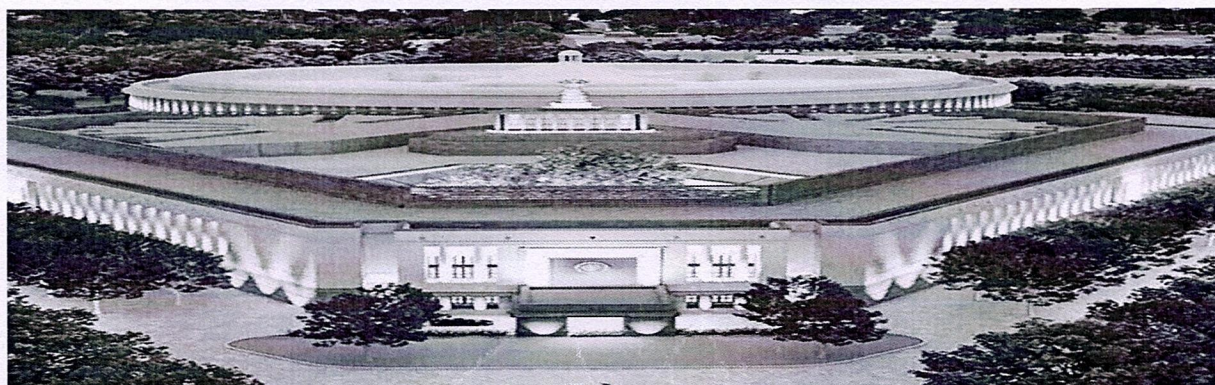


"SPACE IN PARLIAMENT"



COMPILATION OF REPLIES GIVEN IN PARLIAMENT

**Government of India
Department of Space**

PARLIAMENT QUESTIONS – MONSOON SESSION OF PARLIAMENT 2024

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**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

LOK SABHA

UNSTARRED QUESTION NO. 421

TO BE ANSWERED ON WEDNESDAY, JULY 24, 2024

GUIDANCE TO PRIVATE PLAYERS BY IN-SPACE

421. SHRI YOGENDER CHANDOLIA:

Will the PRIME MINISTER be pleased to state:

- (a) the details of activities undertaken by Indian National Space Promotion and Authorisation Centre (IN-SPACE) to guide private player in the Space sector;**
- (b) whether Indian Space Research Organisation (ISRO) plans to launch any domestic private satellites; and**
- (c) if so, the details thereof?**

ANSWER

**MINISTER OF STATE IN THE MINISTRY OF PERSONNEL, PUBLIC
GRIEVANCES & PENSIONS AND IN THE PRIME MINISTER'S OFFICE
(DR. JITENDRA SINGH):**

* * * *

- (a) With the unlocking of the Space Sector for the private sector by the Government, following support activities are undertaken by Indian National Space Promotion and Authorisation Centre (IN-SPACE) to guide private player in the Space sector:**

- 2
- **Providing mentorship as well as ISRO facility utilization support.**
 - **Technology Transfer to NGEs.**
 - **IN-SPACe Seed fund support to start-ups to transform novel idea into a prototype development.**
 - **IN-SPACe Price support for NGEs for utilization of ISRO's facility.**
 - **Creation of IN-SPACe Digital Platform to connect all the stake holders of space eco system.**
 - **Established IN-SPACe Design Lab, where start-ups can use high end simulation software for design and analysis of critical space systems/subsystems.**
 - **Skill development in emerging space technology area etc.**

(b) ISRO has already launched satellites made by domestic private players under commercial launch agreements with NewSpace India Ltd. (NSIL), the CPSE under Department of Space. NSIL will continue to provide launch services under commercial agreement with the private satellite companies.

(c) Two satellites viz. Thybolt-1 and Thybolt-2 built by M/s Dhruva Space (P) Limited, Bengaluru and a satellite viz. Anand, built by M/s Pixxel India (P) Limited, Bengaluru were launched in PSLV C54 Mission on November 26, 2022 as co-passengers.

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**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

LOK SABHA

UNSTARRED QUESTION NO. 440

TO BE ANSWERED ON WEDNESDAY, JULY 24, 2024

PRIVATE PLAYERS IN SPACE SECTOR

440. SHRI DUSHYANT SINGH:

Will the PRIME MINISTER be pleased to state:

- (a) whether the Government is providing any incentives to build demand for the domestic private space sector;**
- (b) if so, the details thereof along with the details of schemes to promote private players in space sector;**
- (c) whether the Government is establishing any public-private partnership model for earth observation satellite;**
- (d) if so, the details thereof;**
- (e) whether the Government runs any incentive programmes for conducting satellite launches through domestic rockets from Indian launch pads; and**
- (f) if so, the details thereof?**

ANSWER

**MINISTER OF STATE IN THE MINISTRY OF PERSONNEL, PUBLIC
GRIEVANCES & PENSIONS AND IN THE PRIME MINISTER'S OFFICE**

(DR. JITENDRA SINGH):

* * * *

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(a) Yes Sir.

(b) With the liberation of space sector, private sector is allowed to carry out end to end space activities in India. Indian National Space Promotion and Authorization Centre (IN-SPACe) was created in Department of Space for promoting, authorizing and overseeing the activities of non-government entities (NGEs) in Space Sector/sub sector. Private sector is being incentivised and encouraged to take up the space activities. IN-SPACe has brought out the Differential Pricing Policy, where the NGEs can use and utilise the state's capital-intensive facilities and services on discounted basis in different vertical for its usage.

(c) Yes Sir.

(d) The project is at formative stage and is being worked out.

(e) Yes Sir.

(f) Incentives are being provided to space start-ups, academia and micro & small enterprises for conducting satellite launches of up to 50 kg (2 Nos) through NSIL rocket on NSIL approved pricing as per IN-SPACe Differential Pricing Policy.

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**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

LOK SABHA

UNSTARRED QUESTION NO. 396

TO BE ANSWERED ON WEDNESDAY, JULY 24, 2024

PROGRESS OF GAGANYAAN

396. PROF. SOUGATA RAY:

Will the PRIME MINISTER be pleased to state:

- (a) the status of the progress of Gaganyaan;**
- (b) whether the ISRO has selected and trained Astronauts;**
- (c) if so, the details thereof;**
- (d) whether the ISRO has collaboration with any other agencies for the Axiom-4 Mission; and**
- (e) if so, the details thereof?**

ANSWER

**MINISTER OF STATE IN THE MINISTRY OF PERSONNEL, PUBLIC
GRIEVANCES & PENSIONS AND IN THE PRIME MINISTER'S OFFICE**

(DR. JITENDRA SINGH):

* * * *

(a) The status of the progress of Gaganyaan programme is as follows.

- i. Human Rated Launch Vehicle: Ground testing of propulsion systems stages, including solid, liquid and**

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cryogenic engine, towards human rating of the launch vehicle have been completed.

- ii. **Crew Module Escape System:** Design & realization of five types of Crew Escape system solid motors completed. Static testing of all five types of solid motors completed. First Test Vehicle mission (TV-D1) for the performance validation of crew escape system (CES) and parachute deployment has been successfully accomplished.
- iii. **Orbital Module Systems:** Design of Crew Module and Service Module structure have been completed. Various Parachute Systems have been tested through Integrated Main parachute Air drop Test and Rail Track Rocket Sledge Tests. Ground test programme towards human rating of Crew Module Propulsion System has been completed and Service Module Propulsion System test programme is nearing completion. Characterization of Thermal Protection System has been completed.
- iv. **Gaganyatri Training:** Two out of three semesters of the training programme completed. Independent Training Simulator and Static Mockup Simulators realized.
- v. **Major Ground Infrastructure:** Critical ground facilities such as Orbital Module Preparation Facility (OMPF), Astronaut Training Facility (ATF) and Oxygen Testing Facility have been operationalized. Realization of Mission Control Centre (MCC) Facilities and establishment of Ground Station Networks are nearing completion.

- vi. **Gaganyaan First uncrewed mission:** Solid and Liquid Propulsion Stages of human rated launch vehicle are ready for flight integration. C32 Cryogenic stage is nearing completion. Crew Module and Service Module structure realization completed. Flight integration activities are in progress.

(b) & (c)

Astronaut Selection Board constituted by ISRO had selected four astronauts from the group of test pilots from the Indian Air Force. All four astronauts have undergone training on spaceflight basic module at Russia. Currently, astronauts are undergoing training at the ISRO's Astronauts Training Facility (ATF) in Bengaluru for Gaganyaan Mission

(d) & (e)

ISRO is pursuing an ISRO-NASA joint mission to International Space Station (ISS) wherein one Gaganyaatri from ISRO will undertake space travel to ISS. This is a collaborative effort of ISRO, NASA and NASA identified private entity i.e. Axiom Space. Recently, ISRO has signed a Space Flight Agreement with Axiom Space for this joint mission to ISS.

