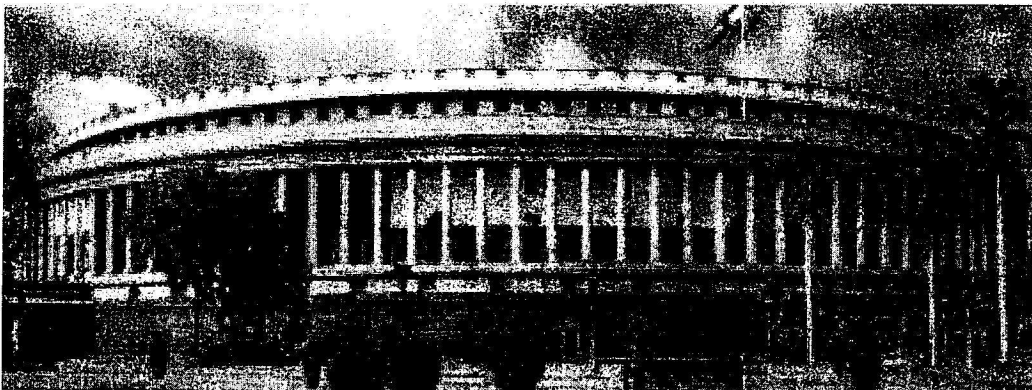




**GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE**

**"SPACE IN PARLIAMENT"**



**WINTER SESSION OF PARLIAMENT 2016  
(NOVEMBER-DECEMBER 2016)**

**COMPILATION OF REPLIES GIVEN  
IN PARLIAMENT DURING 2016**

**Government of India  
Department of Space**

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**PARLIAMENT QUESTIONS – WINTER SESSION OF PARLIAMENT 2016**

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**GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE**

**LOK SABHA  
UNSTARRED QUESTION NO.1**

**TO BE ANSWERED ON WEDNESDAY, NOVEMBER 16, 2016**

**CHANDRAYAAN-II**

**1 DR. RATNA DE (NAG):**

**SHRI CHANDRA PRAKASH JOSHI:**

**SHRI MANOJ TIWARI:**

**Will the PRIME MINISTER be pleased to state:**

- (a) whether the Government has proposed any timeline regarding the launch of Chandrayaan-II;**
- (b) if so, the details thereof;**
- (c) if not, the reasons therefor; and**
- (d) the detailed information about the progress and recent developments 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)&(b) Chandrayaan-2, India's second mission to the Moon, is a totally indigenous mission comprising of Orbiter, Lander and Rover. It is proposed to be launched during the first quarter of 2018.**
- (c) Does not arise.**

- (d) **The spacecraft and subsystems are under development. Orbiter and Rover flight systems are in advanced stage of realization. Payloads are under development at various ISRO centres / laboratories. Special tests for new systems in Lander have been identified and a Lander Sensors Performance Test (phase-1) over artificial craters created in Chitradurga district has been conducted. Lunar Terrain Test facility is ready for Lander drop test (leg mechanism test) and Rover mobility tests.**

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**GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE**

**LOK SABHA  
UNSTARRED QUESTION NO.62**

**TO BE ANSWERED ON WEDNESDAY, NOVEMBER 16, 2016**

**SPACE PROJECTS**

**62 SHRI C.S. PUTTA RAJU:**

**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 during the said period;**
- (b) the amount allocated, disbursed and utilized for these projects, project-wise;**
- (c) the total amount left unutilized 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 the Department of Space during the last five years i.e. 2011-12, 2012-13, 2013-14, 2014-15 & 2015-16 include - (i) seven communication satellites viz. GSAT-11, GSAT-14, GSAT-15, GSAT-16, GSAT-17, GSAT-18 and GSAT-19; (ii) eight remote sensing satellites viz. Resourcesat-2A, Cartosat-2E, SCATSAT-1,**

**NISAR (NASA-ISRO Synthetic Aperture Radar), Cartosat-3, RISAT-1A and Oceansat-3 & 3A; (iii) fifteen continuation flights of PSLV and (iv) three space science missions viz. Mars Orbiter Mission, Chandrayaan-2 and Aditya-L1.**

**Out of these, GSTA-14, GSAT-15, GSTA-16, GSAT-18, SCATSAT-1 and Mars Orbiter Mission have been launched. The projects pending completion in the last five years include Chandrayaan-2, Aditya-L1, Resourcesat-2A and GSAT-11.**

**(b)&(c) The details of amount allocated, disbursed, utilised, including the amount left unutilised and amount returned for these projects, project-wise are given below:**

**[₹ in Crore]**

<b>SN</b>	<b>Projects</b>	<b>Amount Allocated</b>	<b>Amount Disbursed as on March 2016</b>	<b>Amount Utilised up to March 2016</b>	<b>Amount left unutilised as on April 01, 2016</b>	<b>Amount returned</b>
<b>1.</b>	<b>GSAT-14</b>	<b>45</b>	<b>45</b>	<b>44.99</b>	<b>0.01</b>	<b>0.01</b>
<b>2.</b>	<b>GSAT-15 (including launch services)</b>	<b>892.69</b>	<b>830.88</b>	<b>806.4</b>	<b>24.48</b>	<b>**</b>
<b>3.</b>	<b>GSAT-16 (including launch services)</b>	<b>897.94</b>	<b>865</b>	<b>864.12</b>	<b>0.88</b>	<b>**</b>
<b>4.</b>	<b>GSAT-17 (including launch services)</b>	<b>1013.2</b>	<b>219.3</b>	<b>215.7</b>	<b>3.6</b>	<b>**</b>

5.	<b>GSAT-18 (including launch services)</b>	<b>1022</b>	<b>556</b>	<b>555.04</b>	<b>0.96</b>	<b>**</b>
6.	<b>GSAT-19</b>	<b>94</b>	<b>5.8</b>	<b>5.67</b>	<b>0.13</b>	<b>**</b>
7.	<b>Resourcesat- 2A</b>	<b>200</b>	<b>107</b>	<b>106.11</b>	<b>0.89</b>	<b>**</b>
8.	<b>Cartosat-2E</b>	<b>160</b>	<b>27.53</b>	<b>26.98</b>	<b>0.55</b>	<b>**</b>
9.	<b>SCATSAT-1</b>	<b>80</b>	<b>14</b>	<b>13.59</b>	<b>0.41</b>	<b>**</b>
10.	<b>NISAR</b>	<b>513</b>	<b>25.98</b>	<b>22.46</b>	<b>3.52</b>	<b>**</b>
11.	<b>Cartosat-3</b>	<b>351.16</b>	<b>18.3</b>	<b>18.16</b>	<b>0.14</b>	<b>**</b>
12.	<b>RISAT-1A</b>	<b>490</b>	<b>10.2</b>	<b>9.82</b>	<b>0.38</b>	<b>**</b>
13.	<b>Oceansat-3 &amp; 3A</b>	<b>797.17</b>	<b>14.7</b>	<b>0.1</b>	<b>14.6</b>	<b>**</b>
14.	<b>PSLV (C36- C50)</b>	<b>3090</b>	<b>136</b>	<b>135.44</b>	<b>0.56</b>	<b>**</b>
15.	<b>Mars Orbiter Mission</b>	<b>450</b>	<b>450</b>	<b>447.39</b>	<b>2.61</b>	<b>2.61</b>
16.	<b>Chandrayaan- 2</b>	<b>603</b>	<b>283.61</b>	<b>273.64</b>	<b>9.97</b>	<b>**</b>
17.	<b>GSAT-11</b>	<b>583.5</b>	<b>493</b>	<b>491.47</b>	<b>1.53</b>	<b>**</b>
18.	<b>Aditya-L1</b>	<b>378.53</b>	<b>53.55</b>	<b>37</b>	<b>16.55</b>	<b>**</b>

**\*\* The amount left un-utilized in the above projects is carried forward to subsequent financial years for completing remaining activities in respective projects. Hence, amount is not returned, until the projects are closed.**

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- (d) **The new projects initiated and approval obtained by the Department of Space in the last two years i.e. 2014-15 & 2015-16 include: Cartosat-2E, fifteen continuation flights of PSLV, Cartosat-3, Oceansat-3 & 3A, NISAR, RISAT-1A, GSAT-19, SCATSAT-1, GSAT-17 and GSAT-18.**

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**GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE**

**LOK SABHA  
UNSTARRED QUESTION NO.100**

**TO BE ANSWERED ON WEDNESDAY, NOVEMBER 16, 2016**

**LAUNCH OF PSLV-C34**

**100 SHRI ASHWINI KUMAR CHOUBEY:**

**Will the PRIME MINISTER be pleased to state:**

- (a) the details of the total number of satellites launched by the PSLV-C34 from Satish Dhawan Space Centre;**
- (b) the detailed information of the working of satellites which were launched by PSLV-C34;**
- (c) whether India has increased use of space capabilities for military applications in space; and**
- (d) if so, the details thereof and the future planning regarding the same?**

**ANSWER**

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

**(DR. JITENDRA SINGH):**

- (a) On June 20, 2016, ISRO's Polar Satellite Launch Vehicle (PSLV-C34) has successfully launched 20 satellites from Satish Dhawan Space Centre (SDSC), Sriharikota. The details are given below:**

<b>Satellite</b>	<b>Country/ Institution</b>	<b>No. of Satellites</b>	<b>Weight (in kg)</b>
<b>Cartosat-2 Series</b>	<b>India</b>	<b>01</b>	<b>727</b>
<b>BIROS</b>	<b>Germany</b>	<b>01</b>	<b>130</b>
<b>SkySat-Gen2-1</b>	<b>USA</b>	<b>01</b>	<b>110</b>



