DEPARTMENT OF SPACE

DEMAND NO. 90

Department of Space

A. The Budget allocations, net of recoveries, are given below:

(In crores of Rupees)

	Major Head	Actual 2009-2010			Budget 2010-2011			Revised 2010-2011			Budget 2011-2012		
		Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total
	Revenue	1882.66	994.20	2876.86	2322.76	778.00	3100.76	1917.48	880.00	2797.48	2751.47	926.00	3677.47
	Capital	*1286.09*	*...*	*1286.09*	*2677.24*	*...*	*2677.24*	*2082.52*	*...*	*2082.52*	*2948.53*	*...*	*2948.53*
	Total	**3168.75**	**994.20**	**4162.95**	**5000.00**	**778.00**	**5778.00**	**4000.00**	**880.00**	**4880.00**	**5700.00**	**926.00**	**6626.00**
1. Secretariat - Economic Services	3451	...	9.07	9.07	...	8.00	8.00	...	8.66	8.66	...	9.20	9.20
Space Research													
Space Technology													
Launch Vehicle Technology													
2. GSLV MK-III Development	3402	121.97	...	121.97	101.96	...	101.96	88.34	...	88.34	87.14	...	87.14
	5402	56.23	...	56.23	51.00	...	51.00	42.44	...	42.44	38.50	...	38.50
	Total	*178.20*	*...*	*178.20*	*152.96*	*...*	*152.96*	*130.78*	*...*	*130.78*	*125.64*	*...*	*125.64*
3. Cryogenic Upper Stage Project (CUSP)	3402	0.27	...	0.27	0.10	...	0.10	0.10	...	0.10	0.10	...	0.10
4. Polar Satellite Launch Vehicle - Continuation (PSLV-C) Project	3402	199.54	...	199.54	239.00	...	239.00	224.00	...	224.00	244.50	...	244.50
	5402	10.44	...	10.44	11.00	...	11.00	6.00	...	6.00	5.50	...	5.50
	Total	*209.98*	*...*	*209.98*	*250.00*	*...*	*250.00*	*230.00*	*...*	*230.00*	*250.00*	*...*	*250.00*
5. Vikram Sarabhai Space Centre (VSSC)	3402	167.70	298.10	465.80	226.43	200.54	426.97	218.64	227.87	446.51	231.07	223.00	454.07
	5402	174.45	...	174.45	156.69	...	156.69	156.54	...	156.54	231.96	...	231.96
	Total	*342.15*	*298.10*	*640.25*	*383.12*	*200.54*	*583.66*	*375.18*	*227.87*	*603.05*	*463.03*	*223.00*	*686.03*
6. Indian Space Research Organisation - Inertial Systems Unit (IISU)	3402	13.27	...	13.27	15.18	...	15.18	12.88	...	12.88	19.33	...	19.33
	5402	16.28	...	16.28	13.60	...	13.60	16.75	...	16.75	20.41	...	20.41
	Total	*29.55*	*...*	*29.55*	*28.78*	*...*	*28.78*	*29.63*	*...*	*29.63*	*39.74*	*...*	*39.74*
7. Liquid Propulsion Systems Centre	3402	163.08	83.99	247.07	162.19	58.92	221.11	157.00	68.30	225.30	150.58	83.00	233.58
	5402	25.21	...	25.21	82.43	...	82.43	46.02	...	46.02	80.75	...	80.75
	Total	*188.29*	*83.99*	*272.28*	*244.62*	*58.92*	*303.54*	*203.02*	*68.30*	*271.32*	*231.33*	*83.00*	*314.33*
8. GSLV Operational Project (Including MK-III Operational)	3402	263.16	...	263.16	236.52	...	236.52	196.19	...	196.19	279.46	...	279.46
	5402	11.83	...	11.83	13.48	...	13.48	12.91	...	12.91	13.00	...	13.00
	Total	*274.99*	*...*	*274.99*	*250.00*	*...*	*250.00*	*209.10*	*...*	*209.10*	*292.46*	*...*	*292.46*

(In crores of Rupees)

