



सत्यमेव जयते

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

"SPACE IN PARLIAMENT"



**WINTER SESSION OF PARLIAMENT 2024
(NOVEMBER-DECEMBER, 2024)**

**COMPILATION OF REPLIES GIVEN IN
PARLIAMENT**

Government of India
Department of Space

Parliament Question – Winter Session of Parliament 2024

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GOVERNMENT OF INDIA

DEPARTMENT OF SPACE

LOK SABHA

UNSTARRED QUESTION NO. 273

TO BE ANSWERED ON WEDNESDAY, NOVEMBER 27, 2024

SPACE SECTOR START-UPS FUND

273. SHRI DHAIRYASHEEL SAMBHAJIRAO MANE:

SHRI SUDHEER GUPTA:

Will the PRIME MINISTER be pleased to state:

- (a) whether Union Government has approved a 1000 crore venture capital fund under IN-SPACE programme to support space sector focused start-ups in the country and if so, the details thereof;**
- (b) the manner in which this approved fund is likely to be spent and the criteria followed for selecting start-ups;**
- (c) the manner in which the proposed fund will boost employment in the Indian space sector through various start-ups across the entire space supply chain;**
- (d) the steps taken/being taken by the Government to cultivate a skilled workforce, drive innovation and boost India's competitiveness in the global space market through this fund; and**
- (e) the manner in which the said fund will help in nurturing the talent in the country and prevent the loss of talent to other countries?**

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

- (a) The Union Cabinet has approved a Rs.1000 crores Venture Capital fund dedicated to Indian Space Sector. The Rs.1000 Cr. VC fund is structured to align with Indian strategic vision for the space sector and supports the goals set forth in the 2020 space reforms. The fund is designed to address the unique needs of private companies operating in the high-risk, high-reward field of space technology.
- (b) The modalities and selection of fund managers are being worked out.
- (c) One of the primary goals of the fund is to create a robust ecosystem that promotes job creation and enhances India's standing in the space technology sector. The fund is expected to generate,

Direct employment: jobs in engineering, data analysis, software development, manufacturing, and other technical fields are expected to increase. Each investment could potentially generate hundreds of direct job opportunities within these high-skill areas.

Indirect employment opportunities: Additional employment will also be generated in fields associated with logistics, professional services, and supply chain management. These

jobs will arise from the increased demand created by scaling business manufacturing units.

- (d) By fostering a skilled workforce in the space sector, the fund aims to build sustainable talent pool, enhancing India's global standing and driving innovation through skill professionals.**
- (e) Many Indian startups relocate abroad due to better financial opportunities. The fund will work to retain talent within India, preventing brain drain and fostering the growth of homegrown space companies.**

The fund aims to address the critical need for risk capital, as traditional lenders are hesitant to fund startups in this high-tech sector. With nearly 250 space startups emerging across the value chain, timely financial support is crucial to ensure their growth and prevent talent loss overseas. The proposed government-backed fund will boost investor confidence, attract private capital, and signal the government's commitment to advancing space reforms. It will serve as an Alternative Investment Fund under SEBI regulations, providing early-stage equity to startups and enabling them to scale for further private equity investments.

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

LOK SABHA

UNSTARRED QUESTION NO. 299

TO BE ANSWERED ON WEDNESDAY, NOVEMBER 27, 2024

SPACE MISSIONS OF ISRO

299. PROF. SOUGATA RAY:

Will the PRIME MINISTER be pleased to state:

- (a) the details of ongoing space mission of ISRO;**
- (b) the current status of the Gaganyaan Mission;**
- (c) the details of the re-entry missions by ISRO; and**
- (d) the details of ISRO's manned spaceflight and its advancements in technology and exploration?**

ANSWER

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

- (a) Various Earth Observation and technology Demonstration missions of ISRO such as NISAR, RISAT-1B, Resourcesat 3 series, TDS-01, TDS-02, Oceansat-3A, IDRSS series, NVS-02, SPADEX are at various stages of realization including Assembly, Integration & Testing related activities. The applications include all weather C Band RADAR imaging,**

oceanography applications, Environmental Monitoring & Climate change, Software defined payloads, Technologies for Rendezvous & Docking etc. The Space exploration missions ongoing are (i) Chandrayaan-4 with the prime objective of collecting Lunar Sample from the Moon and returning it safely to Earth and (ii) Venus Orbiter Mission configured with the objective of studying Venus to further improve our understanding of origin and evolutionary processes of Venus, its atmosphere, ionosphere etc.

ISRO is developing a partially reusable Next Generation Launch Vehicle (NGLV) that has a maximum payload capability of 30 tons to Low Earth Orbit and is based on LOX-Methane propulsion systems. ISRO is also developing a winged body Reusable Launch Vehicle – Orbital Re-entry Vehicle (RLV-ORV) with retractable Landing Gear, that will be launched into orbit using existing propulsion systems and subsequently re-enter into the earth's atmosphere for an autonomous approach and landing on a runway. Further, ISRO has initiated the Advanced Missions & Recovery Experiments (ADMIRE) R & D project to demonstrate the Vertical Take-off and Vertical Recovery of a liquid stage towards reusability in future launch vehicles. In addition to the ongoing operational PSLV, GSLV & LVM3 launch vehicle programmes, ISRO has recently completed the development of a Small Satellite Launch Vehicle (SSLV) that can lift 500 kg to 500 km planar Low Earth Orbit.

- (b) The status of the progress of Gaganyaan programme is as follows:**

- **Uncrewed Gaganyaan (G1) mission: Preparation for the first uncrewed mission (G1) commenced.**
 - **Human Rated Launch Vehicle: Human rating of the launch vehicle has been completed. All the flight propulsion stages have reached SDSC SHAR. Fluid mock-up filling trials of C32 Cryogenic Stage completed successfully.**
 - **Crew Module & Crew Escape System: First Test Vehicle mission (TV-D1) for the performance validation of Crew Escape System (CES) has been successfully accomplished. CES for G1 mission has reached the launch complex.**
 - **Orbital Module Systems: Ground test programmes for Crew Module and Service Module Propulsion systems have been completed. Various Parachute Systems have been tested, which includes Main parachute Air drop Test & Phase-3 of Rail Track Rocket Sledge Tests .Flight systems are in the final phase of integration.**
- **Gaganyatri Training: Regular training programmes continues. Independent Training Simulator and Static Mock-up Simulators realized for training purpose.**
 - **Major Ground Infrastructure: 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.**

- (c) **ISRO has carried out two re-entry missions i.e., Space capsule Recovery Experiment (SRE-1) which was launched onboard PSLV-C7 vehicle on January 10, 2007 and Crew module Atmospheric Re-entry Experiment (CARE) which was launched onboard the experimental flight of GSLV-MkIII (LVM3-X) on December 18, 2014. ISRO is also developing a winged body Reusable Launch Vehicle – Orbital Re-entry Vehicle (RLV-ORV) with retractable Landing Gear, that will be launched into orbit using existing propulsion systems and subsequently re-enter into the earth's atmosphere for an autonomous approach and landing on a runway. In addition, missions under the Gaganyaan programme involve re-entry/recovery of the Crew Module**
- (d) **ISRO's human space flight programme aims to demonstrate end to end capability of launching a crew to Low Earth Orbit, on-orbit operations and landing back safely on Earth. These capabilities will be incrementally expanded and demonstrated by ISRO to undertake Indian human exploration missions beyond LEO in future. This involves development of essential technologies, mission operation protocols as well as establishment of specialised ground facilities. A revision in Gaganyaan programme has been recently approved to include the objective of launching the 1st module of Bharatiya Antariksh Station by 2028 and demonstrating essential technologies for undertaking long duration human spaceflight missions in LEO.**

GOVERNMENT OF INDIA

DEPARTMENT OF SPACE

LOK SABHA

UNSTARRED QUESTION NO. 460

TO BE ANSWERED ON WEDNESDAY, NOVEMBER 27, 2024

ANALOGUE MISSION IN TIBET REGION BY ISRO

460. SHRI DHAIRYASHEEL SAMBHAJIRAO MANE:

SHRI SUDHEER GUPTA:

Will the PRIME MINISTER be pleased to state:

- (a) whether Indian Space Research Organisation (ISRO) has launched its first analogue mission in Tibet region of the country and if so, the details thereof;**
- (b) the aims and objectives of this mission;**
- (c) whether the Government is planning to send its first human to space under the Gaganyaan Mission and if so, the details thereof;**
- (d) the manner in which this analogue mission will be a game changer in sending the first Indian to space;**
- (e) whether ISRO is also planning to set up its first space centre by the year 2035 and if so, the details thereof; and**
- (f) the details of the progress made in this regard and total amount of expenditure likely to be incurred on the mission??**

ANSWER

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

(DR. JITENDRA SINGH):