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

LOK SABHA

UNSTARRED QUESTION NO. 281

TO BE ANSWERED ON WEDNESDAY, JULY 24, 2024

PUSHPAK VIMAN LAUNCH VEHICLE

281. SHRI S JAGATHRATCHAKAN:

Will the PRIME MINISTER be pleased to state:

- (a) whether the Government has taken any initiatives to make space access more affordable and sustainable;**
- (b) if so, the details thereof and if not, the reasons therefor;**
- (c) whether the Indian Space Research Organisation (ISRO) aims to make the upper stage of Pushpak Viman Launch Vehicle reusable, reducing costs and minimizing space debris; and**
- (d) if so, the details thereof and if not, the reasons therefor?**

ANSWER

**MINISTER OF STATE IN THE MINISTRY OF PERSONNEL, PUBLIC
GRIEVANCES & PENSIONS AND IN THE PRIME MINISTER'S OFFICE
(DR. JITENDRA SINGH):**

- (a) Yes, Sir.**
- (b) ISRO has been developing critical technologies towards reusable space transportation systems to make space access more affordable and sustainable. ISRO has developed a winged**

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body Reusable Launch Vehicle (RLV) named Pushpak and successfully demonstrated the autonomous Runway Landing over three Landing (RLV-LEX-01, RLV-LEX-02 & RLV-LEX-03). ISRO has also initiated the development activities towards a mission to demonstrate the orbital flight and re-entry of Pushpak.

In addition to the above, ISRO has initiated the development activities towards the demonstration of Vertical Take-off & Vertical Landing (VTVL), which is an enabling technology for recovery & reuse of booster stages of heavier launch vehicles. ISRO is also working on the critical technologies for Scramjet propulsion, which will be useful during the atmospheric phase of the flight of a launch vehicle, as the oxidizer for the fuel is derived from the atmosphere itself. This reduces the need for carrying the oxidizer along with the fuel and will benefit in bringing down the cost of access to space.

(c) & (d)

The Pushpak Vehicle by itself can potentially be used as a reusable flyback upper stage of a heavier launch vehicle. As of now, ISRO is currently focusing on the demonstration of orbital flight & re-entry of Pushpak and establishing the reliability through multiple missions.

(10)

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

LOK SABHA

UNSTARRED QUESTION NO. 329

TO BE ANSWERED ON WEDNESDAY, JULY 24, 2024

INITIATIVE TO STUDY THE ASTEROIDS

329. SHRI T R BAALU:

Will the PRIME MINISTER be pleased to state:

- (a) whether ISRO has launched a new initiative to study the asteroids in space and if so, the details thereof;**
- (b) the extent to which the studies would help India and the world to avert the asteroids that are threatening to hit Earth in the near future; and**
- (c) the details of progress made so far in this regard?**

ANSWER

**MINISTER OF STATE IN THE MINISTRY OF PERSONNEL, PUBLIC
GRIEVANCES & PENSIONS AND IN THE PRIME MINISTER'S OFFICE**

(DR. JITENDRA SINGH):

* * * *

- a) ISRO, as part of IS40M (ISRO System for Safe and Sustainable Space Operations Management) activities, has initiated efforts for capacity building in the area of asteroid observation and planetary defence, the latter aims to protect the planet Earth against any catastrophic asteroid impact threat. Preliminary**

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observational campaigns have been conducted to observe the asteroids using the existing astronomical telescopes within India. Ultimately, dedicated telescopes for asteroid observations, subsequent analysis to determine the asteroid's path and characterisation of the asteroid's composition, size shape etc. for impact risk analysis and advance warning are envisaged as part of this efforts. ISRO also looks forwards to join IAWN (International Asteroid Warning Network) and SMPAG (Space Mission Planning Advisory Group), these two entities function under the auspices of the United Nation for engaging in scientific research related to the impact potential of asteroid and to coordinate a global level effort for mitigating any impact hazard, respectively. Through the memberships, ISRO will benefit from the interactions with professionals and have access to the latest technological developments related to asteroid study and impact risk mitigation.

As part of awareness raising and engage academic community, the international asteroid day was celebrated at ISRO headquarters where 100 students participated in the interactive sessions and several eminent experts from JAXA and ESA delivered technical talks.

- b) India's geographic location offers a unique vantage point for asteroid observation which can help bridge existing gap in asteroid observation. There is a host of Indian astronomical observatories which has the capability to detect asteroid, though dedicated facilities are desirable. ISRO can significantly contribute by detecting new asteroids as well as

by providing follow-up observations that are crucial to refine the knowledge of asteroids' paths. With its matured technical prowess, ISRO can significantly contribute to global planetary defence efforts by providing scientific payloads, tracking support, analysis support, etc. In future, ISRO has plans to collaborate with other space agencies like NASA, ESA and JAXA on planetary defence related activities.

- c) ISRO participated as observers in IAWN and SMPAG annual meetings and showcased its potential capabilities which were well received.

Discussion for collaboration with ESA (European Space Agency) for RAMSES (Rapid Apophis Mission for Security and Safety) for Apophis flyby monitoring is also in progress. Subsequent meetings involving the respective teams of scientists are expected to firm up the specific areas where the organisations can complement each other's strengths.

(13)

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

LOK SABHA

UNSTARRED QUESTION NO. 426

TO BE ANSWERED ON WEDNESDAY, JULY 24, 2024

SPACE PROGRAMMES AND MISSIONS

426. SMT. APARAJITA SARANGI:

Will the PRIME MINISTER be pleased to state:

that the details of the India's space programmes and missions to be launched in the year 2024?

ANSWER

**MINISTER OF STATE IN THE MINISTRY OF PERSONNEL, PUBLIC
GRIEVANCES & PENSIONS AND IN THE PRIME MINISTER'S OFFICE**

(DR. JITENDRA SINGH):

Following are the space programmes & missions planned in the year 2024.

- i. Three PSLV missions, two of which are technology demonstration missions (TDS-01 & SPADEX) and one dedicated commercial mission for NewSpace India Limited (NSIL)**
- ii. One GSLV mission to launch NVS-02 Navigation Satellite**
- iii. One SSLV mission, to launch a technology demonstration Satellite (EOS-08).**

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- iv. **First unmanned flight under Gaganyaan Programme (HLVM3-G1)**
 - v. **Technology demonstration of Dual-Fuel Scramjet (DFS) propulsion technology on a sub-orbital sounding rocket platform as part of developing critical technologies for Air Breathing Propulsion towards reducing cost of access to space.**
 - vi. **Ground demonstration of Rendezvous & Docking that will provide valuable technical inputs for the SPADEX mission on PSLV later in the year.**
 - vii. **Celebration of the first National Space Day on August 23, 2024 to commemorate the successful soft and safe landing of "Vikram" Lander near South Pole of the moon.**

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

LOK SABHA

UNSTARRED QUESTION NO. 433

TO BE ANSWERED ON WEDNESDAY, JULY 24, 2024

SPACE EXPLORATION AND TECHNOLOGY DEVELOPMENT

433. DR. PRADEEP KUMAR PANIGRAHY:

Will the PRIME MINISTER be pleased to state:

- (a) the manner in which India is positioning itself globally in space exploration and technology development and the details of innovative technologies which are being developed to enhance space capabilities?**
- (b) the details of recent successes and milestones that have been achieved and the manner in which India will leverage them for further advancement;**
- (c) the manner in which collaborations and partnerships are fostering space technology advancements and global contributions;**
- (d) the details of key priorities for future space missions aligned with long-term goals, addressing challenges for sustained growth and success;**
- (e) the manner in which India is promoting innovation and skill development in space technology among youth; and**

- (f) the details of vision for India's role in shaping the future of space technology with strategies in place to realize this vision?