	Major Head	Actual 2009-2010			Budget 2010-2011			Revised 2010-2011			Budget 2011-2012		
		Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total
9. Space Capsule Recovery Experiment (SRE)	3402	9.00	...	9.00	4.93	...	4.93	4.79	...	4.79	4.40	...	4.40
10. Manned Mission Initiatives/Human Space Flight Programme	3402	19.02	...	19.02	100.00	...	100.00	9.39	...	9.39	65.64	...	65.64
	5402	5.98	...	5.98	50.00	...	50.00	5.32	...	5.32	33.17	...	33.17
	Total	*25.00*	*...*	*25.00*	*150.00*	*...*	*150.00*	*14.71*	*...*	*14.71*	*98.81*	*...*	*98.81*
11. Indian Institute of Space Science & Technology	3402	145.00	...	145.00	140.00	...	140.00	10.00	...	10.00	100.00	...	100.00
12. Semi Cryogenic Engine Development	3402	8.41	...	8.41	41.82	...	41.82	30.37	...	30.37	89.41	...	89.41
	5402	18.55	...	18.55	208.18	...	208.18	9.63	...	9.63	60.59	...	60.59
	Total	*26.96*	*...*	*26.96*	*250.00*	*...*	*250.00*	*40.00*	*...*	*40.00*	*150.00*	*...*	*150.00*
Total-Launch Vehicle Technology		**1429.39**	**382.09**	**1811.48**	**1854.51**	**259.46**	**2113.97**	**1247.31**	**296.17**	**1543.48**	**1755.51**	**306.00**	**2061.51**
Satellite Technology													
13. Oceansat-2 and 3	3402	1.34	...	1.34	0.50	...	0.50	0.50	...	0.50	2.75	...	2.75
	5402	1.41	...	1.41	1.10	...	1.10	9.50	...	9.50	47.25	...	47.25
	Total	*2.75*	*...*	*2.75*	*1.60*	*...*	*1.60*	*10.00*	*...*	*10.00*	*50.00*	*...*	*50.00*
14. Resourcesat-2 and 3	3402	2.02	...	2.02	2.73	...	2.73	2.62	...	2.62	3.45	...	3.45
	5402	19.92	...	19.92	19.27	...	19.27	19.38	...	19.38	29.21	...	29.21
	Total	*21.94*	*...*	*21.94*	*22.00*	*...*	*22.00*	*22.00*	*...*	*22.00*	*32.66*	*...*	*32.66*
15. ISRO Satellite Centre (ISAC)	3402	128.37	142.74	271.11	157.60	93.07	250.67	90.06	103.50	193.56	85.57	87.69	173.26
	5402	55.01	...	55.01	169.52	...	169.52	154.54	...	154.54	147.43	...	147.43
	Total	*183.38*	*142.74*	*326.12*	*327.12*	*93.07*	*420.19*	*244.60*	*103.50*	*348.10*	*233.00*	*87.69*	*320.69*
16. Laboratory for Electro-Optics System (LEOS)	3402	27.51	...	27.51	25.13	...	25.13	24.61	...	24.61	24.57	...	24.57
	5402	9.45	...	9.45	15.01	...	15.01	12.10	...	12.10	18.28	...	18.28
	Total	*36.96*	*...*	*36.96*	*40.14*	*...*	*40.14*	*36.71*	*...*	*36.71*	*42.85*	*...*	*42.85*
17. Radar Imaging Satellite-1 (RISAT-1)	3402	1.59	...	1.59	0.96	...	0.96	0.81	...	0.81	0.16	...	0.16
	5402	5.57	...	5.57	2.54	...	2.54	1.19	...	1.19	0.79	...	0.79
	Total	*7.16*	*...*	*7.16*	*3.50*	*...*	*3.50*	*2.00*	*...*	*2.00*	*0.95*	*...*	*0.95*
18. G.SAT-4/G.SAT-4R/G.SAT-11 EM	3402	1.18	...	1.18	...	...	...	...	...	...	1.00	...	1.00
	5402	...	...	...	...	...	...	...	...	...	49.00	...	49.00
	Total	*1.18*	*...*	*1.18*	*...*	*...*	*...*	*...*	*...*	*...*	*50.00*	*...*	*50.00*
19. Navigational Satellite System (NSS)	3402	17.70	...	17.70	34.39	...	34.39	23.40	...	23.40	32.07	...	32.07
	5402	201.48	...	201.48	227.71	...	227.71	144.00	...	144.00	186.23	...	186.23
	Total	*219.18*	*...*	*219.18*	*262.10*	*...*	*262.10*	*167.40*	*...*	*167.40*	*218.30*	*...*	*218.30*
20. Semi-Conductor Laboratory (SCL)	3402	46.67	...	46.67	24.89	28.96	53.85	26.42	31.58	58.00	45.72	34.28	80.00
21. Advanced Communication Satellite (G - SAT 11 including Launch Services)	3402	...	...	...	8.00	...	8.00	6.21	...	6.21	7.55	...	7.55
	5402	10.22	...	10.22	117.00	...	117.00	28.79	...	28.79	402.45	...	402.45