- a) **First analogue space mission was carried out in Leh, as a collaborative effort by ISRO, AAKA Space Studio, University of Ladakh, IIT Bombay and supported by Ladakh Autonomous Hill Development Council.**
- b) **Aim and objectives are to simulate life in an interplanetary habitat to tackle the challenges of a base station beyond Earth.**
- c) **Yes, Sir. ISRO is targeting the first human space flight demonstration mission under the Gaganyaan programme by end of 2026. The Gaganyaan Programme envisages undertaking the human spaceflight to Low Earth Orbit (LEO) and to lay the foundation of technologies needed for an Indian human space exploration programme in the long run.**
- d) **Objectives of this analogue side mission are not linked with the planned first human space flight demonstration mission, targeted in 2026.**
- e) **Yes, Sir. ISRO is planning to set up its first space centre (space station) i.e Bharatiya Antariksh Station (BAS) by 2035. BAS will be the first National Space Laboratory to conduct multidisciplinary microgravity experiments and studies in the fields of Science, Technologies, Medicine, Agriculture, Space manufacturing, among others. BAS will also be acting as platform for global & national collaboration, gateway to lunar exploration & beyond and to help boosting the Space Economy of the country.**

- f) **ISRO has initiated development of various technologies for the Bharatiya Antariksh Station. These technologies will be demonstrated through precursor missions for BAS, which have been recently approved as part of revision in Gaganyaan programme. With a net additional funding of ₹11,170 Cr in the already approved programme, the total revised funding of Gaganyaan Programme with enhanced scope is ₹20,193 Cr.**

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

LOK SABHA

UNSTARRED QUESTION NO. 1446

TO BE ANSWERED ON WEDNESDAY, DECEMBER 04, 2024

SPACE DEBRIS MANAGEMENT

1446. SHRI BAIJAYANT PANDA:

Will the PRIME MINISTER be pleased to state:

- (a) the details of the efforts the Government has made to address challenges related to space debris management, space traffic management and sustainable use of space?**

ANSWER

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

- (a) Recognising the growing importance of Space Situational Awareness (SSA) for space sustainability, ISRO System for Safe and sustainable Space Operations Management (IS4OM) has been established to focus all efforts related to spaceflight safety and debris mitigation and for dealing with the emerging challenges in operating in a congested space environment.**

Network for Space object TRacking and Analysis (NETRA) has been approved by GOI for SSA capacity building.

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ISRO adheres to the internationally accepted space debris mitigation guidelines recommended by UN -COPOUS and Inter-Agency Space Debris Coordination Committee (IADC) to the maximum possible extent.

For all Indian launch vehicles, Collision Avoidance Analysis (COLA) is performed to select collision threat-free lift-off time within the launch window. Continual assessments of any close approach risk to ISRO's operational satellites are carried out and Collision Avoidance Manoeuvres (CAM) are performed as and when needed. In case the object posing close approach risk is another active satellite, the required coordination is carried out with the owner/operator so that only one of the satellites performs the CAM. Continual efforts to improve the operational methodologies for close approach assessment are pursued to adapt to the challenges posed by the surging space traffic, apart from modelling on-orbit break-up events and prediction of atmospheric re-entries of space objects etc.

ISRO contributes substantially to shaping the pertinent guidelines and recommendations for sustainable use of space as an active member of various international agencies dealing with safety and sustainability of outer space activities, such as IADC, IAA (International Academy of Astronautics, ISO (International Organization for Standardization), IAF (International Astronautical Federation), UN Long Term Sustainability Working Group.

The Indian Space Policy places significant importance in space debris mitigation requirements and SSA capacity building.

The recently unveiled Debris Free Space Mission (DFSM) initiative is also spearheaded by ISRO with an aim to achieve debris-free space missions by all Indian space actors, both governmental and non-governmental, by 2030. The initiative aligns with global efforts for space sustainability, positioning India as a nation prioritizing safety, security, and sustainability in outer space activities.

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

LOK SABHA

UNSTARRED QUESTION NO. 1503

TO BE ANSWERED ON WEDNESDAY, DECEMBER 04, 2024

NASA-ISRO SYNTHETIC APERTURE RADAR MISSION

1503. ADV GOWAAL KAGADA PADAVI:

Will the PRIME MINISTER be pleased to state:

- (a) the reasons for delay in launching NASA-ISRO Synthetic Aperture Radar (NISAR) Mission;**
- (b) the challenges faced by the Government in development and timely execution of India's space exploration mission particularly those related to technological advancement, financial constraints and international cooperation;**
- (c) whether the Government proposes to enhance satellite manufacturing, propulsion systems and space exploration capabilities of the Indian Space Research Organisation (ISRO) especially keeping in view recent emphasis being given on establishing leading space companies in the country; and**
- (d) the initiatives put in place to encourage private sector participation in India's Space Sector including policy reforms, financial incentives or partnerships aimed at fostering innovation and competition?**

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ANSWER

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

* * * *

- (a) **NASA-ISRO Synthetic Aperture RADAR (NISAR) is an Earth science mission being jointly developed by NASA and ISRO under a collaborative agreement.**

The NISAR was earlier slated for launch in the first-half of 2024. However, during the assembly, integration & testing phase, NASA experts determined that the 12-meter Radar Antenna Reflector need some corrective actions and has to be taken to USA for rectification.

Subsequently, the Radar Antenna Reflector, was delivered to ISRO by NASA in October 2024, which is re-integrated with the satellite and currently undergoing necessary tests. Also, due to the eclipse season, the conditions are not conducive for deployment of NISAR's boom and the Radar Antenna Reflector. In view of the afore-mentioned factors, NISAR is now likely to be launched during March 2025.

- (b) **Space exploration missions requires indigenous development of several complex technologies. Such developments go through an exhaustive time cycle that includes conceptualisation, design, development of prototype, qualification and flight model and numerous tests, design**

iterations, supply chain, extensive reviews. Challenges in International collaborations include geo-political considerations, establishing common mission objectives, alignment with respective national priorities and ensuring timely availability of resources/infrastructure.

- (c) The department is actively enhancing the capabilities through various Technology development and advanced R&D programs. The programs include development of propulsion systems of various thrust capabilities, sensor technologies, advanced docking systems, enhancing Launch vehicle capabilities such as stage recovery, satellite navigation, quantum communication related technologies, optical satellite systems etc.

The government has recently approved the Chandrayaan-4 and Venus Orbiter Mission that would further the capabilities in various elements of satellite realisation. The Chandrayaan-4 mission envisages extraction and return of lunar sample back to Earth. The Venus Orbiter Mission aims to successfully orbit Venus and better understand the Venusian surface and subsurface, atmospheric processes and influence of Sun on Venusian atmosphere.

Further, realisation of various satellite systems/sub systems and integration are being outsourced to various Indian industries.

- (d) The Government has taken following measures to encourage and incentivise private sector participation in space exploration and technology development in India :

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- I. The space sector has been liberalised and private sector allowed to carry out end to end space activities. 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**
 - II. 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, Technical Centre, 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 with all the stakeholders of space ecosystem etc.**
 - III. In order to ease access to foreign capital by Indian NGEs, Government of India has brought out revised FDI policy for Space Sector.**
 - IV. The Union Cabinet has approved the establishment of a Rs.1,000/- crore Venture Capital Fund dedicated to supporting India's Space Sector.**

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

LOK SABHA

UNSTARRED QUESTION NO. 1531

TO BE ANSWERED ON WEDNESDAY, DECEMBER 04, 2024

SPACE TECHNOLOGY PROGRAMME IN ANDHRA PRADESH

1531. DR. BYREDDY SHABARI:

Will the PRIME MINISTER be pleased to state:

- (a) whether the State of Andhra Pradesh is getting benefits from any space technology programme aimed in improving agriculture and resource management and if so, the details thereof;**
- (b) the impact of ISRO's initiatives on weather forecasting and disaster preparedness in Andhra Pradesh; and**
- (c) whether there are any satellite data centres or space-related facilities in the Nandyal, Andhra Pradesh and 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) **Space based inputs are used in Andhra Pradesh for pre-harvest crop acreage & production estimation for rice crop, inventory of horticulture crops, viz., mango, banana, citrus & turmeric, and for agricultural drought assessment. Space technology is being used on experimental basis for rice yield estimation in Kakinada and Guntur districts of Andhra Pradesh under PMFBY scheme and the inputs are used for crop insurance claim settlement by Govt. of Andhra Pradesh.**

ISRO generates and disseminates spatial data on land use / land cover (annual and at 5-yearly interval), surface water spread (weekly), and wastelands & land degradation (decadal), for India. These inputs are useful for resources management for Andhra Pradesh state.

- (b) **Data of the meteorological and ocean observation satellite such as INSAT-3DR & 3DS, and Oceansat-3 realized by ISRO are being used for weather forecasting and early warning of cyclones and extreme weather events by IMD.**

As part of National Hydrology Project, ISRO developed spatial flood early warning system for the Godavari river using satellite data and high resolution digital terrain data. It is implemented on experimental mode since 2022 and flood alerts are being disseminated to the Andhra Pradesh State Disaster Management Authority with 2-day lead time.