ANSWER

**MINISTER OF STATE IN THE MINISTRY OF PERSONNEL, PUBLIC
GRIEVANCES & PENSIONS AND IN THE PRIME MINISTER'S OFFICE**

(DR. JITENDRA SINGH):

- a) Indian Space Research Organisation (ISRO) has been at the forefront of space technology and exploration since its inception. Over the years, leveraging its key resources, the organisation has made several strides in space technologies, making India a major player in the global space arena. Current areas of research and broad priority of Indian space programme includes Stage Recovery & Reuse, LOX-Methane Engine, Air breathing/Hybrid Propulsion, Advanced Materials & Manufacturing, Advanced Inertial systems, Low Cost Spacecrafts, Inter-linking of satellite networks, On-Orbit Servicing, Docking, Lunar sample return, Quantum Communication, Electric Propulsion, Advanced Scientific Payloads, Space Based Surveillance, Atomic Clock, Travelling Wave Tube Amplifiers for communication payloads, Technologies for sustained Human space missions viz. Regenerative Life support systems, Rendezvous & Docking, Inflatable habitats, Human factor & Engineering studies etc.

Subsequent to the opening of space sector i.e. Space Sector Reforms 2020, participation of Non-Governmental Entities (NGEs) is enhanced significantly and some of the start-up companies are actively ventured into in key space activities viz., launch vehicle building, satellite making, space applications and space situational awareness.

- b) **ISRO/ DOS has recently achieved significant milestones in space exploration, including Chandrayaan-3 mission to the moon, Aditya-L1 mission to study the sun, Small Satellite Launch Vehicle (SSLV) which offers quick, cost-effective satellite launches, Reusable Launch Vehicle-Landing Experiments (RLV-LEX) for demonstrating reusable rocket technology, X-ray Polarimeter Satellite (XPOSAT) for studying cosmic X-rays, Gaganyaan Test Vehicle (TV) which is a step towards India's human space mission etc. Indian space start-ups have also progressed significantly and achieved remarkable milestones viz., Vikram-S, the first-ever suborbital flight launch by an Indian private entity (M/s Skyroot) and Agniban, an advanced sub-orbital flight launch by M/s Agnikul.**
- c) **International cooperation has been part of Indian space programme since inception. Establishment of Thumba Equatorial Rocket Launching Station (TERLS), conduct of Satellite Instructional Television Experiment (SITE) and Satellite Telecommunication Experiment Project (STEP), launches of**

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Aryabhata, Bhaskara, Ariane Passenger Payload Experiment (APPLE), IRS-IA, IRS-IB satellites, INSAT series of satellites, Missions to Moon, etc., have the components of international cooperation.

ISRO is pursuing bilateral and multilateral relations with space agencies and space related bodies with the aim of building and strengthening existing ties between countries; taking up new scientific and technological challenges addressing global challenges like climate change and disaster management and defining international frameworks for exploitation and utilization of outer space for peaceful purposes.

- d) Key priorities for future space missions include developing human spaceflight capabilities, advanced missions to moon, establishing our own space station, interplanetary missions and enhancing satellite technology for communication, navigation & earth observation. Long-term goals focus on sustainable space infrastructure, space debris management, and fostering international collaborations. Challenges include ensuring cost-effective missions, protecting against space hazards, and developing cutting-edge technology. Addressing these challenges requires investment in research, strengthening public-private partnerships, and international cooperation to share knowledge and resources for sustained growth and success in space exploration.**

- e) **India is promoting innovation and skill development in space technology among youth through various initiatives. ISRO/DOS conducts outreach programs like the Young Scientist Programme (YUVIKA) to inspire students with hands-on learning experiences. ISRO also collaborates with universities and educational institutions to integrate space technology into curricula and support student projects. Competitions and hackathons are conducted to encourage creative problem-solving. Additionally, incubation centers provide support for researchers, fostering a culture of innovation and nurturing the next generation of space scientists and engineers.**

Indian National Space Promotion & Authorization Center (IN-SPACe) has been making various initiatives with an aim to inspire, educate and equip the next generation of space professionals with necessary skills & knowledge to excel in the space sector.

Indian Institute of Space Science and Technology (IIST), exclusive Academic wing of Department of Space has been offering high quality education in space science and technology to meet the demands of Indian Space Programme. The institute offers undergraduate, postgraduate, doctoral and post-doctoral programmes in broad areas of space science, technology and applications.

- f) **India's vision for shaping the future of space technology includes becoming a leading player in global space exploration and**



leveraging space technology for socio-economic benefits. The nation has set the Space Vision 2047, which includes enhancing the India's share in the global space economy at a significant level, Indian Moon landing by 2040 and establishing Bharatiya Antariskha Station by 2035. Towards framing the decadal vision & strategy, a document on 'Decadal Vision for Indian space sector with a focus on space based economy and strategies to achieve the vision' has been generated.

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

LOK SABHA

UNSTARRED QUESTION NO. 1427

TO BE ANSWERED ON WEDNESDAY, JULY 31, 2024

SPACE TECHNOLOGY AND SPACE COOPERATION

1427. SHRI RAJU BISTA:

Will the PRIME MINISTER be pleased to state:

- (a) whether the International Space Organisations have requested India for the transfer of technology and future space cooperation after successful Chandrayaan Mission;**
- (b) the details of the steps taken by the Ministry for improving the scope of business prospect in satellite manufacturer and launching in Indian perspective;**
- (c) the details about the significant achievements of ISRO from 2014 till date; and**
- (d) the details about some of the notable satellites that ISRO has successfully launched into space?**

ANSWER

**MINISTER OF STATE IN THE MINISTRY OF PERSONNEL, PUBLIC
GRIEVANCES & PENSIONS AND IN THE PRIME MINISTER'S OFFICE
(DR. JITENDRA SINGH):**


- 22
- (a) While International Space Organisations have congratulated India for Chandrayaan-3 success, no specific request was made for the transfer of technology and future space cooperation.**
 - (b) The Government of India has announced reforms in the space sector in June, 2020 towards enabling the private players to provide end-to-end services towards enhancing the Indian space economy to a significant level. Indian Space Policy-2023 was released in April 2023 as an overarching, composite and dynamic framework to implement the space reform vision. It helps to promote greater participation of Non-Governmental Entities (NGEs) in the value chain of space economy in order to develop robust, innovative and competitive space ecosystem aiming for a larger share of India in global space economy. It also enables the NGEs to make use of infrastructure created through public funds. Further, amendment was made to the Foreign Direct Investment policy for space sector, enabling higher threshold of foreign investments in various space domains.**

Indian National Space Promotion and Authorisation centre (IN-SPACe), a single-window agency, was formed under Department of Space, to promote, regulate and authorize space activities of Non-Governmental Entities (NGEs). Further, in order to carry out space activities, the facilities across various ISRO centres will also be permitted for use by private sector through IN-SPACe. New Space India Limited (NSIL), a CPSE under the Department of Space will transfer the matured technologies developed by ISRO to Indian industries. ISRO will also nurture Indian space

industries by sharing its experiences on quality and reliability protocols, documentation, testing procedures etc. Announcement of Opportunities and initiatives like 'Atmanirbharta in development of space technologies/ products/ systems through Indian industry' are also being undertaken offering challenges in new domains of space technology.

(c) 54 spacecraft missions (15 Communication, 26 Earth Observation, 8 Navigation and 5 Space Science), 53 launch vehicle missions (35 PSLV, 9 GSLV, 7 LVM3 and 2 SSLV) and 8 technology demonstrators, have been successfully realized, since 2014 till date. Significant achievements are given below:

- In January 2014, the first successful flight with indigenous Cryogenic Upper Stage, GSLV-D5 launch vehicle carrying GSAT-14.
- In September 2014, India's Mars Orbiter Spacecraft successfully entered into an orbit around planet Mars, putting India into a league of select nations which had sent a spacecraft to the Red Planet. The spacecraft completed about 8 years of operation against the designed life of 6 months and serving nation with a lot of interesting science data.
- In December 2014, the country witnessed the experimental flight of the next generation launch vehicle – the GSLV MKIII. The LVM3-X/CARE Mission, the first experimental suborbital flight of the vehicle, launched the Crew Module Atmospheric Re-entry experiment (CARE).