(In crores of Rupees)

	Major Head	Actual 2009-2010			Budget 2010-2011			Revised 2010-2011			Budget 2011-2012		
		Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total
	Total	*10.22*	*...*	*10.22*	*125.00*	*...*	*125.00*	*35.00*	*...*	*35.00*	*410.00*	*...*	*410.00*
22. Earth Observation - New Missions, (Cartostat-3, TES Hyperspectral, DMSAR-1,ENVISAT,SCATSAT,RISAT-3, Future EO Missions and GISAT)	3402	0.76	...	0.76	1.50	...	1.50	...	...	...	18.75	...	18.75
	5402	1.19	...	1.19	34.00	...	34.00	...	...	...	181.25	...	181.25
	Total	*1.95*	*...*	*1.95*	*35.50*	*...*	*35.50*	*...*	*...*	*...*	*200.00*	*...*	*200.00*
23. SARAL	3402	...	...	...	1.03	...	1.03	1.06	...	1.06	1.63	...	1.63
	5402	...	...	...	38.97	...	38.97	11.94	...	11.94	20.87	...	20.87
	Total	*...*	*...*	*...*	*40.00*	*...*	*40.00*	*13.00*	*...*	*13.00*	*22.50*	*...*	*22.50*
Total-Satellite Technology		**531.39**	**142.74**	**674.13**	**881.85**	**122.03**	**1003.88**	**557.13**	**135.08**	**692.21**	**1305.98**	**121.97**	**1427.95**
Launch Support, Tracking Network & Range Facility													
24. Satish Dhawan Space Centre - SHAR (SDSC-SHAR)	3402	137.82	102.14	239.96	121.05	70.50	191.55	125.00	102.90	227.90	148.50	97.52	246.02
	5402	120.01	...	120.01	195.35	...	195.35	136.51	...	136.51	188.75	...	188.75
	Total	*257.83*	*102.14*	*359.97*	*316.40*	*70.50*	*386.90*	*261.51*	*102.90*	*364.41*	*337.25*	*97.52*	*434.77*
25. ISRO Telemetry, Tracking & Command Network (ISTRAC)	3402	36.09	33.91	70.00	27.38	37.22	64.60	27.60	42.91	70.51	28.00	47.79	75.79
	5402	30.00	...	30.00	23.41	...	23.41	26.15	...	26.15	17.57	...	17.57
	Total	*66.09*	*33.91*	*100.00*	*50.79*	*37.22*	*88.01*	*53.75*	*42.91*	*96.66*	*45.57*	*47.79*	*93.36*
Total-Launch Support, Tracking Network & Range Facility		**323.92**	**136.05**	**459.97**	**367.19**	**107.72**	**474.91**	**315.26**	**145.81**	**461.07**	**382.82**	**145.31**	**528.13**
Total-Space Technology		**2284.70**	**660.88**	**2945.58**	**3103.55**	**489.21**	**3592.76**	**2119.70**	**577.06**	**2696.76**	**3444.31**	**573.28**	**4017.59**
Space Applications													
26. Space Applications Centre (SAC)	3402	70.13	138.65	208.78	100.43	100.44	200.87	100.51	117.06	217.57	101.07	128.76	229.83
	5402	151.90	...	151.90	96.54	...	96.54	83.29	...	83.29	190.92	...	190.92
	Total	*222.03*	*138.65*	*360.68*	*196.97*	*100.44*	*297.41*	*183.80*	*117.06*	*300.86*	*291.99*	*128.76*	*420.75*
27. Development and Education Communication Unit(DECU)	3402	12.97	7.80	20.77	73.74	7.85	81.59	21.04	8.60	29.64	72.54	10.80	83.34
	5402	1.52	...	1.52	1.43	...	1.43	1.72	...	1.72	1.02	...	1.02
	Total	*14.49*	*7.80*	*22.29*	*75.17*	*7.85*	*83.02*	*22.76*	*8.60*	*31.36*	*73.56*	*10.80*	*84.36*
28. National Natural Resources Management System(NNRMS)	3402	15.64	...	15.64	87.62	...	87.62	42.06	...	42.06	74.82	...	74.82
29. Earth Observation Application Mission(EOAM)	3402	2.49	...	2.49	2.31	...	2.31	2.33	...	2.33	2.53	...	2.53
30. Regional Remote Sensing Service Centres(RRSSCs)	3402	13.90	...	13.90	...	...	...	...	...	...	...	...	...
	5402	18.07	...	18.07	...	...	...	...	...	...	...	...	...
	Total	*31.97*	*...*	*31.97*	*...*	*...*	*...*	*...*	*...*	*...*	*...*	*...*	*...*
31. National Remote Sensing Centre (NRSC)	3402	59.18	62.80	121.98	63.16	62.05	125.21	62.52	67.71	130.23	62.92	78.25	141.17