During the flood season, ISRO generates flood inundation maps for major floods using satellite data and are provided to Andhra Pradesh State Disaster Management Authority and

Andhra Pradesh State Remote Sensing Centre, for flood disaster management.

ISRO released Flood Hazard Zonation Atlas for Andhra Pradesh in 2022, which is prepared using flood inundation maps generated using satellite data during 2000 to 2020.

ISRO/ DoS has not conducted any impact assessment of ISRO's initiatives on weather forecasting and disaster preparedness in Andhra Pradesh.

- (c) ISRO/ DoS has not established any satellite data centre or space-related facilities in the Nandyal, Andhra Pradesh.**

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

LOK SABHA

UNSTARRED QUESTION NO. 1544

TO BE ANSWERED ON WEDNESDAY, DECEMBER 04, 2024

STARTUPS IN SPACE SECTOR

1544. SHRI BHARTRUHARI MAHTAB:

SHRI BIPLAB KUMAR DEB:

Will the PRIME MINISTER be pleased to state:

- (a) the total number of countries identified by Indian National Space Promotion and Authorisation Centre (IN-SPACE) where private sector can operate; and**
- (b) whether there has been a rise in the number of startups in space sector during the last five years and 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) IN-SPACE has established relationships with more than 25 countries from across the world, including both Space faring and Space aspiring nations, where Indian companies can pitch their products/ solutions. IN-SPACE has also conducted "IN-**

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SPACE Space Days” with 6 countries so far, in order to enable focused match making for Indian Private Space Sector companies in these countries.

- (b) The number of Space Start-ups have gone up, from just 1 in 2014 to around 266 as on date.**

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

LOK SABHA

UNSTARRED QUESTION NO. 2542

TO BE ANSWERED ON WEDNESDAY, DECEMBER 11, 2024

PRIVATE COMPANIES WORKING WITH ISRO

2542. SHRI PRABHAKAR REDDY VEMIREDDY:

Will the PRIME MINISTER be pleased to state:

- (a) the detailed list of private companies (domestic / international) which have partnered with Indian Space Research Organisation (ISRO) for space exploration and technology projects in the country along with their scope, duration and purpose of collaborations during the last five years;**
- (b) the details of the steps taken by the Government to encourage and incentivise private sector participation in space exploration and technology development in the Country during the last five years; and**
- (c) the details of the total number of inventions and patents registered by private companies associated/working with ISRO in regard to space exploration and technology in 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):

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- (a) **The industry participation has been the back bone for the Indian Space Programme since its inception. Indian Industry has reached a matured level of self-sufficiency to produce materials, components and sub-systems for both launch vehicle and satellites. However, there is no specific partnered space exploration/ technology projects between ISRO and private companies.**

Supports from industries are also being harnessed through mechanism like Purchase Order including technology developmental orders for various space systems of ISRO, Contract, Memorandum of Understanding and Technology Transfer. Many products are successfully developed and realized through industries for the Indian Space Programme. Considering the future DOS programmes and advanced space missions in anvil, ISRO always strives to increase the participation of industry in all the programmes by leveraging their strengths in focus areas of interest.

- (b) **The Indian government has taken the following measures to encourage and incentivise private sector participation in space exploration and technology development in India:**

- i. The space sector has been liberalised and private sector allowed to carry out end to end space activities.**
- ii. 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.**
- iii. 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.**

- iv. 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, Technical Centre, 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 with all the stakeholders of space ecosystem etc.
- v. The number of Space Start-Ups have gone up, from just 1 in 2014 to around 266 as on date.
- vi. IN-SPACe has signed around 71 MoUs with Non-Government Entities (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.
- vii. In order to ease access to foreign capital by Indian NGEs, the Central Government has brought out revised FDI policy for Space Sector.
- viii. 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.
- ix. The Union Cabinet has approved the establishment of a Rs.1,000 crore Venture Capital (VC) Fund dedicated to supporting India's space sector.
- x. IN-SPACe has initiated Establishment of Earth Observation (EO) System under Public Private Partnership (PPP). The Expression of Interest (EOI) is invited from Non-Government Entities (NGEs).

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xi. Technology Transfer of Small Satellite Launch Vehicle (SSLV) to Indian entities is under process and response to RFP is invited from shortlisted bidders.

xii. Announcement of Opportunity is made by IN-SPACE for making available Indian orbital resources to the NGEs. Bid is under consideration and one Indian entity is selected.

(c) Patents originated from ISRO are filed and the patenting process is managed by ISRO. Details of the inventions and patents registered by private companies are not available with ISRO/DOS. Also, ISRO does not own any patent with private companies as of now.

GOVERNMENT OF INDIA

DEPARTMENT OF SPACE

LOK SABHA

UNSTARRED QUESTION NO. 2565

TO BE ANSWERED ON WEDNESDAY, DECEMBER 11, 2024

BHARTIYA ANTRIKSH SPACE STATION

2565. SHRI BHARTRUHARI MAHTAB:

SHRI BIDYUT BARAN MAHATO:

SHRI DULU MAHATO:

SHRI DINESHBHAI MAKWANA:

Will the PRIME MINISTER be pleased to state:

- (a) the details of the goals of establishing Bhartiya Antriksh Space Station to enhance possibilities of future exploration programmes; and**
- (b) the details of the scheduled ambitious indigenous programmes to achieve India's Space Vision 2047?**

ANSWER

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

(DR. JITENDRA SINGH):

- (a) The vision for space in the Amrit kaal envisages including other things, establishing an operational Bharatiya Antariksh Station (BAS) by 2035 and Indian Crewed Lunar Mission by**

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2040. BAS will be the first National Space Laboratory to conduct multidisciplinary microgravity experiments and studies in the fields of Science, Technologies, Medicine, Agriculture, Space manufacturing, among others. BAS will also be acting as platform for global & national collaboration, gateway to lunar exploration & beyond and to help boosting the Space Economy of the country.

ISRO has initiated development of various technologies for the Bharatiya Antariksh Station. These technologies will be demonstrated through precursor missions for BAS, which has been recently approved by the Government as part of revision in Gaganyaan programme.

(b) Department of Space leap towards India's Space Vision 2047 with the approvals of key Missions which includes,

- **Establishment of 1st module Bharatiya Anthariksh Station (BAS) by 2028,**
- **Development of Next Generation of satellite Launch Vehicle (NGLV) (re-usable Low-cost launch vehicle) by 2032,**
- **Chandrayaan-4 by 2027, to develop and demonstrate the technologies to come back to Earth after successfully landing on the Moon and also collect moon samples, and**
- **Venus Orbiter Mission (VOM) by 2028, to study the Venusian surface and subsurface, atmospheric processes and influence of Sun on Venusian Atmosphere.**

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

LOK SABHA

UNSTARRED QUESTION NO. 2616

TO BE ANSWERED ON WEDNESDAY, DECEMBER 11, 2024

HOMEGROWN SPACE PRODUCTS

2616. SHRI LAVU SRI KRISHNA DEVARAYALU:

Will the PRIME MINISTER be pleased to state:

- (a) whether the Government is considering expansion of GST exemptions to ground systems, satellite components and launch vehicles in the space sector and if so, the details thereof;**
- (b) whether the Government is considering expansion of Production-Linked Incentive (PLI) scheme to include the space sector and if so, the timeline and key components of the Proposed scheme; and**
- (c) whether the Government has taken measures to encourage the use of homegrown space products and services in areas in such as agriculture, disaster management and infrastructure and 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):

- 30
- (a) **The Government provides GST exemption on 'Satellite Launch Services' as well as 'on transfer of communication assets [Spacecraft (including satellites)]' to encourage the domestic players. GST exemption for Ground Systems, components of Launch vehicles/Satellites, have been demanded by Industry in various meetings/forums. However, a formal proposal from Industry is awaited, detailing the nature/scope of the exemption sought.**
 - (b) **An 'Investment Incentive Scheme' has been worked out for Space Sector in lieu of Production-Linked Incentive Scheme.**
 - (c) **Yes sir, in order to encourage use of space technology, IN-SPACe devised a seed fund scheme and provided grant to the six Indian start-ups to develop products and services in the sectors i.e. Agriculture, Disaster management and Urban Development using space technology. The details of the start-ups are M/s ARMS4AI, M/s mistEO, M/s Augtual (Fabric), M/s Hyspace, M/s Xovian and M/s Seagull.**

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

LOK SABHA

UNSTARRED QUESTION NO. 2718

TO BE ANSWERED ON WEDNESDAY, DECEMBER 11, 2024

BENEFITS OF MOON MISSION

2718. SHRI BALABHADRA MAJHI:

Will the PRIME MINISTER be pleased to state:

- (a) the details of the findings on the Moon by different countries which sent spacecraft to the Moon; and**
- (b) the details of expected benefits from the Moon Mission?**

ANSWER

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

(a) The Lunar missions sent by various countries have yielded significant scientific findings. A brief overview of the major missions is presented here.

