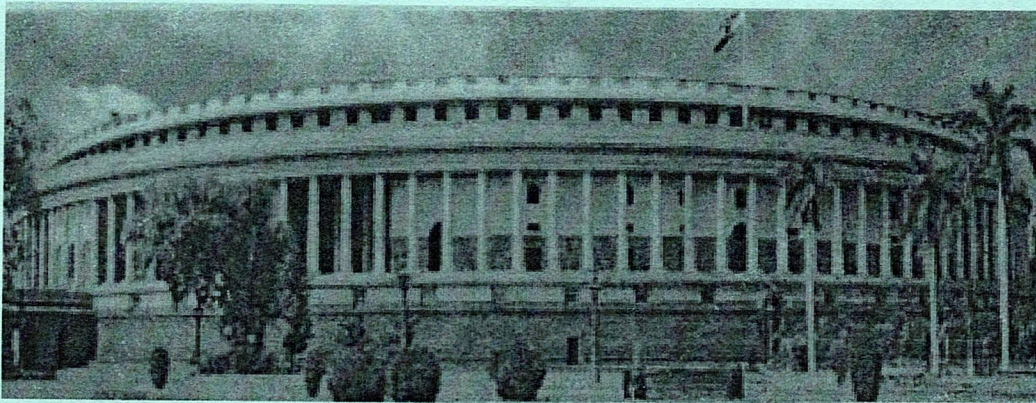




**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

"SPACE IN PARLIAMENT"



**MONSOON SESSION OF PARLIAMENT 2017
(JULY-AUGUST 2017)**

**COMPILATION OF REPLIES GIVEN
IN PARLIAMENT DURING 2017**

**Government of India
Department of Space**

PARLIAMENT QUESTIONS – MONSOON SESSION OF PARLIAMENT 2017

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**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

**LOK SABHA
STARRED QUESTION NO.41**

TO BE ANSWERED ON WEDNESDAY, JULY 19, 2017

LAUNCH OF NANO SATELLITES

***41. SHRI SATAV RAJEEV:**

SHRI P.R. SUNDARAM:

Will the PRIME MINISTER be pleased to state:

- (a) whether the Indian Space Research Organisation (ISRO) placed 30 nano satellites and an earth observation satellite Cartosat-2 in a single launch by its Polar Satellite Launch Vehicle PSLV C-38 and if so, the details thereof;**
- (b) whether majority of satellites were from foreign countries and if so, the details thereof;**
- (c) the foreign exchange earned out of this satellite launch;**
- (d) whether ISRO has taken steps to protect these satellites from space debris once they are made functional; 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) to (e) A Statement is laid on the Table of the House.

STATEMENT LAID ON THE TABLE OF THE LOK SABHA IN REPLY TO STARRED QUESTION NO.41 REGARDING "LAUNCH OF NANO SATELLITES" ASKED BY SHRI SATAV RAJEEV AND SHRI P.R. SUNDARAM FOR ANSWER ON WEDNESDAY, JULY 19, 2017.

- (a) **Yes, Madam. Indian Space Research Organisation (ISRO) has successfully launched an Indian earth observation satellite 'Cartosat-2 series' (weighing 712 kg) as primary payload on-board its Polar Satellite Launch Vehicle (PSLV-C38) on June 23, 2017 at 09:29 hrs along with 30 Nano satellites (total weighing 243 kg) in a single launch from Satish Dhawan Space Centre (SDSC), Sriharikota.**

The Cartosat-2 series satellite provides high resolution images of earth's surface at sub-meter resolution (Black & White image) and at 2-meter resolution (4-band colored image) for large scale mapping applications.

Out of these 30 Nano satellites, 29 satellites from 14 foreign countries were launched under commercial arrangement between Antrix Corporation Limited (Antrix), the commercial arm of ISRO and the foreign customers. One Nano satellite NIUSAT (weighing 15 kg) was from Noorul Islam University, Tamil Nadu.

- (b) **Yes, Madam. Out of these 30 Nano satellites, 29 satellites were from 14 foreign countries viz. Austria (1), Belgium (3), Chile (1), Czech Republic (1), France (1), Finland (1), Germany (1),**

Italy (3), Japan (1), Latvia (1), Lithuania (1), Slovakia (1), UK (3) and USA (10).

(c) Antrix has earned foreign exchange of about 6.1 Million Euro through launching of the 29 Nano satellites.

(d) & (e)

ISRO has taken measures to protect its operational satellites from space debris by carrying out (i) collision avoidance studies for all launch vehicles of ISRO to clear lift-off time; and (ii) space object proximity analysis on a daily basis to assess close conjunction with other space objects, in particular, of those objects identified by Inter-Agency Space Debris Coordination Committee (IADC). The foreign satellites have reported satisfactory reception of signal after the launch and are monitored by respective customers.

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

**LOK SABHA
STARRED QUESTION NO.46**

TO BE ANSWERED ON WEDNESDAY, JULY 19, 2017

GSAT-10

***46. PROF. SAUGATA ROY:**

SHRI N.K. PREMACHANDRAN:

Will the PRIME MINISTER be pleased to state:

- (a) whether the Government has provided facilities to certain DTH operators on GSAT-10 satellite;**
- (b) if so, the details thereof;**
- (c) whether the capacity of the INSAT 4A has been fully utilised ;**
- (d) if so, the details thereof; and**
- (e) the capacity of GSAT-10 provided to certain DTH operators including its time period?**

ANSWER

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

(DR. JITENDRA SINGH):

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

STATEMENT LAID ON THE TABLE OF THE LOK SABHA IN REPLY TO STARRED QUESTION NO.46 REGARDING "GSAT-10" ASKED BY PROF. SAUGATA ROY AND SHRI N.K. PREMACHANDRAN FOR ANSWER ON WEDNESDAY, JULY 19, 2017.

