



**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE**

"SPACE IN PARLIAMENT"



**WINTER SESSION OF PARLIAMENT 2015
(NOVEMBER-DECEMBER 2015)**

**COMPILATION OF REPLIES GIVEN IN
PARLIAMENT DURING 2015**

**Government of India
Department of Space**

PARLIAMENT QUESTIONS – WINTER SESSION OF PARLIAMENT 2015

INDEX

Sl. No.	LS/RS	Question No.	Date	Subject	Page No.
1	LS	S42	2.12.2015	FLOOD EARLY WARNING SYSTEM	1-3
2	LS	S57	2.12.2015	INDIGENOUSLY DEVELOPED SATELLITES	4-10
3	LS	U504	2.12.2015	ALLOCATION OF FUNDS FOR SPACE PROGRAMME	11
4	LS	U519	2.12.2015	LAUNCH OF SATELLITES	12-13
5	LS	U633	2.12.2015	LAUNCH OF ASTROSAT	14-15
6	LS	U655	2.12.2015	INDIAN SPACE PROGRAMME	16-18
7	LS	U662	2.12.2015	SATELLITE NAVIGATION SYSTEM	19-20
8	LS	U671	2.12.2015	GAGAN	21
9	LS	U681	2.12.2015	LAUNCH OF AMERICAN SATELLITES	22-24
10	LS	U1723	9.12.2015	DEVELOPMENT IN SPACE TECHNOLOGY	25-27
11	LS	U1742	9.12.2015	ASTROSAT	28-29
12	LS	U1762	9.12.2015	SATELLITES FOR AGRI PURPOSE	30-31
13	LS	U1784	9.12.2015	SPACE TOURISM	32
14	LS	S243	16.12.2015	LAUNCH OF SATELLITES	33-35
15	LS	U2766	16.12.2015	NATIONAL SPACE LAW	36-37
16	LS	U2866	16.12.2015	LAUNCH OF FOREIGN SATELLITES	38-39
17	LS	U2903	16.12.2015	INVESTMENTS UNDER MAKE IN INDIA	40-41
18	LS	U2983	16.12.2015	SPACE COOPERATION	42
19	LS	S350	23.12.2015	DISASTER MANAGEMENT BY ISRO	43-45
20	LS	U3920	23.12.2015	LAUNCH OF GSAT	46-47
21	LS	U3997	23.12.2015	LAUNCH OF GSLV	48-49
22	LS	U4002	23.12.2015	ATTRITION OF SCIENTISTS FROM ISRO	50-52
23	LS	U4131	23.12.2015	NATIONAL URBAN INFORMATION SYSTEM	53-56

Sl. No.	LS/RS	Question No.	Date	Subject	Page No.
24	RS	U604	3.12.2015	FUNDS FOR SPACE PROJECTS	57-58
25	RS	U1399	10.12.2015	MAKING OF INDIAN REGIONAL SATELLITE NAVIGATION SYSTEM GLOBAL	59
26	RS	U1400	10.12.2015	ISRO PERFORMING POST LAUNCH ORBIT RAISING MANOEUVRES	60
27	RS	U1401	10.12.2015	FUNDS FOR SHAR AND ISRO	61-63
28	RS	U2205	17.12.2015	SHORTAGE OF SCIENTISTS IN ISRO	64-65

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

LOK SABHA
STARRED QUESTION NO. 42

TO BE ANSWERED ON WEDNESDAY, DECEMBER 02, 2015

FLOOD EARLY WARNING SYSTEM

*42. SHRIMATI POONAM MAHAJAN:

Will the PRIME MINISTER be pleased to state:

- (a) whether the Indian Space Research Organisation (ISRO) has developed Flood Early Warning System (FLEWS) and if so, the details thereof;
- (b) whether FLEWS has the ability to forecast heavy rains twenty four hours in advance and if so, the details thereof;
- (c) whether warning system for snow melting and glacier lake bursts has been incorporated in FLEWS and if so, the details thereof;
- (d) the details of areas where FLEWS has been deployed, State-wise; and
- (e) the steps being taken by the Government to further improve the capability of the Flood Early Warning Systems?

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. 42 REGARDING "FLOOD EARLY WARNING SYSTEM" ASKED BY SHRIMATI POONAM MAHAJAN FOR ANSWER ON WEDNESDAY DECEMBER 02, 2015.

- (a) Yes Madam. The North Eastern Space Applications Centre (NESAC) of DOS/ISRO has developed the Flood Early Warning System (FLEWS) as a Research & Development (R&D) project in Assam State in association with Assam State Disaster Management Authority (ASDMA). FLEWS is a terrain-specific model, which employs satellite based inputs, in-situ data on rainfall and river discharge data at critical locations to provide advance information on flood events as an input to disaster preparedness.
- (b) No Madam. Presently, FLEWS model is not providing heavy rainfall forecast. However, heavy rainfall forecast, on an experimental basis, is being provided by Space Applications Centre, Ahmedabad and hosted on its MOSDAC website.
- (c) No Madam. Snow melting and glacier lakes bursts have not been incorporated in FLEWS model as it is developed only for the state of Assam. However, the impact of snow melt runoff is incorporated in the model through in-situ observations of river discharge.
- (d) As R&D project, the FLEWS model is being used in all the flood prone districts of Assam State (25 districts), except two hill districts of North Cachar and Karbi Anglong. Further, the flood forecasting methodology developed by National Remote Sensing Centre (NRSC) of ISRO for the Godavari floodplains is transferred to Central Water Commission (CWC), Hyderabad.

- (e) The Central Water Commission, Ministry of Water Resources is mandated for flood forecasts in India. ISRO undertakes studies to develop methodology for flood forecasting using space based and in-situ observations, as Research & Development. Also, ISRO provides capacity building with regard to spatial flood inundation modeling.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

LOK SABHA
STARRED QUESTION NO. 57

TO BE ANSWERED ON WEDNESDAY, DECEMBER 02, 2015

INDIGENOUSLY DEVELOPED SATELLITES

*57. SHRI RAOSAHEB DANVE PATIL:

Will the PRIME MINISTER be pleased to state:

- (a) the details of the indigenously manufactured satellites currently placed successfully in the space orbit and the number thereof which got destroyed before being placed in the orbit;
- (b) whether the information from these satellites is being used by other countries for their benefits without the knowledge of the Government of India and if so, the details thereof;
- (c) the number of satellites launched by the Government with the support from other countries so far, the cost incurred thereon and the extant status thereof; and
- (d) whether certain countries have expressed their desire to utilise services of Indian launching stations to place their satellites 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) to (d) 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. 57 REGARDING "INDIGENOUSLY DEVELOPED SATELLITES" ASKED BY SHRI RAOSAHEB DANVE PATIL FOR ANSWER ON WEDNESDAY DECEMBER 02, 2015.

- (a) As on date, 63 indigenously built satellites have been successfully placed in the space orbit. In addition, ISRO has successfully placed 4 satellites built by students of Indian Universities. The details are attached in the Annexure-1. Seven Satellites namely Rohini Technology Payload, SROSS-1, SROSS-2, IRS-1E, INSAT-4C, GSAT-4 and GSAT-5P did not reach orbit due to failure of launch vehicle.
- (b) No Madam.
- (c) As on date, 28 satellites have been launched with the support from other countries. The details are attached in Annexure -2.
- (d) Yes Madam. While 51 foreign satellites from 20 countries have been successfully launched into orbit using ISRO's Polar Satellite Launch Vehicle under a commercial arrangement with Antrix Corporation Limited (Antrix), agreements have been signed for launching 25 more foreign satellites from 7 countries viz. Algeria, Canada, Germany, Indonesia, Japan, Singapore and USA. The launches of these foreign satellites are envisaged during 2015-2017 time period. The details are attached in Annexure-3.