<b>Satellite</b>	<b>Country/ Institution</b>	<b>No. of Satellites</b>	<b>Weight (in kg)</b>
<b>LAPAN-A3</b>	<b>Indonesia</b>	<b>01</b>	<b>120</b>
<b>M3MSat</b>	<b>Canada</b>	<b>01</b>	<b>85</b>
<b>GHGSat-D</b>	<b>Canada</b>	<b>01</b>	<b>26</b>
<b>DOVE</b>	<b>USA</b>	<b>12</b>	<b>57</b>
<b>SWAYAM</b>	<b>College of Engineering, Pune</b>	<b>01</b>	<b>1</b>
<b>SATHYABAMASAT</b>	<b>Sathyabama University, Chennai</b>	<b>01</b>	<b>1.5</b>

- (b) **The Cartosat-2 Series satellite of India is working satisfactorily. The early operation phase after the launch, including the payload calibration activities has been completed and the satellite is currently under commissioning phase for operational use. The performance of student satellites (Sathyabamasat and SWAYAM) and the foreign satellites is not monitored by India after their launch. All these satellites reported satisfactory reception of signal after the launch.**
- (c)&(d) **In India, space technology is used for the peaceful use of outer space and harnessing the space technology for national development. The data and services derived from earth observation, communication and navigation satellites are used for various applications in the area of natural resources management, infrastructure planning, Disaster Management Support, rural connectivity, location based service, societal services, including strategic applications. To ensure continuity of services and to further strengthen applications in these areas, a plan is in place for suitably augment the space infrastructure.**

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**GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE**

**LOK SABHA  
UNSTARRED QUESTION NO.153**

**TO BE ANSWERED ON WEDNESDAY, NOVEMBER 16, 2016**

**MARS ORBIT MISSION**

**153. DR. THOKCHOM MEINYA:**

**Will the PRIME MINISTER be pleased to state:**

- (a) the main purpose of Mangalyaan;**
- (b) whether ISRO has achieved the target of Mangalyaan;**
- (c) if so, the details thereof;**
- (d) whether ISRO has successfully used the cryogenic technology in this mission; 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) Mars Orbiter Mission (MOM), popularly known as Mangalyaan is India's first interplanetary mission. The main purpose of Mangalyaan, as a technology demonstration mission, is to demonstrate India's capability to insert MOM in Martian orbit and operating Mars Orbiter spacecraft for 6 months.**
- (b) Yes Madam.**

**(c) The significant achievements of MOM include:**

- **Mars orbiter spacecraft has been successfully inserted into elliptical orbit around Mars on September 24, 2014. It has completed 25 months in its orbit around Mars and is presently functioning satisfactorily.**
- **Scientific payloads onboard MOM continues to provide valuable data of Mars surface and its atmosphere. Mars Color Camera has captured more than 500 images of the Martian surface.**
- **It has provided excellent opportunities in planetary research for the scientific community of the country. Archived data was released on 24.Sep.2016 for free download for scientific research. It has witnessed more than 1500 downloads and about 40 GB data has so far been downloaded.**

**(d) No Madam. ISRO did not envisage using cryogenic technology in this mission. The launch requirements of the mission were achieved with the XL variant of India's Polar Satellite Launch Vehicle. However, indigenous cryogenic technology has been realised and demonstrated in GSLV launches.**

**(e) Does not arise.**

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**GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE**

**LOK SABHA  
UNSTARRED QUESTION NO.178**

**TO BE ANSWERED ON WEDNESDAY, NOVEMBER 16, 2016**

**SPACE INNOVATION CENTRE**

**178 DR. GOKARAJU GANGA RAJU:**

**Will the PRIME MINISTER be pleased to state:**

- (a) whether the Government of Andhra Pradesh is planning to set up a Space Innovation Centre in the capital city in collaboration with the Indian Space Research Organisation in a bid to encourage young researchers;**
- (b) if so, the details thereof;**
- (c) whether similar proposal has come from any other State; 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) The matter is in the formative stages and officials from Government of Andhra Pradesh had interaction with officials of Indian Space Research Organisation to explore the possibilities of usage of Satellite data for Disaster Risk Reduction applications. The Government of Andhra Pradesh proposes to utilise the satellite data on Meteorology and**

**Land through ISRO Portals and develop users' specific applications through active participation of Academia and young researchers.**

- (c) No Madam.**
- (d) Does not arise.**

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**GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE**

**LOK SABHA  
UNSTARRED QUESTION NO.206  
TO BE ANSWERED ON WEDNESDAY, NOVEMBER 16, 2016**

**LAUNCH OF PSLV-C35**

**206 SHRI GAJANAN KIRTIKAR:**

**SHRI SUDHEER GUPTA:**

**SHRI DHANANJAY MAHADIK:**

**SHRI BIDYUT BARAN MAHATO:**

**DR. SUNIL BALIRAM GAIKWAD:**

**SHRI MOHITE PATIL VIJAYSINH SHANKARRAO:**

**SHRI SATAV RAJEEV:**

**SHRI S.R. VIJAYAKUMAR:**

**DR. HEENA VIJAYKUMAR GAVIT:**

**SHRI ASHOK SHANKARRAO CHAVAN:**

**KUNWAR HARIBANSH SINGH:**

**SHRI VENKATESH BABU T.G.:**

**DR. J. JAYAVARDHAN:**

**Will the PRIME MINISTER be pleased to state:**

- (a) whether the Indian Space Research Organisation (ISRO) has successfully launched eight Satellites into two different orbits in a single flight through PSLV-C35 recently;**
- (b) if so, the details thereof and the features of the said flight;**
- (c) whether the satellites launched also include satellites of foreign countries and if so, the details thereof;**
- (d) the total successful satellites flight taken off by PSLV of Indian as well as foreign countries till date, separately; and**

- 14
- (e) the quantum of foreign exchange earned by the Government during the said period and the number of foreign satellites waiting to be launched by ISRO?

**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) On September 26, 2016, ISRO's Polar Satellite Launch Vehicle (PSLV-C35) has successfully launched India's SCATSAT-1 satellite (weighing 371 kg) along with five satellites (weighing 279 kg) of foreign customers and two University/ academic institute's satellites (weighing 15 kg). This mission was the first PSLV mission to launch satellites into two different orbits and was also the longest of the PSLV missions conducted till date with duration of 2 hours, 15 minutes and 33 seconds.
- (c) Yes Madam. Five satellites of foreign customers were launched in this mission. These satellites are: ALSAT-1B, ALSAT-2B & ALSAT-1N (Algeria), NLS-19 (Canada) and Pathfinder-1 (USA).
- (d) Till date, PSLV has successfully launched 42 Indian Satellites (34 National satellites with a total mass of ~ 34,400 kg and 8 student satellites with a total mass of ~ 75 kg).  
PSLV has so far launched 79 foreign satellites (with a total mass of ~ 6100 kg) from 21 countries, on commercial basis,

**under contract between Antrix Corporation Limited and respective foreign customer.**

- (e) The quantum of foreign exchange earned through launching of these 79 foreign satellites amounts to approx. 21.7 Million USD and 127 Million Euros. A total of 108 foreign satellites are planned to be launched on-board PSLV in the coming years.**

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**GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE**

**LOK SABHA  
UNSTARRED QUESTION NO.213  
TO BE ANSWERED ON WEDNESDAY, NOVEMBER 16, 2016**

**INDIGENOUS MANNED AIRCRAFT**

**213 SHRI CHANDRA PRAKASH JOSHI:**

**SHRI HARI OM PANDEY:**

**DR. RATNA DE (NAG):**

**SHRI MANOJ TIWARI:**

**Will the PRIME MINISTER be pleased to state:**

- (a) whether the Government has any proposal to send "Indigenous Manned Aircraft" in space in near future;**
- (b) if so, the details thereof;**
- (c) if not, the reasons therefor; and**
- (d) the detailed information about recent development and plan out lay, if any, 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)to(c) No Madam. As of now, Manned Space Programme is not an approved programme. Currently, ISRO is developing a few critical technologies relevant for human spaceflight.**
- (d) The development of critical technologies includes Crew Module (CM) systems, Environmental Control & Life Support System (ECLSS), Flight Suit and Crew Escape System (CES). The Crew module was realised and flight tested in the experimental mission of GSLV MkIII launched on 18-12-2014,**

where the re-entry characteristics and the recovery of the Crew Module was demonstrated. The flight suit development has been completed. Development of the ECLSS and the Crew Escape Systems are progressing well. Towards this, an amount of ₹ 173 Crore has been approved and out of which ₹ 136.90 Crore has been utilised as on 31<sup>st</sup> March, 2016.

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**GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE**

**LOK SABHA  
UNSTARRED QUESTION NO.226  
TO BE ANSWERED ON WEDNESDAY, NOVEMBER 16, 2016**

**LAUNCH OF SATELLITES**

**226 SHRIMATI V. SATHYA BAMA:**

**SHRI PR. SENTHIL NATHAN:**

**Will the PRIME MINISTER be pleased to state:**

- (a) whether the Government has provided adequate funds for the SHAR Centre Sriharikota and ISRO Centres across the country in the last two years;**
- (b) if so, the details thereof and funds allocated for SHAR Centre and ISRO Centres;**
- (c) whether the Government has signed MoU or any agreements with foreign countries for the launching of their satellites/space ships from SHAR Centre Sriharikota;**
- (d) if so, the details thereof and the summary of the MoU/agreements signed between India and other foreign countries;**
- (e) the details of income generated/to be generated for using our SHAR Centre Sriharikota for the launch of their satellites/space vehicles etc.; and**
- (f) the steps taken by the Government to increase the strength of qualified people at SHAR Centre and ISRO?**

**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 funds allocated for SHAR Centre and other ISRO Centres during last two years are given below:

[Rs in Crores]

Centre/ Unit	Budget Allocated (2014-15)	Budget Allocated (2015-16)
Satish Dhawan Space Centre - SHAR	527.00	722.68
Other ISRO Centres/ Programmes	5299.00	6236.76
<b>Total</b>	<b>5826.00</b>	<b>6959.44</b>

- (c)&(d) No Madam. The launching of satellites of foreign customers, on-board India's Polar Satellite Launch Vehicle (PSLV) is facilitated through Antrix corporation limited (Antrix), the commercial arm of DOS. As on date, 79 satellites from 21 countries have been successfully launched on-board PSLV from SHAR, Sriharikota. Towards launching of these foreign satellites, Antrix has entered into 41 Launch Services Agreement with foreign customer viz. Argentina (1), Algeria (2), Belgium (1), Canada (11), France (2), Germany (7), Italy (1), Indonesia (2), Israel (1), Japan (1), Luxembourg (1), Netherlands (1), Republic of Korea (1), Singapore (3), UK (2) and USA (4).
- (e) The income generated so far through launching of these 79 foreign satellites amounts to approx. 21.7 Million USD and 127 Million Euros.