(a) & (b)

GSAT-10 carries 30 transponders and a GAGAN payload. 12 Ku-band transponders are utilised for DTH services. 11.25 C-band transponders are utilised for TV, Very Small Aperture Terminal (VSAT) and Digital Satellite News Gathering (DSNG) services and 0.75 transponder is being considered for alternate users due to change in demand. Six extended C band transponders are to be used for government services. GAGAN payload is utilised primarily for airline navigation services in association with Airports Authority of India.

(c) & (d)

INSAT-4A carries 12 C band and 12 Ku band transponders. 12 Ku-band transponders are utilised for DTH services. 12 C-band transponders were utilized for providing TV, VSAT and DSNG services till recently and fragmented capacity of about 1.6 transponders are being considered for alternate users due to change in demand.

(e) 12 Ku-band transponders in GSAT-10 are leased for an initial period of 3 years for DTH services.

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

**LOK SABHA
UNSTARRED QUESTION NO.481**

TO BE ANSWERED ON WEDNESDAY, JULY 19, 2017

ISRO MISSIONS

481. SHRI RADHESHYAM BISWAS:

Will the PRIME MINISTER be pleased to state:

- (a) whether Indian Space Research Organisation (ISRO) is targeting maximum missions this year;**
- (b) if so, the details thereof;**
- (c) whether ISRO is planning to accomplish this by September, 2017; 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) to (d)

In this calendar year i.e. 2017, Indian Space Research Organisation (ISRO) has launched 104 satellites, in a single launch, onboard PSLV-C37 on February 15, 2017 and 31 satellites, in a single launch, on-board PSLV-C38 on June 23, 2017. These satellites include - Two Indian Cartosat-2

series satellites, two Indian Nano-Satellites, one Nano satellite from Indian University and 130 foreign satellites from 19 countries viz. Austria, Belgium, Chile, Czech Republic, France, Finland, Germany, Italy, Israel, Japan, Kazakhstan, Latvia, Lithuania, Slovakia, Switzerland, The Netherlands, UAE, UK and USA.

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

**LOK SABHA
UNSTARRED QUESTION NO.500**

TO BE ANSWERED ON WEDNESDAY, JULY 19, 2017

GROWTH OF SPACE ACTIVITIES

500. DR. MANOJ RAJORIA:

Will the PRIME MINISTER be pleased to state:

- (a) whether the Government has formulated a policy for supporting the overall growth of space activities with increased level of private participation; and**
- (b) 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)

Department of Space has drawn a long term perspective plan, addressing various facets of Indian space programme viz., Space Transportation Systems, Space Infrastructure, Space Applications and Capacity Building. In order to cope up with the enhanced national requirements of space systems and services, ISRO is making focused efforts, through appropriate transfer of technology and hand-holding, to enhance

involvement of Indian industries towards productionisation of integrated systems/ subsystems, including assembly and testing by vendor as per ISRO's design. Towards this, discussions are being held with the Indian industry towards formulating a plan & strategy to enhance the capacity and capability of managing the Polar Satellite Launch Vehicle (PSLV) programme on an end to end basis. ISRO has involved a consortium of industries for Assembly, Integration and Testing (AIT) of two similar satellites, wherein the sub-systems and infrastructure is being provided by ISRO.

The Government is in the process of formulating a National Space Act for supporting the overall growth of space activities with increased level of private participation.

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

**LOK SABHA
UNSTARRED QUESTION NO.626**

TO BE ANSWERED ON WEDNESDAY, JULY 19, 2017

LAUNCH OF GSAT-17

626. SHRI C. MAHENDRAN:

SHRI R. PARTHIPAN:

Will the PRIME MINISTER be pleased to state:

- (a) whether the Government has successfully launched GSAT-17 communication satellite onboard the Ariane-5 launch vehicle recently;**
- (b) if so, the details thereof;**
- (c) whether the satellite will be an addition to the Indian communication satellites that are already providing services;**
- (d) if so, the details thereof; and**
- (e) whether the satellite will provide meteorological and satellite-based data to help rescue services and 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, Madam.**

- (b) **GSAT-17 communication satellite, with a lift-off mass of 3477 Kg, carrying communication, Data Relay Transponder (DRT), Search & Rescue Payload was successfully launched on June 29, 2017 using Ariane-5 launch vehicle from Kourou launch base of Arianespace.**
- (c) **Yes Madam.**
- (d) **GSAT-17 is presently undergoing in-orbit tests. Subsequently, it will be inducted into the INSAT/GSAT system for providing various communication services to the country in C, Extended-C and S-band.**
- (e) **GSAT-17 carries a Data Relay Transponder for receiving meteorological, hydrological and oceanographic data from Automatic Weather Stations, Automatic Rain Gauges and Agro Met Stations and relaying back for down linking in extended C-Band. It also carries a Search & Rescue Payload, which picks up and relays the alert signals originating from the distress beacons of maritime, aviation and land based users to help in rescue services.**

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

**LOK SABHA
UNSTARRED QUESTION NO.632**

TO BE ANSWERED ON WEDNESDAY, JULY 19, 2017

ACHIEVEMENTS OF ISRO PROGRAMME

632. SHRI RAJU SHETTY:

Will the PRIME MINISTER be pleased to state:

- (a) whether the country's space programme is moving in positive direction;**
- (b) if so, the details of this recent achievements of the programmes in brief;**
- (c) whether any activities are proposed to be taken up shortly based on the experience gained in recent achievements; and**
- (d) 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) & (b)

Yes, Madam. Indian space programme is striving to provide increased space based capability and witnessed significant achievements in recent times. Some of the notable achievements include-

