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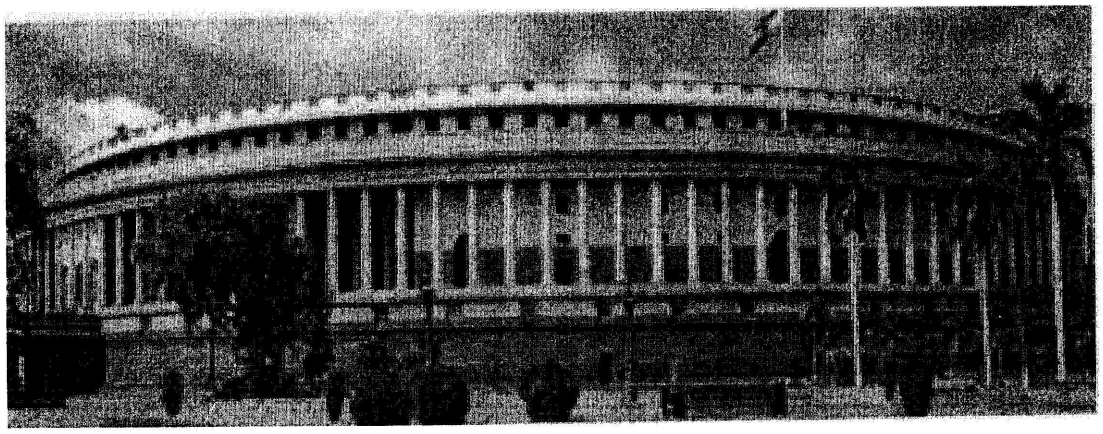
GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

"SPACE IN PARLIAMENT"



WINTER SESSION OF PARLIAMENT 2019
(NOVEMBER - DECEMBER 2019)

COMPILATION OF REPLIES GIVEN IN PARLIAMENT DURING 2019

Government of India
Department of Space
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GOVERNMENT OF INDIA
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LOK SABHA
UNSTARRED QUESTION NO.483

TO BE ANSWERED ON WEDNESDAY, NOVEMBER 20, 2019

PROGRESS OF IRNSS

483. SHRIMATI KIRRON KHER:

Will the PRIME MINISTER be pleased to state:

(a) the progress made so far under Indian Regional Navigation Satellite System (IRNSS) program, in which India will have its own Positioning System;

(b) the steps taken by the Government to introduce this positioning system in consumer products like mobile phones; and

(C) the proposed timeline by which the positioning system would be introduced in consumer products?

ANSWER

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

(a) India's indigenous navigation satellite system termed as Navigation with Indian Constellation (NavIC) is already established by ISRO and is functional since April 2018. NavIC consists of Space Segment (constellation of seven IRNSS satellites) and Ground Segment (spread across India). The system is providing Positioning, Navigation and Timing (PNT)

service and one satellite (IRNSS-1A) is providing messaging service.

(b)&(c) Use of AIS-140 compliant NavIC-based vehicle trackers system has been made compulsory to all commercial vehicles. More than 75 companies are now manufacturing NavIC based vehicle trackers, and several thousand vehicles are now plying on the roads equipped with these devices. The updated version of new mobile models will be having NavIC based positioning systems. NavIC has been accepted by 3GPP (Third Generation Project Partnership) thereby enabling incorporation of NavIC as part of assisted GNSS. NavIC is also useful for applications like timing solution, drones, surveying, weather radiosondes, forestry, precision agriculture, etc.

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GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

LOK SABHA
UNSTARRED QUESTION NO.509

TO BE ANSWERED ON WEDNESDAY, NOVEMBER 20, 2019

SATELLITES TO ASSESS POLLUTION STATUS

509. SHRI PARVESH SAHIB SINGH VERMA:

Will the PRIME MINISTER be pleased to state:

(a) whether the Department has used its satellites to assess the pollution situation in Delhi, if so, the details thereof and if not, the reasons therefor;

(b) whether the Department has calculated the contribution of stubble burning in Delhi's pollution, if so, the details thereof and if not, the reasons therefor;

(c) whether the Department would release images of stubble burning which would have been captured by ISRO satellites and if so, the details thereof; and

(d) whether the images released by NASA showing stubble burning in Punjab and Haryana is accurate, if so, the details thereof and if not, the reasons therefor?

ANSWER

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

(a) The Imager payload on-board ISRO's INSAT-3D & 3DR satellites is used to monitor Aerosol Optical Depth (AOD), which is indicator of particles and smoke from biomass burning

affecting visibility and increase of PM2.5 and PM10 concentration in the atmosphere. It is found that AOD, PM2.5 and PM10 concentrations are higher over Indo-Gangetic Plain covering parts of Delhi, Uttar Pradesh and Bihar during October and November. High concentration of these pollutants is seen originating from parts of Punjab and Haryana during stubble burning.

(b) Climatological study of satellite based fire occurrences and associated pollutant parameters reveal that fire occurrences increased by 4% over Punjab and Haryana region during October- November between 2003 and 2017. The model based analysis suggests that there is a high probability of transportation of smoke aerosols from Punjab & Haryana, towards down-wind regions of Delhi, Uttar Pradesh and Bihar.