- 
- **AstroSat launched by PSLV in September, 2015, is the first dedicated Indian astronomy mission aimed at studying celestial sources in X-ray, optical and UV spectral bands simultaneously.**
 - **ISRO has established and operationalised Navigation with Indian Constellation (NavIC) which provides highly accurate Position, Navigation and Time information to users in India and its surroundings.**
 - **Successful flight testing of Reusable Launch Vehicle-Technology Demonstrator (RLV-TD) was done on May 23, 2016 from Satish Dhawan Space Centre (SDSC) SHAR, Sriharikota.**
 - **In 2017, PSLV C-37 created a world record by successfully placing 104 satellites in orbit during a single launch.**
 - **ISRO has launched the 2.2 Ton communication satellite (South Asia Satellite) in 2017 to support neighbouring countries.**
 - **The first developmental mission of GSLV Mk-III D1 was successfully accomplished in June-2017 and boosted GSAT-19 satellite into geosynchronous transfer orbit.**
 - **ISRO demonstrated a crucial technology element of Human spaceflight in July 2018- The Pad Abort Test (PAT) to qualify the Crew Escape System (CES). The Pad Abort Test flight was a demonstration of the capability of CES to evacuate the Crew in case of a contingency at launch Pad.**

- **GSAT-29 high throughput communication satellite was successfully launched on November 14, 2018, on-board GSLV Mk III-D2.**
- **In 2018, ISRO's next generation high throughput communication satellite, GSAT-11 was successfully launched on December 05, 2018 from Kourou.**
- **India's second mission to Moon, Chandrayaan-2 was successfully launched on July 22, 2019 on-board GSLV Mk III-M1, first operational flight of this new launch vehicle. Chandrayaan-2 Orbiter is providing valuable science data for the research community.**
- **PSLV-C52 successfully launched EOS-04 satellite (RISAT-1A) in Feb-2022 along with two small satellites - a student satellite (INSPIRESat-1) from Indian Institute of Space Science & Technology (IIST) and a technology demonstrator satellite (INS-2TD) from ISRO, which is a precursor to India-Bhutan Joint Satellite (INS-2B).**
- **'ISRO System for Safe & Sustainable Operations Management (IS4OM) was dedicated to the nation in July, 2022.**
- **LVM3 M2/OneWeb India-1 & LVM3 M3/OneWeb India-2 Missions were successfully accomplished in October 2022 & March 2023 respectively, exemplifying Atmanirbharata and enhances India's competitive edge in the global commercial launch service market.**

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- **PSLV-C54 successfully launched EOS-06 satellite (Oceansat-3) in November, 2022 along with Eight Nano-satellites including INDIA-BHUTAN SAT (INS-2B).**
 - **First successful mission of SSLV-D2 was accomplished in February, 2023 by injecting three satellites into precious orbit.**
 - **Reusable Launch Vehicle Autonomous Landing Experiments (RLV-LEX) were successfully conducted thrice at the Aeronautical Test Range (ATR), Chitradurga, Karnataka during 2023-24.**
 - **GSLV-F12/NVS-01 mission was successfully accomplished in May, 2023. GSLV deployed the NVS-01 navigation satellite, the first of the second-generation navigation satellites.**
 - **Chandrayaan-3: LVM3-M4 successfully launched the Chandrayaan-3 Spacecraft on 14th July, 2023. Successfully accomplished safe & soft-landing of Vikram Lander at 'Shiv Shakti' point (Statio Shiv Shakti) & deployment of Pragyaan Rover on the lunar surface on August 23, 2023**
 - **Aditya-L1 was successfully launched in September, 2023 using PSLV-C57. Spacecraft placing at Sun-Earth Lagrangian point (L1) i.e. Halo-Orbit Insertion (HOI) was successfully accomplished on January 6, 2024.**
 - **PSLV-C58/XPOSAT mission was successfully accomplished in January, 2024.**

- **GSLV F14/ INSAT-3DS mission (fully funded by Ministry of Earth Sciences) was successfully accomplished in February, 2024.**
- **Successfully carried out the second experimental flight ATV-D03/DFS for the demonstration of Air Breathing Propulsion Technology in July, 2024.**

(d) The notable satellites that ISRO has launched into space includes space science missions such as Aryabhata, Astrosat, Mangalyaan, Chandryaan series XPOSAT, ADITYA-L1. ISRO has also successfully deployed an indigenous satellite based Navigation system namely the IRNSS/NavIC series of satellites. Further various Earth Observation Satellites such as Resourcesat series & Carto series were also launched. In the communication satellite segment the notable launches include the INSAT and GSAT series such as INSAT- 4C, GSAT-7A, GSAT-11, GSAT-29, GSAT-9 etc.

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

LOK SABHA

UNSTARRED QUESTION NO. 1433

TO BE ANSWERED ON WEDNESDAY, JULY 31, 2024

SUPPORT TO SPACE TECHNOLOGY START-UPS

1433. MS. S JOTHIMANI:

Will the PRIME MINISTER be pleased to state:

- (a) the details of the number of private start-ups related to space tech services in India currently;**
- (b) whether there is any proposal of a Public Private Partnership (PPP) for the advancement of space technology;**
- (c) if so, the details thereof and if not, the reasons therefor;**
- (d) whether any space technology start-up has approached ISRO for their operations and ventures and if so, the details thereof; and**
- (e) whether the Union Government has any concrete plan to develop a policy in order to enhance support to such start-ups?**

ANSWER

**MINISTER OF STATE IN THE MINISTRY OF PERSONNEL, PUBLIC
GRIEVANCES & PENSIONS AND IN THE PRIME MINISTER'S OFFICE**

(DR. JITENDRA SINGH):

- (a) As on date a total of 229 space start-ups have registered under space technology category compared to just 01 (one) in 2014

(b) & (c)

Yes Sir, the Space Commission has approved the framework to realize Earth Observation (EO) satellite constellations by NGEs under PPP model in its 152nd meeting. NSIL has floated a proposal for launch vehicle production in PPP model.

- (d) Following the sectoral reforms, the Indian Space arena is witnessing a rapid growth of start-ups and private firms. ISRO, towards facilitating a vibrant space ecosystem in India, has been extending its technical support, sharing its expertise and facility utilisation through IN-SPACE. Its support for a recent suborbital mission 'Agnibaan SOrTeD', conducted by M/s Agnikul Cosmos, an Indian start-up showcases the willingness of the organisation to support and nurture private startups in India's space sector. Similarly, with an ample technical support from ISRO, M/s Skyrroot Aerospace successfully launched a maiden sub-orbital flight ('Vikram-S') last year. In addition to above, ISRO has been extending technical supports to several space start-ups involved in launch vehicle building, satellite development, space applications and ground systems.

- (e) Yes Sir, the following major initiatives have been taken by the government to encourage more entrepreneurs to enter the space Tech sector and contribute to Indian space economy

- **The space sector has been liberalised and private sector allowed to carry out end to end space activities.**
- **Indian National Space Promotion and Authorization Centre (IN-SPACe) was created in Department of Space for promoting, authorising and overseeing the activities of non-government entities (NGEs) in Space Sector.**
- **The Indian Space Policy — 2023 has been formulated by the Government to provide regulatory certainty to space activities by various stakeholders, in order to create a thriving space ecosystem.**
- **In order to ease access to foreign capital by Indian NGEs, IN-SPACe along with Department of Space has brought out revised FDI policy for Space Sector.**
- **IN-SPACe has conceptualized and launched "IN-SPACe Pre-Incubation Entrepreneurship (PIE) Development Program". This program will not only help to transform the idea into a prototype but also help in the development of entrepreneurs and allied business skills.**
- **Various schemes to encourage and hand hold private sector also announced and implemented by IN-SPACe, i.e., Seed fund Scheme, Pricing Support Policy, Mentorship support, Design Lab for NGEs, Skill Development in Space Sector, ISRO facility utilisation support, Technology Transfer to NGEs, creation of IN-SPACe Digital Platform to connect all the stakeholders of space ecosystem etc.**

- **Decadal vision and strategy for Indian space economy is also announced by IN-SPACe, which shall increase the share of India in overall space economy.**
- **IN-SPACe has been driving international outreach activities in terms of collaborations and partnerships with international space organizations and companies for various business and investment opportunities.**
- **IN-SPACe is encouraging Indian industry to take up the local manufacturing of the cost effective ground system for communication services.**
- **IN-SPACe has been encouraging state governments, for setting up of dedicated end-to-end manufacturing clusters for Space system products and components.**

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

LOK SABHA

UNSTARRED QUESTION NO. 1589

TO BE ANSWERED ON WEDNESDAY, JULY 31, 2024

SUCCESSFUL ISRO MISSIONS

1589. SHRI NARESH GANPAT MHASKE:

DR. SHRIKANT EKNATH SHINDE:

SHRI PRAVEEN PATEL:

SMT. DAGGUBATI PURANDESWARI:

Will the PRIME MINISTER be pleased to state:

- (a) the details of the number of spacecraft missions, launch vehicle missions and technology demonstrators which have been successfully realized by the Department of Space since 2014;**
- (b) whether the Mars Orbiter Mission has achieved its stipulated objectives;**
- (c) the major breakthroughs made by AstroSat since its launch in September 2015;**
- (d) the details of the agreements signed by ISRO with other countries in the field of space cooperation during the last ten years;**
- (e) the details of the International space missions and projects in which ISRO has participated; and**
- (f) the details of the future of India's space programme?**

ANSWER

**MINISTER OF STATE IN THE MINISTRY OF PERSONNEL, PUBLIC
GRIEVANCES & PENSIONS AND IN THE PRIME MINISTER'S OFFICE
(DR. JITENDRA SINGH):**

(a) The details of the number of spacecraft missions, launch vehicle missions, and technology demonstrators which have been successfully realized by the Department of Space since 2014:

- Spacecraft Missions : 54 Nos.**
- Launch Vehicle Missions : 53 Nos.**
- Technology Demonstrators : 8 Nos.**



(b) Yes, Sir. The Mars Orbiter Mission has achieved its stipulated technological, as well as scientific objectives. The first inter-planetary mission to Mars, was successful in furthering understanding of Martian atmospheric composition and in providing clues for estimating the loss rate of atmosphere.