India:

Chandrayaan-1 (2008): India's first lunar mission, it discovered water molecules on the lunar surface and exosphere, as well as mapped the Moon's mineral composition. Chandrayaan-1 also

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carried the Moon Impact Probe (MIP), which found the signatures of the lunar exospheric water vapour and noble gases. The mission has generated a 3D lunar atlas from the indigenous Terrain Mapping Camera (TMC) onboard the orbiter. Discovery-class science results have been obtained about the interaction of the solar wind with the lunar regolith, discovery of ion population in the lunar wake region, as well as the mapping of the minimagnetospheres on the lunar surface.

Chandrayaan-2 (2019): India's second lunar mission, it aimed to soft-land a rover near the lunar south pole, but the lander was not successful in soft-landing. However, the orbiter continues to study the Moon's surface and composition, as well as the exosphere. This mission has generated high resolution (~25 cm spatial resolution in nadir direction) images of the lunar surface with the Orbiter High Resolution Camera (OHRC) onboard the orbiter. Moreover, the CHACE-2 mass spectrometer has mapped the lunar Ar-40 gas for the first time and studied its variation, which has implications to understand the radiogenic activities inside the Moon. The DF-SAR instrument has studied the sub-surface water-ice on the Moon, while the IIRS instrument has done unambiguous detection of the lunar surface water-ice with its extended wavelength range. The CLASS instrument has studied the surface mineralogy and brought out several first-of-its kind of science results.

Chandrayaan-3 (2023): This mission successfully achieved a soft landing near the Moon's south pole on August 23, 2023.

This historic feat made India the fourth country to accomplish a soft landing on the Moon and the first to reach the lunar south polar region. The rover deployed by Chandrayaan-3 conducted scientific experiments to study the lunar surface composition, thermal properties, and mineral composition. The Chandrayaan-3 mission has validated the Lunar Magma Ocean (LMO) hypothesis and provided insights on the dynamics of the lunar materials during the early days of Moon. This mission has further enhanced India's position in space exploration and contributed valuable scientific data to our understanding of the Moon.

United States (NASA):

Ranger: A series of unmanned probes that impacted the Moon's surface, sending back high-resolution images before impact.

Lunar Orbiter: A series of unmanned spacecraft that orbited the Moon and took detailed photographs of the entire lunar surface, aiding in selecting landing sites for the Apollo missions.

Surveyor: A series of unmanned spacecraft that soft-landed on the Moon and conducted soil mechanics experiments, as well as taking photographs of the lunar surface.

Apollo Missions (1969-1972): The most iconic lunar missions, they brought back lunar rocks and soil samples, allowing scientists to study the Moon's composition and geological history. They also installed scientific instruments on the lunar

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surface to measure seismic activity, magnetic fields, and solar wind.

Other Lunar Orbiter Missions: NASA has launched several lunar orbiters to study the Moon's surface, composition, and environment. These include the Clementine mission (1994), Lunar Prospector mission (1998), Lunar Reconnaissance Orbiter (2009), Gravity Recovery and Interior Laboratory (GRAIL) mission (2011) and the Lunar Atmosphere and Dust Environment Explorer (LADEE) mission (2013).

Soviet Union/Russia:

Luna Program (1959-1976): A series of unmanned missions that achieved several firsts, including the first spacecraft to reach the Moon, the first to photograph the far side of the Moon, and the first to perform a soft landing on the Moon.

Luna 24 (1976): The last Soviet lunar mission, it returned lunar soil samples from the Mare Crisium region.

Zond 5, 6, 7, and 8: These unmanned spacecraft flew around the Moon and returned to Earth, testing technologies for future crewed missions.

China:

Chang'e Program: The Chang'e program has successfully progressed through several phases. The initial phase involved orbiting the Moon, achieved by the Chang'e 1 and 2 missions.

Subsequently, the program focused on lunar landing and roving, accomplished by Chang'e 3 and 4. The most recent phase has involved sample return missions, with Chang'e 5 bringing lunar samples to Earth and Chang'e 6 returning samples from the far side of the Moon.

Japan:

Kaguya (2007): Japan's lunar orbiter studied the Moon's gravity field, topography, and mineral composition.

SLIM (Smart Lander for Investigating Moon) (2024): Successfully landed on the Moon in January 2024, demonstrating high-precision landing technology.

(b) Lunar missions offer a wealth of potential benefits, both scientific and economic. Studying the Moon can provide insights into the early solar system and the formation of Earth. Discovering resources like water-ice could support future lunar missions and potentially provide raw materials for space industries. Additionally, the Moon serves as a testing ground for technologies needed for other deep-space missions. Moon missions also enable the use of Moon as a vantage point for sensitive Astronomical observations. Economically, lunar missions could lead to space mining, lunar tourism, and the development of new technologies with applications on Earth. International cooperation is also a key benefit, as lunar missions often involve partnerships between nations, fostering collaboration and diplomacy.

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

LOK SABHA

UNSTARRED QUESTION NO. 2751

TO BE ANSWERED ON WEDNESDAY, DECEMBER 11, 2024

ADITYA-L1 MISSION

2751. SHRI KHAGEN MURMU:

Will the PRIME MINISTER be pleased to state:

the manner in which the Government plans to leverage the insights gained from the Aditya-L1 mission to enhance India's capabilities in solar research and its implications for space weather?

ANSWER

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

(DR. JITENDRA SINGH):

Department of Space has taken multi-pronged approach to leverage the insights gained from the Aditya-L1 mission which includes:

- (i) Constitution of the Aditya-L1 Science Working Group (SWG) to maximise the scientific results from the mission;**

- (ii) Engaging the country's solar science and heliophysics community for the scientific value addition for the mission, as well as science data utilization; and**
- (iii) Conducting brainstorming meetings along with the PAN-India solar/ heliophysics community to take the achievement of Aditya-L1 forward by enhancing the solar science and space weather research in the country.**

Despite being a dedicated Solar Science Mission, the insight gained from Aditya-L1 will be of immense importance for space weather research, which has potential to contribute building the space weather forecasting capability of the country, by integrating other observations and necessary infrastructure.

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

LOK SABHA

UNSTARRED QUESTION NO. 3793

TO BE ANSWERED ON WEDNESDAY, DECEMBER 18, 2024

SHUKRYAAN MISSION

3793. SHRI ANANTA NAYAK:

Will the PRIME MINISTER be pleased to state:

- (a) whether the Government has given final approval for its Shukryaan Mission;**
- (b) if so, the details along with the aims and objectives thereof;**
- (c) time by which the said mission is likely to be launched by ISRO;**
- (d) the total amount of expenditure incurred/likely to be incurred thereon till its launch;**
- (e) the time by which India's first space station will be established;**
- (f) whether ISRO is going to set up/start its first Artificial Intelligence (AI) lab in the space;**
- (g) if so, the salient features of the said space lab and its aims and objectives;**
- (h) the manner in which it is to be helpful in space exploration and establishing India as a potent force in the field of such exploration worldwide; and**
- (i) the total amount of expenditure likely to be incurred thereon?**

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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. Approval given for Venus Orbital Mission (VOM).
- (b) The proposal for Venus Orbiter Mission (VOM) aims to successfully orbit Venus and better understand the Venusian surface and subsurface, atmospheric processes and influence of Sun on Venusian atmosphere. The mission would provide opportunity to technologists and scientific community of our country, to further explore and understand the Venusian science considerably well before the global community. The Indian Venus Mission is expected to answer some of the outstanding scientific questions resulting in various scientific outcomes.
- (c) The mission is expected to be accomplished on the opportunity available during March , 2028.
- (d) The total approved fund for Venus Orbiter Mission is Rs. 1236 Crore, out of which Rs. 824 Crore will be spent on the VOM spacecraft.
- (e) It is planned to establish the 1st module of Bharatiya Antariksh Station (BAS) by 2028 and a fully operational BAS by 2035.
- (f), (g) & (h)

Setting up of Artificial Intelligence (AI) Lab in Space is not currently envisaged.

However, Bharatiya Antariksh Station (BAS), will be the first National Space Laboratory to conduct multidisciplinary microgravity experiments and studies in the fields of Science, Technologies, Medicine, Agriculture, Space manufacturing, among others.

BAS will be acting as platform for global & national collaboration, gateway to lunar exploration & beyond and to help boosting the Space Economy of the country.

(i) With the recent approval of revision in Gaganyaan Programme, the scope of the program has been expanded to include precursor missions to Bharatiya Antariksh Station (BAS), including development & launch of 1st module of BAS (BAS-01). With a net additional funding of Rs. ₹11,170 Crore in the already approved programme, the total revised funding of Gaganyaan Programme with enhanced scope is Rs. ₹20,193 Cr.