Indigenously built satellites successfully placed in space orbit (As on November 2015)			
SN	Satellite	Launch Date	Purpose of Satellite
1.	Aryabhata	19-04-1975	Experimental Space Science
2.	Bhaskara-1	07-06-1979	Earth Observations
3.	Rohini RS-1	18-07-1980	Experimental
4.	Rohini RS-D1	31-05-1981	Experimental
5.	APPLE	19-06-1981	Experimental Communication
6.	Bhaskara-2	20-11-1981	Earth Observations
7.	Rohini RS-D2	17-04-1983	Earth Observations
8.	IRS-1A	17-03-1988	Earth Observations
9.	IRS-1B	29-08-1991	Earth Observations
10.	SROSS-C	20-05-1992	Scientific Experiments
11.	INSAT-2A	10-07-1992	Communication
12.	INSAT-2B	23-07-1993	Communication
13.	SROSS-C2	04-05-1994	Scientific Experiments
14.	IRS-P2	15-10-1994	Earth Observations
15.	INSAT-2C	07-12-1995	Communication
16.	IRS-1C	28-12-1995	Earth Observations
17.	IRS-P3	21-03-1996	Earth Observations
18.	INSAT-2D	04-06-1997	Communication
19.	IRS-1D	29-09-1997	Earth Observations
20.	INSAT-2E	03-04-1999	Communication
21.	OCEANSAT-1	26-05-1999	Ocean Observations
22.	INSAT-3B	22-03-2000	Communication
23.	GSAT-1	18-04-2001	Communication
24.	TES	22-10-2001	Technology Experiments
25.	INSAT-3C	24-01-2002	Communication
26.	KALPANA-1	12-09-2002	Weather

Indigenously built satellites successfully placed in space orbit (As on November 2015)			
SN	Satellite	Launch Date	Purpose of Satellite
27.	INSAT-3A	10-04-2003	Communication and Weather
28.	GSAT-2	08-05-2003	Communication
29.	INSAT-3E	28-09-2003	Communication
30.	Resourcesat-1	17-10-2003	Earth Observations
31.	GSAT-3 (EDUSAT)	20-09-2004	Communication
32.	CARTOSAT-1	05-05-2005	Earth Observations
33.	HAMSAT	05-05-2005	Communication
34.	INSAT-4A	22-12-2005	Communication
35.	CARTOSAT-2	10-01-2007	Earth Observations
36.	SRE-1	10-01-2007	Space Capsule Recovery Experiment
37.	INSAT-4B	12-03-2007	Communication
38.	INSAT-4CR	02-09-2007	Communication
39.	CARTOSAT-2A	28-04-2008	Earth Observations
40.	IMS-1	28-04-2008	Earth Observations
41.	Chandrayaan-1	22-10-2008	Space Science
42.	OCEANSAT-2	23-09-2009	Ocean Observations
43.	CARTOSAT-2B	12-07-2010	Earth Observations
44.	RESOURCESAT-2	20-04-2011	Earth Observations
45.	YOUTHSAT	20-04-2011	Space Science
46.	GSAT-8	21-05-2011	Communication & Navigation
47.	GSAT-12	15-07-2011	Communication
48.	Megha Tropiques	12-10-2011	Weather & Climate
49.	RISAT-1	26-04-2012	Earth Observations
50.	GSAT-10	29-09-2012	Communication & Navigation
51.	SARAL	25-02-2013	Ocean Observations

Indigenously built satellites successfully placed in space orbit (As on November 2015)			
SN	Satellite	Launch Date	Purpose of Satellite
52.	IRNSS-1A	01-07-2013	Navigation
53.	INSAT-3D	26-07-2013	Weather & Climate
54.	GSAT-7	30-08-2013	Communication
55.	Mars Orbiter Spacecraft	05-11-2013	Planetary Exploration
56.	GSAT-14	05-01-2014	Communication
57.	IRNSS-1B	04-04-2014	Navigation
58.	IRNSS-1C	16-10-2014	Navigation
59.	GSAT-16	07-12-2014	Communication
60.	IRNSS-1D	28-03-2015	Navigation
61.	GSAT-6	27-08-2015	Communication
62.	ASTROSAT	28-09-2015	Space Science
63.	GSAT-15	11-11-2015	Communication

Student Satellites of Indian Universities launched (As on November 2015)			
Satellite	Institution	Launch Date	Purpose
ANUSAT	Anna University, Tamilnadu	20-04-2009	Experimental
STUDSAT	Consortium of Engineering Colleges	12-07-2010	Experimental
SRMSat	SRM University, Tamilnadu	12-10-2011	Experimental
JUGNU	IIT, Kanpur, UP	12-10-2011	Experimental

Satellites launched with the support from other countries			
SN	Satellite	Country	Launch Cost (₹ in crores)
1	Aryabhata	Russia	free
2	Bhaskara-1	Russia	free
3	Bhaskara-2		free
4	Apple	France	free
5	INSAT-1A	United States of America	468.57
6	INSAT-1B		
7	INSAT-1C		
8	INSAT-1D		
9	IRS-1A	Russia	7.50
10	IRS-1B		31.80
11	INSAT-2A	France	785.10
12	INSAT-2B		
13	INSAT-2C		
14	INSAT-2D		
15	INSAT-2E		
16	IRS-1C	Russia	60.31
17	INSAT-3A	France	2273.63
18	INSAT-3B		
19	INSAT-3C		
20	INSAT-3D		
21	INSAT-3E		
22	INSAT-4A	France	875.00
23	INSAT-4B		
24	GSAT-7	France	485.29
25	GSAT-8	France	297.00
26	GSAT-10	France	406.82
27	GSAT-15	France	601.19
28	GSAT-16	France	581.00

FOREIGN SATELLITES PROPOSED TO BE LAUNCHED DURING 2015-17				
SN	Satellite	Country	Mass (kg)	Tentative Launch schedule
1.	TeLEOS-1	Singapore	425	2015
2.	VELOX-C1 (NTU)		135	
3.	Kent Ridge-1 (NUS)		80	
4.	VELOX-II (NTU)		18	
5.	Athenoxat-1 (NTU)		8	
6.	Galassia (NUS)		5	
7.	BIROS	Germany	135	2016
8.	SkySat-Gen2-1	USA	110	
9.	LAPAN-A3	Indonesia	120	
10.	M3M	Canada	85	
11.	Maxvalier	Germany	20	
12.	Venta-1	Germany		
13.	GHGSat-D	Canada	28	
14.	NLS-19	Canada	7	
15.	DOVE-6	USA	20	
16.	DOVE-7			
17.	DOVE-8			
18.	Pathfinder-1	USA	50	
19.	ALSAT-2B	Algeria	120	
20.	ALSAT-1B		110	
21.	ALSAT-1N		7	
22.	Planet Iq-1	USA	15	
23.	Planet Iq-2			
24.	CE-SAT1	Japan	65	2017
25.	EnMAP	Germany	950	

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

LOK SABHA
UNSTARRED QUESTION NO. 504

TO BE ANSWERED ON WEDNESDAY, DECEMBER 02, 2015

ALLOCATION OF FUNDS FOR SPACE PROGRAMME

504. SHRI VINCENT H. PALA:

Will the PRIME MINISTER be pleased to state:

- (a) the funds allocated for various space programmes during the last three years, year-wise; and
- (b) the amount of funds allocated for military related space programmes, yearwise?

ANSWER

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

- (a) The funds allocated for various space programmes during the last three years, year-wise are given below:

₹ in Crores

Space Programme	2012-13 (Actuals)	2013-14 (Actuals)	2014-15 (Revised Estimates)
Space Technology	2896.49	2960.15	3514.61
Space Applications	575.35	591.13	736.20
Space Science	313.00	406.77	305.85
INSAT Operational	974.09	1041.00	1124.03
Other Programmes & Direction/Administration	97.35	169.91	145.31
Total	4856.28	5168.96	5826.00

- (b) The funding for non civilian space programmes comes from user agencies. Hence, no funds are allocated under Department of Space.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

LOK SABHA
UNSTARRED QUESTION NO. 519

TO BE ANSWERED ON WEDNESDAY, DECEMBER 02, 2015

LAUNCH OF SATELLITES

519. SHRI K. ASHOK KUMAR:

Will the PRIME MINISTER be pleased to state:

- (a) whether Indian Space Research Organisation (ISRO) is planning to launch 12 satellites designed by students from various academic institutions next year;
- (b) if so, the details thereof;
- (c) whether the premier space agency has launched five student satellites since 2009; 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) Indian Space Research Organisation (ISRO) is addressing the possibility of launching satellites being designed by students of various Indian institutions / Universities, as given below. These satellites are under various stages of development.

Student Satellite	Institution / University
SWAYAM	College of Engineering, Pune, Maharashtra.
PISAT	PES University, Bangalore, Karnataka
PRATHAM	Indian Institute of Technology, Bombay, Mumbai
SATHYABAMASAT	Sathyabama University, Chennai, Tamilnadu

NIUSAT	Noorul Islam Univeristy, Kumaracoil, Tamilnadu
PARIKSHIT	Manipal Institute of Technology, Manipal, Karnataka
IITMSAT	Indian Institute of Technology, Madras, Chennai, Tamilnadu

(c) Since 2009, Indian Space Research Organisation (ISRO) has launched four student satellites.

(d) The details of Students satellites launched by ISRO since 2009 are given below:

Satellite	Institution	Launch Date	Remarks
ANUSAT	Anna University, Tamilnadu	20-04-2009	Successful
STUDSAT	Consortium of Engineering Colleges	12-07-2010	Successful
SRMSat	SRM University, Tamilnadu	12-10-2011	Successful
JUGNU	Indian Institute of Technology, Kanpur, Uttar Pradesh	12-10-2011	Successful

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

LOK SABHA
UNSTARRED QUESTION NO. 633

TO BE ANSWERED ON WEDNESDAY, DECEMBER 02, 2015

LAUNCH OF ASTROSAT

633. SHRI MOHITE PATIL VIJAYSINH SHANKARRAO:

SHRI DHANANJAY MAHADIK:

SHRI SATAV RAJEEV:

DR. HEENA VIJAYKUMAR GAVIT:

SHRIMATI SUPRIYA SULE:

SHRI T. RADHAKRISHNAN:

DR. J. JAYAVARDHAN:

Will the PRIME MINISTER be pleased to state:

- (a) whether the Indian Space Research Organisation (ISRO) has launched Astrosat as its first astronomical mission;
- (b) if so, the details and the objectives including the cost incurred thereon;
- (c) whether the Government has received requests from other countries for launch of such satellites; and
- (d) if so, the details thereof and the steps being 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) Yes Madam. Astrosat is the first dedicated Indian astronomy mission launched by Indian Space Research Organisation (ISRO).
- b) Astrosat was launched successfully onboard Polar Satellite Launch Vehicle, PSLV-C30 on 28th September 2015 from Satish Dhawan Space Centre, Sriharikota. The objectives of the mission

are to study the stars and galaxies in Ultraviolet, optical and X-ray wavelength bands to enhance our understanding of the universe. The sanctioned cost of Astrosat is ₹ 177.85 crores and the cost incurred upto end March 2015 is ₹ 172.68 crores (provisional).