- (f) **To meet the increased demands for space based services in the Country and to enhance the core competency in the Organisation, a proposal for suitably augmenting the manpower, has been generated and the same has been reviewed and recommended by the Space Commission. Further, the proposal for augmentation of human resources has been taken up and is under processing.**

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**GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE**

**LOK SABHA  
STARRED QUESTION NO.116**

**TO BE ANSWERED ON WEDNESDAY, NOVEMBER 23, 2016**

**LAUNCH OF SATELLITE**

**\*116. SHRI RAKESH SINGH:**

**Will the PRIME MINISTER be pleased to state:**

- (a) whether the country has achieved expertise in launching satellite into space;**
- (b) if so, the details thereof and the percentage of success in this regard;**
- (c) whether the share of the country in global satellite market is very less despite such expertise and if so, the reasons therefor; and**
- (d) the measures taken by the Government to increase the share of the country in commercial prospects in this sector?**

**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.**

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**STATEMENT LAID ON THE TABLE OF THE LOK SABHA IN REPLY TO  
STARRED QUESTION NO.116 REGARDING "LAUNCH OF SATELLITE"  
ASKED BY SHRI RAKESH SINGH FOR ANSWER ON WEDNESDAY,  
NOVEMBER 23, 2016.**

- (a) **Yes Madam.**
- (b) **Presently, ISRO has one operational launch vehicle, Polar Satellite Launch Vehicle (PSLV). Geosynchronous Satellite Launch Vehicle (GSLV MkII) with indigenous cryogenic stage had three consecutive successful flights and efforts are underway to operationalise it.**

**The PSLV has the capability to carry 1750 kg to 600 km Sun Synchronous Polar orbit. Till date, thirty-seven launches of PSLV have taken place and the last thirty six missions have been successful. Thus, PSLV has witnessed a success rate of 97.3%. The GSLV MkII has the capability to launch 2 tonne class of satellites into Geosynchronous Transfer Orbit (GTO). Till date, ten launches of GSLV MkII have taken place, out of which seven were successful. GSLV MkII has a success rate of 70%. The last three missions with indigenous cryogenic stage were successful. Since 2011, PSLV and GSLV MkII have a 100% success rate.**

**The next generation launch vehicle, GSLV MkIII, capable of launching 3.5 to 4 tonne class of satellite is in an advanced stage of development. The first developmental flight of GSLV Mk-III is targeted during first quarter of 2017.**

- (c) As of now, the spare capacity available onboard PSLV, after meeting the national requirements, is provided for commercial launch services. Till date, besides 42 Indian Satellites (34 National satellites with a total mass of ~ 34,400 kg and 8 student satellites with a total mass of 75 kg), PSLV has successfully launched 79 foreign satellites (with a total mass of ~ 6100 kg) from 21 countries on commercial basis. Since the priority for PSLV is to meet the national requirement and only spare capacity is made available for commercial launch services, the share of the country in global satellite market is very less.
- (d) In order to meet the enhanced national requirements for launching satellites for earth observation, communication & navigation, ISRO is taking steps to increase the launch capacity. ISRO will continue to provide the launch capacity, when available, for commercial launch services. Towards stepping up the launch capacity, ISRO is in the process of exploring the possibility of enhanced involvement of Indian industry. Besides meeting the national demand, the industry can explore the opportunities for commercial launch services.

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**GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE**

**LOK SABHA  
UNSTARRED QUESTION NO.1218**

**TO BE ANSWERED ON WEDNESDAY, NOVEMBER 23, 2016**

**FUNDS FOR SPACE TECHNOLOGY**

**1218. DR. KIRIT P. SOLANKI:**

**Will the PRIME MINISTER be pleased to state:**

- (a) the quantum of funds allocated by the Government for the development of space technology during the last three years;**
- (b) whether some amount has remained unspent during the last financial year;**
- (c) if so, the details thereof;**
- (d) whether more budget is required for space technology after the advent of revolution in the field of information technology; and**
- (e) if so, the percent-wise increase in the budget by the Government along with the details thereof?**

**ANSWER**

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

**(DR. JITENDRA SINGH):**

- (a) The amount of funds allocated to Department of Space for the development of space technology during the last three years are given below:**

(₹ in crores)

Financial Year	Budget Allocated
2013-14	5172.00
2014-15	5826.00
2015-16	6959.44

(b) &amp; (c)

During last financial year, the Department of Space has utilized funds to the extent of 99.43% w.r.t. to RE allocations. The details of amount utilized and that has remained unspent during the last financial year is given below:

(₹ in crores)

Financial Year	Revised Estimates	Actuals	Amount unspent	% utilisation wrt RE
2015-16	6959.44	6920.00	39.44	99.43%

(d) &amp; (e)

The requirement of funds for Space Technology is driven by the programmatic targets envisaged during coming years. It is proposed to increase the budget allocations in 2016-17 for Space Technology compared to RE allocation made during previous financial year.

The increased allocation is proposed to be utilized for meeting the programmatic targets such as supporting space based information technology connectivity in the country through first generation high throughput communication satellite like GSAT-11 operating in Ka/Ku band; development of Advanced Launch Vehicle Technology; high-resolution imaging system; Satellite Navigation System; and Space Science & Planetary Exploration.

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**GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE**

**LOK SABHA  
UNSTARRED QUESTION NO.1274**

**TO BE ANSWERED ON WEDNESDAY, NOVEMBER 23, 2016**

**AGREEMENT WITH FRENCH AGENCY**

**1274. SHRIMATI KAVITHA KALVAKUNTLA:**

**Will the PRIME MINISTER be pleased to state:**

- (a) whether the Indian Space Research Organisation (ISRO) has entered into any agreement with French National Space Agency and other global space agencies to combat climate change;**
- (b) if so, the details thereof; and**
- (c) the manner in which ISRO will be contributing to this global effort?**

**ANSWER**

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

**(DR. JITENDRA SINGH):**

- (a) No Madam. Indian Space Research Organisation (ISRO) has not entered into any agreement so far with French National Space Agency (CNES) and other global space agencies to combat climate change.**

**(b) Does not arise.**

**(c) ISRO and CNES have jointly organized a meeting on April, 03, 2016 at New Delhi to highlight the importance of space inputs for climate change studies and to support government decisions taken during Committee of Parties (COP-21) meeting at Paris. Heads of space agencies and their representatives from India, France, USA, Japan, Mexico and Europe (ESA & EUMETSAT) have attended this event and approved the principles of a Declaration underlining the commitments made by the space sector to evolve space-based operational tools combining in-situ measurements and increased computing resources; develop new technologies to be flown in space or encourage their research community to contribute actively with new models. Cooperation to cross-calibrate instruments and cross-validate their measurements, in order to achieve an international, independent system for estimating the emissions of all world nations based on internationally accepted data, thus creating a level playing field and an independent basis for further reductions was also stressed at this meeting.**

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**GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE**

**LOK SABHA  
UNSTARRED QUESTION NO.1280**

**TO BE ANSWERED ON WEDNESDAY, NOVEMBER 23, 2016**

**INTERNATIONAL SPACE STATION**

**1280. SHRI MOHITE PATIL VIJAYSINH SHANKARRAO:**

**SHRI DHANANJAY MAHADIK:**

**Will the PRIME MINISTER be pleased to state:**

- (a) whether India is yet to become a member of the international space station and if so, the details thereof and the reasons therefor;**
- (b) whether the Indian Space Research Organisation (ISRO) is developing a technology that will allow it to transfer humans from one vehicle or spacecraft to another in space and if so, the details thereof;**
- (c) the aims and objectives behind the move; and**
- (d) the time by which this technology will be developed?**

**ANSWER**

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

**(DR. JITENDRA SINGH):**

- (a) **Yes Madam. India is yet to become a member. The studies on the possibilities of conducting Earth Observation experiments, utilizing International Space Station (ISS) as platform, for Earth's environment and climate are underway.**
- (b) **No Madam.**
- (c) **Does not arise.**
- (d) **Does not arise.**

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**GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE**

**LOK SABHA  
UNSTARRED QUESTION NO.1287**

**TO BE ANSWERED ON WEDNESDAY, NOVEMBER 23, 2016**

**SATELLITES LAUNCHED**

**1287. SHRI M.K. RAGHAVAN:**

**DR. K. GOPAL:**

**SHRI K.N. RAMACHANDRAN:**

**Will the PRIME MINISTER be pleased to state:**

- (a) whether India's space capacity of 34 working satellites is barely half of what the country needs and is severely limited to meet increasing demands from both the centre and State Governments and business and if so, the details thereof;**
- (b) whether ISRO plans to put 12-18 satellites in space each year to meet this demand and also wants to be free to pursue higher technologies and if so, the details thereof;**
- (c) whether the domestic industry should urgently step into making satellites and launch vehicles to meet this demand;**
- (d) if so, the steps taken by the Government to encourage the domestic industry for taking up this cause and the details of private industries working with ISRO?**

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

- (a) India presently has 38 operational satellites in orbit comprising of 16 Earth observation (including meteorological), 13 communication, 7 navigational and 2 Space Science satellites. These satellites are being utilized to their full capacity to meet the demands of Central & State Governments and business in the area of natural resources management, infrastructure planning, disaster management support, enabling weather forecasting, including the demands of satellite communication. To ensure continuity of services and to meet further demands in these areas, a plan is in place to suitably augment the space infrastructure.