(c) INSAT 3D & 3DR Imager based AOD, PM2.5 and PM10 spatial maps are made available on web portals viz. airquality.iirs.gov.in and www.mosdac.gov.in along with other ancillary parameters for visualization. Using medium resolution Indian Remote Sensing (IRS) satellite data, stubble burned area maps are generated at the end of stubble burning activity in Kharif season.

(d) ISRO has been carrying out monitoring of stubble burning since 2015. The products generated are comparable to the NASA products.

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GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

LOK SABHA
UNSTARRED QUESTION NO.527

TO BE ANSWERED ON WEDNESDAY, NOVEMBER 20, 2019

CONSTELLATION OF REMOTE SENSING SATELLITES

527. SHRI P.P. CHAUDHARY:

MS. PRATIMA BHOUMIK:

Will the PRIME MINISTER be pleased to state:

(a) whether any progress has been made in technical discussions to realize a virtual constellation of remote sensing satellites provided by space agencies as part of the BRICS Programme;

(b) if so, the details thereof; and

(c) the purposes for which such a network can be utilized?

ANSWER

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

(a) Yes Sir.

(b) The space agencies of BRICS nations have been negotiating a Framework Agreement to formalize the cooperation on building a 'virtual constellation of remote sensing satellites', made up of satellites contributed by BRICS space agencies. Technical aspects with respect to identifying the satellites and the ground stations for the initial virtual constellation were discussed by the Space Agencies.

(c) **The purpose of the proposed virtual constellation is to get access to satellite remote sensing data, which could be used by the individual BRICS nations for various applications including natural resources management and disaster management.**

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GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

LOK SABHA
UNSTARRED QUESTION NO.588

TO BE ANSWERED ON WEDNESDAY, NOVEMBER 20, 2019

LAUNCH OF CHANDRAYAAN-II

588. SHRI KIRTI VARDHAN SINGH:

Will the PRIME MINISTER be pleased to state:

(a) the cost incurred on the launch of Chandrayaan-II;

(b) whether the launch was successful taking in view the various research on Moon which was planned by the scientists of ISRO and if so, the details thereof; and

(c) the reasons for the failure of the Vikram Lander to land smoothly on the surface of the Moon?

ANSWER

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

(DR. JITENDRA SINGH):

(a) The approved cost of Chandrayaan-II Project is Rs. 603 Crore (excluding launch cost). Chandrayaan-II was launched on-board the GSLV MK III M1. The cost of GSLV MK III M1 vehicle is Rs. 367 Crore.

(b) & (c) Chandrayaan-II Spacecraft was successfully launched. The objectives of Chandrayaan-II Mission were:

1. Scientific studies through payloads on-board the orbiter

2. **Technology demonstration of soft landing and roving on the lunar surface**

The indigenously developed Chandrayaan-2 spacecraft comprising of Orbiter, Lander and Rover was successfully launched on-board indigenous GSLV MK III-M1 Mission on 22nd July 2019. After accomplishing four earth bound maneuvers and Trans Lunar Injection, the spacecraft was successfully inserted into the Lunar orbit on 20th August 2019. A series of moon bound maneuvers were then carried out to achieve a Lunar orbit of 119x127 km. The Lander 'Vikram' was separated, as planned, from the Orbiter on 2nd September 2019. After two successful de-orbiting maneuvers, powered descent of the Lander was initiated on 7th September 2019 to achieve soft landing on the moon surface.

The first phase of descent was performed nominally from an altitude of 30 km to 7.4 km above the moon surface. The velocity was reduced from 1683 m/s to 146 m/s. During the second phase of descent, the reduction in velocity was more than the designed value. Due to this deviation, the initial conditions at the start of the fine braking phase were beyond the designed parameters. As a result, Vikram hard landed within 500 m of the designated landing site.

Most of the components of Technology demonstration, including the launch, orbital critical maneuvers, lander separation, de-boost and rough braking phase were successfully accomplished. With regards to the scientific objectives, all the 8 state of the art scientific instruments of

the Orbiter are performing as per the design and providing valuable scientific data. Due to the precise launch and orbital maneuvers, the mission life of the Orbiter is increased to 7 years. The data received from the Orbiter is being provided continuously to the scientific community. The same was recently reviewed in an all India user meet organized at New Delhi.

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O.I.H.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

LOK SABHA
UNSTARRED QUESTION NO.605

TO BE ANSWERED ON WEDNESDAY, NOVEMBER 20, 2019

CHANDRAYAAN-II

605. SHRI KANAKMAL KATARA:

Will the PRIME MINISTER be pleased to state:

(a) whether the Government has any data to assess the progress of Chandrayaan-II mission;

(b) if so, the details of the progress of this mission;

(c) the amount spent by the Government on this mission;

(d) whether any assistance was sought from other countries to make this mission successful; and

(e) if so, the details thereof?

ANSWER

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

(a) Yes Sir.

(b) Orbiter has been functioning normal. The payload and bus systems are performing as planned. Scientific instruments are providing useful scientific data as planned.

(c) Rs. 603 Crores.

(d) No.

(e) Not applicable.