(c) The major breakthrough made by the AstroSat mission include:

- (i) Witnessing the 'live' formation of dwarf galaxies.**
- (ii) Detection of UV light emission from a galaxy at 9.3 billion light years away from Earth.**
- (iii) Solving a decade-old puzzle of a source displaying both hot and cold emission characteristics.**
- (iv) Discovery of X-Ray polarisation in the crab nebula.**
- (v) Identification of quasi-periodic oscillations of a black hole system as dynamical frequency.**

(vi) Witnessing of the 'birth of the black holes'.

- (d) ISRO has signed more than 120 documents for space cooperation with more than 40 countries/ their entities and 4 multilateral organisations in last decade. These cooperative documents enable the cooperation in the fields of peaceful uses of outer space including: satellite data sharing, joint satellite missions, joint experiments, frequency coordination, technology protection, payload accommodation, calibration & validation, ground station support, and professional exchange. Broad areas of cooperation include: earth observation, satellite communication, satellite navigation, human space flight, space exploration and space situational awareness.**
- (e) ISRO has built satellites with international partners, flown payloads from international partners in ISRO's satellite and conducted joint experiments. Specific examples include: building of two joint satellites with France; accommodating payloads from Bulgaria, Canada, France, Germany, Italy, Sweden, UK and USA in Indian satellite missions; and conducting of joint experiments with France, Japan, and USA.**
- (f) As announced by the Hon'ble Prime Minister, establishing Bhartiya Antariksh Station (BAS) by 2035 and Indian Moon landing by 2040 are identified as part of future roadmap for space exploration programme. Missions towards global characterization of thermospheric-ionospheric response to space weather, study of Venus systems, landing on Martian surface, atmospheric characterization of exoplanets etc. are also under studies in this regard.**



Subsequent to the opening of space sector i.e. Space Sector Reforms 2020, participation of Non-Governmental Entities (NGEs) is enhanced significantly and some of the start-up companies are actively ventured into key space activities viz., launch vehicle building, satellite making, space applications and space situational awareness.

Thus the capability of Indian space eco-system is progressively enhancing towards positioning the country in a global scale.

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

LOK SABHA

UNSTARRED QUESTION NO. 2546

TO BE ANSWERED ON WEDNESDAY, AUGUST 07, 2024

INDIANISATION OF TECHNIQUE IN SPACE SECTOR

2546. SHRI P C MOHAN:

SHRI BIDYUT BARAN MAHATO:

SHRI MUKESH RAJPUT:

Will the PRIME MINISTER be pleased to state:

- (a) the details regarding Indianisation of techniques and tools utilised in the space sector;**
- (b) the revenue generated since 2014 by launching foreign satellites; and**
- (c) the roadmap ahead for the space exploration programme?**

ANSWER

**MINISTER OF STATE IN THE MINISTRY OF PERSONNEL, PUBLIC
GRIEVANCES & PENSIONS AND IN THE PRIME MINISTER'S OFFICE**

(DR. JITENDRA SINGH):

- (a) The department is taking proactive measures in indigenization of space systems and associated technologies. Space sector indigenization involves strategic initiatives such as developing indigenous satellite platforms like IRS & INSAT, and launch vehicles like PSLV, GSLV, LVM3 (GSLV Mk3) & SSLV with**

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locally produced components, including the complex cryogenic engine. The process includes in-house Research & Development, maximal usage of indigenous items and rigorous qualification to ensure reliability. Additionally, skill development, infrastructure upgrades, increased industry participation etc. are regularly followed for creating self-reliant and cost-effective space technologies.

As such, the indigenous content typically in Polar Satellite Launch Vehicle (PSLV) has been enhanced from about 70% to 90% in the operational phase. Satellites, being the electronics intensive item, indigenous content is about 70%. Continuous efforts are still being taken to further reduce the import content and to develop and qualify indigenous elements like electronics, special alloys, composites etc.

- (b) Starting from January 2014 till July 2024, a total of 397 Foreign Satellites have been successfully launched on commercial basis. Through launching of these foreign satellites, country has earned a total Foreign Exchange revenue of approximately 157 Million USD and 261 Million Euros.
- (c) As announced by the Hon'ble Prime Minister, establishing Bhartiya Antariksh Station (BAS) by 2035 and Indian Moon landing by 2040 are identified as part of future roadmap for space exploration programme. Missions towards global characterization of thermospheric-ionospheric response to space weather, study of Venus systems, landing on Martian surface, atmospheric characterization of exoplanets etc. are also under studies in this regard.

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

LOK SABHA

UNSTARRED QUESTION NO. 2548

TO BE ANSWERED ON WEDNESDAY, AUGUST 07, 2024

INDIAN NAVIC SYSTEM

2548. SHRI RAJU BISTA:

Will the PRIME MINISTER be pleased to state:

- (a) the status of India's NavIC system and the manner in which it is different from the contemporary systems vis a vis GPS, GLONASS;**
- (b) the impact ISRO & Earth observation satellites had on various sectors, such as agriculture, disaster management, and environmental monitoring;**
- (c) the details of the progress made by the country in its mission to send humans to space;**
- (d) the future plans of ISRO including the development of human spaceflight capabilities and exploration of deeper space; and**
- (e) the details of the measures taken by the Government to promote private sector participation in the space sector?**

ANSWER

**MINISTER OF STATE IN THE MINISTRY OF PERSONNEL, PUBLIC
GRIEVANCES & PENSIONS AND IN THE PRIME MINISTER'S OFFICE
(DR. JITENDRA SINGH):**

- (a) India's NavIC is an independent regional navigation satellite system designed to provide PNT (Position, Navigation and Timing) service over Indian landmass and 1500 kilometers beyond. NavIC space segment consists of a constellation of seven satellites in geosynchronous orbits. Currently, there are four functional satellites providing PNT service. The satellites that are no longer capable of PNT service have been repurposed for additional useful services like safety-of-life messaging. The full constellation of seven satellites is expected to be completed in the coming years.

NavIC is a regional system, whereas GPS and GLONASS are global systems. However, the performance of NavIC, as seen with a seven satellite constellation, is at par with the contemporary systems in the envisaged service area.

- (b) ISRO's Earth Observation (EO) satellites are providing data for applications in the domains of Agriculture, Water, Environment, Urban & Rural Development, and for Disaster Management Support, which have been internalised / institutionalised by the respective users.

In the Agriculture domain, EO data has facilitated advance information on yield of major crops and in assessing & monitoring agriculture drought situations. The EO data is also being used in the PMFBY programme, benefiting farmers and agricultural insurance companies.

EO data is used for disaster management support for deriving near-real time information; development of early warning models and damage assessment with reference to disasters such as

Floods, Forest fires, Cyclones, Landslides and Earthquakes. Such inputs help in decision making for disaster response, planning long term mitigation measures, and also in reducing the loss of lives; and extent & cost of evacuation operations for major disasters such as cyclones & floods.

EO data is also providing information on aerosols, agricultural residue burning and weather parameters, for environmental monitoring and citizens' benefit.

All these applications provide tangible and intangible contributions for societal development.

(c) The progress made for Gaganyaan Programme are as follows:

- i. Human Rated Launch Vehicle: Ground testing of propulsion stages, including solid, liquid and cryogenic engine, towards human rating of the launch vehicle has been completed.**
- ii. Crew Module Escape System: Design & realization of five types of Crew Escape System solid motors completed. Static testing of all five types of solid motors completed. First Test Vehicle mission (TV-D1) for the validation of crew escape system and parachute deployment has been successfully accomplished.**
- iii. Orbital Module Systems: Design of Crew Module and Service Module structure have been completed. Various Parachute Systems have been tested through Integrated Main parachute Air drop Test and Rail Track Rocket Sledge Tests. Ground test programme towards human rating of Crew Module Propulsion System has been completed and Service**

Module Propulsion System test programme is nearing completion. Characterization of Thermal Protection System has been completed.