(b), (c) & (d)

Considering the enhanced national requirements for launching satellites for earth observation, communication & navigation, the present capacity of launches is a constraint. ISRO has been pursuing a conscious approach of building up and nurturing the industrial capabilities in the country to maximally support the Indian Space Programme. Through appropriate transfer of technology and hand-holding, ISRO is making focused efforts to enhance participation of Indian



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**industries for manufacturing of space related hardware such as rocket engine & stages, propellant tanks, spacecraft structures, solar panels, thermal control systems, electronic packages etc., required for satellites and launch vehicles.**

**In order to step up the launch capacity within the country, ISRO is in the process of exploring the possibility of involving Indian industry in a greater role towards productionization of integrated systems/ subsystems, including assembly and testing by vendor as per ISRO's design.**

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**GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE**

**LOK SABHA  
UNSTARRED QUESTION NO.1343**

**TO BE ANSWERED ON WEDNESDAY, NOVEMBER 23, 2016**

**BILATERAL AGREEMENTS**

**1343. SHRI P.R. SUNDARAM:**

**Will the PRIME MINISTER be pleased to state:**

- (a) the details of the bilateral agreements signed with foreign countries in the fields of space research and rocket launch technology; and**
- (b) the expected developments from new space projects initiated by the Department of Space in the next two years?**

**ANSWER**

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

**(DR. JITENDRA SINGH):**

- (a) Government of India and its national space body, the Indian Space Research Organisation (ISRO) of Department of Space (DOS) has signed MoU/ bilateral agreements with 39 foreign countries on peaceful uses of outer space viz. Afghanistan, 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, United Arab Emirates, Venezuela and Vietnam. The scope of cooperation under these MoUs include - Joint development of scientific instruments; joint realization of satellite missions; joint calibration and validation experiments; development of advanced technologies for building and launching of spacecrafts for earth observation and space science exploration.**

- (b) The outcomes expected from various new space projects in the next two years include – (i) continuity of data and services for natural resources monitoring, all weather imaging, oceanography, disaster management support; (ii) enhancing remote sensing capability with high resolution data; (iii) augmentation of INSAT/GSAT capacity; (iv) enhancing communication capability with high throughput satellites; (v) building indigenous capability for launching 4 ton class communication satellites; (vi) building operational applications of indigenous navigation system NavIC.**

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**GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE**

**LOK SABHA  
STARRED QUESTION NO.219**

**TO BE ANSWERED ON WEDNESDAY, NOVEMBER 30, 2016**

**WEATHER SATELLITE**

**\*219. SHRI SUMAN BALKA:**

**Will the PRIME MINISTER be pleased to state:**

- (a) whether the Indian Space Research Organisation has successfully launched the country's weather satellite INSAT-3DR, into a Geosynchronous Transfer Orbit (GTO) to provide variety of inputs essential for accurate weather forecasting; 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) A Statement is laid on the Table of the House.**

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**STATEMENT LAID ON THE TABLE OF THE LOK SABHA IN REPLY TO  
STARRED QUESTION NO.219 REGARDING "WEATHER SATELLITE"  
ASKED BY SHRI SUMAN BALKA FOR ANSWER ON WEDNESDAY,  
NOVEMBER 30, 2016.**

- (a) **Yes Madam. Indian Space Research Organisation (ISRO) has successfully launched Indian weather satellite 'INSAT-3DR' into a Geosynchronous Transfer Orbit (GTO) onboard India's Geosynchronous Satellite Launch Vehicle 'GSLV-F05' (equipped with the indigenous Cryogenic Upper Stage) on September 08, 2016 from Satish Dhawan Space Centre, Sriharikota. After completing orbit raising operations, INSAT-3DR has been positioned in its designated slot of 74 degree East longitude in geostationary orbit.**
- (b) **INSAT-3DR carries two meteorological payloads viz., 6 channel Imaging system and 19 channel Atmospheric sounder. It also carries a Data Relay Transponder (DRT) and Satellite Aided Search and Rescue (SA&R) payload.**
- The multi-spectral Imaging system generates images of the earth, every 30 minutes, in six wavelength bands (visible, shortwave infrared, middle infrared, water vapor and 2 bands in thermal infrared region) to derive information on various parameters, viz. outgoing long-wave radiation, quantitative precipitation estimation, sea surface temperature, snow cover, cloud motion winds, fog etc. The atmospheric sounder has eighteen narrow spectral channels in shortwave infrared,**

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middle infrared and long wave infrared regions and one channel in the visible region. It provides information on vertical profiles of temperature, humidity and integrated ozone. These profiles are available for a selected region over Indian landmass every one hour and for the entire Indian Ocean Region every six hours. The data and geophysical products derived from INSAT-3DR are assimilated in numerical weather models for weather forecasting, including cyclone tracking.

INSAT-3DR together with INSAT-3D launched in 2013 provides images every 15 minutes.

DRT is used for receiving meteorological, hydrological and oceanographic data from remote, uninhabited locations over the coverage area from Data Collection Platforms (DCPs) and data is relayed back for down linking in extended C-Band.

SAS & R payload (operating in 406 MHz) picks up and relays the alert signals originating from the distress beacons of maritime, aviation and land based users to the Indian Mission Control Centre (INMCC) located at ISRO Telemetry, Tracking and Command Network (ISTRAC), Bangalore.

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**GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE**

**LOK SABHA  
UNSTARRED QUESTION NO.2322**

**TO BE ANSWERED ON WEDNESDAY, NOVEMBER 30, 2016**

**LAUNCH OF SATELLITES**

**2322. SHRI JAYADEV GALLA:**

**Will the PRIME MINISTER be pleased to state:**

- (a) whether ISRO is going to launch 82 satellites in one go in January, 2017;**
- (b) if so, the details thereof; and**
- (c) the details of preparedness to achieve this feat?**

**ANSWER**

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

**(DR. JITENDRA SINGH):**

**(a) & (b)**

**ISRO is planning to launch 83 satellites on-board India's Polar Satellite Launch Vehicle 'PSLV-C37' during January 2017 from Satish Dhawan Space Centre, Sriharikota.**

**The 83 satellites being launched in this mission include – (i) 3 Indian satellites namely Cartosat-2 Series (weighing 730 kg) as primary payload, INS-1A & INS-1B (total weighing 30 kg)**

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and (ii) 80 satellites (total weighing 500 kg) belonging to international customers from five countries, viz. Israel, Kazakhstan, Netherlands, Switzerland and USA. These international customer satellites are being launched as part of the commercial arrangement entered into between the customer and Antrix Corporation Limited (Antrix), a Government of India Company under Department of Space (DOS) and the commercial arm of Indian Space Research Organisation (ISRO).

- (c) Towards preparedness of this mission, activities related to mission studies, satellite interface analysis and several other technical/ programmatic aspects related to the launch are progressing.

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**GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE**

**LOK SABHA  
UNSTARRED QUESTION NO.2379**

**TO BE ANSWERED ON WEDNESDAY, NOVEMBER 30, 2016**

**MEGA SPACE LAUNCHER**

**2379. SHRI G. HARI:**

**Will the PRIME MINISTER be pleased to state:**

- (a) whether an advanced Indian mega space launcher that can deliver ten tonne and heavier communication satellites to space and using semi cryogenic engine is likely to power ISRO's launchers by around 2018 and if so, the details thereof;**
- (b) whether ISRO is gearing up for first test flight of the GSLV Mark-III vehicle in December with a 4000 kg payload and if so, the details thereof;**
- (c) whether the Government has approved the development of the semi cryogenic stage alone; 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) No Madam. The semicryogenic engine is currently under development and the semicryogenic stage using this engine is**

expected to be qualified in the next five years. Whereas, an advanced space launcher that can deliver ten-tonne and heavier communication satellites to space requires a booster stage with clustered Semi-cryogenic engines.

- (b) The first developmental flight of the GSLV Mark-III vehicle i.e. GSLV MkIII-D1 is expected to be launched in the first quarter of 2017. The capacity to launch 4 tonnes will be achieved after a few developmental flights. GSLV MkIII-D1 will put a communication satellite namely GSAT-19 into orbit.

(c) & (d)

No Madam. Approval is yet to be obtained for the development of the semicryogenic stage. The technical project report for initiating the approval process is under preparation.

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**GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE**

**LOK SABHA  
UNSTARRED QUESTION NO.2390**

**TO BE ANSWERED ON WEDNESDAY, NOVEMBER 30, 2016**

**INDIGENOUS SATELLITES**

**2390. DR. KIRIT P. SOLANKI:**

**Will the PRIME MINISTER be pleased to state:**

- (a) the number of indigenous satellites successfully placed into the space orbit by India during the last three years along with the number of satellites which got destroyed before being placed in the orbit;**
- (b) whether other countries have used the information given by the satellites which have been placed into the orbit for their own interests without the knowledge of our Government and if so, the details thereof;**
- (c) the number of satellites which our Government have placed into the orbit with the help of other countries along with the cost involved therein and the present status of these satellites at present;**
- (d) whether some countries want to take help of Indian Spacecraft launching stations to launch their 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) During last three years i.e. during 2013-14, 2014-15 and 2015-16, fourteen (14) indigenously built satellites have been successfully placed in their orbit. During the above said period, no satellite got destroyed before being placed in the desired orbit or in the orbit.
- (b) No Madam.
- (c) As on date, 29 satellites have been launched from outside the country. Out of these, for 3 satellites (Aryabhata, Bhaskara-1 & Bhaskara-2) free launch was provided by Russia as part of Indo-Soviet friendship and for 1 satellite (Apple), Ariane offered a free launch in their developmental flight. Remaining satellites were launched by hiring launch services on a commercial basis. The details are attached in Annexure-1.
- (d) & (e)

The Indian satellite launching station, located at Sriharikota, is used exclusively for launch vehicles developed by ISRO. While 79 foreign satellites from 21 countries have already been launched into orbit using ISRO's Polar Satellite Launch Vehicle under commercial arrangements with Antrix Corporation Limited (Antrix), agreements have been signed for launching 109 foreign satellites from 10 countries viz. Canada, Germany, Israel, Italy, Japan, Kazakhstan, Malaysia, Netherlands, Switzerland and USA. The launches of these foreign satellites are envisaged by December 2018.