- (i) Operationalisation of GSLV-MkII with home-grown Cryogenic Upper Stage (CUS) with indigenous capability for launching 2-tonne class satellites.**
- (ii) Successful launch of first developmental flight of GSLV-MkIII, which validated new version of Indigenous Cryogenic Engine. With this capability, it will be possible to launch up to 4-tonne class of communication satellites into Geosynchronous Transfer Orbits (GTO).**
- (iii) Realisation of South Asia Satellite to enable South Asian countries to establish SATCOM based services such as Television/DTH, VSAT, e-governance, banking, tele-medicine & tele-education etc., with coverage over South Asia.**
- (iv) Launch of 104 Satellites in a single PSLV (PSLV-C37) mission- Maximum satellites launched in a single launch mission till date.**
- (v) Realisation of 7-satellite NavIC (Navigation - Indian Constellation) to provide Position, Navigation and Timing Services.**
- (vi) Augmentation of Satellite Communication with high-throughput communication satellites.**
- (vii) Successful flight testing of Technology Demonstrators of Re-usable Launch Vehicle (RLV-TD) and Scramjet Air-breathing Engine.**

- (viii) INSAT-3D & 3DR together are providing meteorological data every 15 minutes for enabling weather forecasting. Ocean surface wind vector data from SCATSAT-1 are being used operationally by global user community.**
- (ix) Augmentation of earth observation capability with High Resolution Cartographic and Resource monitoring satellites.**
- (x) Placing a unique multi-wavelength observatory placed in orbit, carrying instruments realised through Indian academic institutes to enhance understanding of universe and astronomical phenomena.**
- (xi) Enabling host of applications using synergy of earth observation, communication and navigation satellites in governance and development.**

(c) & (d)

Based on the experience gained, various activities are planned in the near future, which include:

- (i) Second Developmental flight of GSLV-Mk III with indigenously developed high thrust cryogenic engine and stage in first half of 2018.**
- (ii) Realisation of High throughput Communication 'GSAT-11', carrying Ku & Ka Band communication payloads with multiple spot beams, capable of providing up to 10 Gbps throughput.**

- (iii) Launch of Chandrayaan-2 Mission India's second Lunar mission, Chandrayaan-2 with indigenous Lander, Rover and Orbiter Modules during first half of 2018.**
- (iv) Augmentation of Indigenous navigation services.**
- (v) Launch of high resolution cartographic satellite for large scale mapping applications, which include infrastructure planning, urban & rural development, utility management, natural resources inventory & management, disaster management.**

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

**LOK SABHA
UNSTARRED QUESTION NO.1616**

TO BE ANSWERED ON WEDNESDAY, JULY 26, 2017

NAVIC

1616. SHRI PRAHLAD SINGH PATEL:

Will the PRIME MINISTER be pleased to state:

- (a) whether the Government is considering to offer the service of indigenous GPS to public under Navigation with Indian Constellation (NavIC) Satellites in the country;**
- (b) if so, the details thereof;**
- (c) whether the malfunctioned satellite has been replaced by a new navigation satellite or the malfunctioned satellite gives adverse effect on the launch of indigenous GPS service to the public in the country;**
- (d) if so, the details thereof; and**
- (e) the steps taken/to be taken by the Government in this regard?**

ANSWER

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

(DR. JITENDRA SINGH):

- (a) Indian Space Research Organisation (ISRO) has established the required space segment of the NavIC system for providing signal in space enabling position, navigation and timing information. Indian entrepreneurs are being enabled for**

providing services through NavIC receiver system and requisite information has been made available in public domain.

- (b) The demonstrations for vessel tracking, vehicle tracking, messaging services for fishermen, timing applications have been conducted. Mobile-Apps for navigational alerts across maritime jurisdictions is developed and tested for the Fishermen community using first generation NavIC receivers.
- (c) No, Madam.
- (d) The overall performance of the NavIC system for providing the specified position accuracy is not affected by the on-orbit anomaly in one satellite of the constellation.
- (e) A replacement satellite IRNSS-1H is getting ready for launch in second half of this year.

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

**LOK SABHA
UNSTARRED QUESTION NO.1676**

TO BE ANSWERED ON WEDNESDAY, JULY 26, 2017

ACHIEVEMENTS IN SPACE SECTOR

1676. SHRI BHAIRON PRASAD MISHRA:

Will the PRIME MINISTER be pleased to state:

- (a) the details of the achievements made by the Government in the field of space during the last three years;**
- (b) the rank of our country in the field of space as a result thereof along with the status/position of our country among the world's super powers; and**
- (c) the details of the areas wherein the country is likely to be benefited therefrom?**

ANSWER

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

(DR. JITENDRA SINGH):

- (a) During the last three years (June 2014 to June 2017), Indian Space Research Organisation (ISRO) has successfully accomplished 41 missions, which includes 19 launch vehicle missions, 19 satellite missions and 3 technology demonstrator missions. Some of the notable achievements include-**

- (i) **Operationalisation of GSLV-MkII with home-grown Cryogenic Upper Stage (CUS) with indigenous capability for launching 2-tonne class satellites.**
- (ii) **Successful launch of first developmental flight of GSLV-MkIII, which validated new version of Indigenous Cryogenic Engine. With this capability, it will be possible to launch upto 4-tonne class of communication satellites into Geosynchronous Transfer Orbits (GTO).**
- (iii) **Launch of 14 flights of PSLV, which includes launch of 104 Satellites in a single PSLV (PSLV-C37) mission – Maximum satellites launched in a single launch mission till date.**
- (iv) **Realisation of South Asia Satellite to enable South Asian countries to establish SATCOM based services such as Television/DTH, VSAT, e-governance, banking, tele-medicine & tele-education etc., with coverage over South Asia.**
- (v) **Realisation of 7-satellite NavIC (Navigation – Indian Constellation) to provide Position, Navigation and Timing Services, with five satellites launched during the last three years.**
- (vi) **Augmentation of Satellite Communication capability with 7 more satellites viz. GSAT-6, GSAT-9, GSAT-15, GSAT-16, GSAT-17, GSAT-18 & GSAT-19.**
- (vii) **Successful Technology Demonstration missions viz. Crew Module Atmospheric Re-entry Experiment (CARE),**

Re-usable Launch Vehicle (RLV-TD) and Scramjet Air-breathing Engine.