- iv. Gaganyatri Training: Two out of three semesters of the training programme completed. Independent Training Simulator and Static Mockup Simulators realized.**
 - v. Major Ground Infrastructure: Critical ground facilities such as Orbital Module Preparation Facility, Astronaut Training Facility, Oxygen Testing Facility have been operationalized.**
 - vi. Gaganyaan First Uncrewed mission: Solid and Liquid Propulsion Stages of human rated launch vehicle are ready for flight integration. C32 Cryogenic stage is nearing completion. Crew Module and Service Module structure realization completed. Flight integration activities are in progress.**
- (d) The mandate of Gaganyaan programme is to demonstrate the capability to indigenously carry out human spaceflight to Low earth orbit. In continuation of Gaganyaan programme, ISRO has developed a comprehensive road map for human spaceflight activities. As per the roadmap, ISRO is planning to carry out crewed and uncrewed follow-on missions. The objectives of these mission will be to induct various indigenous technologies such as flight suits, crew seat, viewport and advanced avionics systems.**

ISRO is also formulating a proposal to develop and deploy Bharatiya Antariksh Station (BAS) in Low earth orbit. Currently,

the teams are working on the preparation of a detailed project report for the same. These programmes will pave the way for demonstration of Lunar landing of an Indian by 2040.

- (e) The Government of India has announced reforms in the space sector in June, 2020, towards enabling the private players to provide end-to-end services towards enhancing the Indian space economy to a significant level.

Indian National Space Promotion and Authorisation centre (IN-SPACe), a single-window agency, was formed under Department of Space, to promote, regulate and authorize space activities of Non-Governmental Entities (NGEs).

Various schemes to encourage and hand hold private sector also announced and implemented by IN-SPACe i.e. Seed Fund Scheme, Pricing Support Policy, Mentorship Support, Design Lab for NGEs, Skill Development in Space Sector, Technology Transfer to NGEs. Further, in order to carry out space activities, the facilities across various ISRO centres will also be permitted for use by private sector through IN-SPACe.

IN-SPACe has signed around 58 MoUs with NGEs to provide necessary support for realization of space systems and applications envisaged by such NGEs, which is expected to increase the industry participation in manufacturing of launch vehicles and satellites.

Indian Space Policy-2023 was released in April 2023 as an overarching, composite and dynamic framework to implement the space reform vision. It helps to promote greater

participation of Non-Governmental Entities (NGEs) i.e. private sector in the value chain of space economy in order to develop robust, innovative and competitive space ecosystem aiming for a larger share of India in global space economy. It also enables the NGEs to make use of infrastructure created through public funds. Further, amendment was made to the Foreign Direct Investment policy for space sector, enabling higher threshold of foreign investments in various space domains.

M/s. New Space India Ltd. (NSIL), a CPSE under the Department of Space will transfer the matured technologies developed by ISRO to Indian industries. ISRO will also nurture Indian space industries by sharing its experiences on quality and reliability protocols, documentation, testing procedures etc. Announcement of opportunities and initiatives like 'Atmanirbharta in development of space technologies/ products/ systems through Indian industry' are also being undertaken offering challenges in new domains of space technology.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA

UNSTARRED QUESTION NO. 363

TO BE ANSWERED ON THURSDAY, JULY 25, 2024

FEASIBILITY STUDY FOR SPACE TOURISM

363. SHRI SANJEEV ARORA:

Will the PRIME MINISTER be pleased to state:

- (a) the status of accomplishment of Gaganyaan mission;
- (b) the results of the feasibility studies for a sub-orbital space tourism mission; and
- (c) the expected timeline for the same?

ANSWER

**MINISTER OF STATE IN THE MINISTRY OF PERSONNEL, PUBLIC
GRIEVANCES & PENSIONS AND IN THE PRIME MINISTER'S OFFICE
(DR. JITENDRA SINGH):**

- (a) The major accomplishment of Gaganyaan Programme is as follows:
 - i. Human Rated Launch Vehicle: Ground testing of propulsion stages, including solid, liquid and cryogenic engine, towards human rating of the launch vehicle has been completed.
 - ii. Crew Module Escape System: Design & realization of five types of Crew Escape System solid motors completed. Static testing of all five types of solid motors completed. First Test Vehicle mission (TV-D1) for the validation of crew escape system and parachute deployment has been successfully accomplished.
 - iii. Orbital Module Systems: Design of Crew Module and Service Module structure have been completed. Various Parachute Systems have been tested through Integrated Main parachute Air drop Test and Rail Track Rocket Sledge Tests. Ground test programme towards human rating of Crew Module Propulsion

System has been completed and Service Module Propulsion System test programme is nearing completion. Characterization of Thermal Protection System has been completed.

- iv. Gaganyatri Training: Two out of three semesters of the training programme completed. Independent Training Simulator and Static Mockup Simulators realized.
 - v. Major Ground Infrastructure: Critical ground facilities such as Orbital Module Preparation Facility, Astronaut Training Facility, and Oxygen Testing Facility have been operationalized.
 - vi. Gaganyaan First Uncrewed mission: Solid and Liquid Propulsion Stages of human rated launch vehicle are ready for flight integration. C32 Cryogenic stage is nearing completion. Crew Module and Service Module structure realization completed. Flight integration activities are in progress.
- (b) ISRO has carried out few technical feasibility studies for a sub-orbital space tourism mission. Results of these studies include basic configuration of space module for safe tourism and a liquid propellant stage booster for launching the module.
- (c) In view of the commercial potential of Space Tourism, Department of Space envisages its commercial exploitation through NewSpace India Limited (NSIL).

O.I.H.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA

UNSTARRED QUESTION NO. 1256

TO BE ANSWERED ON THURSDAY, AUGUST 01, 2024

ACHIEVEMENTS RELATED TO SPACE PROGRAMMES AND MISSIONS

1256. SHRI MADAN RATHORE:

Will the PRIME MINISTER be pleased to state:

- (a) whether it is a fact that India has also played a significant role in space programmes and missions; and
- (b) if so, the details of the achievements made by the country during the last five years?

ANSWER

**MINISTER OF STATE IN THE MINISTRY OF PERSONNEL, PUBLIC
GRIEVANCES & PENSIONS AND IN THE PRIME MINISTER'S OFFICE
(DR. JITENDRA SINGH):**

(a) & (b)

Yes, Sir. India has played a significant role in space programmes and space missions. Over the last five years, the country has achieved notable milestones in the space sector. Some of the major achievements are given below:

- India's second mission to Moon, Chandrayaan-2 was successfully launched on July 22, 2019 on-board GSLV Mk III-M1, first operational flight of this new launch vehicle. Chandrayaan-2 Orbiter is providing valuable science data for the research community.
- The launch of PSLV-C48/ RISAT-2BR1 in December, 2019 marked the 50th launch of PSLV, the workhorse launch vehicle. PSLV-C48/ RISAT-2BR1 is the 75th Launch vehicle mission from SDSC SHAR.