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Annexure referred to in reply to part (c) of Lok Sabha Unstarred Question No. 2390 for answer on 30/11/2016

## Satellites launched with the support from other countries

SN	Satellite	Country	Launch Date	Launch Cost (₹ in Crores)	Present Status
1	Aryabhata	Russia	19-04-1975	free	India's first experimental satellite. Mission completed
2	Bhaskara-1	Russia	07-06-1979	free	Mission completed
3	Bhaskara-2		20-11-1981	free	Mission completed
4	Apple	France	19-06-1981	free	Mission completed
5	INSAT-1A	United States of America	10-04-1982	468.57	Failed in Orbit
6	INSAT-1B		30-08-1983		Mission Completed
7	INSAT-1C		22-07-1988		Mission Completed
8	INSAT-1D		12-06-1990		Mission Completed
9	IRS-1A	Russia	17-03-1988	7.50	Mission Completed
10	IRS-1B		29-08-1991	31.80	Mission Completed
11	INSAT-2A	France	10-07-1992	785.10	Mission Completed
12	INSAT-2B		23-07-1993		Mission Completed
13	INSAT-2C		07-12-1995		Mission Completed
14	INSAT-2D		04-06-1997		Failed in orbit
15	INSAT-2E		03-04-1999		Mission Completed
16	IRS-1C	Russia	28-12-1995	60.31	Mission Completed
17	INSAT-3A	France	10-04-2003	2273.63	Working 1 ½ years beyond Designed Life
18	INSAT-3B		22-03-2000		Mission Completed
19	INSAT-3C		24-01-2002		Working 2 ½ years beyond Designed Life
20	INSAT-3D		26-07-2013		Expected life 4 more Years
21	INSAT-3E		28-09-2003		Mission Completed
22	INSAT-4A	France	22-12-2005	875.00	Expected life 1 ½ more Years
23	INSAT-4B		12-03-2007		Expected life 2 ½ more Years
24	GSAT-7	France	30-08-2013	485.29	Expected life 4 more Years
25	GSAT-8	France	21-05-2011	297.00	Expected life 6 ½ more Years
26	GSAT-10	France	29-09-2012	406.82	Expected life 11 more Years
27	GSAT-15	France	11-11-2015	601.19	Expected life 11 more Years
28	GSAT-16	France	07-12-2014	581.00	Expected life 10 ½ more Years
29	GSAT-18	France	06-10-2016	458.69	Expected life 15 more Years

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**GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE**

**LOK SABHA  
UNSTARRED QUESTION NO.3476**

**TO BE ANSWERED ON WEDNESDAY, DECEMBER 7, 2016**

**SCRAMJET ENGINE**

**3476. ADV. JOICE GEORGE:**

**SHRI RAM CHARITRA NISHAD:**

**Will the PRIME MINISTER be pleased to state:**

- (a) whether ISRO has successfully demonstrated air breathing propulsion system using scramjet engine technology;**
- (b) if so, the details thereof;**
- (c) the total budget expenditure for the project;**
- (d) whether with this engine, ISRO can reduce the cost per kg. of payload; 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)**

**The first experimental mission of a sub-scale Scramjet engine, towards the realization of an Air Breathing Propulsion System,**

was successfully conducted on August 28, 2016 (at 0600 hrs IST) from Satish Dhawan Space Centre, Sriharikota. Various flight events, namely, burn out of booster rocket stage, ignition of second stage solid rocket, functioning of Scramjet engines, followed by burn out of the second stage took place exactly as planned. With this experimental flight, critical technologies such as ignition of air breathing engines at supersonic speed, holding the flame at supersonic speed, air intake mechanism and fuel injection systems have been successfully demonstrated.

- (c) The total cost incurred towards carrying out the first experimental mission of the Scramjet engine is ₹ 8 Crores.
- (d) No Madam. The Scramjet engine, used in the first experimental mission is a scaled down version to demonstrate proof-of-concept.
- (e) Scramjet engine technology is a complex technology which is yet to be fully proven worldwide. A series of technology demonstration tests are required before inducting the engine with required thrust into future launch vehicles. The technology will be useful only during the atmospheric phase of the flight of launch vehicle and will benefit in bringing down the cost of access to space, by reducing the need of carrying the oxidizer along with the fuel.

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**GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE**

**LOK SABHA  
UNSTARRED QUESTION NO.3484**

**TO BE ANSWERED ON WEDNESDAY, DECEMBER 7, 2016**

**MARS ORBITER MISSION-II**

**3484. SHRI B. SENGUTTUVAN:**

**Will the PRIME MINISTER be pleased to state:**

- (a) whether ISRO has any proposal for sending Mars Orbiter Mission-II (MOM) with a view to studying the red planet from a much closer orbit than the MOM-I and if so, the details thereof;**
- (b) the time frame by which ISRO would send MOM-II to the Mars; and**
- (c) whether the advisory Committee for Space Science is scrutinizing the said scientific proposals to be undertaken for MOM-II 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), (b) & (c)**

**The configuration, objectives and scientific experiments of Mars Orbiter Mission-2 is yet to be formulated. A call for proposals through an Announcement of Opportunity (AO) has been made within India to seek proposals for scientific experiments for Mars Orbiter Mission-2. After receiving the scientific proposals, it will be scrutinized subsequently.**

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**GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE**

**LOK SABHA  
UNSTARRED QUESTION NO.3541**

**TO BE ANSWERED ON WEDNESDAY, DECEMBER 7, 2016**

**REUSABLE LAUNCH VEHICLE**

**3541. SHRIMATI MEENAKASHI LEKHI:**

**Will the PRIME MINISTER be pleased to state:**

- (a) whether the Indian Space Research Organisation is planning to launch reusable vehicle namely the Reusable Launch Vehicle Technology Demonstrator (RLVTD) in near future; 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)**

**ISRO has successfully carried out the first experimental mission of Reusable Launch Vehicle – Technology Demonstrator (RLV-TD), on May 23, 2016 from Satish Dhawan Space Centre, Sriharikota. In this mission, critical technologies such as autonomous navigation, guidance &**

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control and reusable thermal protection system have been successfully demonstrated.

The Development of Reusable Launch Vehicle is a technical challenge and it involves the development of many cutting edge technologies. Presently, it is in the preliminary stage of total developmental process. A series of technology demonstration missions would be required before it is made operational.

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**GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE**

**LOK SABHA  
UNSTARRED QUESTION NO.3556**

**TO BE ANSWERED ON WEDNESDAY, DECEMBER 7, 2016**

**LAUNCH OF FOREIGN SATELLITES**

**3556. SHRI HARISH CHANDRA ALIAS HARISH DWIVEDI:**

**Will the PRIME MINISTER be pleased to state:**

- (a) the names of the countries whose satellites have been commercially launched by ISRO so far;**
- (b) whether the Government has earned any income from the said launches;**
- (c) if so, the year-wise, country-wise details of income earned during the last six years;**
- (d) whether the Government also launches satellites of private companies; 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) As on date, 79 satellites from 21 countries have been successfully launched by ISRO on-board India's Polar Satellite Launch Vehicle (PSLV), under a commercial arrangement between Antrix Corporation Limited, the commercial arm of ISRO and the foreign customer. The countries whose satellites**

have been commercially launched by ISRO are Algeria, Argentina, Austria, Belgium, Canada, Denmark, France, Germany, Italy, Indonesia, Israel, Japan, Luxembourg, Netherlands, Norway, Republic of Korea, Switzerland, Singapore, Turkey, UK and USA.

(b) Yes Madam. Antrix has earned a total income of about 21.7 Million USD and 127 Million Euros through launching of these 79 foreign satellites during the period May 1999 to September 2016.

(c) The details of the income earned by Antrix, year-wise over the last six years through launching of foreign satellites is:

Year 2010 : 2.97 Million Euros

Year 2011 : 1 Million USD and 0.54 Million Euros

Year 2012 : 14.2 Million Euros

Year 2013 : 6.9 Million Euros

Year 2014 : 18.2 Million Euros

Year 2015 : 55.5 Million Euros.

(d) Yes Madam.

(e) Some of the major foreign companies, whose satellites were launched onboard PSLV includes viz. MDA, Canada; Airbus Defence & Space, France; OHB System, Germany; IAI, Israel; ST Electronics, Singapore; Surrey Satellite Technology Limited (SSTL), UK; Terra Bella, a Google company, USA; Planet Labs, USA; Spire Global Inc. USA; BlackSky Global, USA.