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

LOK SABHA

UNSTARRED QUESTION NO. 3722

TO BE ANSWERED ON WEDNESDAY, DECEMBER 18, 2024

PROMOTION OF PRIVATE SECTOR IN SPACE SECTOR

3722. SHRI SHASHANK MANI:

Will the PRIME MINISTER be pleased to state:

that the details of the steps taken by the Government to further promote private sector involvement and the growth of startups 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):**

The following steps are taken by the Government to further promote private sector involvement and the growth of startups in the space sector in India:

- I. The space sector has been liberalised and private sector allowed to carry out end to end space activities.**
- II. Indian National Space Promotion and Authorization Centre (IN-SPACE) was created in Department of Space for promoting,**

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authorising and overseeing the activities of Non-Government Entities (NGEs) in Space Sector.

- III. 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.**
- IV. 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, Technical Centre, 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 with all the stakeholders of space ecosystem etc.**
- V. The number of Space Start-Ups have gone up, from just 1 in 2014 to around 266 as on date.**
- VI. 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.**
- VII. The Union Cabinet has approved the establishment of a Rs.1,000 crore Venture Capital (VC) Fund dedicated to supporting India's space sector.**
- VIII. IN-SPACE has signed around 71 MoUs with Non-Government Entities (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.**

- IX. In order to ease access to foreign capital by Indian NGEs, the Central Government has brought out revised FDI policy for Space Sector.**
- X. IN-SPACe has initiated Establishment of Earth Observation (EO) System under Public Private Partnership (PPP). The Expression of Interest (EOI) is invited from Non-Government Entities (NGEs).**
- XI. Technology Transfer of Small Satellite Launch Vehicle (SSLV) to Indian entities is under process and response to RFP is invited from shortlisted bidders.**
- XII. Announcement of Opportunity is made by IN-SPACe for making available Indian orbital resources to the NGEs. One Indian entity is selected.**

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

LOK SABHA

UNSTARRED QUESTION NO. 3850

TO BE ANSWERED ON WEDNESDAY, DECEMBER 18, 2024

OPERATIONALISATION OF THE BHARATIYA ANTRIKSH STATION

3850. SHRI JAGDAMBIKA PAL:

Will the PRIME MINISTER be pleased to state:

- (a) the details on the objectives and expected capabilities of the Bharatiya Antriksh Station in comparison to other space stations; and**
- (b) the timeline for the construction and operationalization of the Bharatiya Antriksh Station and the milestones that have been set to ensure its timely completion?**

ANSWER

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

(DR. JITENDRA SINGH):

- (a) Bharatiya Antariksh Station (BAS) will fulfil the objectives of an orbiting Indian human spaceflight platform in Low Earth Orbit (LEO). This will enable to undertake medium to long duration human spaceflight missions to LEO, as part of the sustained Indian human space program. Similar to other operational space stations, BAS will**

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also comprise of multiple modules and state of the art technological capabilities for carrying out cutting edge scientific research and technology development activities in microgravity environment, targeted towards national priorities and societal applications.

(b) With the recent approval of revision in Gaganyaan Programme, the scope of the program has been expanded to include precursor missions to Bharatiya Antariksh Station (BAS), including development & launch of 1st module of BAS (BAS-01). The 1st module of BAS is targeted to be launched in 2028 timeframe and BAS is expected to be fully operationalised with all modules by 2035 timeframe.

GOVERNMENT OF INDIA

DEPARTMENT OF SPACE

LOK SABHA

UNSTARRED QUESTION NO. 3908

TO BE ANSWERED ON WEDNESDAY, DECEMBER 18, 2024

REGULATING GROUND STATION AS A SERVICE INDUSTRY

3908. DR. D RAVI KUMAR:

Will the PRIME MINISTER be pleased to state:

- (a) that detail list of the steps being taken to support access to testing facilities, especially for large antennas and Deep Space Networks, for the nascent Ground Station as a Service (GSaaS) industry;**
- (b) whether there are any considerations proposals for reducing the royalty fee/ MHz for Earth Observation (EO) satellite data reception station;**
- (c) the details of the steps being taken to facilitate Transfer-of-Technology (ToT) for Tri-band feed realization from ISRO, and**
- (d) whether the Government plans to develop a single-window mechanism for GSaaS approvals/licenses?**

ANSWER

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

(DR. JITENDRA SINGH):

(a) Department of Space (DoS) has successfully established Deep Space Networks and various large antennas to provide ground station segment for various missions. These include systems operating in different frequency bands and established at various locations. They support both ISRO Satellites (including Deep Space/ Interplanetary Missions), External Space Agency missions and Launch Vehicle operations and also operations of Non-Government Entities (NGEs). Access provided to NGE's includes support for Payload Testing, Telemetry and Tele-command Support, In-orbit Validations.

Further, NSIL has been providing support to domestic and international customers through ISRO's tracking facilities involving large antennas and Deep Space Network as part of "Ground Station as a Service" related activity. As a part of this, nearly 17 satellite/ launch vehicle missions have been supported on commercial basis.

(b) Remote Sensing Data of spatial resolution of 5 m is accessible on 'free and open' basis to all. Further, remote sensing data of less than 5 m is made available free of any charges to Government Entities and at a fair and transparent pricing to NGEs.

Earth Observation (EO) satellite data reception services are being offered by NSIL on per pass basis to domestic and international customers.

(c) There has been an emerging need to develop indigenously a Tri-band Data Reception System, that would facilitate cost effective, compact and efficient systems, for future Earth Observation Space Systems. DoS has successfully developed

indigenously a Tri-band system operating in S, S & Ka-Band, capable of tracking & receiving dual Polarization (RHC & LHC) data from Remote Sensing Satellites.

Further in view of the large demand from local/ Indian Industries & global market potential for this Tri-band(S/C/Ka) Antenna & feed System, the technology transfer (ToT) process is initiated and is under approval.

(d) Conceptual discussion on the possible Inter-departmental single window interface for processing authorization/ approvals/ licenses by the respective departments for the common applicants in the space sector is taken up by IN-SPACE.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE
RAJYA SABHA
STARRED QUESTION NO. 115

TO BE ANSWERED ON THURSDAY, DECEMBER 05, 2024

**CHALLENGES IN DEVELOPMENT AND TIMELY EXECUTION OF INDIA'S SPACE
EXPLORATION MISSIONS**

*115. SMT. JEBI MATHER HISHAM:

Will the PRIME MINISTER be pleased to state:

- (a) the reasons behind the delay in the mission launch of NASA-ISRO Synthetic Aperture Radar (NISAR);
- (b) the challenges that Government has faced in development and timely execution of India's space exploration missions;
- (c) whether Government has plans to enhance the capabilities of the ISRO in satellite manufacturing, propulsion systems and space exploration, considering the recent emphasis on building leading space companies in the country; and
- (d) the initiatives to promote private-sector participation in India's space sector, including any policy reforms, financial incentives or partnerships aimed at fostering innovation and competitiveness?

ANSWER

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

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

STATEMENT LAID ON THE TABLE OF THE RAJYA SABHA IN REPLY TO STARRED QUESTION NO. 115 REGARDING "CHALLENGES IN DEVELOPMENT AND TIMELY EXECUTION OF INDIA'S SPACE EXPLORATION MISSIONS" ASKED BY SMT. JEBI MATHER HISHAM FOR ANSWER ON THURSDAY, DECEMBER 05, 2024.

- (a) NASA-ISRO Synthetic Aperture RADAR (NISAR) is an Earth science mission being jointly developed by NASA and ISRO under a collaborative agreement.

The NISAR was earlier slated for launch in the first-half of 2024. However, during the assembly, integration & testing phase, NASA experts determined that the 12-meter Radar Antenna Reflector need some corrective actions and has to be taken to USA for rectification.

Subsequently, the Radar Antenna Reflector, was delivered to ISRO by NASA in October 2024, which is re-integrated with the satellite and currently undergoing necessary tests. Also, due to the eclipse season, the conditions are not conducive for deployment of NISAR's boom and the Radar Antenna Reflector. In view of the afore-mentioned factors, NISAR is now likely to be launched during March 2025.

- (b) Space exploration missions requires indigenous development of several complex technologies. Such developments go through an exhaustive time cycle that includes conceptualisation, design, development of prototype, qualification and flight model and numerous tests, design iterations, supply chain, extensive reviews. Challenges in International collaborations include geo-political considerations, establishing common mission objectives, alignment with respective national priorities and ensuring timely availability of resources/infrastructure.

- (c) The department is actively enhancing the capabilities through various Technology development and advanced R&D programs. The programs include development of propulsion systems of various thrust capabilities, sensor technologies, advanced docking systems, enhancing Launch vehicle capabilities such as stage recovery, satellite navigation, quantum communication related technologies, optical satellite systems etc.