- (viii) INSAT-3D & 3DR together are providing meteorological data every 15 minutes for enabling weather forecasting. Ocean surface wind vector data from SCATSAT-1 are being used operationally by global user community.**
 - (ix) Augmentation of earth observation capability with 4 satellites viz., 3 High Resolution Cartographic and 1 Resource monitoring satellites.**
 - (x) Placing a unique multi-wavelength observatory 'Astrosat' in orbit, carrying instruments realised through Indian academic institutes to enhance understanding of universe and astronomical phenomena.**
 - (xi) Mars Orbiter Mission (MOM) completed 1000 days in the orbit. Earlier, Mars Orbiter Spacecraft was successfully placed in Martian orbit on September 24, 2014 making India the first country to do so in its first attempt.**
 - (xii) Enabling host of applications using synergy of earth observation, communication and navigation satellites in governance and development.**
- (b) India has created a niche in the field of space science & technology viz. launch services, earth observation, communication & navigation and application of space technology for national development. Today, India stands one among the top six space faring nations in the world.**

- (c) **The areas which are benefitted/ likely to be benefitted with the utilization of space technology and its applications include – resource monitoring, weather forecasting, telecommunication, broadcasting, rural connectivity, health & education, governance, disaster management support, location based services, space commerce including host of societal applications. The space science and planetary missions, viz. Mars Orbiter Mission and ASTROSAT renew the interest of young minds towards space science.**

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

**LOK SABHA
UNSTARRED QUESTION NO.1730**

TO BE ANSWERED ON WEDNESDAY, JULY 26, 2017

WEATHER SATELLITE

1730. SHRI PR. SENTHIL NATHAN:

Will the PRIME MINISTER be pleased to state:

- (a) whether the Government has launched any satellites to specifically predict accurate weather forecast, rainfall, cyclones, depressions, etc. with a view to help common man, farmers and fishermen;**
- (b) if so, the details thereof and if not, the reasons therefor;**
- (c) whether the Government has any plans to launch satellites, specially to provide all useful information for common people, agriculturists, fishermen and rural industries; 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)

At present, India has five operational satellites in the orbit namely, Kalpana-1, INSAT-3D, INSAT-3DR, Megha-tropiques and Scatsat-1 providing data on various weather parameters viz. clouds, outgoing long-wave radiation, atmospheric motion

vector, vertical profiles of temperature & humidity, sea surface temperature, ocean surface winds, radiation budget etc. The meteorological data obtained from INSAT-3D & 3DR every 15 minutes and humidity profile data of SAPHIR on-board Megha-tropiques is being operationally assimilated in the numerical weather models by India Meteorology Department (IMD) for improving weather forecast. The Ocean surface wind vector data from SCATSAT-1 are being also used operationally for prediction of cyclone track, its intensity & landfall with improved accuracy.

(c) & (d)

There are 13 satellites providing earth observation data and 5 satellites providing weather data. Utilizing these datasets, IMD provides satellite-enabled services to agriculturists in India, which include weather information, agro-advisory, agromet services to support farming operations in the country. The fishing sector is being supported through advisories on Potential Fishing Zones and the ocean state forecast generated by Indian National Centre for Ocean Information Services (INCOIS). Data continuity for these services will be ensured by launching replacement satellites as and when need arises.

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

**LOK SABHA
UNSTARRED QUESTION NO.1781**

TO BE ANSWERED ON WEDNESDAY, JULY 26, 2017

CARTOSAT-2 SATELLITE

1781. SHRI MANOJ TIWARI:

Will the PRIME MINISTER be pleased to state:

- (a) whether space satellite Cartosat-2 is capable of helping Indian Agency in identifying terrorist hide-outs;**
- (b) if so, the details thereof;**
- (c) whether the Government is contemplating to station its own satellite in orbit;**
- (d) if so, the details thereof; and**
- (e) 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) & (b)

Cartosat-2 series satellite is a high resolution imaging satellite placed in a sun synchronous orbit to provide high resolution images of earth's surface at sub-meter resolution (Black & White image) and at 2 meter resolution colored image (4 bands). The images obtained from these satellites are useful in

identifying activities in remote areas, change detection analysis and variety of applications requiring high resolution images, including strategic applications.

(c), (d) & (e)

Indian Space Research Organisation (ISRO) has already stationed five high resolution satellites in orbit.

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

**LOK SABHA
UNSTARRED QUESTION NO.1793**

TO BE ANSWERED ON WEDNESDAY, JULY 26, 2017

ASTROSAT MISSION

1793. SHRI DHARAM VIRA:

Will the PRIME MINISTER be pleased to state:

- (a) whether the Astrosat mission launched in 2015 by the Indian Space Research Organisation (ISRO) is on track to complete its intended objectives by the end of its five year lifespan;**
- (b) if so, the details thereof; and**
- (c) whether there are any plans to launch a similar satellite after 2020 and if so, the details thereof and the likely cost of the project?**

ANSWER

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

(DR. JITENDRA SINGH):

- (a) Yes, Madam. The AstroSat (launched on 28th September 2015) is a unique multi-wavelength observatory in space, carrying instruments realised through Indian academic institutes, to enhance understanding of universe and astronomical phenomena.**
- (b) The satellite has completed 22 months in orbit. All the payloads are operational and are observing the celestial sources in Ultra-Violet, Optical and X-ray wavelength bands.**

As intended, AstroSat is operating as an observatory, in which the observing time is utilised by Indian astronomy community. Till now, AstroSat has observed 360 celestial sources. 48 research papers have been published in journals and a special section on AstroSat is published in the June issue of Journal of Astrophysics and Astronomy (JAA). Through an Announcement of Opportunity (AO), 35% time of the observatory is provided to Indian researchers from October 2016 and 10% time is to be provided to international researchers from October 2017.