- c) No Madam. The Government has not received any requests from other countries for the launch of such Astrosat type of satellites.
- d) Does not arise.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

LOK SABHA
UNSTARRED QUESTION NO. 655

TO BE ANSWERED ON WEDNESDAY, DECEMBER 02, 2015

INDIAN SPACE PROGRAMME

655. SHRIMATI JAYSHREEBEN PATEL:

DR. SUBHASH BHAMRE:

Will the PRIME MINISTER be pleased to state:

- (a) whether the primary objective of the Indian Space Programme/Mission is to achieve self-reliance in Space Technology and to execute programmes/missions for the socio-economic development of the country;
- (b) if so, the details of the programmes/missions drawn up and those proposed by ISRO for socio-economic development of the country;
- (c) the funds allocated/utilised for the purpose during the Eleventh and Twelfth Plan periods; and
- (d) the steps taken by the ISRO for the commercial exploitation of indigenously developed space technology including the foreign exchange earned therefrom during the said period?

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) The programmes/missions drawn up and proposed by Indian Space Research Organization (ISRO) for the socio-economic

development of the country include (i) Earth Observation programme for natural resources inventory and management (like agriculture, land and water resources, fisheries), near real time disaster management support, weather forecasting, smart governance; (ii) Satellite Communication programmes for telecommunication, television broadcasting, Direct-to-Home services, search and rescue, tele-education, telemedicine and (iii) Satellite Navigation programme for location based services. To enable these, ISRO has embarked on the following programmes:

- i. Launch Vehicle development programme comprising of Polar Satellite Launch Vehicle (PSLV), Geosynchronous Satellite Launch Vehicle (GSLV) and next generation GSLV Mk-III launch vehicle missions.
- ii. Earth Observation programme consisting of state-of-the-art remote sensing satellites viz. Resourcesat, Cartosat, Oceansat, Radar Imaging Satellite, Geo-Imaging Satellite and weather/climate satellites viz. INSAT-3DR missions.
- iii. Satellite Communication programme comprising of INSAT/GSAT communication satellites
- iv. Satellite Navigation programme consisting of constellation of 7 Indian Regional Navigation Satellite System (IRNSS) along with associated ground segment intended to provide accurate positional information and timing services.
- v. Space science and planetary exploration programme

(c) Funds allocated/utilised during 11th and 12th Plan periods are given below:

Five Year Plan	(₹ In Crores)	
	Allocation	Utilization
	Revised Estimates	
11 th Plan (2007-12)	20,268.51	19,207.55
First 3 Years of 12 th Plan (2012-2015)	15,878.07	15,848.60

(d) Government, in September 1992, has set up Antrix Corporation Limited (Antrix), as ISRO's commercial arm, under the administrative control of Department of Space for commercial exploitation of indigenously developed space technology products and services. Antrix has taken steps to provide products and services by way of: (i) Marketing of Indian Remote Sensing Satellites data to international customers, (ii) Establishment of ground stations in foreign countries to receive the IRS data (iii) Leasing of satellite transponders on-board INSAT/ GSAT satellites, (iv) Launching foreign satellites on-board Indian launch vehicles; (v) Building/marketing satellites and sub-systems for international customers and (vi) providing mission support services for foreign satellites.

Antrix, through the above activities has earned during:

- (i) 11th Five Year Plan Period: Revenue of ₹ 5177.27 Crores; Out of which, Foreign Exchange equivalent was ₹ 511.53 Crores (77.34 Million USD and 13.93 Million Euros); and
- (ii) First three years of 12th Five Year Plan Period (till 31 March 2015): Revenue of ₹ 4764.71 Crores; Out of which, Foreign Exchange equivalent was ₹ 564.47 Crores (14.20 Million USD and 63.43 Million Euros).

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

LOK SABHA
UNSTARRED QUESTION NO. 662

TO BE ANSWERED ON WEDNESDAY, DECEMBER 02, 2015

SATELLITE NAVIGATION SYSTEM

662. SHRIMATI V. SATHYA BAMA:

SHRI S.P. MUDDAHANUME GOWDA:

Will the PRIME MINISTER be pleased to state:

- (a) whether Indian Space Research Organisation (ISRO) has unveiled plans to gradually make its regional satellite navigation system global and if so, the details thereof;
- (b) whether four of the seven Indian Regional Navigation Satellite System (IRNSS) satellites are in orbit and the last three spacecraft would be added in orbit by March, 2016 and if so, the details thereof;
- (c) whether it is true that the IRNSS would provide self reliance in the 207 strategically important area of position related information and if so, the details thereof; and
- (d) whether the ISRO is now focusing on completing the regional constellation and extending it to SAARC countries 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) No Madam.
- (b) Yes Madam. Four of the seven satellites in IRNSS constellation (IRNSS-1A, 1B, 1C, and 1D) are in orbit. Remaining three

satellites (IRNSS-1E, 1F and 1G) are targeted for launch during January 2016 to March 2016.

- (c) Yes Madam. Self reliance in the strategically important area of position related information will be achieved with the use of indigenously built constellation of seven IRNSS satellites and a network of required ground segment.
- (d) The IRNSS constellation is planned to be completed by March 31, 2016. By design, the service area of IRNSS constellation encompasses the SAARC countries. Like GPS, the Standard Positioning Services of IRNSS is made available to all the users. The SAARC member countries, therefore, can adopt the IRNSS system for the navigational services.

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GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

LOK SABHA
UNSTARRED QUESTION NO. 671

TO BE ANSWERED ON WEDNESDAY, DECEMBER 02, 2015

GAGAN

671. ADV. JOICE GEORGE:

Will the PRIME MINISTER be pleased to state:

- (a) whether the Government is planning to extend GPS Aided Geo Augmented Navigation (GAGAN) coverage to the SAARC countries;
- (b) if so, the details thereof; and
- (c) the expected financial accruals from this venture?

ANSWER

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

- (a)&(b) The signals beamed by GAGAN cover all the SAARC countries and can be utilized by any of the member countries. SAARC member countries can use GAGAN system for en-route navigation and safety-of-life application over their region by obtaining certification from country level civil aviation authorities and establishing necessary ground infrastructure.
- (c) Does not arise.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

LOK SABHA
UNSTARRED QUESTION NO. 681

TO BE ANSWERED ON WEDNESDAY, DECEMBER 02, 2015

LAUNCH OF AMERICAN SATELLITES

681. SHRI P. NAGARAJAN:

Will the PRIME MINISTER be pleased to state:

- (a) whether Indian Space Research Organisation (ISRO) has recently launched satellites for the United States;
- (b) if so, the details thereof;
- (c) the total number of satellites launched by ISRO for foreign countries as on date, satellite and country-wise; and
- (d) the details of the revenue generated in the process?

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) ISRO, in its recent PSLV-C30/ASTROSAT mission on 28th September 2015, has launched four identical nano satellites "Lemur" belonging to Spire Global Inc. of the United States. These nano satellites (together weighing 28 kg) carried instruments for vessel tracking and weather studies.
- (c) ISRO, through its commercial arm - Antrix Corporation Limited, till date, has launched 51 satellites from 20 countries. The details are given in the Annexure-1.
- (d) In the process of launching these 51 satellites from 20 countries, revenue to the extent of 17.17 Million USD and 79.98 Million Euros was earned.