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**GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE**

**LOK SABHA  
UNSTARRED QUESTION NO.3613**

**TO BE ANSWERED ON WEDNESDAY, DECEMBER 7, 2016**

**ALLOCATION FOR SPACE PROJECTS**

**3613. DR. BHOLA SINGH:**

**Will the PRIME MINISTER be pleased to state:**

- (a) the details of funds allocated to the Department of Space during the last three years, project-wise; and**
- (b) the quantum of funds spent and the results of the schemes on which the funds were spent?**

**ANSWER**

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

**(DR. JITENDRA SINGH):**

- (a)&(b) The details of funds allocated to Department of Space and quantum of funds spent during last three years, programme/ project /Centre/ Unit/ scheme-wise are given as Annexure-A.**

**The major results/achievements of the above schemes include**

- (i) Launch of 11 flights of Polar Satellite Launch Vehicle i.e. PSLV C22 to PSLV C-32; (ii) Launch of two developmental flights of GSLV with indigenous cryogenic stage;**

**(iii) Experimental flight of GSLV MK III, including demonstration Crew Module Atmospheric Re-Entry Experiment; (iv) Operationalisation of advanced meteorological satellite INSAT-3D; (v) Launch and operationalisation of five communication satellites viz. GSAT-6, GSAT-7, GSAT-14, GSAT-15 & GSAT-16; (vi) Launch of six navigational satellites of NavIC Constellation i.e IRNSS-1A to IRNSS-1F; (vii) Successful insertion of Mars Orbiter into martian orbit.; (viii) Placing multi wavelength observatory i.e. ASTROSAT in space; (ix) Space Based Information support for natural resource management, governance and development including disaster management.**

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**ANNEXURE-A**

Annexure referred to in reply to part (a)&(b) of Lok Sabha  
unstarred question No.3613 for answer on 07.12.2016

(₹ in crores)

SI No	Programmes /Projects/ Centres/ Units	2013-14		2014-15		2015-16	
		Allocated (RE)	Spent	Allocated (RE)	Spent	Allocated (RE)	Spent
I	Launch Vehicle Technology	1697.96	1674.67	1996.02	2007.18	2498.52	2524.66
II	Satellite Technology	726.00	745.63	852.09	846.33	971.28	967.30
III	Tracking & launch Support Infrastructure	541.00	539.85	666.50	666.56	881.98	847.69
IV	Space Applications	593.02	591.13	736.20	734.97	967.63	931.02
V	Space Sciences	404.50	406.77	305.85	305.43	297.75	313.23
VI	Direction Administration/ Other programmes	173.71	169.91	145.31	146.59	174.53	163.75
VII	INSAT Operational	1035.85	1041.00	1124.03	1116.39	1167.75	1172.35
	<b>Total</b>	<b>5172.04</b>	<b>5168.96</b>	<b>5826.00</b>	<b>5823.45</b>	<b>6959.44</b>	<b>6920.00</b>

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**GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE**

**LOK SABHA  
UNSTARRED QUESTION NO.3619**

**TO BE ANSWERED ON WEDNESDAY, DECEMBER 7, 2016**

**EXPLORING NEW CELESTIAL BODIES**

**3619. SHRI KUNWAR PUSHPENDRA SINGH CHANDEL:**

**Will the PRIME MINISTER be pleased to state:**

- (a) whether the Government has prepared any proposal for discovery of new celestial bodies and life on other planets;**
- (b) if so, the details thereof;**
- (c) whether the Government proposes to promote new research projects on space science;**
- (d) if so, the details thereof; and**
- (e) the details of funds spent and techniques patented in space sector during the last three years?**

**ANSWER**

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

**(DR. JITENDRA SINGH):**

- (a) No Madam. ISRO has not prepared any proposal for discovery of new celestial bodies and life on other planets.**
- (b) Does not arise.**



- (c) **Yes Madam.**
- (d) **ISRO is working on two Space Science projects namely Aditya-L1 and X-ray Polarimeter satellite (XPoSAT). Aditya-L1 mission is aimed at studying the Sun from a halo orbit around the Sun-Earth Lagrangian point 1 (L1), which is about 1.5 million kilometers from the Earth. It carries seven payloads to observe the photosphere, chromosphere and the outermost layers of the Sun, the corona in different wavebands. XPoSAT is the first satellite devoted for X-ray polarization studies of celestial sources.**
- (e) **The details of funds spent in the space sector during the last three years is given below:**

(₹ in crores)

<b>Financial Year</b>	<b>2013-14</b>	<b>2014-15</b>	<b>2015-16</b>
<b>Amount Spent</b>	<b>5168.95</b>	<b>5823.45</b>	<b>6920.00</b>

**The details of patents filed and granted during last three years are given below:**

<b>Financial Year</b>	<b>Patents Filed</b>	<b>Patents Granted</b>
<b>2013-14</b>	<b>19</b>	<b>2</b>
<b>2014-15</b>	<b>13</b>	<b>12</b>
<b>2015-16</b>	<b>25</b>	<b>15</b>

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**GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE**

**LOK SABHA  
UNSTARRED QUESTION NO.4401**

**TO BE ANSWERED ON WEDNESDAY, DECEMBER 14, 2016**

**NANOCRAFT**

**4401. SHRI KUNWAR PUSHPENDRA SINGH CHANDEL:**

**Will the PRIME MINISTER be pleased to state:**

- (a) whether the Government is contemplating to send nanocraft into space; 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) Yes Madam.**
- (b) Indian Space Research Organisation (ISRO) is planning to send two nano satellites into space namely INS-1A & INS-1B, weighing 10 kg each including payload mass of 5 kg. These nano satellites are meant for technology demonstration. Mission life is expected to be six months to one year.**

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**GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE**

**LOK SABHA  
UNSTARRED QUESTION NO.4498**

**TO BE ANSWERED ON WEDNESDAY, DECEMBER 14, 2016**

**ADOPTION OF VILLAGE**

**4498. SHRIMATI KOTHAPALLI GEETHA:**

**Will the PRIME MINISTER be pleased to state:**

- (a) whether ISRO has adopted drought hit villages to help farmers;**
- (b) if so, the details thereof and the manner in which ISRO is going to help the villagers in these villages;**
- (c) whether ISRO has any plan to adopt more such villages in the coming years; 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) As a part of Corporate Social Responsibility (CSR) activities, Antrix Corporation Limited, a Public Sector Unit under Department of Space and the commercial arm of ISRO, has adopted Brahmasandra Village, Tumukuru district, Karnataka.**

- (b) **Adoption of Brahmasandra village is through Bharatiya Agro Industries Foundation (BAIF), an NGO, empanelled by the Ministry of Drinking Water & Sanitation, New Delhi. Various activities planned include rain water harvesting, tank rejuvenation, construction of water harvesting structures, skill development, income generation, women empowerment, construction of household toilets, Anganwadis, services to livestock and fodder development. These activities are expected to improve agricultural productivity, availability of drinking water, sanitation facilities, ground water table, milk production, children's education, women empowerment and formation of a vibrant village development community for sustaining the benefits. Overall, the project aims to improve the quality of life of farmers and to address the basic needs of the village community.**
- (c) **No Madam. Adoption of more number of villages has not been envisaged at present.**
- (d) **Does not arise.**

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GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE

**RAJYA SABHA**  
**UNSTARRED QUESTION NO. 288**

TO BE ANSWERED ON THURSDAY, NOVEMBER 17, 2016

**INSTALLATION OF SECURITY GADGETS AT ISRO AND SHAR SPACE CENTRES**

288. DR. V. MAITREYAN:

Will the PRIME MINISTER be pleased to state:

- (a) whether Government has awarded any contracts to Public sector companies or Private companies dealing with security and surveillance, CCTV cameras, Thermal cameras and IRIS detection systems to be installed at Sriharikota High Altitude Range (SHAR) Center Sriharikota and other Indian Space Research Organisation (ISRO) installations;
- (b) if so, the details thereof and if not, the reasons therefore;
- (c) the details of the funds earmarked for the such purposes; and
- (d) the steps taken by Government to tighten and increase the security and surveillance and vigilance at SHAR centre and other ISRO installations?

**ANSWER**

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

(DR. JITENDRA SINGH):

(a)to(c) Yes Sir. Security and surveillance is a continuous process. Based on the reviews conducted from time to time and directives issued by the concerned security agencies, various security/ surveillance gadgets viz. CCTV cameras, Thermal cameras, biometric systems, security power fencing etc., are installed/ being augmented in various ISRO Centres/ Units, including SHAR. To facilitate these systems, various Public sector/ Private Companies have been awarded contracts for procurement, installation and annual maintenance, following prescribed codal procedures.

The funds earmarked towards procurement, installation and annual maintenance of these security/ surveillance gadgets are approximately Rs. 48 crores.

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- (d) The security and surveillance of all major ISRO Centres/ Units and installations is entrusted to Central Industrial Security Force (CISF), under Ministry of Home Affairs (MHA) for providing round the clock security. All the extant orders and directives issued by MHA on security measures from time to time are being complied by the department. Some of the steps taken by ISRO to tighten and increase the security, surveillance and vigilance at SHAR centre and other ISRO installations include - (i) perimeter security, (ii) frisking & screening, (iii) power fencing, (iv) migration to biometric based Access Control System, (v) conduct of security awareness programmes and mock drills.

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GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE

**RAJYA SABHA**  
**UNSTARRED QUESTION NO. 1084**

TO BE ANSWERED ON THURSDAY, NOVEMBER 24, 2016

**DEPLOYMENT OF ROVER ON LUNAR SURFACE**

1084. SHRI T. RATHINAVEL:

Will the PRIME MINISTER be pleased to state:

- (a) whether it is a fact that Indian Space Research Organisation (ISRO) is bracing to deploy rover on lunar surface, if so, the details thereof;
- (b) whether it is also a fact that the wheeled rover would be useful in pursuing multiple applications by collecting soil and rock sediments; and
- (c) whether it is also a fact that the ISRO has not yet finalized the timing of its launch?

**ANSWER**

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

(DR. JITENDRA SINGH):

- (a) Yes Sir. Indian Space Research Organisation (ISRO) is planning to deploy a rover on the lunar surface in the Chandrayaan-2 mission. The Chandrayaan-2, India's second mission to the Moon, is a totally indigenous mission comprising of Orbiter, Lander and Rover. After reaching the 100 km lunar orbit, the Lander will soft land on the lunar surface at a specified site and deploy a rover.
- (b) The six-wheeled rover will move around the landing site in semi-autonomous mode as decided by the ground commands. The payloads on the rover will observe the lunar surface and send back data, which will be useful for chemical analysis of the lunar soil. Collection of soil and rock sediments is not planned in this mission.
- (c) ISRO is working towards the launch of Chandrayaan-2 during the first quarter of 2018.