- (c) At present, the plans for a similar astronomy satellite is in the study phase.**

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

**LOK SABHA
UNSTARRED QUESTION NO.1801**

TO BE ANSWERED ON WEDNESDAY, JULY 26, 2017

ALERT SYSTEM AT UNMANNED LEVEL CROSSINGS

1801. SHRI JITENDRA CHAUDHURY:

Will the PRIME MINISTER be pleased to state:

- (a) whether ISRO has made a system to alert users at unmanned level crossings;**
- (b) if so, the details thereof including the manner in which it works; and**
- (c) the number of States which have already implemented this system?**

ANSWER

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

(DR. JITENDRA SINGH):

(a) & (b)

ISRO has demonstrated a satellite based solution for unmanned level crossings (UMLCs) using navigation and communication technologies to avoid accidents. By automatic triggering, the system provides alerts by blowing hooter in the locomotive as well as audio-visual warning at the level crossing about the approaching train. The concept has been successfully demonstrated and the field trials with railways are in progress.

(c) Indian Railways is expected to implement operational system after the completion of field trials.

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

**LOK SABHA
UNSTARRED QUESTION NO.1824**

TO BE ANSWERED ON WEDNESDAY, JULY 26, 2017

INDIGENOUS SATELLITES

1824. SHRI KAPIL MORESHWAR PATIL:

SHRI RAOSAHEB DANVE PATIL:

Will the PRIME MINISTER be pleased to state:

- (a) the details of satellites being operated by the country at present;**
- (b) whether the Government is seeking foreign aid/cooperation for operating these satellites and if so, the amount of fund spent for operation of foreign satellites each year;**
- (c) the extent to which indigenous satellites are being used; and**
- (d) the modalities worked out by the Government for developing indigenous satellites in the country?**

ANSWER

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

(DR. JITENDRA SINGH):

- (a) At present, there are 42 Indian satellites operational in orbit comprising of:**
 - i. Fifteen Communication Satellites namely, INSAT-4A, 4B & 4CR, GSAT-6, 7, 8, 9, 10, 12, 14, 15, 16, 17, 18 & 19.**

- ii. **Fourteen Earth Observation Satellites namely, Resourcesat-1, 2 & 2A, RISAT-2, Cartosat-1, Cartosat-2, Cartosat-2 Series (5 Nos.), Oceansat-2, SARAL & SCATSAT-1.**
 - iii. **Four Meteorological Satellites namely, Kalpana-1, INSAT-3D & 3DR and Megha-Tropiques.**
 - iv. **Seven Navigational Satellites namely, IRNSS-1A, 1B, 1C, 1D, 1E, 1F & 1G.**
 - v. **Two Space Science Satellites namely, Mars Orbiter Mission & Astrosat.**
- (b) **No, Madam. Government is not seeking any foreign aid/cooperation for operating these satellites. Indian Space Research Organisation (ISRO) is not operating any foreign satellites.**
- (c) **The currently operational indigenous satellites are being utilised to support various applications and services in the area of resource monitoring, weather forecasting, telecommunication, broadcasting, disaster management, location based services, including host of societal applications.**
- (d) **ISRO has been developing satellites indigenously since 1975. Except the first generation INSAT satellites, all communication satellites have been built indigenously. All the earth observation, meteorological, navigation and space science satellites have been developed indigenously by ISRO.**

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

**LOK SABHA
UNSTARRED QUESTION NO.2783**

TO BE ANSWERED ON WEDNESDAY, AUGUST 02, 2017

CHANDRAYAAN - I

2783. ADV. M. UDHAYAKUMAR:

Will the PRIME MINISTER be pleased to state:

- (a) whether India's first lunar probe, Chandrayaan-I which was considered lost, is still orbiting the moon and if so, the details thereof;**
- (b) whether NASA scientists have found it by using a new ground based radar technique and if so, the details thereof;**
- (c) whether ISRO lost communication with Chandrayaan-I almost a year after it was launched and if so, the details thereof;**
- (d) whether the new findings by NASA will help ISRO in establishing contact with Chandrayaan-I; 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) & (b)

Yes, Madam. India's first lunar mission, Chandrayaan-I is still orbiting the moon around 160 km orbit. Since the communication

with Chandrayaan-I was lost in August 2009, the spacecraft could not be used thereafter, though it is still orbiting the Moon.

On March 10, 2017, NASA's Jet Propulsion Laboratory (JPL) located an object orbiting the Moon around 160 km by virtue of a new technological application of interplanetary radar. Through the trajectory generation software, ISRO has confirmed that the object is Chandrayaan-I, which is still in orbit and its altitude varies between 150-270 km over every two years.

(c) Yes, Madam. Chandrayaan-1 was launched on October 22, 2008 and inserted in to the lunar orbit on November 08, 2008. The scientific instruments on-board studied the Moon from different perspectives and generated excellent data for research. On August 29, 2009, the mission was concluded as the communication with the spacecraft was lost and it could no longer be used.

(d) & (e)

No, Madam. While the Chandrayaan-I is still orbiting the Moon, it is not possible to establish contact with it since the communication is lost.

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

**LOK SABHA
UNSTARRED QUESTION NO.2935**

TO BE ANSWERED ON WEDNESDAY, AUGUST 02, 2017

OPERATIONAL SATELLITES

2935. SHRI MANSHANKAR NINAMA:

Will the PRIME MINISTER be pleased to state:

- (a) whether the satellites which are currently operational are fulfilling only half of the requirements of the country;**
- (b) if so, the details thereof;**
- (c) whether it has been affecting our capacity to resolve issues relating to governance and if so, the details thereof;**
- (d) the number of satellites which are currently operational along with the number of satellites which are under construction; and**
- (e) the steps being taken by the Government for building more and more satellites and to accelerate their use?**

ANSWER

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

(DR. JITENDRA SINGH):

(a) & (b)

The currently operational 42 satellites are being utilised to meet the requirements of resources monitoring, infrastructure planning, enabling weather forecasting, disaster management support, location based services, host of societal applications, including the demands of satellite

communication. To ensure continuity of services and to meet further requirements in these areas, a plan is in place to suitably augment the space infrastructure.