Foreign Satellites launched by ISRO, Country-wise, through
its commercial arm – Antrix Corporation Limited (as of 02
December 2015)

SN	Country	Satellite launched	Mass (kgs)	Date of Launch
1	Algeria	ALSAT-2A	116	12-07-2010
2	Argentina	PEHUENSAT-1	6	10-01-2007
3	Austria	NLS-8.1	14	25-02-2013
4		NLS-8.2	14	25-02-2013
5	Belgium	PROBA	94	22-10-2001
6	Canada	CAN-X-2	7	28-04-2008
7		NLS-5	16	28-04-2008
8		NLS-6.1	6.5	12-07-2010
9		SAPPHIRE	148	25-02-2013
10		NEOSSAT	74	25-02-2013
11		NLS-7.1	15	30-06-2014
12		NLS-7.2	15	30-06-2014
13		NLS-14	14	28-09-2015
14	Denmark	AAUSAT-II	3	28-04-2008
15		NLS-8.3	3	25-02-2013
16	France	SPOT-6	712	09-09-2012
17		SPOT-7	714	30-06-2014
18	Germany	TUBSAT	45	26-05-1999
19		BIRD	92	22-10-2001
20		COMPASS-I	3	28-04-2008
21		RUBIN-8	8	28-04-2008
22		CUBESAT-1	1	23-09-2009
23		CUBESAT-2	1	23-09-2009
24		RUBIN-9.1	1	23-09-2009
25		RUBIN-9.2	1	23-09-2009
26		AISAT	14	30-06-2014

SI No.	Country	Satellite launched	Mass (kgs)	Date of Launch
27	Indonesia	LAPAN-TUBSAT	56	10-01-2007
28		LAPAN- A2	76	28-09-2015
29	Israel	TECSAR/POLARIS-1	300	21-01-2008
30	Italy	AGILE	350	23-04-2007
31	Japan	CUTE-1.7	5	28-04-2008
32		PROITERES	15	09-09-2012
33		SEEDS	3	28-04-2008
34	Luxembourg	VESSELSAT-1	28.7	12-10-2011
35	Republic of Korea	KITSAT-3	110	26-05-1999
36	Singapore	X-SAT	106	20-04-2011
37		VELOX-1	7	30-06-2014
38	Switzerland	CUBESAT-4	1	23-09-2009
39		NLS-6.2	1	12-07-2010
40	The Netherlands	DELFI-C3	6.5	28-04-2008
41	Turkey	CUBESAT-3	1	23-09-2009
42	United Kingdom	STRAND-1	6.5	25-02-2013
43		DMC3-1	447	10-07-2015
44		DMC3-2	447	
45		DMC3-3	447	
46		CBNT-1	91	
47		De-OrbitSail	7	
48	USA	Lemur1	28	28-09-2015
49		Lemur2		
50		Lemur3		
51		Lemur4		

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

LOK SABHA
UNSTARRED QUESTION NO. 1723

TO BE ANSWERED ON WEDNESDAY, DECEMBER 09, 2015

DEVELOPMENT IN SPACE TECHNOLOGY

1723. SHRI FAGGAN SINGH KULASTE:

DR. KIRIT P. SOLANKI:

SHRI NAGENDRA KUMAR PRADHAN:

Will the PRIME MINISTER be pleased to state:

- (a) whether the Government has organised a National level meet to provide an opportunity for interaction amongst Ministries/departments and State Governments towards enhanced utilisation of the space technology in governance and development;
- (b) if so, the details in this regard;
- (c) whether any study has been undertaken to find out the utilisation of space technology in governance and development in the country;
- (d) if so, the details in this regard; and
- (e) the details of steps taken so far by the Government to enhance the use of space technology in governance and development 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) Yes Madam.

(b) A one day National Meet on "Promoting Space Technology based tools and Applications on Governance & Development" was organized on September 07, 2015 at Vigyan Bhavan, New Delhi with the participation of Central Ministries / Departments and State Governments. The National Meet comprised of nine theme sessions namely Agriculture, Energy & Environment, Infrastructure Planning, Water Resources, Technology Diffusion, Developmental Planning, Communication & Navigation, Weather & Disaster Management and Health & Education. Secretaries of 58 Ministries/ Departments have presented the action plans jointly prepared with Indian Space Research Organisation (ISRO) to enhance functional effectiveness, facilitate planning and decision making. Chief Secretaries/ Principal Secretaries of 9 States have also made presentations on use of space technology in specific sectors in their States.

(c),(d)&(e) The requirements and utilization of space technology in governance and development in the country is assessed from time to time through the standing committees (chaired by Secretaries to GOI) under National Natural Resources Management System to provide impetus for operational use of space technology and also through user meet organised annually. In the recent past, the interactions of the expert working groups of ISRO with various Ministries / Departments have given better understanding of the utilisation of space technology in governance & development and culminated into the organisation of the National Meet.

The steps taken by ISRO so far to enhance the use of space technology in governance and development in the country include:

- (i) Formation of expert working groups in ISRO.
- (ii) Preparation of joint action plan on “Effective use of Space Technology” and Identification of Space Applications addressing the requirements of Ministries / Departments.
- (iii) Conduct of Proof of Concept or Pilot projects
- (iv) Development of customised tools and applications
- (v) Development of a Web based Geo-portal “Bhuvan” for providing satellite data and development of tools for visualisation, analysis and dissemination.
- (vi) Institutionalisation of space applications and enabling formation of space technology cells in the Ministries / Departments
- (vii) Capacity building of the officials of Ministries / Departments

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

LOK SABHA
UNSTARRED QUESTION NO. 1742

TO BE ANSWERED ON WEDNESDAY, DECEMBER 09, 2015

ASTROSAT

1742. SHRI NANA PATOLE:

SHRI MALLIKARJUN KHARGE:

SHRI P.P. CHAUDHARY:

SHRI SUNIL KUMAR SINGH:

SHRI DILIPKUMAR MANSUKHLAL GANDHI:

Will the PRIME MINISTER be pleased to state:

- (a) whether Indian Space Research Organisation (ISRO) has launched space observatory ASTROSAT for the study of astronomical objects;
- (b) if so, the details thereof;
- (c) whether it is similar to the Hubble Space Telescope of NASA;
- (d) whether ISRO has also launched Satellites of other countries along with this mission, if so, the details thereof; and
- (e) whether it will be used to understand the universe and to study the astronomical phenomenas, 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) ASTROSAT was successfully launched onboard Polar Satellite Launch Vehicle, PSLV-C30 on 28th September 2015 from Satish Dhawan Space Centre, Sriharikota into a 650 km near-equatorial orbit with 6 degree orbital inclination. ASTROSAT carries five payloads to study the stars and galaxies in ultraviolet, optical and X-ray wavelength bands to enhance our understanding of the universe.

(c) No Madam. The Hubble Space Telescope is a large space telescope with 230 cm diameter mirror and was launched in a 600 km nearly circular orbit. Hubble's four main instruments observe in the near ultraviolet, visible and near infrared spectra.

Whereas, ASTROSAT has an Ultraviolet telescope with 38 cm diameter mirror and was launched in a 650 km near-equatorial orbit. It carries five astronomy payloads, which carry out imaging, timing and spectral studies in far ultraviolet, near ultraviolet, visible and X-ray wavelengths.

(d) Yes Madam. Along with ASTROSAT, six satellites from other countries viz., LAPAN-A2 (Indonesia), NLS-14 (Canada) and four identical LEMUR satellites (USA) were launched under the commercial agreement with Antrix Corporation Limited – the commercial arm of ISRO.

(e) Yes Madam. ASTROSAT will be used to understand the universe and study the astronomical phenomena.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

LOK SABHA
UNSTARRED QUESTION NO. 1762

TO BE ANSWERED ON WEDNESDAY, DECEMBER 09, 2015

SATELLITES FOR AGRI PURPOSE

1762. SHRI KIRTI VARDHAN SINGH:

Will the PRIME MINISTER be pleased to state:

- (a) whether Indian Space Research Organisation (ISRO) has launched any satellite specifically for assisting in agriculture development;
- (b) if so, the details thereof;
- (c) the details of various functions which would be performed by the space observatory recently launched by ISRO; and;
- (d) whether the observatory will send data related to agriculture, 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. Indian Space Research Organisation (ISRO) has launched Indian Remote Sensing Satellites in thematic series viz. Resourcesat, Cartosat and Radar Imaging Satellite (RISAT-1). The images acquired by these Satellites, in conjunction with field observations, are used for various applications in the area of agriculture development, which includes mapping and monitoring of agricultural crops & its condition, crop acreage estimation & production forecast, crop phenology & growth; site suitability for crops, cropping system analysis,

watershed monitoring & management, command area management and drought assessment. These satellites are also used for varied applications in natural resource management, infrastructure planning and disaster management.

(c) Space observatory ASTROSAT, recently launched by ISRO carries five payloads to study the stars and galaxies in ultraviolet, optical and X-ray wavelength bands. The various functions performed by ASTROSAT are: (i) pointing the instruments to view stars and galaxies, (ii) measuring the intensity and spectra of the source using onboard detectors, (iii) storing the measurements from the detector in the onboard storage, (iv) transmission of the data to the Ground station for scientific analysis

(d) No Madam.

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GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

LOK SABHA
UNSTARRED QUESTION NO. 1784

TO BE ANSWERED ON WEDNESDAY, DECEMBER 09, 2015

SPACE TOURISM

1784. SHRI RAMA KISHORE SINGH:

SHRI SUSHIL KUMAR SINGH:

Will the PRIME MINISTER be pleased to state:

- (a) whether the Government in collaboration with other countries has evolved a strategic plan to explore possibilities in space tourism;
- (b) if so, the details thereof;
- (c) whether Indian Space Research Organisation (ISRO) is planning for development of technology related to space tourism; and
- (d) if so, the details thereof and the benefits likely to accrue as a result thereof?