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**RAJYA SABHA  
UNSTARRED QUESTION NO. 1085**

TO BE ANSWERED ON THURSDAY, NOVEMBER 24, 2016

**OBJECTIVES OF SECOND INDIAN MARS ORBITER MISSION-2**

1085. SHRIMATI AMBIKA SONI:

DR. T. SUBBARAMI REDDY:

Will the PRIME MINISTER be pleased to state:

- (a) the objectives of Second Indian Mars Orbiter Mission MOM-2 and by what time, it would be achieved;
- (b) what are additional experiments that would be undertaken in MOM-2, and what is the payload limit; and
- (c) in what way, it would be different from MOM-1, 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(c) The main objective of Mars Orbiter Mission (MOM), as a technology demonstration mission, is to demonstrate India's capability to insert MOM in Martian orbit and operating Mars Orbiter spacecraft for 6 months. MOM has completed 25 months in its orbit around Mars and is presently functioning satisfactorily.

A call for proposals through an Announcement of Opportunity (AO) has been made within India to seek proposals for scientific experiments for Mars Orbiter Mission-2. The configuration, objectives and scientific experiments of Mars Orbiter Mission-2 is yet to be formulated.

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GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE

**RAJYA SABHA  
UNSTARRED QUESTION NO. 1086**

TO BE ANSWERED ON THURSDAY, NOVEMBER 24, 2016

**ISRO CONDUCTING CRITICAL BAILOUT TEST**

1086. SHRI A.K. SELVARAJ:

Will the PRIME MINISTER be pleased to state:

- (a) whether it is a fact that the Indian Space Research Organisation (ISRO) is gearing up to conduct a critical crew bailout test to see how fast and effectively the crew module of an intended space mission could be punched out from the spacecraft in the event of an emergency; and
- (b) whether it is also a fact that while the overall aim is to master the technology that aims at rescuing the crew if a launch is aborted at any stage, the present test would try out the scenario of aborting a launch at the pad itself, if so, the details thereof?

**ANSWER**

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

(DR. JITENDRA SINGH):

- (a) No Sir. Crew bailout test is not planned. However, as part of development of critical technologies, Indian Space Research Organisation (ISRO) is planning to conduct a Pad Abort Test.
- (b) Yes Sir. The Pad Abort Test will demonstrate the effectiveness of the Escape System for safe escape in case the launch is aborted at the launch pad. In this test, the test article consists of an Unoccupied Module and an Escape System, with a height of 14 meter and lift-off mass of 12.5 ton. It will be propelled with the help of quick-acting solid motors and upon reaching a safe altitude and range, the unoccupied module separates and safely lands in the sea with the help of a parachute based deceleration system. The test will be conducted at Satish Dhawan Space Centre, Sriharikota.

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GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE

**RAJYA SABHA**  
**UNSTARRED QUESTION NO. 1885**

TO BE ANSWERED ON THURSDAY, DECEMBER 01, 2016

**PUTTING GSAT-19E INTO ORBIT**

1885. SHRI K.R. ARJUNAN:

Will the PRIME MINISTER be pleased to state:

- (a) whether Indian Space Research Organisation (ISRO) is working on to put into orbit GSAT-19E, an indigenous communication satellite that would weigh about 3.3 tonne payload;
- (b) whether it is also a fact that the satellite assembly and launching process of the GLSV Mk-III are at advanced stages; and
- (c) whether it is also a fact that the ISRO's target was to take the payload capacity beyond four tonnes in the coming years while concentrating on the launch of Chandrayaan-2 in less than two years, if so, the details thereof?

**ANSWER**

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

(DR. JITENDRA SINGH):

- (a) Yes Sir. Indian Space Research Organisation (ISRO) is working towards putting into orbit an indigenous communication satellite GSAT-19, weighing 3.3 tonne and carrying Ka/ Ku band payloads.
- (b) Yes Sir. The satellite assembly is in advanced stages. The launch campaign for the first developmental flight of GSLV Mk-III has commenced on September 29, 2016 at Satish Dhawan Space Centre (SDSC), Sriharikota.
- (c) Yes Sir. ISRO is working towards increasing the payload capacity of GSLV Mk-III beyond four tonnes in the coming years. The strategies identified to achieve the increased payload capacity include performance improvement of propulsion systems, inert mass optimisation and miniaturisation of avionics system. The Chandrayaan-2, comprising of Orbiter, Lander and Rover, with a total payload mass of 3250 kg is planned to be launched onboard GSLV Mk-II during the first quarter of 2018.

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GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE

RAJYA SABHA  
UNSTARRED QUESTION NO. 1886

TO BE ANSWERED ON THURSDAY, DECEMBER 01, 2016

**PROGRESS OF CHANDRAYAAN-2 MISSION**

1886. DR. T. SUBBARAMI REDDY:

SHRIMATI AMBIKA SONI:

Will the PRIME MINISTER be pleased to state:

- (a) what is the progress of Chandrayaan-2 mission and whether test flights are under way, if so, the details thereof;
- (b) whether orbiter with payloads which would orbit around the Moon would collect all scientific information, if so, the details thereof; and
- (c) by what time it is proposed to be launched?

**ANSWER**

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

(DR. JITENDRA SINGH):

- (a) Chandrayaan-2, India's second mission to the Moon, is a totally indigenous mission comprising of Orbiter, Lander and Rover. The Orbiter and Rover flight systems are in advanced stage of realisation. Payloads are under development at various ISRO Centres / laboratories. Realisation of indigenous Lander is in progress. Special tests for new systems in Lander have been identified and a Lander Sensors Performance Test (phase-1) over artificial craters created in Chitradurga district in Karnataka has been conducted. Lunar Terrain Test facility is ready for Lander drop test and Rover mobility tests.
- (b) The Orbiter carrying six payloads will orbit around the Moon in 100 km lunar orbit. The payloads will collect scientific information on lunar topography, mineralogy, elemental abundance, lunar exosphere and signatures of hydroxyl and water-ice.
- (c) ISRO is working towards the launch of Chandrayaan-2 during the first quarter of 2018.

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**RAJYA SABHA  
UNSTARRED QUESTION NO. 2691**

TO BE ANSWERED ON THURSDAY, DECEMBER 08, 2016

**INDIGENOUS SATELLITES PLACED SUCCESSFULLY IN ORBIT**

2691. SHRI PARIMAL NATHWANI:

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) what are the chances of using information from these satellites by other countries without the knowledge of Government of India, the details thereof; and
- (c) the number of satellites launched by Government with the support from other countries so far, the cost incurred thereon and the extant status thereof?

**ANSWER**

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

(DR. JITENDRA SINGH):

- (a) India presently has 38 indigenously manufactured satellites operational in orbit. It comprises of 12 Earth observation satellites (RESOURCESAT-1 & 2, CARTOSAT-1 & 2, CARTOSAT-2S [3 nos.], RISAT-1, OCEANSAT-2, MEGHA-TROPIQUES, SARAL & SCATSAT-1); 4 Meteorological satellites (INSAT-3D, KALPANA, INSAT-3A & INSAT-3DR); 13 communication satellites (INSAT-3C, 4A, 4B, 4CR, GSAT-6, 7, 8, 10, 12, 14, 15, 16 & 18), 7 navigational satellites (IRNSS-1A to 1G) and 2 Space Science satellites (Mars Orbiter Mission & ASTROSAT).

Since January 2011, none of the satellites got destroyed before being placed in the desired orbit.

- (b) The satellites are designed in such a way that it will not allow any information to be accessed or used without the knowledge of ISRO.

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- (c) As on date, 29 satellites have been launched from outside the country. Out of these, for 3 satellites (Aryabhata, Bhaskara-1 & Bhaskara-2), free launch was provided by Russia as part of Indo-Soviet friendship and for 1 satellite (Apple), Ariane offered a free launch in their developmental flight. Remaining satellites were launched by hiring launch services on a commercial basis. The details are attached in **Annexure-1**.

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Annexure referred to in reply to part (c) of Rajya Sabha Unstarred Question No.2691 for answer on 08.12.2016

Satellites launched with the support from other countries

SN	Satellite	Country	Launch Date	Launch Cost (₹ in Crores)	Present Status
1	Aryabhata	Russia	19-04-1975	free	India's first experimental satellite. Mission completed
2	Bhaskara-1	Russia	07-06-1979	free	Mission completed
3	Bhaskara-2		20-11-1981	free	Mission completed
4	Apple	France	19-06-1981	free	Mission completed
5	INSAT-1A	United States of America	10-04-1982	468.57	Failed in Orbit
6	INSAT-1B		30-08-1983		Mission Completed
7	INSAT-1C		22-07-1988		Mission Completed
8	INSAT-1D		12-06-1990		Mission Completed
9	IRS-1A	Russia	17-03-1988	7.50	Mission Completed
10	IRS-1B		29-08-1991	31.80	Mission Completed
11	INSAT-2A	France	10-07-1992	785.10	Mission Completed
12	INSAT-2B		23-07-1993		Mission Completed
13	INSAT-2C		07-12-1995		Mission Completed
14	INSAT-2D		04-06-1997		Failed in orbit
15	INSAT-2E		03-04-1999		Mission Completed
16	IRS-1C	Russia	28-12-1995	60.31	Mission Completed
17	INSAT-3A	France	10-04-2003	2273.63	Working 1 ½ years beyond Designed Life
18	INSAT-3B		22-03-2000		Mission Completed
19	INSAT-3C		24-01-2002		Working 2 ½ years beyond Designed Life
20	INSAT-3D		26-07-2013		Expected life 4 more Years
21	INSAT-3E		28-09-2003		Mission Completed
22	INSAT-4A	France	22-12-2005	875.00	Expected life 1 ½ more Years
23	INSAT-4B		12-03-2007		Expected life 2 ½ more Years
24	GSAT-7	France	30-08-2013	485.29	Expected life 4 more Years
25	GSAT-8	France	21-05-2011	297.00	Expected life 6 ½ more Years
26	GSAT-10	France	29-09-2012	406.82	Expected life 11 more Years
27	GSAT-15	France	11-11-2015	601.19	Expected life 11 more Years
28	GSAT-16	France	07-12-2014	581.00	Expected life 10 ½ more Years
29	GSAT-18	France	06-10-2016	458.69	Expected life 15 more Years

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GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE

**RAJYA SABHA  
UNSTARRED QUESTION NO. 2692**

TO BE ANSWERED ON THURSDAY, DECEMBER 08, 2016

**PROJECTS COMPLETED BY ISRO**

2692. DR. KANWAR DEEP SINGH:

Will the PRIME MINISTER be pleased to state:

- (a) whether it is a fact that Indian Space Research Organisation (ISRO) has completed many of its important projects with lesser cost than what was allocated for;
- (b) if so, the details of such projects and if not, the reasons therefor; and
- (c) what incentives were given to ISRO for doing so?