- (c) **Satellite based data and services are being used by various Ministries/Departments in planning, monitoring and evaluation of developmental activities in various sectors, which include agriculture, forestry & environment, water resources, urban & rural planning, asset mapping, mineral prospecting, ocean resources, meteorology, satellite communication, location based services, tele-education, tele-medicine and disaster management support.**
- (d) **At present, there are 42 operational satellites in orbit comprising of 18 Earth observation (including meteorological), 15 communication, 7 navigational and 2 Space Science satellites. 26 satellites are currently under various stages of realisation.**
- (e) **In order to step up the building of satellites, ISRO is involving a consortium of industries for Assembly, Integration and Testing (AIT) of satellites, wherein the sub-systems and infrastructure is being provided by ISRO. The AIT of a navigation satellite is in progress and the satellite is getting ready for launch in second half of this year.**

In order to accelerate the use of satellites and its services, an outreach facility has been established in Hyderabad to cater to the requirements of capacity building in space-based applications. This facility caters to several activities like training, Information Kiosks, content generation, outsourcing and mass communication. The facility comprises of large number of thin client systems providing access to satellite data and various software tools for building applications for various developmental activities.

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

**LOK SABHA
UNSTARRED QUESTION NO.3730**

TO BE ANSWERED ON WEDNESDAY, AUGUST 09, 2017

ELECTRICAL PROPULSION

3730. SHRI JAYADEV GALLA:

Will the PRIME MINISTER be pleased to state:

- (a) whether Indian Space Research Organisation (ISRO) is gearing up to incorporate electrical propulsion as an alternative to the use of chemical propellants;**
- (b) if so, the details thereof and how electrical propulsion is more useful than chemical propellants; and**
- (c) the time by which India will be capable of launching heavy satellites of 5-6 tonnes which ISRO are currently launching from European Space Agency's Arienne Rocket?**

ANSWER

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

(DR. JITENDRA SINGH):

- (a) Yes, Madam.**
- (b) Launch vehicles inject the communication satellites into an elliptical Geosynchronous Transfer Orbit (GTO). The orbit of the satellite is then raised from GTO to a higher circular orbit by imparting necessary increase in velocity using the satellite**

propulsion system. Presently, ISRO satellites employ Chemical Propulsion System (CPS) for the orbit raising operation. Electric Propulsion System can perform the same operation by making use of solar power and ion thrusters. The amount of propellant required to carry out such operation is much lower than the propellant required for chemical propulsion. This results in significant reduction in the lift-off mass of the satellite. However, the time required for orbit raising using electric propulsion system is much longer compared to the chemical propulsion system.

- (c) The capability to launch heavy satellites of 5-6 tonnes to the Geosynchronous Transfer Orbit (GTO) will be achieved after the development and qualification of the Semi-cryogenic engine & stage are successfully completed. The Semi-cryogenic engine is under development and the first Semi-cryogenic engine hardware is expected to be qualified by 2019. The Semi-cryogenic stage using this engine is expected to be qualified for flight use by 2021.**

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

**LOK SABHA
UNSTARRED QUESTION NO.3894**

TO BE ANSWERED ON WEDNESDAY, AUGUST 09, 2017

DEVELOPMENT OF LAUNCHING CAPACITY

3894. SHRI MANSHANKAR NINAMA:

Will the PRIME MINISTER be pleased to state:

- (a) the amount allocated to the Indian Space Research Organisation (ISRO) particularly for developing capacity for launching of satellites;**
- (b) whether any revenue has been earned by ISRO by launching satellites of other countries and if so, the details thereof;**
- (c) whether the Government is contemplating to encourage ISRO as Commercial Satellites Launch Enterprise so that it could be self-reliant and if so, the details thereof;**
- (d) whether the Government has formulated any policy to seek co-operation of foreign countries to develop capacity for launching satellites; 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) Based on the approved outlay of ₹8658.74 Crores, activities towards three launch vehicles viz. Polar Satellite Launch**

Vehicle (PSLV), Geosynchronous Satellite Launch Vehicle (GSLV) and Geosynchronous Satellite Launch Vehicle-Mark III (GSLV Mk-III) are in progress. Out of 31 launch vehicles (15 PSLV, 13 GSLV and 3 GSLV Mk-III) to be realised under this outlay, 10 launch vehicles (3 PSLV, 5 GSLV and 2 GSLV Mk-III) have been completed till date and work is in progress for the remaining vehicles.

- (b) As on date, Antrix Corporation Limited (Antrix), a Government of India company under Department of Space and the commercial arm of Indian Space Research Organisation (ISRO), has earned a revenue of 21 Million USD and 146 Million Euros in Foreign Exchange, through launching of 209 foreign satellites from 29 countries. These foreign satellites have been launched under a commercial arrangement between Antrix and the foreign customers.**
- (c) Primarily, ISRO's launch vehicles are being used for launching national satellites towards meeting the earth observation, communication, navigation and scientific needs of the country. The excess capacity available has been utilised for launching satellites of other countries by Antrix on a commercial basis. Towards stepping up the launch capacity, ISRO is making efforts to increase participation of Indian Industries for realisation of hardware for launch vehicles.**
- (d) No, Madam.**
- (e) Does not arise.**

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA
STARRED QUESTION NO. 60

TO BE ANSWERED ON THURSDAY, JULY 20, 2017

IMPORT OF SOPHISTICATED TIMEKEEPERS FOR SATELLITES

*60. SHRI SANJAY SETH :

Will the PRIME MINISTER be pleased to state:

- (a) whether the Indian Space Research Organisation (ISRO) had imported twenty seven sophisticated timekeepers for the nine satellites of the Indian Regional Navigation Satellite System;
- (b) If so, the details thereof;
- (c) whether three atomic clocks of one of the seven satellites of the country's newly operational navigation satellite system also called desi GPS have stopped working;
- (d) if so, the details thereof and the reasons therefor;
- (e) whether this has affected the overall performance of our navigation system; and
- (f) if so, the steps taken by Government to overcome this problem?

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.

STATEMENT LAID ON THE TABLE OF THE RAJYA SABHA IN REPLY TO STARRED QUESTION NO.60 REGARDING "IMPORT OF SOPHISTICATED TIMEKEEPERS FOR SATELLITES" ASKED BY SHRI SANJAY SETH FOR ANSWER ON THURSDAY, JULY 20, 2017.