(In crores of Rupees)

	Major Head	Actual 2009-2010			Budget 2010-2011			Revised 2010-2011			Budget 2011-2012		
		Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total
	5402	25.21	...	25.21	104.94	...	104.94	91.97	...	91.97	82.63	...	82.63
	Total	*84.39*	*62.80*	*147.19*	*168.10*	*62.05*	*230.15*	*154.49*	*67.71*	*222.20*	*145.55*	*78.25*	*223.80*
32. Disaster Management Support (DMS)	3402	7.20	...	7.20	31.07	...	31.07	19.68	...	19.68	28.40	...	28.40
	5402	5.07	...	5.07	7.55	...	7.55	10.29	...	10.29	6.17	...	6.17
	Total	*12.27*	*...*	*12.27*	*38.62*	*...*	*38.62*	*29.97*	*...*	*29.97*	*34.57*	*...*	*34.57*
33. North Eastern Space Applications Centre (NE-SAC)	3402	5.33	1.67	7.00	6.25	1.75	8.00	...	1.75	1.75	6.07	1.93	8.00
Total-Space Applications		**388.61**	**210.92**	**599.53**	**575.04**	**172.09**	**747.13**	**435.41**	**195.12**	**630.53**	**629.09**	**219.74**	**848.83**
Space Sciences													
34. Physical Research Laboratory (PRL)	3402	39.04	28.06	67.10	45.70	26.00	71.70	33.97	13.16	47.13	48.31	32.39	80.70
35. National Atmospheric Research Laboratory (NARL)	3402	10.37	2.75	13.12	12.00	2.45	14.45	8.43	0.67	9.10	16.44	2.90	19.34
36. National Institute of Climate change and Environmental Studies	3402	...	...	...	1.00	...	1.00	0.10	...	0.10	0.10	...	0.10
37. RESPOND	3402	16.50	...	16.50	15.00	...	15.00	14.00	...	14.00	15.00	...	15.00
38. Sensor Payload Development / Planetary Science Programme	3402	1.15	...	1.15	16.00	...	16.00	8.25	...	8.25	30.00	...	30.00
39. Megha-tropiques Project	3402	2.30	...	2.30	2.37	...	2.37	2.20	...	2.20	1.13	...	1.13
	5402	9.06	...	9.06	7.63	...	7.63	7.80	...	7.80	0.87	...	0.87
	Total	*11.36*	*...*	*11.36*	*10.00*	*...*	*10.00*	*10.00*	*...*	*10.00*	*2.00*	*...*	*2.00*
40. ADITYA	3402	...	...	...	3.70	...	3.70	0.34	...	0.34	1.22	...	1.22
	5402	...	...	...	36.30	...	36.30	5.41	...	5.41	38.78	...	38.78
	Total	*...*	*...*	*...*	*40.00*	*...*	*40.00*	*5.75*	*...*	*5.75*	*40.00*	*...*	*40.00*
41. Astrosat 1 & 2	3402	0.99	...	0.99	1.59	...	1.59	1.11	...	1.11	0.83	...	0.83
	5402	11.04	...	11.04	8.41	...	8.41	8.89	...	8.89	9.17	...	9.17
	Total	*12.03*	*...*	*12.03*	*10.00*	*...*	*10.00*	*10.00*	*...*	*10.00*	*10.00*	*...*	*10.00*
42. Indian Lunar Mission - Chandrayan - 1 & 2	3402	2.93	...	2.93	4.63	...	4.63	3.78	...	3.78	7.70	...	7.70
	5402	14.74	...	14.74	95.37	...	95.37	21.22	...	21.22	72.30	...	72.30
	Total	*17.67*	*...*	*17.67*	*100.00*	*...*	*100.00*	*25.00*	*...*	*25.00*	*80.00*	*...*	*80.00*
43. ISRO Geosphere Biosphere Programme (ISRO GBP)	3402	17.00	...	17.00	28.96	...	28.96	22.46	...	22.46	24.74	...	24.74
44. Atmospheric Science Programmes	3402	28.80	...	28.80	28.45	...	28.45	20.13	...	20.13	25.20	...	25.20
45. Small Satellites for Atmospheric Studies and Astronomy	3402	1.00	...	1.00	8.00	...	8.00	2.00	...	2.00	4.00	...	4.00
	5402	...	...	...	2.00	...	2.00	0.50	...	0.50	1.00	...	1.00
	Total	*1.00*	*...*	*1.00*	*10.00*	*...*	*10.00*	*2.50*	*...*	*2.50*	*5.00*	*...*	*5.00*
46. Other Schemes	3402	8.04	2.53	10.57	13.70	2.00	15.70	16.64	2.00	18.64	17.04	2.00	19.04
Total-Space Sciences		**162.96**	**33.34**	**196.30**	**330.81**	**30.45**	**361.26**	**177.23**	**15.83**	**193.06**	**313.83**	**37.29**	**351.12**