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GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

LOK SABHA
UNSTARRED QUESTION NO.1384

TO BE ANSWERED ON WEDNESDAY, NOVEMBER 27, 2019

CHANDRAYAAN-III

1384. SHRI NITESH GANGA DEB:

Will the PRIME MINISTER be pleased to state:

(a) whether the Government has any proposal for a Chandrayaan-III Mission in the near future;

(b) if so, the details thereof; and

(c) the details of amount of money spent on Chandrayaan-II Mission?

ANSWER

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

(a) Yes Sir,

(b) ISRO has drawn out a roadmap of lunar exploration missions to master the technologies required. This roadmap has been presented to the space commission. Based on the final analysis and recommendations of the expert committee, works on future lunar missions are progressing.

(c) Rs. 603 Crores.

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GOVERNMENT OF INDIA

DEPARTMENT OF SPACE

LOK SABHA

UNSTARRED QUESTION NO.1386

TO BE ANSWERED ON WEDNESDAY, NOVEMBER 27, 2019

MANNED MISSION TO MARS

1386. MS. MALA ROY:

Will the PRIME MINISTER be pleased to state:

(a) whether there is any plan to launch a manned mission to Mars and if so, the details thereof and when it is likely to be launched;

(b) whether the training has started for the persons who will go to Mars; and

(C) if so, the details thereof?

ANSWER

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

(DR. JITENDRA SINGH):

(a) No, Sir. Currently, there are no plans to launch a manned mission to Mars.

(b) & (c) Do not arise.

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GOVERNMENT OF INDIA

DEPARTMENT OF SPACE

LOK SABHA

UNSTARRED QUESTION NO.2679

TO BE ANSWERED ON WEDNESDAY, DECEMBER 04, 2019

STUDY BY CHANDRAYAAN

2679. SHRI MAGUNTA SREENIVASULU REDDY:

Will the PRIME MINISTER be pleased to state:

(a) whether the Chandrayaan-2 has begun spectroscopic studies of lunar surface;

(b) if so, the details thereof; and

(C) the details of aims of the Imaging Infrared Spectrometer (IIRS) on-board Chandrayaan-2 and the details of this devices' contribution?

ANSWER

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

(DR. JITENDRA SINGH):

(a) Yes, Sir.

(b) Infrared measurements are done during bright sunlit conditions while X-ray measurements are carried out during phases of solar activity.

(c) IIRS aims to identify and map the location of minerals using absorption features in the reflected sunlight from the Moon's surface. The extended operational band of IIRS also enables

clear identification and mapping of water-ice on the sunlit lunar surface. The extended band of 3-5 microns in infrared enables improved capability to subtract the thermal background which otherwise causes uncertainties in estimating the water signature.

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GOVERNMENT OF INDIA

DEPARTMENT OF SPACE

LOK SABHA

UNSTARRED QUESTION NO.2730

TO BE ANSWERED ON WEDNESDAY, DECEMBER 04, 2019

R&D CENTRE

2730. SHRI COSME FRANCISCO CAITANO SARDINHA:

Will the PRIME MINISTER be pleased to state:

(a) whether ISRO has any plans to set up Research and Development (R&D) centres across the country;

(b) if so, the details of the proposed centres, State /UT-Wise;

(c) whether the Government would consider setting up a R&D centre of ISRO in economically, educationally and technologically advanced State of Goa located centrally on western seaboard of India and having good Infrastructure for space related R&D; and

(d) if so, the details thereof and if not, the reasons for exclusion of Goa from ISRO's plans?

ANSWER

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

(DR. JITENDRA SINGH):

(a) Yes, Sir.

(b) State/UT wise Research and Development centers are as follows:

Space Technology Cells (STCs): 1. STC- IISc Bangalore, Bengaluru, Karnataka. 2. STC- IIT Bombay, Mumbai, Maharastra. 3. STC- IIT Kanpur, Kanpur, Uttar Pradesh. 4. STC- IIT Kharagpur, Kharagpur, West Bengal. 5. STC- IIT Madras, Chennai, Tamil Nadu. 6. STC- Savitribai Phule Pune University, Pune, Maharastra. 7. STC- IIT Roorkee, Roorkee, Uttrakhand. 8. STC- IIT Guwahati, Guwahati, Assam. 9. STC- IIT Delhi, New Delhi, Delhi.

Regional Academic Centres for Space (RACS): 1. RACS (Western Zone) - MNIT Jaipur, Jaipur, covers Dadar & Nagar Haveli, Goa, Daman & Diu, Gujarat, Maharashtra and Rajasthan. 2. RACS (North–Eastern Zone) - Gauhati University, Guwahati, covers Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura. 3. RACS (Northern Zone)- NIT Kurukshetra, Kurukshetra, covers Delhi, Haryana, Himachal Pradesh, Jammu & Kashmir, Punjab and Uttarakhand. 4. RACS (Southern Zone) - NITK Surathkal, Mangalore, cover Andhra Pradesh, Karnataka, Kerala, Lakshadweep, Pondicherry, Tamil Nadu and Telangana. 5. RACS (Central Zone) - IIT (BHU), Varanasi, cover Chhattisgarh, Madhya Pradesh and Uttar Pradesh. 6. RACS (Eastern) - NIT Patna, Patna, covers A&N Islands, Bihar, Jharkhand, Odisha, Sikkim and West Bengal.