The government has recently approved the Chandrayaan-4 and Venus Orbiter Mission that would further the capabilities in various elements of satellite realisation. The Chandrayaan-4 mission envisages extraction and return of lunar sample back to Earth. The Venus Orbiter Mission aims to successfully orbit Venus and better understand the

Venusian surface and subsurface, atmospheric processes and influence of Sun on Venusian atmosphere.

Further, realisation of various satellite systems/sub systems and integration are being outsourced to various Indian industries.

(d) The Government has taken following measures to encourage and incentivise private sector participation in space exploration and technology development in India:

- I. The space sector has been liberalised and private sector allowed to carry out end to end space activities. 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.
- II. 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, Technical Centre, 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 with all the stakeholders of space ecosystem etc.
- III. In order to ease access to foreign capital by Indian NGEs, Government of India has brought out revised FDI policy for Space Sector.
- IV. The Union Cabinet has approved the establishment of a Rs.1,000/- crore Venture Capital Fund dedicated to supporting India's Space Sector.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA
STARRED QUESTION NO. 120

TO BE ANSWERED ON THURSDAY, DECEMBER 05, 2024

CHANDRAYAAN

*120. SHRI IRANNA KADADI:

Will the PRIME MINISTER be pleased to state:

- (a) the future of Chandrayaan Missions;
- (b) the cost effectiveness of such missions;
- (c) whether International space organisations has requested India for the transfer of technology and future space cooperation after successful Chandrayaan Mission;
- (d) steps taken by Government for improving the scope of business prospect in satellite manufacturing and launching from Indian perspective;
- (e) the information about the significant achievements of ISRO from 2021 till date; and
- (f) the information about some of the notable satellites that ISRO has successfully launched into space?

ANSWER

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

(a) to (f) 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. 120 REGARDING "CHANDRAYAAN" ASKED BY SHRI IRANNA KADADI FOR ANSWER ON THURSDAY, DECEMBER 05, 2024.

- (a) ISRO has successfully executed three Chandrayaan missions and the Chandrayaan-3 mission resulted in successful safe and soft landing on the moon.

A series of Chandrayaan missions are planned to build capability towards achieving the goal of Indian landing on Moon by 2040. Towards this, Government of Indian has approved Chandrayaan-4 mission, which will demonstrate the capability of landing on Moon and safe return to earth including technologies for sample collection. Chandrayaan-5/ LuPEX mission is being planned to demonstrate the higher capacity lander, which is an important element for future landing missions including human landing.

- (b) Continuous efforts are made for cost effectiveness of the missions through standardisation, indigenisation, utilization of state of the art technologies and integration of multiple functionalities.
- (c) 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.
- (d) The Government of India has announced reforms, on June, 2020, in the space sector 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.
- (e) 15 spacecraft missions (2 Communication, 9 Earth Observation, 1 Navigation and 3 Space Science), 17 launch vehicle missions (8 PSLV, 3 GSLV, 3 LVM3 and 3 SSLV)

and 5 technology demonstrators, have been successfully realized, since 2021 till date. Significant achievements are given at Annexure-1.

- (f) The notable satellites that ISRO has launched into space includes space science missions such as Aryabhata, Astrosat, Mangalyaan, Chandrayaan 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 & Cartosat 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.

Annexure referred to in reply to part (e) of the Rajya Sabha Starred Question No. 120 for answer on 05.12.2024.

Annexure-1

Significant achievements of ISRO from 2021 to till date

- 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 & Sustained Operations Management (IS4OM) was dedicated to the nation in Jul-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.
- PSLV-C54 successfully launched EOS-06 satellite (Oceansat-3) in Nov-2022 along with Eight Nano-satellites including INDIA-BHUTAN SAT (INS-2B).
- First successful mission of SSLV-D2 was accomplished in Feb- 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 Sep-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.

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- PSLV-C58/XPOSAT mission was successfully accomplished in Jan-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.
 - The third developmental flight of SSLV is successful. The SSLV-D3 placed EOS-08 precisely into the orbit in August 2024.
 - GSAT-N2 was successfully accomplished in November 2024.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA

UNSTARRED QUESTION NO. 1247

TO BE ANSWERED ON THURSDAY, DECEMBER 05, 2024

GAGANYAAN MISSION

1247. SHRI RAJEEV SHUKLA:

Will the PRIME MINISTER be pleased to state:

- (a) the details of progress made by the Gaganyaan Mission which envisages demonstration of ISRO's human spaceflight capability;
- (b) the stipulated timeline for the same;
- (c) the challenges and risks associated with the said project;
- (d) the measures being taken to mitigate the said risks; and
- (e) the details of other such missions to be undertaken involving humans?

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 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 has 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) Stipulated Timeline for Gaganyaan Mission is as follows:

- i. 1st Uncrewed (experimental) mission is targeted by the end of 2024. Further, Uncrewed Missions are targeted for Q3 of 2025 and Q1 of 2026 respectively.
- ii. Crewed spaceflight mission is targeted for Q4 of 2026.

- (c) Major challenges and risks are related to seamless supply of raw materials, semiconductor components and timely deliveries of hardware from industries.
- (d) Multiple sources have been identified for supply of critical elements for the mission. The criticalities with regards to the timely delivery of subsystems are monitored closely for intervention of higher management. Gaganyaan Industry Meet were organised to sensitize industries about the quality aspects required for human space mission and timely delivery of hardware.
- (e) Government has recently announced expanded vision for Space Programme where in Bharatiya Antariksha Station by 2035 and Indian Moon Landing by 2040 were envisioned. Future missions for Bharatiya Antariksha Station and Indian Moon Landing will also involve humans.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA
UNSTARRED QUESTION NO. 1248

TO BE ANSWERED ON THURSDAY, DECEMBER 05, 2024

STATUS OF GAGANYAAN MISSION

1248. SHRI KARTIKEYA SHARMA:

Will the PRIME MINISTER be pleased to state:

- (a) the recent measures taken to implement the Human Rated Launch Vehicle Programme or Gaganyaan, including the timeline for the planned uncrewed and crewed missions, and the key milestones achieved so far, the details thereof;
- (b) the larger intended socio-economic benefits of the programme which would benefit the Indian populace across industries and geographies, the details thereof; and
- (c) whether any initiatives have been implemented to promote the participation of the private sector, including companies and startups based in Haryana in the Gaganyaan program, 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 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

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completed. First Test Vehicle mission (TV-D1) for the performance validation of Crew Escape System (CES) has been successfully accomplished.

- iii. Orbital Module Systems: Design of Crew Module and Service Module structure has 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 under preparation for flight integration. Crew Module and Service Module structure realization completed. Flight integration activities are in progress.
- (b) The Gaganyaan mission, while primarily a scientific and technological endeavor, carries significant socio-economic benefits for India. Some of the key areas where the mission is expected to have a positive impact:

i. Technological Advancements and Spin-offs:

New Technologies: The development of advanced technologies like cryogenic engines, lightweight materials, life support systems, and robotics will have applications in various industries, including aerospace, automotive, healthcare, and energy.

Job Creation: The mission is expected to create numerous jobs in the aerospace industry, research institutions, and associated sectors.

Economic Growth: The development of indigenous space technology will attract investments, boost domestic manufacturing, and contribute to economic growth.

ii. Inspiring Future Generations:

STEM Education: The mission will inspire young minds to pursue careers in science, technology, engineering, and mathematics (STEM).

National Pride: A successful human spaceflight program will enhance national pride and inspire a sense of achievement among the Indian populace.

iii. International Collaboration and Diplomacy:

Global Partnerships: The mission will foster international collaborations with other spacefaring nations, leading to knowledge sharing and joint ventures.

Diplomatic Influence: India's successful space program will enhance its global standing and diplomatic influence.

iv. Scientific Research and Innovation:

Microgravity Experiments: Conducting experiments in microgravity can lead to breakthroughs in various fields, including materials science, biotechnology, and medicine.

Remote Sensing and Earth Observation: The mission can contribute to improved weather forecasting, disaster management, and resource management.

- (c) The government has taken several initiatives to promote participation of Indian Industries and start-ups across India including State of Haryana in Indian Space Programmes.

The Government of India has announced reforms, on June, 2020, in the space sector 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 (INSPACe), a single-window agency, was formed under Department of Space, to promote, regulate and authorize 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. 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. Various schemes to encourage and hand hold private sector also announced and

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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, amendment was made to the Foreign Direct Investment policy for space sector, enabling higher threshold of foreign investments in various space domains. 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. 1249

TO BE ANSWERED ON THURSDAY, DECEMBER 05, 2024

COLLABORATIONS IN THE FIELD OF SPACE RESEARCH

1249. SMT. PHULO DEVI NETAM:

Will the PRIME MINISTER be pleased to state:

- (a) the current status of ISRO's collaboration with other space agencies and countries;
- (b) the details of steps taken by Government to encourage startups to boost India's space programme;
- (c) whether Government has undertaken any initiatives to encourage private investment and participation in space-related activities, if so, the details thereof and if not, the reasons therefor; and
- (d) the vision of ISRO in terms of international collaboration contributing to the advancement of space exploration and technology?