- (a) Yes, Sir.
- (b) Twenty seven numbers of Rubidium Atomic Frequency Standard (RAFS) for use in Indian Navigation satellite are procured by ISRO from a supplier in Germany.
- (c) Yes, Sir.
- (d) Three RAFS of the IRNSS-1A have shown anomalous performance and have been switched off. The Department is going through the process of identifying the cause of the anomaly.
- (e) & (f) NavIC constellation continues to provide the requisite performance. As part of the initial project plan, two spare satellites were planned to deal with any contingency. A replacement satellite IRNSS-1H is getting ready for launch in 2nd half of this year.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA
UNSTARRED QUESTION NO. 624

TO BE ANSWERED ON THURSDAY, JULY 20, 2017

INDIAN SATELLITES IN OUTER SPACE

624. SHRI C.P. NARAYANAN:

Will the PRIME MINISTER be pleased to state:

- (a) how many satellites of India are there in outer space at present;
- (b) how many of them are used for communication and how many are used for other purposes like collection of various data;
- (c) what is the annual income earned from them; and
- (d) whether our expenses to produce and put them in space are less than those of other countries?

ANSWER

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

(DR. JITENDRA SINGH):

- (a) At present, there are 42 Indian satellites operational in orbit.
- (b) Out of these 42 satellites, 15 satellites are used for communication, 4 for meteorological observations, 14 for earth observations, 7 for navigation and 2 for space science purposes.
- (c) During FY 2016-17, the total revenue accrued from communication satellites through leasing of INSAT/ GSAT transponders is ₹ 746.68 Crore. With respect to earth observation satellites, the annual income from sale of remote sensing satellite data is ₹ 25.17 Crores.
The data and value added services derived from earth observation, meteorological, communication & navigation satellites are used to support various applications viz. resource monitoring, weather forecasting, disaster management, location based services, including societal applications.
- (d) Yes, Sir. The expenses to realize and launching of these satellites are less than those of other countries.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA
UNSTARRED QUESTION NO. 1429

TO BE ANSWERED ON THURSDAY, JULY 27, 2017

NEW SATELLITE LAUNCH PADS

1429. SHRIMATI KANIMOZHI:

Will the PRIME MINISTER be pleased to state:

- (a) whether Government is considering to build new satellite launch pads in the country;
- (b) whether the Kulasekarapattinam has been proposed by Government to be ideal location for being a launch pad and if so, the steps taken/proposed to be taken by Government to build a new satellite launch pad; 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), (b) & (c) The Indian satellite launching station located at Satish Dhawan Space Centre, Sriharikota has two launch pads - the First Launch Pad (FLP) and the Second Launch Pad (SLP). A Second Vehicle Assembly Building (SVAB) is being established at the Second Launch Pad to overcome the limitation in the number of vehicles that can be assembled and integrated in a year, which is expected to be ready by the beginning of next year. In addition to enabling a significant increase in the launch frequency from the existing two launch pads, the SVAB can also cater to the requirements of a third launch pad at Sriharikota in future.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

**RAJYA SABHA
UNSTARRED QUESTION NO. 1430**

TO BE ANSWERED ON THURSDAY, JULY 27, 2017

UPDATES ON MARS ORBITER SPACECRAFT

1430. SHRI SAMBHAJI CHHATRAPATI:

Will the PRIME MINISTER be pleased to state:

- (a) whether the Mars Orbiter Spacecraft which had entered into Mars orbit on September 24, 2014 is performing as per the expectations;
- (b) whether Indian Space Research Organisation (ISRO) scientists have started interpretation of data and photographs being transmitted by the Spacecraft; and
- (c) if so, the highlights of the observations drawn by space scientists?

ANSWER

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

(DR. JITENDRA SINGH):

- (a) Yes, Sir. Mars Orbiter Mission has successfully completed 1000 days in its orbit on June 19, 2017, surviving well beyond its designed mission life of six months. All Scientific payloads continue to provide valuable data of Mars surface and its atmosphere.
- (b) Yes, Sir.
- (c) Mars Colour Camera on-board MOM has acquired more than 700 images of Martian surface. MOM atlas is published and updates on MOM images are regularly provided in ISRO website. The observations drawn by scientists have been published in 20 scientific papers in peer reviewed journals. The archived scientific data has been released to public for free download and scientific research. About 1380 registered users have downloaded more than 370 GB of data.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA
UNSTARRED QUESTION NO.2092

TO BE ANSWERED ON THURSDAY, AUGUST 03, 2017

DESI GLOBAL POSITIONING SYSTEM

2092. SHRI SANJAY SETH:

Will the PRIME MINISTER be pleased to state:

- (a) whether Government has developed its very own desi Global Positioning System (GPS);
- (b) if so, the details thereof;
- (c) the cost of developing this system;
- (d) whether Government has evolved any strategy to popularise the desi navigation system as American GPS dominates the navigation system market across the world;
- (e) if so, the details thereof; and
- (f) the time by which this GPS would be made operational and set to hit the market?

ANSWER

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

(DR. JITENDRA SINGH):

- (a) & (b) Indian Space Research Organisation (ISRO) has deployed an indigenous regional positioning system named as "Navigation with Indian Constellation" (NavIC). It consists of seven satellites in a constellation to provide Position, Navigation and Timing (PNT) services in Indian mainland and surrounding region up to 1500 Km. It provides two types of services viz. Standard Positioning Service (SPS) and Restricted Service (RS).
- (c) A budget of ₹ 1420 Crore has been approved by the Government for the realisation of the system including 7 in-orbit satellites, 2 satellites as ground spare and associated ground segment.