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- PSLV-C52 successfully launched EOS-04 satellite (RISAT-1A) in February, 2022 along with two small satellites - a student satellite (INSPIRESat-1) from Indian Institute of Space Science & Technology (IIST) and a technology demonstrator satellite (INS-2TD) from ISRO, which is a precursor to India-Bhutan Joint Satellite (INS-2B).
 - 'ISRO System for Safe & Sustainable Operations Management (IS4OM) was dedicated to the nation in July, 2022.
 - LVM3 M2/OneWeb India-1 & LVM3 M3/OneWeb India-2 Missions were successfully accomplished in October 2022 & March 2023 respectively. With these launches, LVM3 exemplifies Atmanirbharata and enhances India's competitive edge in the global commercial launch service market.
 - PSLV-C54 successfully launched EOS-06 satellite (Oceansat-3) in November, 2022 along with Eight Nano-satellites including INDIA-BHUTAN SAT (INS-2B).
 - First successful mission of SSLV-D2 was accomplished in February, 2023 by injecting three satellites into precise orbit.
 - Reusable Launch Vehicle Autonomous Landing Experiments (RLV-LEX) were successfully conducted thrice at the Aeronautical Test Range (ATR), Chitradurga, Karnataka during 2023-24.
 - GSLV-F12/NVS-01 mission was successfully accomplished in May, 2023. GSLV deployed the NVS-01 navigation satellite, the first of the second-generation satellites envisaged for the Navigation with Indian Constellation (NavIC) service, into a Geosynchronous Transfer Orbit.
 - ISRO successfully carried out the first integrated test on an intermediate configuration of the 2000kN Semi-cryogenic Engine in May, 2023 at the newly commissioned semi-cryogenic integrated engine & stage test facility at ISRO Propulsion Complex (IPRC). Further, hot test of the Semi-cryogenic Engine was carried out by a hot-firing for a short duration of 4.5 Seconds in July, 2023.
 - **Chandrayaan-3:** LVM3-M4 successfully launched the Chandrayaan-3 Spacecraft on 14th July, 2023. Successfully accomplished safe & soft-landing of Vikram Lander at 'Shiv Shakti' point (Statio Shiv Shakti) & deployment of Pragyaan Rover on the lunar surface on August 23, 2023

- Aditya-L1 was successfully launched in September, 2023 using PSLV-C57. Spacecraft placing at Sun-Earth Lagrangian point (L1) i.e. Halo-Orbit Insertion (HOI) was successfully accomplished on January 6, 2024.
- As part of Gaganyaan programme, new Test Vehicle for testing critical systems was successfully developed and TV-D1 was successfully launched in October, 2023 to demonstrate Crew Escape System (CES). Announcement of Astronaut-Designates (4 Nos.) to the Country and Astronaut wings bestowing were done in February, 2024.
- PSLV-C58/XPOSAT mission was successfully accomplished in January, 2024.
- GSLV F14/ INSAT-3DS mission (fully funded by MoES) was successfully accomplished in February, 2024.
- Successfully carried out the second experimental flight ATV-D03/DFS for the demonstration of Air Breathing Propulsion Technology in July, 2024.
- Space Sector Reforms was announced in 2020 with an objective of enhancing India's share in global space economy. As a result, exponential increase in space start-ups is witnessed. M/s Skyroot Aerospace and M/s Agnikul Cosmos have successfully launched their sub-orbital flights in 2023 & 2024 respectively. Several other start-ups have significantly progressed towards launch vehicle & satellite development and space applications. IN-SPACe, created under Department of Space as part of Space Reforms 2020, has been functioning as a single window agency to promote, regulate & authorize the space activities of Non-Governmental Entities (NGEs).
- Indian Space Policy-2023 was released in April, 2023 as an overarching, composite and dynamic framework to implement the space reform vision approved by the Cabinet.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA

UNSTARRED QUESTION NO. 1257

TO BE ANSWERED ON THURSDAY, AUGUST 01, 2024

SPACE DEBRIS MANAGMENT

1257. DR. FAUZIA KHAN:

Will the PRIME MINISTER be pleased to state:

- (a) the details on the current status of Government's efforts to mitigate space debris, including any technological advancements or international collaborations in this regard;
- (b) whether any strategies and technologies have been developed or planned to be developed by Government for the active removal or clean-up of space debris; and
- (c) if so, the details of such programme along with the contribution of the programme to global initiatives in this area?

ANSWER

MINISTER OF STATE IN THE MINISTRY OF PERSONNEL, PUBLIC GRIEVANCES &
PENSIONS AND IN THE PRIME MINISTER'S OFFICE

(DR. JITENDRA SINGH):

- (a) At present, internationally accepted space debris mitigation guidelines recommended by UN-COPOUS and Inter-Agency Space Debris Coordination Committee (IADC) are followed to the maximum possible extent in all space activities by ISRO. The currently adopted mitigation practices include limiting release of mission related objects (such payload cover etc.), preventing on-orbit explosions through robust design measures and end-of-life "passivation" (venting of excess fuel and discharging batteries etc.), removal of satellites and rocket bodies at their end-of-life away from densely populated regions of active satellites.

Close approach analysis is performed for all operational space assets to detect any potential collision risk in near future. To mitigate any such risks, Collision avoidance maneuvers are designed and executed as and when required. The lift-off time of the

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launch vehicle is suitably adjusted well in advance to avoid any potential collision during ascent phase of launch vehicle missions and during the first orbital phase of satellite.

More proactive efforts are being undertaken such as de-orbiting of Low-Earth Orbit satellites at their end-of-life as well as de-orbiting of PSLV upper stages after payload injection to very low altitudes (below 350 km) so that they are naturally removed from orbits within few years.

As a notable example, in 2023, Meghatropiques satellite was de-orbited through a series of manoeuvres at end of mission and was successfully made to re-enter the atmosphere with a targeted impact point over the Deep Pacific Ocean on March 7, 2023. The satellite would have otherwise orbited the Earth as a debris object for more than a few 100 years.

ISRO has been a member of the IADC (Inter-Agency Space Debris Coordination Committee), since 1996. With the membership of 13 leading space-faring agencies, IADC is the most widely recognised entity on space debris related matters and brought out the foundational guidelines on space debris mitigation. ISRO has made substantial contribution in shaping the subsequent revisions of these guidelines. ISRO has also been an active participant in the activities of IAA Space Debris Working Group, IAF space traffic management committee and ISO working group for space debris. Indian delegation contribute very significantly to the activities of UNCOPUOS Long Term Sustainability Working Group.

Recently, in the opening plenary session of the 42nd annual meet of IADC, ISRO has declared the India's intent to achieve debris free space missions by all Indian space actors, governmental and non-governmental by 2030.

- (b) Yes, ISRO has plans to develop technology for Active Debris Removal. Many activities towards this are initiated and are at study level.
- (c) At present, several futuristic technology developments in the area of rendezvous and docking, space robotics, on-orbit servicing, related sensor, guidance and navigational algorithm development is being pursued within ISRO. Such technologies will be utilised for debris removal. Specific initiatives are in progress through concerted efforts among ISRO centres to conceptualize and demonstrate a debris removal mission.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA
STARRED QUESTION NO. 192

TO BE ANSWERED ON THURSDAY, AUGUST 08, 2024

SPACE INDUSTRIAL AND PROPELLANTS PARK PROJET IN TAMIL NADU

*192. SHRI K.R.N. RAJESHKUMAR:

Will the PRIME MINISTER be pleased to state:

- (a) whether the Central Government is aware of the newly announced Space Industrial and Propellants Park by Tamil Nadu, close to the new spaceport at Kulasekarapattinam, Thoothukudi district, and if so, the details thereof;
- (b) the support and measures that will be provided by the Central Government to ensure the timely completion of the Project; and
- (c) the expected benefit to the Indian space industry and techno-economic contribution to our country from this Project?

ANSWER

MINISTER OF STATE IN THE MINISTRY OF PERSONNEL, PG &
PENSIONS AND IN THE PRIME MINISTER'S OFFICE
(DR. JITENDRA SINGH):

(a) to (c) A Statement is laid on the Table of the House.

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STATEMENT LAID ON THE TABLE OF THE RAJYA SABHA IN REPLY TO
STARRED QUESTION NO. 192 REGARDING "SPACE INDUSTRIAL AND
PROPELLANTS PARK PROJECT IN TAMIL NADU" ASKED BY SHRI K.R.N.
RAJESHKUMAR FOR ANSWER ON THURSDAY, AUGUST 08, 2024.

- (a) Yes Sir. Government of Tamil Nadu has announced this project on 19.02.2024.
- (b) IN-SPACE has entered into a Memorandum of Understanding (MoU) with Tamil Nadu Industrial Development Corporation (TIDCO) for setting up Space Manufacturing Cluster. The support and measures that will be provided by IN-SPACE as per the MoU to ensure the timely completion of project are:
- I. To advice Government of Tamil Nadu on potential industries investing in the manufacturing cluster.
 - II. Promotion and awareness to space and allied sector industries for setting up manufacturing cluster.
 - III. Providing technical guidance for setting up the manufacturing unit.
 - IV. Providing technical consultation towards establishment of common infrastructure facilities by Govt. of Tamil Nadu for assembly, integration and testing of Space systems developed by manufacturing companies.
- (c) The Space industrial and propellants park with state-of-the-art common facilities, research centres, plotted land parcels armed with its strategic advantage of proximity to the space port will encourage numerous space related start-ups and industries to set up their units.

With major space industries setting up their units, the region is expected to reap economic benefits with the development of supporting industries, social infrastructure, and the huge employment opportunities. The space park is poised to become a cornerstone of space related manufacturing in India enabling space industries to have easier access to reliable, high quality components and sub-system.

