India's Need to Have Stakes in Space Tech

Why in news?

India’s pursuit of space technologies particularly its endeavour with the Gaganyaan mission holds significant implications for various aspects of Indian science.

Why India need to have stakes in space technology?

- **Global interest in space**- Over 600 individuals from 50 countries have travelled to space highlighting the global interest in space exploration.
- **Novelty of human spaceflight**- Despite the number of people who have been space, executing a human spaceflight remains a rare achievement for individual countries.

  Only three countries have executed human spaceflight missions namely United States, Russia and China

- **Moon exploration**- There is a renewed focus on lunar exploration for resource extraction and potential colonization, leading to an anticipated surge in human spaceflight missions.
- **Strategic importance**- India aims to be an active participant in this new era of space exploration to secure access to emerging technologies and resources, which are vital for future economic growth.
- **Access novel tech**- By actively engaging in space missions, India ensure that it remains at the forefront of technological innovation and maintains its strategic autonomy.
- **Foster spin off technologies**- Space programs often lead to the development of spin-off technologies with applications beyond space exploration including significant medical advancements like MRI, heart implants and water filtration systems.
- **Cross-sectoral benefits**- The benefits of space exploration extend beyond the realm of space science and technology, impacting various sectors such as healthcare, agriculture, telecommunications, and environmental conservation.
- **Enhance S&T ecosystem**- India's space endeavours can catalyse the development of robust science and technology ecosystem in India fostering collaboration between academia, industry and government institutions.
- **Cryogenic technology denial**-In the 1990s, the US denied India access to cryogenic technology, essential for rocket propulsion, which delayed India’s space program by nearly two decades.
- **Need technological independence**- India-US civilian nuclear deal aimed to facilitate access to certain technologies, it did not completely eliminate India's dependence on foreign technologies.
- **Nuclear test sanctions**- Following *India’s nuclear tests in 1998*, economic sanctions

led to ban on basic components like transistors and semiconductors.
- **Pandemic challenges**- COVID-19 revealed India's heavy reliance on imports for essential medical supplies which made India to prioritize the development of domestic capabilities to manufacture essential medical supplies, including vaccines.
- **Self-reliance**- COVID-19 revealed India's heavy dependence on imports for essential medicines, this made India to identify defence, space, communication, and energy as priority areas for indigenization and capacity building.
- **Indigenization-** This would reduce India's dependence on foreign nationals and safeguard its strategic interests.

What are the new S&T programs announced by India that could foster India's stakes in space program?

- **National Green Hydrogen Mission-** It was launched in 2023 to make India a hub for production and export of Green Hydrogen.
- **National Quantum Computing Mission**- It allows Indian scientists to develop indigenous technology, systems, devices, and materials required to propel research and development in quantum technology.
- **IndiaAI mission-** It will establish a comprehensive ecosystem catalyzing AI innovation through strategic programs and partnerships across the public and private sectors.
- **National Deep Tech Startups Policy**- It is strategically formulated to stimulate innovation, spur economic growth, and promote societal development through the effective utilization of deep tech research-driven innovations.
- **LIGO India-** It aims to improve the detectors' collective ability to pinpoint sources of gravitational waves in the sky, India is the part of LIGO program.
- **Square Kilometre Array-** India has been involved in the SKA project right from its inception in the 1990s which will be the world's biggest and most advanced radio telescope ever constructed.
- **Promote research**- Interim budget, 2024 has announced the setting up of Rs 1 lakh crore fund to provide long-term low-cost or zero-interest loans for research and development.
- **Deep tech in defence scheme**- It aims at bolstering deep tech in the defence sector which was announced during interim budget.

What lies ahead?

- The scientific community has welcomed these initiatives, recognizing their potential to stimulate research and innovation in India.
- However, it also emphasizes that these efforts represent only a fraction of the structural reforms, India needs to significantly improve the quality and quantity of scientific output.

References

1. Indian Express- Impact of Gaganyaan's success for Indian science
2. PIB- IndiaAI mission

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