(In crores of Rupees)

	Major Head	Actual 2009-2010 Plan	Actual 2009-2010 Non-Plan	Actual 2009-2010 Total	Budget 2010-2011 Plan	Budget 2010-2011 Non-Plan	Budget 2010-2011 Total	Revised 2010-2011 Plan	Revised 2010-2011 Non-Plan	Revised 2010-2011 Total	Budget 2011-2012 Plan	Budget 2011-2012 Non-Plan	Budget 2011-2012 Total
Direction & Administration/Other Programmes													
47. Special Indigenisation/Advance Ordering	3402	14.28	...	14.28	31.79	...	31.79	46.62	...	46.62	218.76	...	218.76
	5402	60.00	...	60.00	200.00	...	200.00	465.00	...	465.00	20.00	...	20.00
	Total	*74.28*	*...*	*74.28*	*231.79*	*...*	*231.79*	*511.62*	*...*	*511.62*	*238.76*	*...*	*238.76*
48. Others	3402	2.65	58.12	60.77	3.40	52.39	55.79	2.65	56.93	59.58	2.95	58.86	61.81
	5402	27.61	...	27.61	74.34	...	74.34	11.70	...	11.70	12.76	...	12.76
	Total	*30.26*	*58.12*	*88.38*	*77.74*	*52.39*	*130.13*	*14.35*	*56.93*	*71.28*	*15.71*	*58.86*	*74.57*
Total-Direction & Administration/Other Programmes		**104.54**	**58.12**	**162.66**	**309.53**	**52.39**	**361.92**	**525.97**	**56.93**	**582.90**	**254.47**	**58.86**	**313.33**
INSAT Operational													
49. Master Control Facility (MCF)	3252	11.08	21.87	32.95	7.76	25.86	33.62	8.01	26.40	34.41	8.00	27.63	35.63
	5252	17.94	...	17.94	21.41	...	21.41	16.13	...	16.13	9.80	...	9.80
	Total	*29.02*	*21.87*	*50.89*	*29.17*	*25.86*	*55.03*	*24.14*	*26.40*	*50.54*	*17.80*	*27.63*	*45.43*
50. INSAT-3 Satellites (Including Launch Services)	3252	0.23	...	0.23	0.80	...	0.80	0.26	...	0.26	82.81	...	82.81
	5252	16.66	...	16.66	76.80	...	76.80	23.84	...	23.84	44.59	...	44.59
	Total	*16.89*	*...*	*16.89*	*77.60*	*...*	*77.60*	*24.10*	*...*	*24.10*	*127.40*	*...*	*127.40*
51. INSAT-4 Satellites (Including Launch Services and Leasing of Transponders)	3252	27.99	...	27.99	60.04	...	60.04	198.40	...	198.40	227.54	...	227.54
	5252	154.04	...	154.04	514.26	...	514.26	495.05	...	495.05	685.56	...	685.56
	Total	*182.03*	*...*	*182.03*	*574.30*	*...*	*574.30*	*693.45*	*...*	*693.45*	*913.10*	*...*	*913.10*
Total-INSAT Operational		**227.94**	**21.87**	**249.81**	**681.07**	**25.86**	**706.93**	**741.69**	**26.40**	**768.09**	**1058.30**	**27.63**	**1085.93**
Total-Space Research		**3168.75**	**985.13**	**4153.88**	**5000.00**	**770.00**	**5770.00**	**4000.00**	**871.34**	**4871.34**	**5700.00**	**916.80**	**6616.80**
Grand Total		***3168.75***	***994.20***	***4162.95***	***5000.00***	***778.00***	***5778.00***	***4000.00***	***880.00***	***4880.00***	***5700.00***	***926.00***	***6626.00***