ANSWER

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

- (a) Currently, space cooperative documents have been signed with 61 countries and 5 multilateral bodies. The major areas of cooperation are Satellite Remote Sensing, Satellite Navigation, Satellite Communications, Space Science and Planetary Exploration and Capacity Building.
- (b) & (c)

The Government has taken the following measures to encourage and incentivize private sector participation in space exploration and technology development in India:

- i. The space sector has been liberalized and private sector allowed to carry out end to end space activities.

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- ii. 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.
 - iii. 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.
 - iv. 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, Technical Centre, Design Lab for NGEs, Skill Development in Space Sector, ISRO facility utilization support, Technology Transfer to NGEs, creation of IN-SPACe Digital Platform to connect with all the stakeholders of space ecosystem etc.
 - v. The number of Space Start-Ups have gone up, from just 1 in 2014 to around 266 as on date.
 - vi. IN-SPACe has signed around 71 MoUs with Non-Government Entities (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.
 - vii. In order to ease access to foreign capital by Indian NGEs, the Government of India has brought out revised FDI policy for Space Sector.
 - viii. 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.
 - ix. The Union Cabinet has approved the establishment of a Rs.1000 crore Venture Capital (VC) Fund dedicated to supporting India's space sector.
 - x. IN-SPACe has initiated Establishment of Earth Observation (EO) System under Public Private Partnership (PPP). The Expression of Interest (EOI) is invited from Non-Government Entities (NGEs).
 - xi. Technology Transfer of Small Satellite Launch Vehicle (SSLV) to Indian entities is under process and response to RFP is invited from shortlisted bidders.
 - xii. Announcement of Opportunity is made by IN-SPACe for making available Indian orbital resources to the NGEs. Bid is under consideration.

(d) ISRO pursues international collaboration with the objectives of enhancing the capacity of the Indian space programme for advancing programmatic priorities, augmenting space science and earth observation data base, widening ground station networks, bettering products and services through joint experiments and creating platforms for inflow of expertise.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA
UNSTARRED QUESTION NO. 2052

TO BE ANSWERED ON THURSDAY, DECEMBER 12, 2024

EFFORTS TO MAKE INDIA A DEVELOPED NATION BY 2047 IN SPACE SECTOR

2052. SMT. SANGEETA YADAV:

Will the PRIME MINISTER be pleased to state:

- (a) the efforts made by Government to achieve the vision to make India a developed nation by 2047 in the last five years;
- (b) whether Government has formulated any roadmap or action plan to realize the goal of 'Viksit Bharat' by 2047 in Space sector;
- (c) if so, the details thereof;
- (d) whether Government is evaluating new policies/schemes and legislative proposals based on their potential contribution towards achieving 'Viksit Bharat' by 2047; and
- (e) 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):**

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(a) Sir, Government of India has been making significant efforts towards achieving the goals outlined in India's Space Vision 2047. These efforts focus on technological advancements, international partnerships, increasing the participation of private players and advancing space exploration missions. The major initiatives taken up are:

- i. Government of India has carried out Space sector reforms in 2020 to allow participation of Indian private sector in space activities. As a part of these reforms, Government has delineated the roles of various entities viz., IN-SPACe, ISRO and NSIL.
- ii. Government of India has announced the Space Vision 2047 which targets establishing Bharatiya Antariksh Station (BAS) by 2035 and landing of an Indian on Moon by 2040. Towards this, Government has approved four important projects:
 - a. Gaganyaan follow-on missions and establishment of BAS 1st module by 2028,
 - b. Development of Next Generation Satellite Launch Vehicle (NGLV) (Re-Usable Low-cost Launch Vehicle) by 2032,
 - c. Chandrayaan-4 by 2027, to develop and demonstrate the technologies to come back to Earth after successfully landing on the Moon and also collect moon samples, and
 - d. Venus Orbiter Mission (VOM) by 2028, to study the Venusian surface and subsurface, atmospheric processes and influence of Sun on Venusian Atmosphere

(b) & (c)

Yes, Sir. The department has formulated a roadmap for space science exploration missions, integrating multiple domains of developments, towards realizing the goal of Space Vision 2047. Following are the major milestones of the roadmap:

- Launch of 1st module Bharatiya Antariksh Station (BAS) by 2028,
- Establishment of full BAS by 2035

- Indian Moon landing by 2040

Towards this, the department has obtained approvals from the Government for four new projects as mentioned below:

- a. Gaganyaan follow-on missions and establishment of 1st module of Bharatiya Antariksh Station (BAS) by 2028,
- b. Development of Next Generation Satellite Launch Vehicle (NGLV) (Re-Usable Low-cost Launch Vehicle) by 2032,
- c. Chandrayaan-4 by 2027, to develop and demonstrate the technologies to come back to Earth after successfully landing on the Moon and also collect moon samples, and
- d. Venus Orbiter Mission (VOM) by 2028, to study the Venusian surface and subsurface, atmospheric processes and influence of Sun on Venusian Atmosphere

(d) & (e)

Sir, The Government has released the Indian Space Policy, 2023 that provides a level playing field to Non-Government Entities [NGEs] in the space sector by enabling their participation across the entire value chain of space activities in an end-to-end manner.

Further, amendment was made to the Foreign Direct Investment policy for space sector, enabling higher threshold of foreign investments in various space domains.

In line with fostering the space start-ups, the government has also approved setting up of Rs.1000 crore Venture Capital Fund dedicated to space sector, under aegis of IN-SPACe for the coming five years.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA
STARRED QUESTION NO. 259

TO BE ANSWERED ON THURSDAY, DECEMBER 19, 2024

OUTCOMES OF ADITYA-L1 MISSION

*259. SHRI RAMBHAI HARJIBHAI MOKARIYA:

Will the PRIME MINISTER be pleased to state:

the manner in which Government plans to leverage the insights gained from the Aditya-L1 mission to enhance India's capabilities in solar research and its implications for space weather forecasting?

ANSWER

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

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. 259 REGARDING “OUTCOMES OF ADITYA-L1 MISSION” ASKED BY SHRI RAMBHAI HARJIBHAI MOKARIYA FOR ANSWER ON THURSDAY, DECEMBER 19, 2024.

Department has taken multi-pronged approach to leverage the insights gained from the Aditya-L1 mission which includes:

- I. Constitution of the Aditya-L1 Science Working Group (SWG) to maximise the scientific results from the mission.
- II. Engaging the country's solar science and heliophysics community for the scientific value addition for the mission, as well as science data utilization; and
- III. Conducting brainstorming meetings along with the PAN-India Solar/Heliophysics community to take the achievement of Aditya-L1 forward by enhancing the solar science and space weather research in the country.

Despite being a dedicated solar science mission, the insights gained from Aditya-L1 will be of immense importance for space weather research, which has potential to contribute building the space weather forecasting capability of the country, by integrating other observations and necessary infrastructure.

O.I.H.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA
UNSTARRED QUESTION NO. 2848

TO BE ANSWERED ON THURSDAY, DECEMBER 19, 2024

OPPORTUNITIES FOR SPACE SECTOR STARTUPS IN FOREIGN COUNTRIES

2848. SHRI MAYANKBHAI JAYDEVBHAI NAYAK:

DR. MEDHA VISHRAM KULKARNI

SHRI NARESH BANSAL:

DR. KALPANA SAINI:

Will the PRIME MINISTER be pleased to state:

- (a) the total number of countries identified by the Indian National Space Promotion and Authorizaton Centre (IN-SPACe) in which the private sector can operate; and
- (b) whether there has been a rise in the number of startups in the space sector over the last five years, 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) IN-SPACe has established relationships with more than 25 countries from across the world, including both Space faring and Space aspiring nations, where Indian companies can pitch their products/ solutions. IN-SPACe has also conducted "IN-SPACe Space Days" with 6 countries so far, in order to enable focused match making for Indian Private Space Sector companies in these countries.
- (b) The number of Space Start-ups have gone up, from just 1 in 2014 to around 266 as on date.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA
UNSTARRED QUESTION NO. 2849

TO BE ANSWERED ON THURSDAY, DECEMBER 19, 2024

UTILITY OF SMALL SATELLITES

2849. SHRI PRAMOD TIWARI:

Will the PRIME MINISTER be pleased to state:

- (a) whether with launch of Earth Observation Satellite-08(EOS-08) using the Small Satellite Launch Vehicle(SSLV), the utility of small satellites will increase in a variety of sectors;
- (b) if so, the details thereof;
- (c) the current share of country in the world space economy;
- (d) whether privatization of country' small satellite launch sector has generated significant interest; and
- (e) if so, the manner in which the market for space tech is likely to be explored in coming years?