- (d) & (e) ISRO has established the required space segment of the NavIC system for providing signal in space enabling position, navigation and timing information and it can support commercial civil applications. Indian entrepreneurs are being enabled for providing services through NavIC receiver system and requisite information has been made available in public domain. The demonstrations for vessel tracking, vehicle tracking, messaging services for fishermen, timing applications have been conducted. Mobile-Apps for navigational alerts across maritime jurisdictions is developed and tested for the Fishermen community using first generation NavIC receivers. Various types of user receivers are being developed indigenously involving Indian industry and discussions amongst government departments, user-receiver manufacturers, system integrators and service providers are taking place for the usage of NavIC system.
- (f) While the space and ground segment of the NavIC system has been established and demonstrations of various applications/ services have been conducted, the time required for it to become fully operational depends on the service providers making the services available in the market. It may take couple of years to become fully operational in the market.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA
UNSTARRED QUESTION NO.2222

TO BE ANSWERED ON THURSDAY, AUGUST 03, 2017

STATUS OF CHANDRAYAAN PROGRAMME

2222. SHRI PRASANNA ACHARYA:

Will the PRIME MINISTER be pleased to state:

- (a) what is the present position of Chandrayaan programme launched earlier;
- (b) what is the motto of this programme and what is the total expenditure incurred/ to be incurred on this programme; and
- (c) what is the outcome of this programme, so far and whether it has achieved the purpose for which it was launched?

ANSWER

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

(DR. JITENDRA SINGH):

- (a) India's first lunar mission, Chandrayaan-I was launched on October 22, 2008 and inserted successfully in to the lunar orbit on November 08, 2008. The on-board scientific instruments studied the Moon from different perspectives and generated good data for research. The Spacecraft completed 312 days in orbit and made more than 3400 orbits around the Moon. The mission ended on August 29, 2009, as the communication with the spacecraft was lost. Though Chandrayaan-I is still orbiting the Moon, it can no longer be used as there is no communication with the spacecraft.
- (b) The objectives of Chandrayaan-I mission include: (i) development & execution of Chandrayaan-I mission; (ii) precise mission planning & lunar orbit insertion; (iii) evolution & validation of several new technologies; (iv) dropping of Moon Impact Probe (MIP) on the Moon; (v) high resolution imaging, chemical & mineralogical mapping of Moon; (vi) systematic topographic mapping of both near and far side of the moon. The total expenditure incurred on this mission is ₹386.00 crore.

- (c) One of the scientific payloads has discovered the presence of hydroxyl and water molecules on the lunar surface. The MIP impacted on the Moon on November 14, 2008. The science data obtained from Chandrayaan-I has led to more than 160 publications, of which 154 are in Peer reviewed journals. The Chandrayaan-I strengthened international cooperation through accommodation of 6 payloads from different countries. It has renewed interest of younger generation in space science and enhanced India's prestige amongst the world scientific community.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA
UNSTARRED QUESTION NO.2223

TO BE ANSWERED ON THURSDAY, AUGUST 03, 2017

JOINT PROJECT BETWEEN NASA AND ISRO

2223. SHRI K. C. RAMAMURTHY:

Will the PRIME MINISTER be pleased to state:

- (a) whether a joint project between the National Aeronautics and Space Administration (NASA) and Indian Space Research Organisation (ISRO) named NASA-ISRO Synthetic Aperture Radar (NISAR) is on track to be launched by the year 2021;
- (b) if so, the details of partnership along with its total cost and future plan of action;
- (c) to what extent this partnership is expected to benefit ISRO: and
- (d) whether there is any proposal to renew this partnership after 2021 for future joint missions?

ANSWER

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

(DR. JITENDRA SINGH):

- (a) Yes, Sir. ISRO and NASA are working towards realisation of NASA-ISRO Synthetic Aperture Radar (NISAR) mission by 2021.
- (b) In NISAR mission, NASA is responsible for development of L-band SAR and ISRO is responsible for development of S-band SAR. The L & S band SAR will be integrated with ISRO's spacecraft and launched on-board India's GSLV. The total cost of the project includes ISRO's work share cost of about ₹ 788.00 Cr and the cost of JPL's work share of about USD 808 million. After the launch in 2021, the plan of action includes (i) calibration of instruments & validation of data products; (ii) development of science acquisition plan; (iii) development of data processing procedures & applications; and (iv) conduct of outreach activities in research institutes & academia.

- (c) NISAR employs a futuristic SweepSAR technique, which enables very wide swath of more than 200 km and very high resolution of the order of 5-10m. The L & S band microwave data obtained from this satellite will be useful for variety of application, which include estimating agricultural biomass over full duration of crop cycle; assessing soil moisture; monitoring of floods & oil slicks; coastal erosion, coastline changes; assessment of mangroves; surface deformation studies, ice sheet dynamics etc.
- (d) ISRO and NASA have a framework agreement for cooperation in the exploration and use of outer space for peaceful purposes signed in 2008. Under this framework agreement, ISRO and NASA have executed an implementing arrangement for cooperation in NISAR mission, which is valid until 2034 and provides scope for joint activities on science & applications of NISAR data after the launch.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA
UNSTARRED QUESTION NO. 2855

TO BE ANSWERED ON THURSDAY, AUGUST 10, 2017

VENUS MISSION OF ISRO

2855. SHRI N.GOKULAKRISHNAN:

SHRI T. RATHINAVEL:

Will the PRIME MINISTER be pleased to state:

- (a) whether it is a fact that Venus mission is still a distant dream for the Indian Space Research Organisation (ISRO), if so, the details thereof;
- (b) whether it is also a fact that the launch would require around ₹ 9,000 crore; and
- (c) whether initially ten lakh rupees only have been sanctioned for the project, and if so, 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) & (b) The study team has submitted its inputs addressing various options and opportunities for Venus mission. The study team's inputs will be reviewed by Advisory Committee for Space Sciences (ADCOS) for further considerations. Meanwhile, the call for scientific proposals, through an Announcement of Opportunity (AO) to conduct space based experiments has been made to Indian scientists. After completion of selection process of proposals, definition of mission including budget will be worked out.
- (c) Yes, Sir. Ten lakh rupees has been sanctioned for the project.