Space Technology Incubation Centres (S-TICs) : 1. S-TIC (North Eastern Zone)- NIT Agartala, covers Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and

Tripura. 2. S-TIC (Northern Zone)- NIT Jalandhar, covers Chandigarh, Delhi NCT, Haryana, Himachal Pradesh, Jammu Kashmir, Punjab and Uttarakhand. 3. S-TIC (Southern Zone)- NIT Trichy, covers Andhra Pradesh, Karnataka, Kerala, Lakshadweep, Puducherry, Tamil Nadu and Telangana. 4. S-TIC (Western Zone)- NIT Nagpur, covers Dadar & Nagar Haveli, Daman & Diu, Goa, Gujarat, Maharashtra and Rajasthan. 5. S-TIC (Eastern Zone)- NIT Rourkela, covers Andaman & Nicobar Islands, Bihar, Jharkhand, Odisha, West Bengal. 6. S-TIC- (Central Zone) MANIT Bhopal, covers Chhattisgarh, Madhya Pradesh and Uttar Pradesh.

(c) & (d)

Birla Institute of Technology and Science, Goa, National Institute of Technology, Goa and Goa College of Engineering, Goa are covered under Regional Academic Centres for Space (RACS) for the Western zone at MNIT, Jaipur and will actively participate in the research and development activities.

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GOVERNMENT OF INDIA

DEPARTMENT OF SPACE

LOK SABHA

UNSTARRED QUESTION NO.2647

TO BE ANSWERED ON WEDNESDAY, DECEMBER 04, 2019

RESEARCH LAB AT TIRUCHIRAPPALLI

2647. SHRI SU THIRUNAVUKKARASAR:

Will the PRIME MINISTER be pleased to state:

(a) whether the Government has any plans to establish Research Lab or Allied Offices of ISRO at Tiruchirappalli or around it;

(b) if so, the details thereof; and;

(c) the steps taken by the Government to create research institutions involved in Space Programme and satellite technology with collaboration with NIT, Tiruchirappalli and other institutes in Tamil Nadu?

ANSWER

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

(DR. JITENDRA SINGH):

(a) Yes, Sir.

(b) & (c)

ISRO has set-up a Space Technology Incubation Centre (S-TIC) at National Institute of Technology (NIT), Tiruchirappalli. The centre will work with ISRO on the technical problems at hand related to the future Space programmes and shall provide solutions.

This S-TIC will cater to the southern region of India, including Andhra Pradesh, Karnataka, Kerala, Tamilnadu, Telangana, the Union Territories of Lakshadweep and Puducherry.

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GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

LOK SABHA
UNSTARRED QUESTION NO.2534

TO BE ANSWERED ON WEDNESDAY, DECEMBER 04, 2019

FIRST MANNED MISSION

2534. SHRIMATI SANGEETA KUMARI SINGH DEO:
DR. SUKANTA MAJUMDAR:
SHRI VINOD KUMAR SONKAR:
SHRI BHOLA SINGH:
SHRI RAJA AMARESHWARA NAIK:

Will the PRIME MINISTER be pleased to state:

(a) whether the ISRO has planned to launch the first manned mission under Gaganyaan by December, 2021, if so, the details thereof;

(b) whether the ISRO has shortlisted certain number of Indian astronauts for Gaganyaan-India's manned mission to Space, if so, the details thereof;

(c) whether the ISRO has shortlisted some Indian astronauts for training in Russia under Gaganyaan Mission and if so, the details thereof;

(d) whether the ISRO has developed GSLV Mk-III to carry and launch human lives much further into the space and if so, the details thereof; and

(e) the details of other steps/initiatives taken by the ISRO for technological upgradation regarding the successful Gaganyaan Mission?

ANSWER

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

(DR. JITENDRA SINGH):

(a) Yes Sir, the Human Space Mission: Gaganyaan is targeted for December 2021. The Gaganyaan Programme has been approved by the Government of India. The design and configuration of major subsystem are finalized. The procurement and system/ subsystem realisation for tests and flight has commenced.

(b) & (c)

The crew selection and training process for Gaganyaan mission is progressing well including the training in Russia under Gaganyaan Mission.

(d) Yes Sir, GSLV MkIII launcher which is ISRO's heavy lift launcher is identified for Gaganyaan mission. It has requisite payload carrying capacity for Orbital module in desired elliptical orbit. Process for human rating of GSLV Mk-III is progressing well.

(e) ISRO has wide experience in technological areas with respect to Launch vehicle, spacecraft management, ground infrastructure etc. ISRO has taken steps for human rating of existing systems to ensure crew safety. In certain areas where ISRO lacks experience such as Human centric systems, crew training, crew recovery etc., ISRO is planning to collaborate with national and international agencies. MoUs in this regard have already been signed with DRDO labs, Indian Air Force and Russian space agency

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GOVERNMENT OF INDIA

DEPARTMENT OF SPACE

LOK SABHA

UNSTARRED QUESTION NO.2656

TO BE ANSWERED ON WEDNESDAY, DECEMBER 04, 2019

LUNAR TROPHY HUNT

2656. SHRI V.K. SREEKANDAN:

Will the PRIME MINISTER be pleased to state:

(a) Whether the Government is considering to set up a new lunar trophy hunt;

(b) If so, the details thereof;

(c) whether the proposed lunar trophy hunt will look for minerals, ice deposits, etc.; and

(d) If so, the details thereof?

