



SPACE TOURISM - GS III MAINS

Q. Highlight the challenges and benefits of commercializing space travel, and propose strategies for sustainable and inclusive development of this emerging industry. (15 marks, 250 words)

News: *Gopi Thotakura becomes first Indian space tourist: What is space travel — and how much can a journey cost?*

What's in the news?

- India-born aviator and commercial pilot Gopi Thotakura along with five other space tourists became the latest set of individuals to make a short recreational trip to space.

Key takeaways:

- Thotakura, who is based in the United States, is the first space tourist from India but about 50 others have made such trips, most of them in the last three years.

Space Tourism:

- Space tourism is a section of the aviation sector which seeks to provide tourists with the opportunity to become astronauts and experience space travel for recreational, leisure, or business purposes.

Types of Space Tourism:

1. Sub-orbital Spacecraft:

- It takes passengers just beyond the Kármán line. The passengers get to spend a few minutes in outer space and then come back to Earth.
- The NS-25 mission, which Thotakura is a part of, is a sub-orbital mission.
 - Thotakura and his other crew members will be taken to outer space via New Shepard, a fully reusable sub-orbital launch vehicle developed specifically for space tourism by Blue Origin.

2. Orbital Spacecraft:

- It takes passengers much further than the Kármán line. Usually, passengers can spend from a couple of days to more than a week at an altitude of nearly 1.3 million feet.
- In September 2021, Space X's Falcon 9 took four passengers to an altitude of 160 km where they spent three days orbiting the Earth.

Key Players and Milestones:

- **Blue Origin** - Founded by Jeff Bezos, offers sub-orbital flights.
- **Virgin Galactic** - Founded by Richard Branson, also provides sub-orbital space flights.
- **SpaceX** - Founded by Elon Musk, aims for orbital flights and beyond, including potential missions to the Moon and Mars.



- **Other Notable Companies** - Companies like Space Adventures and balloon-based high-altitude flight providers.

Significance of Space Tourism:

1. Technological Advancement:

- Drives innovation in space technology, leading to improvements in spacecraft design, safety, and efficiency.

2. Economic Growth:

- Generates revenue and creates jobs in the aerospace and tourism sectors. Stimulates investments in related industries.

3. Public Engagement:

- Increases public interest and awareness of space exploration. Inspires the next generation of scientists, engineers, and explorers.

4. International Collaboration:

- Encourages cooperation between countries and private companies in space exploration and technology development.

5. Scientific Research:

- Provides opportunities for scientific experiments and research in microgravity environments.

Concerns of Space Tourism:

1. Environmental Impact:

- Launches contribute to atmospheric pollution and carbon emissions. Potential for space debris accumulation.

2. High Costs:

- Currently accessible only to the wealthy, creating a disparity in opportunities for space travel.

3. Safety Risks:

- Inherent risks associated with space travel, including potential for accidents and exposure to harmful space radiation.

4. Resource Allocation:

- Significant financial and material resources are required, which could be argued to be better spent on pressing issues on Earth.

5. Regulatory Challenges:

- Developing and enforcing regulations to ensure the safety and sustainability of space tourism is complex and still evolving.



Way Forward:

1. Cost Reduction Efforts:

- Initiatives aimed at reducing the cost of space tourism should be prioritized, including the development of more cost-effective launch technologies and operational efficiencies.

2. Environmental Mitigation Strategies:

- Research and development efforts should focus on mitigating the environmental impact of space tourism, such as exploring cleaner propulsion technologies and implementing regulations to minimize emissions.

3. Enhanced Safety Measures:

- Continuous improvements in safety protocols and technologies are essential to address safety concerns in space tourism.
- Collaboration between space agencies and private companies can help establish and enforce rigorous safety standards.

4. Public Awareness and Education:

- Educating the public about the benefits and risks of space tourism is crucial for informed decision-making and support.
- Public engagement initiatives can foster understanding and acceptance of space exploration endeavors.

5. International Collaboration:

- Collaboration between nations and space agencies is vital for advancing space tourism in a responsible and sustainable manner.
- Sharing resources, expertise, and best practices can accelerate progress and ensure global cooperation in space exploration efforts.

6. Ethical Considerations:

- Ethical considerations, such as equitable access to space tourism opportunities and minimizing the impact on indigenous communities and ecosystems, should guide decision-making in the development and regulation of space tourism activities.

7. Research and Innovation:

- Continued investment in research and innovation is essential to address existing challenges and unlock new opportunities in space tourism.
- Embracing technological advancements and exploring novel approaches can drive progress and expand the frontiers of space exploration.