**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 projects completed during last three years i.e. 2013-14, 2014-15 & 2015-16 with marginally lesser cost than allocated are - two Communication satellites GSAT-14 & GSAT-6 and India's first interplanetary mission Mars Orbiter Mission.

No incentives have been given to ISRO for doing so.

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GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE

**RAJYA SABHA  
UNSTARRED QUESTION NO. 2693**

TO BE ANSWERED ON THURSDAY, DECEMBER 08, 2016

**SATELLITES UNDER MANUFACTURING**

2693. SHRI HUSAIN DALWAI:

SHRI C. M. RAMESH:

Will the PRIME MINISTER be pleased to state:

- (a) how many working satellites does India have and how many satellites are currently under manufacturing;
- (b) whether it is a fact that currently working satellites are only half of country's requirements;
- (c) if so, whether it seriously affects country's ability to use satellite based solutions for governance;
- (d) what steps would be taken to speed up manufacturing and use of more satellites; and
- (e) whether the Department plans to promote the use of drones wherever it can be a substitute for satellite based solutions?

**ANSWER**

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

(DR. JITENDRA SINGH):

- (a) India presently has 38 operational satellites in orbit comprising of 16 Earth Observation (including meteorological), 13 Communication, 7 Navigational and 2 Space Science satellites. 32 satellites are currently under various stages of manufacturing.
- (b)&(c) The currently operational satellites are being utilised to their full capacity to meet the demands of Central & State Governments and business in the area of natural resources management, infrastructure planning, disaster management support, enabling weather forecasting, including the demands of satellite communication.



- (d) To ensure continuity of services and to meet further demands in these areas, suitable augmentation of space infrastructure is under consideration. ISRO is making focused efforts towards enhancing technical facilities, optimisation of the satellites building process and increased involvement of the industry through appropriate transfer of technology and hand-holding for manufacturing of integrated systems/subsystems, including assembly and testing by vendor as per ISRO's design.
- (e) Drones provide information pertaining to a localised area and cannot substitute the information obtained from satellites. Department of Space proposes to use Drones, wherever it could suitably supplement the space based information.

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GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE

**RAJYA SABHA**  
**UNSTARRED QUESTION NO. 2694**

TO BE ANSWERED ON THURSDAY, DECEMBER 08, 2016

**CHANDRAYAAN-2 MISSION**

2694. SHRI DILIP KUMAR TIRKEY:

Will the PRIME MINISTER be pleased to state:

- (a) what are the details of Indian Space Research Organisation (ISRO) Chandrayaan-2 Mission;
- (b) how much cost is involved in the said Mission; and
- (c) by when the Mission is expected to be completed?

**ANSWER**

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

(DR. JITENDRA SINGH):

- (a) Chandrayaan-2, India's second mission to the Moon, is a totally indigenous mission comprising of Orbiter, Lander and Rover. The Orbiter will study the moon from 100 km lunar orbit, the lander will soft-land on the lunar surface and the Rover will roll out of the lander to perform in-situ observations. The mission is planned to be launched onboard GSLV Mk-II.
- (b) The cost of the mission is ₹ 603.00 crore.
- (c) ISRO is working towards the launch of Chandrayaan-2 during the first quarter of 2018.

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GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE

**RAJYA SABHA  
UNSTARRED QUESTION NO. 3326**

TO BE ANSWERED ON THURSDAY, DECEMBER 15, 2016

**HUMAN SPACE FLIGHT PROGRAMME**

3326. Dr. R. LAKSHMANAN:

Will the PRIME MINISTER be pleased to state:

- (a) whether it is a fact that Government has undertaken an ambitious project of Human Space Flight Programme in order to carry a crew to space and return them back, if so, the details thereof; and
- (b) the status of the project as on date and the details of fund spent on this project so far?

**ANSWER**

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

(DR. JITENDRA SINGH):

- (a) No Sir. As of now, Human Space Flight Programme is not an approved programme. Currently, ISRO is working on a few critical technologies relevant for human spaceflight.
- (b) The development of critical technologies includes Crew Module (CM) systems, Environmental Control & Life Support System (ECLSS), Flight Suit and Crew Escape System (CES). The Crew module was realised and flight tested in the experimental mission of GSLV MkIII launched on 18-12-2014, where the re-entry characteristics and the recovery of the Crew Module was demonstrated. The flight suit development has been completed. Development of the ECLSS and the Crew Escape Systems are progressing well.

Towards development of critical technologies, an amount of ₹ 173 Crores has been approved and out of which ₹ 136.90 Crores has been utilised as on 31 March, 2016.

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GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE

**RAJYA SABHA  
UNSTARRED QUESTION NO. 3327**

TO BE ANSWERED ON THURSDAY, DECEMBER 15, 2016

**CRYOGENIC TECHNOLOGY FOR LAUNCHING SPACE VEHICLES**

3327. SHRI C.M. RAMESH:

Will the PRIME MINISTER be pleased to state:

- (a) whether Indian Space Research Organisation (ISRO) has mastered cryogenic technology to propel its launch vehicles; and
- (b) to what extent ISRO thinks that country has mastered cryogenic technology after the recently launched GSAT-6 with indigenously developed cryogenic engine?

**ANSWER**

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

(DR. JITENDRA SINGH):

- (a)&(b) With the last three consecutive successful launches of Geosynchronous Satellite Launch Vehicle (GSLV) with indigenous Cryogenic engine & stage, ISRO has demonstrated the reliability of indigenous cryogenic technology and efforts are underway to operationalise GSLV.

The launch of GSAT-6 onboard GSLV-D6, on September 27, 2015, was the second successful launch of GSLV with the indigenous Cryogenic stage after GSLV-D5/GSAT-5 mission on 5th January, 2014. The recent launch of GSLV (GSLV-F05/INSAT-3DR) on September 8, 2016 also used the indigenous Cryogenic Stage.

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**RAJYA SABHA  
UNSTARRED QUESTION NO. 3328**

TO BE ANSWERED ON THURSDAY, DECEMBER 15, 2016

**SATELLITES DESIGNED FOR BENEFIT OF FARMERS**

3328. SHRI KAPIL SIBAL:

Will the PRIME MINISTER be pleased to state:

- (a) the details of Indian satellites which were designed to benefit farmers;
- (b) the details of their launching, cost incurred and objectives with regard to agriculture and farmers; and
- (c) whether Government has any mechanism of assessment of benefits accrued from the inputs of these satellites, if so, the details thereof for the last three years, if not, the reason therefor?

**ANSWER**

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

(DR. JITENDRA SINGH):

- (a) The satellite-enabled services in conjunction with ground data, to support farmers in India include weather forecasting, agro-advisory, agromet services, soil moisture and agricultural extension activities to support farming operations in the country by India Meteorology Department (IMD), Ministry of Earth Sciences. Also, Indian Space Research Organisation (ISRO) collaborates with Ministry of Agriculture and Farmers Welfare on various applications using satellite data and geospatial technology in agriculture sector, which include – (i) horticultural crop inventory and site suitability for expansion in under-utilised areas, (ii) crop assessment using medium and high resolution satellite data, (iii) field data collection with field photos using mobile App, (iv) crop cutting experiments based on satellite derived crop vigor information. Earlier, ISRO had transferred the technology to Department of Agriculture Cooperation and Farmer's Welfare for (i) Forecasting Agricultural Output using Space, Agro-meteorology and Land based observations (FASAL) and (ii) National Agricultural Drought Assessment and Monitoring System (NADAMS) and internalised the monitoring of irrigation infrastructure at Central Water Commission.

The satellites designed by ISRO, which are currently in operation, to support these services and applications, include Resourcesat-2, Resourcesat-2A, RISAT-1, Cartosat-1, Kalpana-1, INSAT-3D and INSAT-3DR.

- (b) The details of their launching, cost incurred towards building these satellites, along with objectives are given below:

SN	Satellite (Launch Vehicle)	Launch date	Cost incurred (in ₹ Crores)	Objectives
1.	Resourcesat-2 (PSLV-C16)	20.04.2011	138.71	To provide multispectral images for inventory and management of natural resources, Crop production forecast, wasteland inventory, Land & Water Resources development, and Disaster Management Support.
2.	Resourcesat-2A (PSLV-C36)	07.12.2016	106.11	
3.	Cartosat-1 (PSLV-C6)	05.05.2005	248.49	To provide high resolution images for Cartographic mapping, Stereo data for Topographic Mapping & DEM, and host of DEM Applications – Contour, Drainage network, etc.
4.	RISAT-1 (PSLV-C19)	26.04.2012	375.38	To provide all weather imaging capability useful for agriculture, particularly paddy and jute monitoring in kharif season and management of natural disasters.
5.	Kalpana-1 (PSLV-C4)	12.09.2002	71.30	To provide meteorological data to enable weather forecasting services.
6.	INSAT-3D (Procured launch)	26.07.2013	206.00	Designed for enhanced meteorological observations, including vertical profile of the atmosphere in terms of temperature and humidity for improved weather forecasting and disaster warning.
7.	INSAT-3DR (GSLV-F05)	08.09.2016	116.38	

- (c) The data and value added products derived from these satellites have benefitted the concerned user ministries/ departments in Natural Resources Inventory & Monitoring, crop assessment, wasteland inventory, topographic Mapping & DEM, land & water resources development, weather forecasting and Disaster Management Support. These applications are useful to the decision makers to adopt suitable interventions for planning and management of various activities in agriculture sector.

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