ANSWER

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

(DR. JITENDRA SINGH):

(a), (b), (c) & (d)

No lunar trophy hunt is under consideration at present by the Government.

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GOVERNMENT OF INDIA

DEPARTMENT OF SPACE

LOK SABHA

UNSTARRED QUESTION NO.2628

TO BE ANSWERED ON WEDNESDAY, DECEMBER 04, 2019

PSLV MISSION

2628. SHRI K. MURALEEDHARAN:

Will the PRIME MINISTER be pleased to state:

(a) Whether the next three PSLV missions will carry 14 small foreign satellites;

(b) if so, the details thereof;

(c) Whether ISRO has bagged orders from four international customers in this regard; and

(d) if so, the details thereof?

ANSWER

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

(DR. JITENDRA SINGH):

(a) In the three PSLV missions viz. PSLV-C47, PSLV-C48 and PSLV-C49, a total of 27 foreign customer satellites will be launched as co-passengers to Indian national satellites.

(b) Out of the 27 foreign customer satellites, 24 satellites belong to USA and 1 each from Israel, Lithuania and Japan. These foreign customer satellites are launched as part of commercial

arrangements between NewSpace India Limited (NSIL) and the foreign companies.

(c) Towards launching these 27 foreign customer satellites, NewSpace India Limited (NSIL) has entered into eight commercial launch service agreements with six foreign entities.

(d) The eight commercial launch service agreements that NSIL has entered into are with Planet Inc., USA (1); Spaceflight Inc., USA (3); Tyvak Nano Satellite Systems Inc., USA (1); NanoRacks LLC, USA (1); Municipality of Herzliya, Israel (1); and NanoAvionica LLC, Lithuania (1).

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GOVERNMENT OF INDIA

DEPARTMENT OF SPACE

LOK SABHA

UNSTARRED QUESTION NO.3811

TO BE ANSWERED ON WEDNESDAY, DECEMBER 11, 2019

COMMERCIALISING R&D OF ISRO

3811. SHRI. SUDHAKAR TUKARAM SHRANGARE:

Will the PRIME MINISTER be pleased to state:

(a) whether the Government proposes to set up a new company to commercially exploit the Research and Development (R&D) work of Indian Space Research Organisation (ISRO);

(b) if so, the details thereof;

(c) the time by which the new company is likely to start its operations?

ANSWER

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

(DR. JITENDRA SINGH):

(a) A new company by name, "NewSpace India Limited (NSIL)", has been incorporated on 06th March 2019, as a wholly owned Government of India Undertaking / Central Public Sector Enterprise (CPSE), under the administrative control of Department of Space (DOS) to commercially exploit the research and development work of Indian Space Research Organisation (ISRO) Centres and constituent units of DOS.

(b) **The business activities of NSIL are mainly driven towards enabling Indian industries to productionise space systems through technology transfer mechanisms and to exploit the commercial opportunities emanating from the Indian space programme.**

(c) **NSIL has commenced its commercial business operations since its incorporation.**

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GOVERNMENT OF INDIA

DEPARTMENT OF SPACE

LOK SABHA

UNSTARRED QUESTION NO.3874

TO BE ANSWERED ON WEDNESDAY, DECEMBER 11, 2019

SPACE RESEARCH PROJECTS

3874. PROF. SAUGATA RAY:

Will the PRIME MINISTER be pleased to state:

(a) the details of ongoing space research projects of ISRO;

(b) whether India will become a hub for space related projects;

(c) if so, the details thereof;

(d) the details of commercial benefits of ISRO;

(e) whether a number of foreign countries used our infrastructure facilities in this sector or their research projects; and

(f) if so, the details thereof?

ANSWER

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

(DR. JITENDRA SINGH):

(a) The details of the ongoing space research projects are as follows:

- **Mars Orbiter Mission: India's first mission to orbit Mars and study its atmosphere was launched in 2014.**

- **ASTROSAT: India's first multi-wavelength astronomy satellite was launched in 2015.**
- **Chandrayaan-2: Launched in July 2019, the Orbiter payloads are providing useful science data.**

(b) & (c)

India has developed end-to-end capability to carry out space projects pertaining to building, launching, operating and using satellites for various application needs. India is pursuing cooperation with 55 countries and 5 multinational bodies for peaceful uses of outer space. India is actively participating with multilateral bodies in addressing global issues. India is also providing commercial launch services to foreign countries.

(d) The commercial benefits of ISRO are as follows:

1. **Launch services**
2. **Remote sensing data**
3. **Transponder leasing**
4. **Spin-off technologies**

(e) & (f)

Infrastructure facilities of ISRO have not been used by foreign countries for their research projects.

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GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA
UNSTARRED QUESTION NO. 612

TO BE ANSWERED ON THURSDAY, NOVEMBER 21, 2019

COMMERCIAL EXPLOITATION OF SPACE RESEARCH AND DEVELOPMENT

612. SHRI MANISH GUPTA:

Will the PRIME MINISTER be pleased to state:

(a) the name and objectives of the new company to commercially exploit the research and development work carried out by the Indian Space Research Organisation (ISRO) and its constituent units, the details thereof;

(b) whether private industry in the country would benefit from the initiatives taken, if so, the details thereof;

(c) the details of spin-off technologies and products which can be marketed in India and abroad; and

(d) whether Government could earn substantial foreign exchange through sale of these products abroad, if so, the details thereof?