ANSWER

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

- (a) No Madam.
- (b) Does not arise.
- (c) No Madam.
- (d) Does not arise.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

LOK SABHA
STARRED QUESTION NO. 243

TO BE ANSWERED ON WEDNESDAY, DECEMBER 16, 2015

LAUNCH OF SATELLITES

*243. SHRI BHOLA SINGH:

DR. SUNIL BALIRAM GAIKWAD:

Will the PRIME MINISTER be pleased to state:

- (a) whether the Indian Space Research Organisation (ISRO) has decided to increase the number of satellites to be launched over the next few years;
- (b) if so, the details thereof and the steps taken in this direction;
- (c) whether the Government/ISRO has chalked out any action plan to achieve the target, if so, the details thereof;
- (d) whether ISRO is working on any programme to complete the Indian Regional Navigation Satellite System and launch its solar mission;
- (e) if so, the details thereof and the time by which it is likely to be completed; and
- (f) the funds allocated for the purpose?

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 LOK SABHA IN REPLY TO STARRED QUESTION NO.243 REGARDING "LAUNCH OF SATELLITES" ASKED BY SHRI BHOLA SINGH AND DR. SUNIL BALIRAM GAIKWAD TO BE ANSWERED ON WEDNESDAY, DECEMBER 16, 2015.

- (a) Yes Madam.
- (b) Indian Space Research Organisation (ISRO) proposes to increase the number of satellites to be launched over the next few years in the areas of satellite communication & navigation, earth observation, meteorology, space science & planetary exploration to meet the increasing developmental needs of the country. In order to achieve this, efforts have been made to increase the throughput of delivery of the various systems and subsystems from the existing industrial partners along with the identification and qualification of additional work centres. In addition, the launch infrastructure in Satish Dhawan Space Centre at Sriharikota, is being augmented with a second Vehicle Assembly Building to support the increased number of launches. Further assembly, integration and test facilities at ISRO Satellite Centre, Bangalore and Space Applications Centre, Ahmedabad are also being suitably augmented.
- (c) Yes Madam. The action plan includes - (i) maximising the use of existing facilities, (ii) increasing the throughput through augmentation of in-house facilities & enhanced industry participation, (iii) establishment of additional liquid propellant plant, (iv) assembly & integration of stages through industry and (v) reducing the turn-around time between launches.
- (d) Yes Madam.

- (e) ISRO is developing Indian Regional Navigation Satellite System (IRNSS) consisting of a constellation of 7 satellites. Four of the seven satellites namely, IRNSS-1A, 1B, 1C and 1D have already been placed in orbit. The remaining three satellites namely, IRNSS-1E, 1F and 1G are planned to be realised by March 2016. With regard to ground infrastructure to operate IRNSS constellation, all primary facilities have been established. Establishment of backup navigation and timing centres is in progress. Two ranging and integrity monitoring stations are contemplated in Indonesia and Mauritius, for which the work is under progress.

ISRO is working on the development, realisation and launch of the first Indian solar mission, Aditya-L1. This mission is aimed at studying the Sun from an orbit around the Sun-Earth Lagrangian Point-1 (L1) which is about 1.5 million kilometer from the Earth. It will carry seven payloads including a coronagraph to observe the outermost layers of the Sun, the corona. Aditya-L1 will be launched during 2019-2020 timeframe.

- (f) A budget of ₹1420 Crores has been approved by the Government for the realisation of IRNSS programme including satellites and associated ground segment. The approved cost for Aditya-L1 satellite is ₹ 378.53 Crores.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

LOK SABHA
UNSTARRED QUESTION NO. 2766

TO BE ANSWERED ON WEDNESDAY, DECEMBER 16, 2015

NATIONAL SPACE LAW

2766. SHRI KUNWAR PUSHPENDRA SINGH CHANDEL:

SHRI BAIJAYANT JAY PANDA:

Will the PRIME MINISTER be pleased to state:

- (a) whether the Government plans to frame a national space law;
- (b) if so, the details thereof and if not, the reasons therefor;
- (c) whether India's acceptance of the Outer Space Treaty provide sufficient details about India's space policies and if not the steps being taken in this regard;
- (d) whether the Government proposes to launch a commercial scheme to send human beings to space; 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) Indian Space Research Organisation (ISRO) has initiated a process of formulating a National Space Act for India for supporting the overall growth of space activities, with enhanced levels of private sector participation and offering more commercial opportunities. In this context, consequent to internal studies followed by a national level workshop

with experts across the country, and subsequent consultations, a draft version has been formulated. Currently, the Draft Cabinet Note is in process for seeking the approval of the Competent Authority for Inter-Ministerial Consultation.

- (c) India's acceptance of Outer Space Treaty (1967) per se does not necessitate providing space policies of India. However, the Outer Space Treaty creates certain obligations, such as peaceful uses of outer space, promoting international cooperation in outer space activities, non-weaponisation of outer space etc., on a Member State. India as a Member State to this treaty has been complying with such obligations/ requirements.
- (d) No Madam.
- (e) Does not arise.

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GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

LOK SABHA
UNSTARRED QUESTION NO. 2866

TO BE ANSWERED ON WEDNESDAY, DECEMBER 16, 2015

LAUNCH OF FOREIGN SATELLITES

2866. SHRI OM PRAKASH YADAV:

SHRI SUMEDHANAND SARSWATI:

SHRIMATI SANTOSH AHLAWAT:

SHRI CHIRAG PASWAN:

SHRI C.R. CHAUDHARY:

Will the PRIME MINISTER be pleased to state:

- (a) whether Antirix corporation has recently signed a deal with Google's Sky Box imaging to launch various macro satellites;
- (b) if so, the details thereof;
- (c) the amount of revenue earned/likely to be earned from launching of foreign satellites; and
- (d) whether it is a fact that India has emerged as low cost satellite launching destination in the world and if so, the countries with which India has signed MoU's for launch of satellites?

ANSWER

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

- (a)&(b) Antrix Corporation Limited (Antrix), the commercial arm of Indian Space Research Organisation (ISRO), has signed a Launch Services Agreement (LSA) during April 2014 with

M/s.Skybox Imaging Inc., USA for launching one micro-satellite named SkySat-Gen2-1 weighing 110 kg. This satellite will be launched as one of the co-passengers on board ISRO's Polar Satellite Launch Vehicle (PSLV) during 2016.

It is learnt that Skybox Imaging, during August 2014, has entered into an agreement to be acquired by Google; and the name, as it stands on date, is 'Skybox imaging + Google'.

- (c) Antrix has so far earned a revenue of USD 17.17 Million and Euros 79.98 Million by launching 51 satellites from 20 countries.

Further, Antrix is likely to earn a revenue of USD 4.54 Million and Euros 63.91 Million by launching 25 satellites from 7 countries during 2015-2017.

- (d) India, with its 'work-horse' Polar Satellite Launch Vehicle (PSLV), which has a track record of 30 successive successful flights and proven capability to carry out different types of missions [viz., Low-Earth Orbit - low inclination to sun-synchronous; Sub-Geo-synchronous Transfer Orbit (Sub-GTO); Geo-synchronous Transfer Orbit (GTO)] and also with ability to launch multiple satellites in a single mission, has emerged as one of the most competitive and reliable launch service providers in the world.

Currently, Antrix has signed Launch Service Agreements (LSA) with Companies/ Space Agencies from 7 countries viz., Algeria, Canada, Germany, Indonesia, Japan, Singapore and USA, for launching 25 more satellites.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

LOK SABHA
UNSTARRED QUESTION NO. 2903

TO BE ANSWERED ON WEDNESDAY, DECEMBER 16, 2015

INVESTMENTS UNDER MAKE IN INDIA

2903. SHRI MAHEISH GIRRI:

Will the PRIME MINISTER be pleased to state:

- (a) whether the Department of space is planning to attract investments from private players under Make in India initiative;
- (b) if so, the details thereof and if not, the reasons therefor;
- (c) whether the Department is looking to undertake lateral hiring to meet the shortage of skilled professionals in space agencies;
- (d) if so, the details thereof and if not, the reasons therefor;
- (e) whether the Government has looked into the issue of creating an Aerospace command to link civilian applications with military application; 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)&(b) The space systems, products and services dealt in pursuance of space activities are of high technology & strategic in nature and hence, these are highly restricted for collaborations. Under these circumstances, attracting investments under the envelope of 'Make in India' in space

activities generally experience difficulties in practice. However, Department of Space (DOS) has chosen the path of indigenisation of high technology systems and has been successful in realisation. Due to stringent requirements of space qualified systems, long gestation period for realisation, DOS has been engaging the Indian industry with appropriate support in indigenisation and production efforts.

Commensurate with the scope of space activities and increased demands for space based services in the country, DOS has taken initiatives to achieve higher levels of participation of Indian industry in space activities.