GOVERNMENT OF INDIA

DEPARTMENT OF SPACE

RAJYA SABHA

UNSTARRED QUESTION NO. 2050

TO BE ANSWERED ON THURSDAY, AUGUST 08, 2024

ISRO'S CONTRIBUTION TO CAPACITY BUILDING AND EDUCATION

2050. SHRI SUJEET KUMAR:

Will the PRIME MINISTER be pleased to state:

- (a) the details of ISRO's contribution to the development of human capital in the field of space science and technology, including education and skill development programmes; and
- (b) the details of initiatives in place to inspire and engage the youths in space-related fields?

ANSWER

**MINISTER OF STATE IN THE MINISTRY OF PERSONNEL, PUBLIC
GRIEVANCES & PENSIONS AND IN THE PRIME MINISTER'S OFFICE**

(DR. JITENDRA SINGH):

(a) ISRO organizes various programmes to develop human capital in Space Science & Technology across the country. Few of the programmes are mentioned below:

- YUVIKA Programme for 8th pass out school students.
- Hackathons for Graduates/ Postgraduates/ PhD students.
- Space Exhibitions & Lectures as part of National Space Day, World Space Week etc.,
- ISRO's registered Space Tutor organizes various programmes for promoting space education across the country.
- ISRO organizes Geospatial Training Programme for various Ministries & Departments.

(b) Some of the initiatives to inspire and engage the youths in space-related fields are as follows:

- Youth and Students are given an opportunity to visit Space Museums across ISRO Centres where they can be inspired by the exhibits depicting the rich history of Indian Space Exploration.
- There are interactive galleries which helps them to understand basics of Launch Vehicles and Satellite Communications. Various curated videos are also made available in Space Museums to inculcate importance of Space Research in the minds of Public.
- The Visitors' Gallery in Satish Dhawan Space Centre, Sriharikota (SDSC-SHAR) is also opened to public and youth for witnessing the launches taking place in SDSC-SHAR.
- Regular visits are also organised at ISRO Centres for students to help them to understand the various activities being undertaken.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA

UNSTARRED QUESTION NO. 2051

TO BE ANSWERED ON THURSDAY, AUGUST 08, 2024

COASTAL EROSION IN SRIHARIKOTA, ANDHRA PRADESH

2051. SHRI V. VIJAYASAI REDDY:

Will the PRIME MINISTER be pleased to state:

- (a) whether ISRO has lost 100 metres of coastline of the Satish Dhawan Space Centre (SDSC), the prestigious spaceport at Sriharikota in Andhra Pradesh, during the last four years;
- (b) if so, the details thereof and the reasons therefor;
- (c) whether the Andhra Pradesh State Coastal Zone Management Authority has recommended to build shore-protection groynes along the seafront at Sriharikota;
- (d) whether these recommendations will be undertaken by Government; and
- (e) if so, the details thereof and if not, the reasons therefor?

**MINISTER OF STATE IN THE MINISTRY OF PERSONNEL, PUBLIC
GRIEVANCES & PENSIONS AND IN THE PRIME MINISTER'S OFFICE
(DR. JITENDRA SINGH):**

(a) & (b)

Erosion of coastline has been noticed for a length of about 2.5 Kilometers and for a width of about 250 meters on the north coast of Sriharikota due to coastal erosion since 1972 till 2020. The above coastal erosion was monitored using the satellite data, from 1972 to 2020.

- (c) Yes Sir. Andhra Pradesh State Coastal Zone Management Authority (APCZMA) has reviewed the proposal for building Groynes for shoreline protection and recommended for realization as per norms.

Since, the proposed activity is coming under Coastal Regulation Zone (CRZ) of Andhra Pradesh coast, APCZMA suggested to obtain the approval from Ministry of Environment, Forest & Climate Change (MoEF & CC).

- (d) The recommendations will be undertaken subject to approvals and clearances.
- (e) Department of Space has involved National Centre for Coastal Research (NCCR), Ministry of Earth Sciences for field studies, data analysis, configuration and design of Groynes system for shoreline protection.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA

UNSTARRED QUESTION NO. 2052

TO BE ANSWERED ON THURSDAY, AUGUST 08, 2024

LAUNCHING OF FOREIGN SATELLITES BY ISRO

2052. SHRI RAJEEV SHUKLA:

Will the PRIME MINISTER be pleased to state:

- (a) the total number of foreign satellites launched by ISRO during the last five years, year-wise and country-wise;
- (b) the revenue generated as a result of the same; and
- (c) the details of measures being taken or proposed to be taken to further augment the said capacity of ISRO?

**MINISTER OF STATE IN THE MINISTRY OF PERSONNEL, PUBLIC
GRIEVANCES & PENSIONS AND IN THE PRIME MINISTER'S OFFICE**

(DR. JITENDRA SINGH):

- (a) During the last 5 years, i.e. from 2019 to 2023, a total of 163 foreign customer satellites have been successfully launched by NewSpace India Limited (NSIL), a Govt. of India company under Department of Space and the commercial arm of Indian Space Research Organisation, under commercial arrangements. Details of the same is tabulated below:

Year	No. of foreign satellites launched	No. of foreign satellites launched country wise
2019	50	USA: 45 ; Lithuania: 2; Switzerland: 1; Spain: 1; Israel: 1
2020	9	USA: 4 ; Lithuania: 1 ; Luxembourg: 4 ;
2021	14	USA: 13 ; Brazil: 1 ;
2022	44	USA: 1 ; Singapore: 3 ; Switzerland: 4 ; UK: 36 ;

Year	No. of foreign satellites launched	No. of foreign satellites launched country wise
2023	46	USA: 1 ; Singapore: 9 ; UK: 36 ;

(b) During last five years, total FE revenue earned through launching of 163 foreign satellites amounts to approx. 153 Million USD and 113 Million Euro.

(c) & (d)

The Space Sector reforms announced by the Government during June 2020, as part of “Unlocking India’s potential in Space Sector”, would enable NSIL to undertake more commercial launches using ISRO’s SSLV, PSLV and LVM3. NSIL is planning to manufacture more number of rockets viz. SSLV, PSLV and LVM3 through Indian Industry to address the emerging commercial global launch service market.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA
UNSTARRED QUESTION NO. 2053
TO BE ANSWERED ON THURSDAY, AUGUST 08, 2024

SERVICES OFFERED BY ANTRIX CORPORATION LIMITED

2053. DR. V. SIVADASAN:

Will the PRIME MINISTER be pleased to state:

- (a) the details of various services offered by Antrix Corporation Limited;
- (b) the turnover of the company in the last five years, year-wise;
- (c) the profit /loss reported by the company in the last five years, year-wise; and
- (d) the total investment of Government in the company?

**MINISTER OF STATE IN THE MINISTRY OF PERSONNEL, PUBLIC
GRIEVANCES & PENSIONS AND IN THE PRIME MINISTER'S OFFICE
(DR. JITENDRA SINGH):**

(a) Antrix Corporation Limited (ACL) with its corporate office in Bengaluru is a wholly owned Government of India company under the administrative control of Department of Space. ACL is engaged in providing space sector products and services worldwide ranging from supply of hardware and software, earth observation and scientific missions, remote sensing data services, transponder lease services, launch services, mission support services and other allied services.

(b)

Total Income (₹ in Crores)	Financial Years				
	2019-20	2020-21	2021-22	2022-23	2023-24
(Turnover + Other Income)	1502.62	709.58	232.44	115.93	174.85

(c)

	Financial Years				
Profit before Tax (₹ in Crores)	2019-20	2020-21	2021-22	2022-23	2023-24
	297.04	77.22	36.24	64.91	84.50

(d) The total investment of the Government of India in the company is INR 6.80 Crores.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA

UNSTARRED QUESTION NO. 2054

TO BE ANSWERED ON THURSDAY, AUGUST 08, 2024

SHUKRAYAAN MISSION

2054. MS. DOLA SEN:

Will the PRIME MINISTER be pleased to state:

- (a) whether the Shukrayaan mission submitted by ISRO is awaiting approval from Government;
- (b) if so, the reasons therefor and the timeline of final approval for the mission by Government; and
- (c) the details on the estimated cost for the Mission?

**MINISTER OF STATE IN THE MINISTRY OF PERSONNEL, PUBLIC
GRIEVANCES & PENSIONS AND IN THE PRIME MINISTER'S OFFICE
(DR. JITENDRA SINGH):**

- (a) Study on Venus Orbiter Mission is in progress and project is in planning stage.
- (b) & (c)

Timeline and Cost will be firmed up once the studies are completed and configuration is finalized.