ANSWER

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

(a) A new company by name, "New Space India Limited (NSIL)", has been incorporated on 06th March 2019, as a wholly owned Government of India Undertaking / Central Public Sector Enterprise (CPSE), under the administrative control of Department of Space (DOS) to commercially exploit the research and development work of Indian Space Research Organisation (ISRO).

Mandate of NSIL includes viz. (i) Small Satellite technology transfer to industry wherein NSIL will obtain license from DOS/ISRO and sub-license it to industries; (ii) Manufacture of Small Satellite Launch Vehicle (SSLV) in collaboration with Private Sector; (iii) Productionisation of Polar Satellite Launch Vehicle (PSLV) through Indian Industry; (iv) Productionisation and marketing of Space based services,

including launch and application; (v) Transfer of technology developed by ISRO Centres and constituent institutions of DOS; and (vi) Marketing of spin-off technologies and products, both in India and abroad and (vii) any other subject which Government of India deems fit.

(b) Yes Sir.

With the activity plan and the mandate set for NSIL, Indian industries are likely to see a major spur in their growth in the space sector. This initiative would further enable scaling up the manufacturing and production base in Indian industries towards meeting the growing needs of Indian space programme and exploiting the opportunities available in the global space market.

(c) All the involved technologies related to ISRO's small satellite and its sub-systems that could be transferred to Indian industries for productionisation which eventually would cater to national demand as well as commercial needs of domestic and global market. This activity is also likely to give rise to several spin-off technologies that could be marketed nationally and globally.

(d) Yes Sir.

Through the sale of products related to small satellite, sub-system technology and the spin off products in domestic and global market, foreign exchange revenue will be generated.

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GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA
UNSTARRED QUESTION NO. 614

TO BE ANSWERED ON THURSDAY, NOVEMBER 21, 2019

ESTABLISHMENT OF INCUBATION CENTRES BY ISRO

614. SHRI R VAITHILINGAM:

Will the PRIME MINISTER be pleased to state:

(a) whether it is a fact that ISRO is considering to establish six incubation centres in various parts of the country;

(b) if so, the details thereof;

(c) whether it is also a fact that the students will be allowed to use these centres for R&D purposes;

(d) whether it is also a fact that the ISRO will ask students to address problems and buy solution from them; and

(e) if so, the details thereof?

ANSWER

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

(a) Yes, Sir.

(b) The Details of the six Space Technology Incubation Centres are as below:

Sl. No.	Region	Institute, Location
1	North Eastern	National Institute of Technology, Agartala, Tripura
2	Northern	Dr. BR Ambedkar National Institute of Technology, Jalandhar, Punjab
3	Southern	National Institute of Technology, Tiruchirappalli, Tamilnadu
4	Western	Visvesvaraya National Institute of Technology, Nagpur, Maharashtra

Sl. No.	Region	Institute, Location
5	Eastern	National Institute of Technology, Rourkela, Odisha
6	Central	Maulana Azad National Institute of Technology, Bhopal, Madhya Pradesh

(c) Yes, Sir.

(d) Yes, Sir.

(e) Relevant issues faced in various ISRO Centres shall be provided to these Space Technology Incubation Centres for developing solutions.

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GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA
STARRED QUESTION NO. 47

TO BE ANSWERED ON THURSDAY, NOVEMBER 21, 2019

UNSUCCESSFUL CHANDRAYAAN MISSION

*47. SHRI MANAS RANJAN BHUNIA:

Will the PRIME MINISTER be pleased to state:

(a) whether Government had taken a step to launch Chandrayaan for a special Mission to Moon, if so, the details of the plan;

(b) what was the position; and

(c) what problems made the plan and mission incomplete and unsuccessful?

ANSWER

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

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

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STATEMENT LAID ON THE TABLE OF THE RAJYA SABHA IN REPLY TO STARRED QUESTION NO.47 REGARDING "UNSUCCESSFUL CHANDRAYAAN MISSION" ASKED BY SHRI MANAS RANJAN BHUNIA FOR ANSWER ON THURSDAY, NOVEMBER 21, 2019.

(a) to (c) Yes Sir. The objectives of the Chandrayaan-2 Mission were

1. Scientific studies through payloads on-board the orbiter
2. Technology demonstration of soft landing and roving on the lunar surface

The indigenously developed Chandrayaan-2 spacecraft comprising of Orbiter, Lander and Rover was successfully launched on-board indigenous GSLV MK III-M1 Mission on 22nd July 2019. After accomplishing four earth bound maneuvers and Trans Lunar Injection, the spacecraft was successfully inserted into the Lunar orbit on 20th August 2019. A series of moon bound maneuvers were then carried out to achieve a Lunar orbit of 119x127 km. The Lander 'Vikram' was separated, as planned, from the Orbiter on 2nd September 2019. After two successful de-orbiting maneuvers, powered descent of the Lander was initiated on 7th September 2019 to achieve soft landing on the moon surface.

