

## Introduction

- **After announcing** Gaganyaan**,** ISRO **in 2019 set out a next step:** a modest **Indian space station** in low Earth orbit, to be built once crew flight, docking and life-support are proven. It is not a copy of the **International Space Station**. It is a small national laboratory so that Indian astronauts have somewhere to go after a short Gaganyaan sortie.

## Body

## The plan (as stated around 2019)

- **Sequence: crew module and escape systems** → **Gaganyaan** orbital flight with Indian astronauts → **rendezvous and docking** → a **20-tonne-class** station at a few hundred kilometres, with a crew of a few persons for a limited stay.
- Timeline spoken of then was the **late 2020s to about 2030**, after Gaganyaan, not a parallel mega-project. Later docking tests (such as **SpaDeX**) and a revised station name and date sit on that same ladder.
- **Design choice: indigenous modules**, Indian launchers (**LVM3** class and successors), and Indian ground control - with possible later international visiting vehicles, not dependence on ISS which is ageing.
- **Supporting bricks: human-rating** of launchers, spacesuits, regenerative life support, and a **space medicine** cadre. **NewSpace India Limited** and later **IN-SPACe** bring industry into fabrication.

## How it benefits the space programme

- **Human spaceflight continuity:** without a station, Gaganyaan is a one-off prestige flight. A station creates a **training and mission cycle** for astronauts and flight surgeons.
- **Microgravity science:** materials, biology, combustion and Earth observation instruments that need a **crewed, serviceable** platform, not only a short satellite pass.
- **Technology pull:** docking, robotics, closed-loop air and water, and in-orbit assembly are dual-use skills for later **lunar** and deep-space aims.
- **Industry and Make in India:** pressure vessels, sensors and software for a station are a demand signal to MSME and large vendors, similar to how PSLV/GSLV built a supplier base.
- **Strategic autonomy:** access to ISS is political. A small national station keeps **independent crew access** and bargaining power in global science.
- **Earth benefits:** crew can tend disaster, agriculture and ocean sensors - a link to **NDMA** and farm weather products - if payloads are planned that way.

## Limits

- Cost must not starve **navigation, communication and earth-observation** satellites that already pay for weather and security. A station is a complement, not the whole programme.

## Flow diagram

Gaganyaan crew flight -> Docking and life support

Docking and life support -> Small Indian space station

Small Indian space station -> Microgravity science

Small Indian space station -> Astronaut cycle

Small Indian space station -> Industry Make in India

Microgravity science -> Autonomous human spaceflight

Astronaut cycle -> Autonomous human spaceflight

Industry Make in India -> Autonomous human spaceflight

## Conclusion

India's plan is a small post-Gaganyaan station, not an ISS rival. It benefits the programme by giving crew a destination, pulling docking and life-support technology, and widening industry. It will pay only if Gaganyaan, docking and a strict cost cap stay on the critical path.

## Facts & figures

### Gaganyaan

India's first crewed orbital mission; the necessary step before any station crew.

### Station class

Public ISRO statements pointed to a small ~20 tonne facility, not a 400-tonne ISS analogue.

### Docking

Rendezvous and docking (later demonstrated on SpaDeX) are the engineering gate to assembling a station.

### LVM3

Human-rated heavy launcher path for crew and modules; industry fabrication through NSIL and vendors.

### ISS context

The International Space Station is ageing; India is not a full partner, so an indigenous lab is an autonomy choice.