	Head of Dev	Budget Support	IEBR	Total	Budget Support	IEBR	Total	Budget Support	IEBR	Total	Budget Support	IEBR	Total
C. Plan Outlay													
1. Space Research	13402	3168.75	...	3168.75	5000.00	...	5000.00	4000.00	...	4000.00	5700.00	...	5700.00

1. **Secretariat-Economic Services:** Provision is made for expenditure to be incurred on the Secretariat of the Department of Space (DOS).

2. **GSLV Mk-III Development:** GSLV Mk-III is intended to develop a cost-effective launch vehicle capable of launching 4 tonne class of communication satellites to Geo-synchronous Transfer Orbit (GTO). The Project envisages the development of a number of technologies which include, among others, 200 tonne solid stage booster (S-200), 25 tonne cryogenic engines (C-25) and L-110 tonne liquid stage engines as core boosters.

3. **Cryogenic Upper Stage (CUS) Project:** The objective of the Project is to develop and qualify an indigenous restartable cryogenic stage employing liquid oxygen as oxidizer and liquid hydrogen as fuel for the upper stage of GSLV. CUS-3 stage was flight tested in GSLV D3 mission on 15th April, 2010 which was unsuccessful. A comprehensive technical assessment of CUS-3 flight stages by National Panel of Eminent Experts was carried out and recommendations are being implemented.

4. **Polar Satellite Launch Vehicle - Continuation (PSLV-C) Project:** The PSLV is capable of placing 1400-1600 Kg class IRS satellites in Polar Sun-Synchronous Orbit, 1000 Kg class satellites into Geo-synchronous Transfer Orbit and upto 2800 Kg class satellites into Low Earth Orbit. The PSLV-C15 in addition to Cartosat-2B carried four auxiliary satellites namely STUDSAT built jointly

by students from a consortium of seven engineering colleges from Karnataka & Andhra Pradesh, two nano satellites i.e., NLS 6.1 & NLS 6.2 from University of Toronto & Canada and ALSAT-2A, a micro satellite from Algerian Space Agency was launched successfully on July 12, 2010. The launch of PSLC-C16 carrying Resourcesat-2 and Youthsat is planned for launch during last quarter of 2010-2011. Whereas, launch of PSLV-C17 carrying GSAT-12 is planned during the first quarter of 2011-2012. The Launch of Megha-tropiques, RISAT-1, SARAL and IRNSS-1 are also planned on-board PSLV-C18, PSLV-C19, PSLV-C20 & PSLV-C21 respectively during 2011-2012.