- (c)&(d) Presently, DOS does not look for any lateral induction of specialists from space agencies. However, a mechanism exists in ISRO to provide lateral induction to those Indian citizens, possessing Ph.D qualification and who are working in India / foreign countries in specific areas of expertise, which are of relevance to the Indian Space Programme through assessment of individuals' technical competencies. For the present, no such provision has been made for non-Ph.D holders, evincing interest to come back to India to pursue career in Space.
- e) Department of Space is mandated for harnessing the benefits of space technology for national development.
- f) Does not arise.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

LOK SABHA
UNSTARRED QUESTION NO. 2983

TO BE ANSWERED ON WEDNESDAY, DECEMBER 16, 2015

SPACE COOPERATION

2983. SHRI KIRTI VARDHAN SINGH:

Will the PRIME MINISTER be pleased to state:

- (a) whether the Government has signed any agreement with any other developing/ developed countries for Research and Development in Space Technology; and
- (b) 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) Yes Madam.
- (b) Government of India and its national space body, the Indian Space Research Organisation (ISRO) of Department of Space (DOS) has signed agreement with other developing/ developed countries and their space bodies for peaceful uses of outer space including Research and Development (R&D) in space science, technology and applications. Currently such cooperative agreements are in place with Argentina, Australia, Brazil, Canada, Chile, China, Egypt, France, Germany, Hungary, Indonesia, Israel, Italy, Japan, Kazakhstan, Kingdom of Saudi Arabia, Kuwait, Mexico, Mongolia, Myanmar, Peru, Republic of Korea, Russia, Spain, Sweden, Syria, Thailand, The Netherlands, Ukraine, United Kingdom, United States of America and Venezuela.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

LOK SABHA
STARRED QUESTION NO. 350

TO BE ANSWERED ON WEDNESDAY, DECEMBER 23, 2015

DISASTER MANAGEMENT BY ISRO

*350. DR. RAMESH POKHRIYAL "NISHANK":

Will the PRIME MINISTER be pleased to state:

- (a) whether the Indian Space Research Organisation (ISRO) has developed any disaster management mechanism, if so, the details thereof;
- (b) whether the space department has link-ups with various State agencies for the purpose, if so, the details thereof; and
- (c) the programmes being implemented by the Government for research and skill development in space technology?

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.

STATEMENT LAID ON THE TABLE OF THE LOK SABHA IN REPLY TO STARRED QUESTION NO.350 REGARDING "DISASTER MANAGEMENT BY ISRO" ASKED BY DR. RAMESH POKHRIYAL "NISHANK" TO BE ANSWERED ON WEDNESDAY, DECEMBER 23, 2015.

- (a) Under its Disaster Management Support (DMS) Programme, Indian Space Research Organisation (ISRO) supports the disaster management activities in the country by means of providing - (i) Aerial and Space based data & information services and (ii) Satellite based emergency communication services.

To enable these services, ISRO has set up a Decision Support Centre (DSC) in 2005 at National Remote Sensing Centre, Hyderabad for providing data, value added products and information services in near-real time to concerned Central and State departments. The DSC presently supports the needs of various natural disasters such as Cyclone, Flood, Earthquake, Tsunami, Landslide and Forest Fire. In respect of agricultural drought, ISRO has developed and transferred the methodology to Mahalanobis National Centre for Crop Forecasting (MNCFC) under Department of Agriculture and Cooperation & Farmers Welfare (DAC&FW). ISRO also enables satellite based emergency communication services through portable satellite phones and transportable satellite terminals to facilitate data and voice transfer between inaccessible areas. Further, in association with India Meteorological Department (IMD) more than 200 Cyclone Warning Dissemination Systems are installed in the coastal areas.

- (b) At the behest of Ministry of Home Affairs (MHA), ISRO has established a satellite based Virtual Private Network (VPN) comprising of 44 nodes, which link-ups National Emergency Operations Centre (NEOC), State Emergency Operations Centres (SEOCs), Data providing agency nodes and Observational nodes. Also, ISRO works in close coordination with State Disaster Management Authorities (SDMAs), State Disaster Management (Relief) Departments (DMD), Water Resources Departments (WRDs), Forest Departments, State Remote Sensing Application Centres (SRSACs) and other nodal agencies associated with disaster management in the states.
- (c) Under DMS programme, ISRO undertakes research towards the development of methodology for early warning systems, tools & techniques for generating value added products, geospatial modelling techniques, web & mobile based applications and satellite based emergency communication systems.

Towards skill development, DSC regularly conducts orientation trainings for the state level disaster management functionaries to familiarise them with space technology, value added products & services and its utilisation during disaster relief and mitigation. Also, Indian Institute of Remote Sensing (IIRS) at Dehra Dun regularly conducts capacity building programmes for the disaster management professionals at senior, middle and field levels.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

LOK SABHA
UNSTARRED QUESTION NO. 3920

TO BE ANSWERED ON WEDNESDAY, DECEMBER 23, 2015

LAUNCH OF GSAT

3920. SHRIMATI KOTHAPALLI GEETHA:

SHRI B. SENGUTTUVAN:

Will the PRIME MINISTER be pleased to state:

- (a) whether the Indian Space Research Organisation (ISRO) has successfully launched into space GSAT-15 on Ariane rocket and if so, the details thereof;
- (b) whether the GSAT-15 satellite would provide improved communication facilities to the people in Indian sub-continent, if so, the details thereof;
- (c) whether the Government is planning to launch GSAT-17 and GSAT-18 in 2016-17; and
- (d) if so, the details and the present status 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. The GSAT-15 communication satellite was launched onboard Ariane-5 launch vehicle from Kourou in French Guiana on November 11, 2015 (IST). GSAT-15 carries 24 Ku-band communication transponders and one Navigational Payload namely GAGAN.

- (b) The Ku-band transponders have capability to provide various types of communication services including Direct to Home (DTH), television, Very Small Aperture Terminals (VSATs) and telecommunication services. It would ensure continuity of services and also augment INSAT/GSAT transponder capacity. The navigational payload, GAGAN, will provide in-orbit back up to the existing operational GAGAN payloads in GSAT-8 and GSAT-10.
- (c) Yes Madam.
- (d) GSAT-17 and GSAT-18 are planned to be launched using Ariane Launch vehicle from Kourou in French Guiana. GSAT-17 will carry 24 C-band & 14 Extended C-band transponders, Data Relay Transponder, Search & Rescue and Mobile Satellite Service payloads. GSAT-18 will carry 24 C-band, 12 Extended C-band and 12 Ku-band transponders. Integration of GSAT-18 satellite has been completed and testing is in progress. Fabrication of subsystems and payloads for GSAT-17 is in progress.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

LOK SABHA
UNSTARRED QUESTION NO. 3997

TO BE ANSWERED ON WEDNESDAY, DECEMBER 23, 2015

LAUNCH OF GSLV

3997. SHRIMATI K. MARAGATHAM:

SHRI S. RAJENDRAN:

Will the PRIME MINISTER be pleased to state:

- (a) whether Indian Space Research Organisation (ISRO) has launched satellites weighing up to 2.5 tonnes into geosynchronous orbit, if so, the details thereof;
- (b) whether the ISRO scientists are confident that the indigenous Cryogenic Upper Stage (CUS) could be tweaked further to enhance the performance of the GSLV rocket, if so, the details thereof;
- (c) whether CUS has failed in 2010 and has scored its first success with the launch of GSLV D5 last year; 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) Indian Space Research Organisation (ISRO) has launched satellites into Geosynchronous Transfer Orbit (GTO) using its Geosynchronous Satellite Launch Vehicle (GSLV). In its present configuration, GSLV can launch satellites weighing up to 2.2 tonnes into GTO. Details of the satellites successfully launched by GSLV are given below.

Sl. No	Satellite (GSLV Mission)	Payload Mass (in tonnes)	Date of launch
1	GSAT-1 (GSLV-D1)	1.530	18.04.2001
2	GSAT-2 (GSLV-D2)	1.825	08.05.2003
2	EDUSAT (GSLV-F01)	1.950	20.09.2004
3	INSAT-4CR (GSLV-F04)	2.140	02.09.2007
5	GSAT-14 (GSLV-D5)	1.982	05.01.2014
6	GSAT-6 (GSLV-D6)	2.117	27.08.2015

- (b) Yes Madam. To enhance the performance of GSLV rocket, ISRO is planning for optimising the mass of the Cryogenic Upper Stage and thrust upratement of Cryogenic engine.
- (c) Yes, Madam.
- (d) On January 5, 2014, GSLV-D5 with indigenous Cryogenic engine and stage successfully launched the GSAT-14 communication satellite from Satish Dhawan Space Centre, Sriharikota.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

LOK SABHA
UNSTARRED QUESTION NO. 4002

TO BE ANSWERED ON WEDNESDAY, DECEMBER 23, 2015

ATTRITION OF SCIENTISTS FROM ISRO

4002. SHRI KODIKUNNIL SURESH:

Will the PRIME MINISTER be pleased to state:

- (a) whether the attrition rate of space scientists from ISRO and its affiliated organisations is on the rise in the last three years;
- (b) if so, the details of scientists and technocrats who have left ISRO during the last three years along with the reasons therefor;
- (c) whether the Government intends to improve working conditions, salary and other facilities of scientists; and
- (d) if so, the details thereof and the other steps taken by the Government for promotion of space, science/research and welfare of its scientists?