The first phase of descent was performed nominally from an altitude of 30 km to 7.4 km above the moon surface. The velocity was reduced from 1683 m/s to 146 m/s. During the second phase of descent, the reduction in velocity was more than the designed value. Due to this deviation, the initial conditions at the start of the fine braking phase were beyond the designed parameters. As a result, Vikram hard landed within 500 m of the designated landing site.

Most of the components of Technology demonstration, including the launch, orbital critical maneuvers, lander separation, de-boost and rough braking phase were successfully accomplished. With regards to the scientific objectives, all the 8 state of the art scientific instruments of the Orbiter are performing as per the design and providing valuable scientific data. Due to the precise launch and orbital maneuvers, the mission life of the Orbiter is increased to 7 years. The data received from the Orbiter is being provided continuously to the scientific community. The same was recently reviewed in an all India user meet organized at New Delhi.

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GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA
UNSTARRED QUESTION NO. 613

TO BE ANSWERED ON THURSDAY, NOVEMBER 21, 2019

TECHNOLOGY TRANSFER OF LI-ION CELL DEVELOPED BY ISRO

613. SHRI SHAMBHAJI CHHATRAPATI:

Will the PRIME MINISTER be pleased to state:

(a) whether ISRO has developed an in-house Li-ion Cell Technology and had invited domestic industries to establish production facilities within the country in June 2018;

(b) if so, the details thereof;

(c) what has been the response of domestic industries on the offer of ISRO; and

(d) how efficient is the ISRO technology in comparison to the best technology available globally?

ANSWER

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

(a) Yes, Sir.

(b) & (c) As a response to ISRO's Request for Qualification (RFQ), 157 industries responded, out of which 10 industries were selected through proper scrutiny by an expert committee. Technology transfer agreement has been signed with 6 industries and one week in-house technical training was also provided for the representatives from these industries.

(d) ISRO's Lithium-Ion battery technology is at par with similar technologies available across the world.

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GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA
UNSTARRED QUESTION NO. 611

TO BE ANSWERED ON THURSDAY, NOVEMBER 21, 2019

PREPARATIONS FOR CHANDRAYAAN-3 MISSION

611. SHRI SASMIT PATRA:

Will the PRIME MINISTER be pleased to state:

(a) whether the Department of Space is planning for Chandrayaan-3 (3rd Mission to Moon);

(b) if so, by when Chandrayaan-3 would be commissioned; and

(c) what has been learned from Chandrayaan-2 that could bring about the success of Chandrayaan-3?

ANSWER

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

(a) Yes, Sir.

(b) ISRO has drawn out a roadmap of lunar exploration missions to master the technologies required. This roadmap has been presented to the space commission. Based on the final analysis and recommendations of the expert committee, work on future lunar missions is progressing.

(c) The expert committee has analyzed the flight data and extensive simulations were carried out to re-construct the flight behavior. The recommendations of the expert committee will be implemented in future lunar missions.

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GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA
UNSTARRED QUESTION NO. 1241

TO BE ANSWERED ON THURSDAY, NOVEMBER 28, 2019

PROPOSAL OF ISRO TO TRANSFER SPACE-GRADE LI-ION CELL TECHNOLOGY TO BHEL

1241. SHRI SAMBHAJI CHHATRAPATI:

Will the PRIME MINISTER be pleased to state:

(a) whether ISRO has transferred indigenously developed technology to produce space-grade Lithium-ion cells by BHEL;

(b) if so, the details thereof;

(c) what is the current state of progress on production of space-grade Li-ion cells by BHEL; and

(d) whether there is any plan to market these Li-ion cells in other countries also?

ANSWER

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

(a) Yes, ISRO has transferred its indigenous technology to produce space-grade Li-Ion cells to BHEL.

(b) In March 2018, BHEL signed the Technology Transfer Agreement with ISRO for acquiring the Li-Ion Cell production technology. This production facility is primarily targeting to meet Li-Ion Cell requirements for ISRO and other strategic sectors. However, BHEL can also produce and sell Li-Ion cells for meeting other national/commercial applications by suitably modifying the space-grade cell which can lead to cost reduction.

(c) BHEL is in the process of establishing the Li-Ion production facility near Bangalore in Karnataka. Various equipments (both indigenous and imported) for establishing this facility are procured and being commissioned. ISRO has already provided all technical documentation for establishing the production plant as well as hands-on training in various production activities for BHEL staff at ISRO's facilities.

(d) As per the Technology Transfer Agreement, space-grade Li-Ion cells manufactured by BHEL are meant for meeting the national requirements only. However, BHEL can also sell the space-grade Li-Ion cells to parties outside India after obtaining prior written consent from ISRO.

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GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA
UNSTARRED QUESTION NO. 1240

TO BE ANSWERED ON THURSDAY, NOVEMBER 28, 2019

SETTING UP OF ROCKET LAUNCHING PAD IN TAMIL NADU

1240. DR. SASIKALA PUSHPA RAMASWAMY:

Will the PRIME MINISTER be pleased to state:

(a) whether Government has any proposal to set up rocket launching pad at Kulasekarapattinam in the state of Tamil Nadu;

(b) if so, the details thereof; and

(c) if not, the reasons therefor?

ANSWER

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

(a) Yes, Sir.

(b) Government has proposal to set up rocket launching pad near Kulasekarapattinam in the State of Tamil Nadu.