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) & (b)

EOS-08 is a first -of-its kind mission built on a ISRO's IMS-1 bus with advanced payloads for evaluation and multiple new technologies thereby enhancing the bus capacity. ISRO'S IMS-1 Bus system capabilities are considerably improved with the induction of various new technologies in terms of enhanced power generation, more payload mass capacity, increased data download rate and more data storage in EOS-08 Mission. The more efficient bus design proven in EOS-08 is capable to accommodate variety of new payloads. Hence, the bus can be adapted to different applications, thereby having the potential to increase the utility of small satellites in a variety of sectors.

(c) In 2022, the Indian space market is estimated at approximately USD 8.4 Bn., which is at ~2% of the global space market.

(d) & (e)

There is significant growth expected in the Indian space tech market with the participation of all the stakeholder eco system. Government has brought out the Decadal vision and strategy for the Indian space economy, as per which it is expected to target 8% of world space economy by 2033.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA
UNSTARRED QUESTION NO. 2850

TO BE ANSWERED ON THURSDAY, DECEMBER 19, 2024

SPACE MISSIONS

2850. DR. V. SIVADASAN:

Will the PRIME MINISTER be pleased to state:

- (a) the number of space missions and launches undertook by ISRO in the last five years, year-wise;
- (b) the number of successful missions undertook by ISRO in the last five years, year-wise;
- (c) the number of failed missions in the last five years, year-wise; and
- (d) the number of mission launched by private agencies in the last five years, year-wise?

ANSWER

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

(a), (b) & (c)

- i. The Year-wise data on the number of orbital launches and their outcome is given in the table below:

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Year	Total No. of launch vehicle missions	Successful launch vehicle missions	Failed launch vehicle missions
2020	2	2	0
2021	2	1	1
2022	5	4	1
2023	7	7	0
2024 (till 10.12.24)	4	4	0

- ii. The Year-wise data on the number of space craft missions and their outcome is given in the table below:

Year	Total No. of spacecraft missions	Successful spacecraft missions	Failed spacecraft missions
2020	3	3	0
2021	1	0	1
2022	6	6	0
2023	4	4	0
2024 (till 10.12.24)	4	4	0

(d) No orbital launch vehicle missions have been conducted by Indian private agencies in the last five years. However, two sub-orbital launch vehicle missions have been successfully accomplished by Indian private agencies i.e Vikram-S by M/s Skyroot in 2022 and Agnibaan Suborbital Tech Demonstrator by M/s Agnikul Cosmos in 2024.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA

UNSTARRED QUESTION NO. 2851

TO BE ANSWERED ON THURSDAY, DECEMBER 19, 2024

BHARATIYA ANTRIKSH STATION

2851. SHRI NARHARI AMIN:

Will the PRIME MINISTER be pleased to state:

- (a) the details on the objectives and expected capabilities of the Bharatiya Antriksh Station in comparison to other space stations; and
- (b) the timeline for the construction and operationalisation of the Bharatiya Antriksh Station and milestones set to ensure its timely completion?

ANSWER

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

(DR. JITENDRA SINGH):

- (a) Bharatiya Antariksh Station (BAS) will fulfil the objective of an orbiting Indian human spaceflight platform in Low Earth Orbit (LEO). This will enable to undertake medium to long duration human space flight missions to LEO, as part of the sustained Indian human space program. Similar to other operational space stations, BAS will also comprise of multiple modules and state of the art technological capabilities for carrying out cutting edge scientific research and technology development activities in microgravity environment, targeted towards national priorities and societal applications.
- (b) With the recent approval of revision in Gaganyaan Programme, the scope of the program has been expanded to include precursor missions to Bharatiya Antariksh Station (BAS), including development & launch of 1st module of BAS (BAS-01). The 1st module of BAS is targeted to be launched in 2028 timeframe and BAS is expected to be fully operationalised with all modules by 2035 timeframe.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA
UNSTARRED QUESTION NO. 2852

TO BE ANSWERED ON THURSDAY, DECEMBER 19, 2024

INDIA'S SPACE VISION 2047

2852. SHRI RAMBHAI HARJIBHAI MOKARIYA:

SHRI NARHARI AMIN:

SMT. DARSHANA SINGH:

Will the PRIME MINISTER be pleased to state:

- (a) the details of goal of establishing Bhartiya Antriksh Station to enhance possibilities of future exploration programmes; and
- (b) the details of scheduled ambitious indigenous programmes to achieve India's Space Vision 2047?

ANSWER

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

- (a) The vision for space in the Amrit kaal envisages including other things, establishing an operational Bharatiya Antariksh Station (BAS) by 2035 and Indian Crewed Lunar Mission by 2040. BAS will be the first National Space Laboratory to conduct multidisciplinary microgravity experiments and studies in the fields of Science, Technologies, Medicine, Agriculture, Space manufacturing, among others. BAS will also be acting as platform for global & national collaboration, gateway to lunar exploration & beyond and to help boosting the Space Economy of the country.

ISRO has initiated development of various technologies for the Bharatiya Antariksh Station. These technologies will be demonstrated through precursor missions for BAS, which has been recently approved by the Government as part of revision in Gaganyaan programme.

(b) Department of Space leap towards India's Space Vision 2047 with the approvals of key Missions which includes,

- Establishment of 1st module of Bharatiya Antariksh Station (BAS) by 2028,
- Development of Next Generation of satellite Launch Vehicle (NGLV) (Re-Usable Low-cost launch vehicle) by 2032,
- Chandrayaan-4 by 2027, to develop and demonstrate the technologies to come back to Earth after successful landing on the Moon and also collect moon samples, and
- Venus Orbiter Mission (VOM) by 2028, to study the Venusian surface and subsurface, atmospheric processes and influence of Sun on Venusian Atmosphere.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA
UNSTARRED QUESTION NO. 2853

TO BE ANSWERED ON THURSDAY, DECEMBER 19, 2024

PUBLIC-PRIVATE PARTNERSHIPS OF ISRO

2853. DR. SASMIT PATRA:

Will the PRIME MINISTER be pleased to state:

- (a) the details of the various Public-Private Partnerships (PPP) that Indian Space Research Organisation (ISRO) has entered into;
- (b) the manner in which these PPP modes have developed ISRO and strengthened the space capabilities of India;
- (c) future plans of ISRO in building PPP modes fields and sectors-wise; and
- (d) the manner in which the Space Applications Centre (SAC) of ISRO contributes in this PPP of ISRO?

ANSWER

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

(DR. JITENDRA SINGH):

(a) & (b) ISRO is actively engaged in associating with Industries to realise components, subsystems and systems required for space mission.

(c) Department of Space (DOS) has made following initiatives towards engaging industries through PPP mode:

- I. NSIL is planning to collaborate with Indian Industries for the production of Launch Vehicle Mark 3 (LVM 3) through PPP mode.
- II. IN-SPACE has proposed for PPP in establishing an Earth Observation Constellation.

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III. The Next Generation Launch Vehicle (NGLV) development project is planned to be implemented through a Public Private Partnership mode with NSIL and industry.

IV. ISRO will be a knowledge partner and provide technical support for the above PPP initiatives.

(d) ISRO, through its Centre(s)/ Unit(s), will provide technical support for the PPP activities as per the specific PPP projects. Space Applications Centre (SAC) being one of the major centres of ISRO may also contribute depending upon the nature and type of PPP project.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA

UNSTARRED QUESTION NO. 2854

TO BE ANSWERED ON THURSDAY, DECEMBER 19, 2024

SPACE RESEARCH AND DEVELOPMENT IN ODISHA

2854. SHRI MANAS RANJAN MANGARAJ:

Will the PRIME MINISTER be pleased to state:

- (a) whether there is any plan to establish space research centres or satellite data centres in Odisha to use space technology for local development;
- (b) whether Government promotes space education and awareness in Odisha to build local talent in space science and technology; and
- (c) the steps being taken to increase collaboration between space agencies and local universities or institutes in Odisha for space research initiatives?

ANSWER

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

(DR. JITENDRA SINGH):

- (a) Department of Space has established Balasore Rocket Launching Station (BRLS) during 1979 in Chandipur, Balasore, Odisha and sounding rockets were launched from the launch site. ISRO is also establishing an Atmosphere and Space Research Facility (ASRF) at Chandipur, Balasore in association with Ministry of Earth Science (MoES) and Defense Research and Development Organisation (DRDO) as a super site for atmospheric and space research and project establishment is under progress.
- (b) Department of Space established Space Technology Incubation Centre (STIC) in NIT, Rourkela, Odisha to promote space education & awareness, develop innovative technologies in space domain through local talents and also develop the space start-up entrepreneurs.
- (c) Space Technology Incubation Centre (STIC) is established in collaboration with NIT, Rourkela, Odisha and Veer Surendra Sai Space Innovation Centre is established in collaboration with Veer Surendra Sai University of Technology, Sambalpur, Odisha.