ANSWER

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

- a) No Madam.
- b) The attrition of Scientists, on voluntary grounds, working in the laboratories of the Indian Space Research Organisation has been at a very low level in comparison to the authorised level of total Scientists /Engineers / Technologists. During the calendar years 2012-2014, the attrition of Scientists/

Technocrats, on voluntary grounds, in the laboratories of Indian Space Research Organisation has been recorded as under:

- i. 2012 - 77
- ii. 2013 - 46
- iii. 2014 - 51

c) Yes, Madam. As a part of the decadal exercise, the Government has already appointed 7th Central Pay Commission to review and recommend revision of pay and allowances, apart from many other related matters, for all its employees and the recommendations have been in place. With regard to other factors, increased technical challenges in realisation of high technology space projects, research opportunities in cutting edge technology areas and excellent working systems in the Organisation, ISRO has been able to retain the talent and Scientists are committed to work and support the Indian Space Programme.

d) The Department of Space has taken the following initiatives for promotion of Space Science / Research in the Country:

- i. One time financial grant to set up Space Science laboratories in select eight Universities in the Country;
- ii. Offers specialised academic programmes at PG level at its academic institute, Indian Institute of Space Science and Technology (IIST).
- iii. Introduced fellowship schemes for post graduate students pursuing space science and atmospheric research in eight Universities in the Country;
- iv. Introduction of research fellowship to enable scientists from universities and other academic and research

- institutions to visit and conduct research work at national laboratories, academic/research institutions,
- v. Established Joint Astronomy Programme with participation of other research laboratories and academic institutions in organising research in astronomy area leading to award of Ph.D degree to young research students.
 - vi. Developed customized academic programme in Space Science area both at Undergraduate and Graduate level at IIST.
 - vii. Provides research opportunity in Physical Research Laboratory (PRL) for young scientists to take up research in Space Science area leading to award of Ph.D degree in space science and atmospheric research areas through an academic institution.

For welfare of its scientists in the department, DOS provides subsidised canteen food, transport facility, housing, medical and group insurance etc.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

LOK SABHA
UNSTARRED QUESTION NO. 4131

TO BE ANSWERED ON WEDNESDAY, DECEMBER 23, 2015

NATIONAL URBAN INFORMATION SYSTEM

4131. SHRIMATI POONAM MAHAJAN:

Will the PRIME MINISTER be pleased to state:

- (a) whether Indian Space Research Organisation (ISRO) has developed National Urban Information System (NUIS) and if so, the salient features thereof including the number of cities and towns covered under the aegis of NUIS, Statewise alongwith the time taken for its data to reach the end users;
- (b) whether multi-temporal high resolution satellite data of NUIS is being used to study the urban growth and master plan preparation including infrastructure development for Smart Cities Mission and if so, the details thereof;
- (c) the details and number of statutory corporations companies and other bodies in which the Government has financial or controlling interests which are utilizing NUIS data for urban planning; and
- (d) whether ISRO utilised NUIS data during the recent flood situation in Andhra Pradesh and Tamil Nadu 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) National Urban Information System (NUIS) is the project of Ministry of Urban Development with Survey of India as the focal point. At the behest of Ministry of Urban Development, National Remote Sensing Centre of ISRO has prepared geospatial thematic database (comprising of 12 layers) for 152 towns on 1:10,000 scale and carried out Aerial survey of 132 towns at 1:2,000 scale for Survey of India. The number of cities and towns covered under the aegis of NUIS, State-wise is attached as Annexure.

Within one year after the completion of geospatial thematic database, NRSC has hosted the database on Bhuvan Geoportal and developed Bhuvan-NUIS application for enabling formulation of Master Plans by state town planning departments. NRSC has also organised 2 National workshops, 7 Regional Workshops and 25 State level workshops for imparting training on Bhuvan-NUIS to more than 2,000 Town Planning officials.

- (b) The thematic mapping under NUIS was envisaged as a onetime exercise. NRSC has submitted the geospatial thematic database for 152 towns on 1:10,000 scale to Ministry of Urban Development for further use.
- (c) The concerned state town planning departments have been authorised to use Bhuvan-NUIS database for master plan formulation. However, the entire database is also made available in the public domain on Bhuvan Geoportal for visualisation.

(d) No Madam. However, under its Disaster Management Programme, ISRO has provided the flood inundation maps using satellite data extensively during the recent floods of Tamil Nadu and Andhra Pradesh.

* * * *

ANNEXURE

State/Union Territory -wise number of cities and towns covered under the aegis of NUIS

SN	State/Union Territory	No. of Towns / Cities
1	Andaman & Nicobar Islands	1
2	Andhra Pradesh	6
3	Arunachal Pradesh	2
4	Assam	5
5	Bihar	5
6	Chandigarh	1
7	Chhattisgarh	5
8	Dadra and Nagar Haveli	1
9	Daman & Diu	1
10	Goa	5
11	Gujarat	6
12	Haryana	5
13	Himachal Pradesh	5
14	Jammu & Kashmir	24
15	Jharkhand	5
16	Karnataka	6
17	Kerala	5
18	Lakshadweep	1
19	Madhya Pradesh	6
20	Maharashtra	6
21	Manipur	2
22	Meghalaya	2
23	Mizoram	2
24	Nagaland	2
25	Orissa	6
26	Pondicherry	1
27	Punjab	6
28	Rajasthan	6
29	Sikkim	10
30	Tripura	4
31	Uttar Pradesh	6
32	West Bengal	4
	T O T A L	152

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA
UNSTARRED QUESTION NO. 604

TO BE ANSWERED ON THURSDAY, DECEMBER 3, 2015

FUNDS FOR SPACE PROJECTS

604. DR. V. MAITREYAN:

Will the PRIME MINISTER be pleased to state:

- (a) the Space Projects initiated in the last five years and the details of the projects pending completion in the last five years;
- (b) the amount allocated, disbursed and utilized for these projects, Project-wise;
- (c) the total amount left unutilized in the last five years and the amount returned; and
- (d) the reasons for not initiating new projects in the last two years?

ANSWER

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

(DR. JITENDRA SINGH):

- (a) The space projects initiated by Department of Space during the last five years include six communication satellites viz. GSAT-14, GSAT-15, GSAT-16, GSAT-17, GSAT-18 and GSAT-19; eight remote sensing satellites viz. GISAT, Resourcesat-2A, Cartosat-2E, SCATSAT-1, NISAR (NASA ISRO Synthetic Aperture Radar), Cartosat-3, Oceansat-3 & 3A; continuation flights of PSLV (C36-C50); Chandrayaan-2, Aditya-L1 and India's first mission to planet Mars – Mars Orbiter Mission.
Out of these projects, GSAT-14, GSAT-15, GSAT-16 and Mars Orbiter Mission have been completed. The projects pending completion in the last five years include Chandrayaan-2, Aditya-L1, GISAT and Resourcesat-2A.
- (b) The details of amount allocated, disbursed and utilized for these projects, project-wise are given below:

[₹ in Crore]

SI No	Project	Amount Allocated (Sanctioned Cost)	Amount Disbursed (including BE 2015-16)	Amount Utilised (Actual till 31.3.2015)
1	GSAT-14	45.00	44.99	44.99
2	GSAT-15 (including	859.50	824.07	659.07

SI No	Project	Amount Allocated (Sanctioned Cost)	Amount Disbursed (including BE 2015-16)	Amount Utilised (Actual till 31.3.2015)
	launch services)			
3	GSAT-16 (including launch services)	865.50	865.50	823.65
4	GSAT-17 (including launch services)	1013.20	330.00	0.00
5	GSAT-18 (including launch services)	1022.00	507.00	0.00
6	GSAT-19	94.00	45.00	0.00
7	GISAT	392.00	163.62	83.62
8	Resourcesat-2A	200.00	100.24	50.24
9	Cartosat-2E	160.00	25.00	0.00
10	SCATSAT-1	80.00	30.00	0.00
11	NISAR	513.00	50.00	0.00
12	Cartosat-3	351.16	50.00	0.00
13	Oceansat-3 & 3A	797.17	25.00	0.00
14	PSLV C36-C50	3090.00	203.25	0.00
15	Mars Orbiter Mission	450.00	446.74	440.74
16	Chandrayaan-2	603.00	252.45	212.45
17	Aditya-L1	378.53	42.77	22.77

- (c) The details of total amount for space programme left unutilised in the last five years and the amount returned by Department of Space are given below:

[₹ in Crore]

Financial Year	Budget Estimates	Amount Returned (Surrendered)	Amount left unutilised
2010-11	5778.00	898.00	397.77
2011-12	6626.00	2194.00	647.77
2012-13	6715.00	1835.00	23.75
2013-14	6792.00	1620.00	3.05
2014-15	7238.00	1412.00	2.55

- (d) Does not arise. New projects initiated in the last two years are GSAT-17, GSAT-18 and GSAT-19 communication satellites; continuation flights of PSLV (C36-C50); Oceansat 3 & 3A, Cartosat-2E, Cartosat-3, SCATSAT-1 and NISAR projects.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA
UNSTARRED QUESTION NO. 1399

TO BE ANSWERED ON THURSDAY, DECEMBER 10, 2015

MAKING OF INDIAN REGIONAL SATELLITE NAVIGATION SYSTEM GLOBAL

1399. DR. K.P. RAMALINGAM:

Will the PRIME MINISTER be pleased to state:

- (a) whether Indian Space Research Organisation (ISRO) has unveiled plans to gradually make its regional satellite navigation system global such as USA's GPS and the Russian GLONASS;
- (b) whether the ISRO's four of the seven Indian Regional Navigation Satellite System (IRNSS) satellites are in orbit and the last three spacecraft would be added in orbit by March, 2016;
- (c) whether the IRNSS would provide self-reliance in the strategically important areas of position related information; and
- (d) whether ISRO is now focussing on completing the regional constellation and extending it to SAARC countries later on taking it gradually over the entire globe?