(c) Does not arise.

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GOVERNMENT OF INDIA

DEPARTMENT OF SPACE

RAJYA SABHA

UNSTARRED QUESTION NO. 2041

TO BE ANSWERED ON THURSDAY, DECEMBER 05, 2019

SETTING UP DEDICATED CELLS IN IITs IN COLLABORATION WITH ISRO

2041. SHRI SAMBHAJI CHHATRAPATI:

Will the PRIME MINISTER be pleased to state:

(a) whether ISRO has taken an initiative to involve IITs in high-end space technology by pursuing them to set-up dedicated cells;

(b) if so, the details thereof;

(c) which are the major research areas in which ISRO desires development of high-end technology in collaboration with IITs; and

(d) whether ISRO would fund the identified projects or IITs themselves would arrange the resource?

ANSWER

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

(a) Yes, Sir.

(b) ISRO has set up 5 Space Technology Cells (STCs) at premier institutions like Indian Institute of Technologies (IITs) - Bombay, Kanpur, Kharagpur & Madras; Indian Institute of Science (IISc), Bengaluru and Joint Research Programme with Savitribai Phule Pune University (SPPU, Pune) to carry out research activities in the areas of space technology and applications.

(c) ISRO desires development of high end technology in collaboration with IITs in the areas of Space Science, Space Technology and Space Applications.

(d) Yes, Sir. ISRO would fund the identified projects.

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GOVERNMENT OF INDIA

DEPARTMENT OF SPACE

RAJYA SABHA

UNSTARRED QUESTION NO.2040

TO BE ANSWERED ON THURSDAY, DECEMBER 05, 2019

BRICS REMOTE SENSING SATELLITE CONSTELLATION

2040. SHRI AMAR SHANKAR SABLE:

Will the PRIME MINISTER be pleased to state:

(a) whether any progress has been made in technical discussions to realise a virtual constellation of remote sensing satellites provided by space agencies, as part of the BRICS Programme;

(b) if so, the details thereof; and

(c) the purpose for which such a network can be utilized?

ANSWER

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

(DR. JITENDRA SINGH):

(a) Yes Sir.

(b) The space agencies of BRICS nations have been negotiating a Framework Agreement to formalize the cooperation on building a 'virtual constellation of remote sensing satellites', made up of satellites contributed by BRICS space agencies. Technical aspects with respect to identifying the satellites and the ground stations for the initial virtual constellation were discussed by the Space Agencies.

(c) The purpose of the proposed virtual constellation is to get access to satellite remote sensing data, which could be used by the individual BRICS nations for various applications including natural resources management and disaster management.

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GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA
UNSTARRED QUESTION NO. 2039

TO BE ANSWERED ON THURSDAY, DECEMBER 05, 2019

LAUNCHING OF INDIAN SPACE STATION

2039. SHRI NARAYAN LAL PANCHARIYA:

Will the PRIME MINISTER be pleased to state:

(a) whether the Government has taken a decision to launch an Indian Space Station;

(b) if so, the details thereof;

(c) whether Government has set any time-frame for launching an Indian Space Station;

(d) if so, the details thereof;

(e) whether financial implications of launching an Indian Space Station have been assessed; and

(f) if so, the details thereof?

ANSWER

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

(a) to (f)

Space station is viewed as part of the sustained Indian Human Space programme. Government has not yet taken a decision on the launch of an Indian Space station. However, ISRO has initiated various studies related to newer technologies required for space station

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GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA
UNSTARRED QUESTION NO. 2839

TO BE ANSWERED ON THURSDAY, DECEMBER 12, 2019

SATELLITES LAUNCHED BY INDIA

2839. SHRI RAKESH SINHA:

Will the PRIME MINISTER be pleased to state:

(a) the number of countries whose satellites have been launched by India during the last five years;

(b) the amount of revenue generated thereby; and

(c) the number of countries with which Indian Space Research Organisation has signed a contract and names of such countries?

ANSWER

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

(a) ISRO has launched satellites from 26 countries during the last five years.

(b) The amount of revenue generated thereby is tabulated below:

Financial Year	Amount
	INR in Crores
2014-15	252.59
2015-16	227.45
2016-17	208.37
2017-18	232.56
2018-19	324.19
Total	**1,245.17**

(c) Contracts with 10 countries namely; USA, United Kingdom, Germany, Canada, Singapore, The Netherlands, Japan, Malaysia, Algeria and France were signed in the last five years under commercial arrangements.

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GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA
UNSTARRED QUESTION NO. 2840

TO BE ANSWERED ON THURSDAY, DECEMBER 12, 2019

MANNED MISSION TO MARS

2840. SHRI VAIKO:
DR. T. SUBBARAMI REDDY:
Will the PRIME MINISTER be pleased to state:

(a) whether there is any plan to launch a manned mission to Mars and if so, the details thereof and by when it is likely to be launched;

(b) whether the training for astronauts has begun for going to Mars;

(c) if so, the duration of training and whether it is in India or abroad; and

(d) whether indigenous industries for this purpose are involved, if so, the details thereof?

ANSWER

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

(a) No, Sir. Currently, there are no plans to launch a manned mission to Mars.

(b) to (d) Do not arise.

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