ANSWER

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

(DR. JITENDRA SINGH):

- (a) No Sir.
- (b) Yes Sir. Four of the seven satellites in IRNSS constellation (IRNSS-1A, 1B, 1C, and 1D) are in orbit. Remaining three satellites (IRNSS-1E, 1F and 1G) are targeted for launch during January 2016 to March 2016.
- (c) Yes Sir. Self reliance in the strategically important area of position related information will be achieved with the use of indigenously built constellation of seven IRNSS satellites and a network of required ground segment.
- (d) The IRNSS constellation is planned to be completed by March 31, 2016. By design, the service area of IRNSS constellation encompasses the SAARC countries. Like GPS, the Standard Positioning Services of IRNSS is made available to all the users. The SAARC member countries, therefore, can adopt the IRNSS system for the navigational services. However, at present there is no plan of taking it over the entire globe.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA
UNSTARRED QUESTION NO. 1400

TO BE ANSWERED ON THURSDAY, DECEMBER 10, 2015

ISRO PERFORMING POST LAUNCH ORBIT RAISING MANOEUVRES

1400. DR. K.P. RAMALINGAM:

Will the PRIME MINISTER be pleased to state:

- (a) whether the Indian Space Research Organisation (ISRO) performed the first of three post launch orbit raising manoeuvres on the new GSAT-15 spacecraft recently, if so, the details thereof;
- (b) whether two more orbit connections are slated for the next two days; and
- (c) whether the Ku-band satellite is expected to be ready for use in a month once its orbital slot and functions are stabilised, 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, Sir. As per the planned sequence of events, all the three post launch orbit raising manoeuvres for GSAT-15 spacecraft were carried out successfully during November 12-14, 2015. With this all the orbit raising manoeuvres have been completed.
- (c) Yes Sir. The orbit raising, deployment, parking of satellite in designated orbit of 93.5 degree and three-axis stabilisation of the Ku-band satellite, GSAT-15, have been completed successfully. The payloads have been turned on and the satellite will be ready for use after the completion of the in-orbit testing.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA
UNSTARRED QUESTION NO. 1401

TO BE ANSWERED ON THURSDAY, DECEMBER 10, 2015

FUNDS FOR SHAR AND ISRO

1401. DR. V. MAITREYAN:

Will the PRIME MINISTER be pleased to state:

- (a) whether Government has provided adequate funds for the Sriharikota Range (SHAR), Indian Space Research Organisation (ISRO) at Sriharikota and other facilities;
- (b) if so, the details thereof and the amount allocated, disbursed and utilized for these projects, project-wise;
- (c) the total amount left unutilized in the last five years and the amount returned and the reasons therefor;
- (d) the details of the bilateral agreements signed with foreign countries in the fields of space research and rocket launch technology; and
- (e) the outcomes expected from various new space projects to be initiated by the Department of Space in the coming years?

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) Satish Dhawan Space Centre-SHAR (SDSC-SHAR) is the spaceport of India providing launch support services for indigenous launch vehicles. Major facilities set up at SDSC-SHAR include Solid Propellant Plant, Solid Propellant Booster Plant, propellant storage and service facilities around the two launch pads etc. Presently, two major infrastructural projects viz. Multi-Object Tracking Radar (MOTR) and Second Vehicle Assembly Building are under implementation at SDSC-SHAR. Funding for these facilities have been adequately addressed based on the programmatic requirements. The details of the amount allocated (Budget), disbursed (Revised) and utilized (Actuals) during the financial year 2014-15 for Satish Dhawan Space Centre –SHAR (including MOTR) and Second Vehicle Assembly project at Sriharikota are given below:

[₹ in Crores]

Programme/ Project/Unit	Amount Allocated (Budget Estimates 2014-15)	Amount Disbursed (Revised Estimates 2014-15)	Utilised (Actuals 2014-15)
Satish Dhawan Space Centre - SHAR	508.30	524.00	525.75
Second Vehicle Assembly Building	50.00	3.00**	3.00
Total	558.30	527.00	528.75

** Savings as the final configuration & technical specifications of second VAB is under finalisation.

- (c) The details of total amount for Satish Dhawan Space Centre–SHAR and related facilities in terms of budget estimates, final allocation and the amount left unutilised in the last five years along with the reasons are given below:

[₹ in Crores]

Financial Year	Budget Estimates	Final Allocation	Amount left unutilised	Reasons
2010-11	386.90	364.41	11.01	Delay in finalisation of detailed design review of MOTR facility and Acoustic Suppression System.
2011-12	434.77	326.38	5.35	Implementation of economy measures and postponement of expenditure on launch facilities infrastructure based on actual delivery schedule.
2012-13	437.84	353.86	Nil	Approval for MOTR Project has been received only during the 3 rd Quarter of 2012-2013.
2013-14	457.83	411.00	1.39	Phasing out of expenditure on MOTR and Major Works to the next financial year to comply with RE ceilings.
2014-15	558.00	527.00	1.25	Phasing out of expenditure on Major Works & Housing to the next financial year to comply with RE ceilings.

- (d) Government of India and its national space body, the Indian Space Research Organisation (ISRO) of Department of Space (DOS) has signed bilateral agreements with 36 foreign countries on peaceful uses of outer space viz. Argentina, Australia, Brazil, Brunei Darussalam, Bulgaria, Canada, Chile, China, Egypt, France, Germany, Hungary, Indonesia, Israel, Italy, Japan, Kazakhstan, Kuwait, Mauritius, Mexico, Mongolia, Myanmar, Norway, Peru, Republic of Korea, Russia, Saudi Arabia, Spain, Sweden, Syria, Thailand, The Netherlands, Ukraine, United Kingdom, United States of America and Venezuela.
- (e) The outcomes expected from various new space projects in the coming years include –
(i) continuity of data and services for natural resources monitoring, all weather imaging, oceanography, (ii) enhancing remote sensing capability with high resolution data, (iii) augmentation of INSAT/GSAT capacity, (iv) self reliance in operational capability for launching 4 ton class communication satellites, (v) realising dual frequency radar imaging satellite for natural resources mapping; estimating agricultural biomass; assessing soil moisture; monitoring of floods and oil slicks; coastal erosion, coastline changes and variation of winds in coastal waters; surface deformation studies due to seismic activities etc.

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE

RAJYA SABHA
UNSTARRED QUESTION NO. 2205

TO BE ANSWERED ON THURSDAY, DECEMBER 17, 2015

SHORTAGE OF SCIENTISTS IN ISRO

2205. SHRI PARIMAL NATHWANI:

Will the PRIME MINISTER be pleased to state:

- (a) whether Indian Space Research Organisation (ISRO) is facing shortage of engineers/scientists/physicists;
- (b) if so, the details thereof and the measures taken/proposed to be taken by Government to address the issue; and
- (c) the details of the initiatives taken/ proposed to be taken by Government to promote space science amongst the youth 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)&(b) Indian Space Research Organisation (ISRO) is not facing shortage of engineers/scientists/physicists to fill up the sanctioned post. In order to cater to the needs of increased launch frequency, a comprehensive study on the human resources assessment has been undertaken and further process is in progress.
- (c) As a part of the long term capacity build up strategies for developing high quality human resources in Space Science area, the Department of Space / ISRO has initiated the following pro-active measures in encouraging Indian youth to take up Space Science as their career:
 - i. Introduced fellowship schemes for post graduate students pursuing space science and atmospheric research in eight Universities in the Country;
 - ii. One time financial grant to set up Space Science laboratories in select eight Universities in the Country;

- iii. Introduction of research fellowship to enable scientists from universities and other academic and research institutions to visit and conduct research work at national laboratories, academic/research institutions;
- iv. Established “Joint Astronomy Programme” with participation of other research laboratories and an academic institution in organising research in astronomy area leading to award of Ph.D degree to young research students;
- v. Developed customized academic programme in Space Science area both at Undergraduate and Graduate level at the Indian Institute of Space Science and Technology;
- vi. Provides research opportunity in Physical Research Laboratory (PRL) for young scientists to take up research in Space Science area leading to award of Ph.D degree in space science and atmospheric research areas through an academic institution.