5. **Vikram Sarabhai Space Centre (VSSC):** VSSC is the lead Centre for the development of satellite launch vehicles and sounding rockets and houses the major test and fabrication facilities for launch vehicles.

6. **ISRO Inertial Systems Unit (IISU):** IISU is responsible for research & development in the area of inertial sensors, inertial systems, navigation software, actuators and mechanisms and to realise the flight units of these system for the launch vehicle and satellite programmes.

7. **Liquid Propulsion Systems Centre (LPSC):** LPSC is the lead Centre in the area of liquid and cryogenic rocket engines and stages for launch vehicle and small thrust engines for launch vehicles and spacecraft control.

8. **GSLV-Operational Project (including GSLV Mk-III Operational):** The GSLV-Operational Project has been conceived to meet the launch requirement of 2 tonne class of operational INSAT/GSAT satellites.

9. **Space Capsule Recovery Experiment (SRE):** The main objective of the Space Capsule Recovery Experiment (SRE) is to develop and demonstrate capability to recover an orbiting capsule back on earth. SRE-I was successfully launched on-board PSLV-C7 on January 10, 2007 and was also successfully recovered from Bay of Bengal on January 22, 2007. SRE-II is a follow-on mission to SRE-I to further validate the re-entry technologies.

10. **Manned Mission Initiatives/Human Space Flight Programme:** Detailed feasibility studies on undertaking indigenous human space flight mission with an aim to build and demonstrate the capability for carrying humans to low earth orbit and their safe return to earth has been undertaken. The programme envisages development of a fully autonomous orbital vehicle carrying two or three crew-members to about 275 km low earth orbit and their safe return. Considering the magnitude of complexities and developmental efforts involved, the department has adopted a 3-phased implementation strategy for the programme. The proposal for phase-I activities for Development of Critical Technologies which envisages design, development, and flight testing of crew module, PS4 augmented service module and development of crew escape system for Human Spaceflight Programme at an estimated cost of ₹435.00 Crores has been submitted for approval. The proposal has been cleared by Space Commission, Planning Commission and Finance ministry and is currently under process for Cabinet approval.

11. **Indian Institute of Space Science & Technology (IIST):** Indian Institute of Space Science & Technology is an autonomous body under DOS with the primary objective of creating world class Institution in the area of advanced Space Science & Technology education and generating high quality human resources requirement of DOS/ISRO. The Institute has undergraduate, post-graduate and doctoral programme in the area of space science, technology and applications. The Institute has started functioning from the academic year 2007-2008 around the existing infrastructure of ISRO Centres in Thiruvananthapuram and the annual intake of the Institute is about 150-200 students. IIST has started functioning from its own campus at Valiamala w.e.f. August 15, 2010.

12. **Semi Cryogenic Engine Development:** The objective of this project is to develop and qualify a high thrust Semi Cryogenic engine and stage (employing kerosene of required grade/spar as fuel and Liquid Oxygen as oxidizer) for the future advanced launch vehicle.

13. **Oceansat-2 & 3:** The main objective of Oceansat-2 is to provide continuity of data & services hitherto provided by Oceansat-1 on Oceanography and coastal studies. Oceansat-2 was successfully launched onboard PSLV-C14 on September 23, 2009. Oceansat-3, planned to be initiated towards the end of 11th plan will be a follow-on satellite for Oceansat-2 to provide continuity of data on Ocean & Coastal resources.

14. **Resourcesat-2 & 3:** Taking into account the increased use of space imageries for different applications and continued Earth Observation services required from the IRS satellites, Resourcesat-2 has been conceived as a continuity mission with enhanced capabilities which will be mainly for crop applications, vegetation dynamics and natural resources census applications. The spacecraft is configured with I1.5 K bus which carries three optical Remote Sensing Payloads, LISS-3, LISS-4 and AWIFS & additional AO payload known as AIS from COMDEV, Canada. The Spacecraft weighs around 1200 kg and slated for launch during last quarter of 2010-2011 on-board PSLV-C16. Resourcesat-3 will provide continuity of data after Resourcesat-2.

15. **ISRO Satellite Centre (ISAC):** ISAC is the lead Center for the design, fabrication, testing and management of satellite systems for scientific, technological and application missions.

16. **Laboratory for Electro-Optics Systems (LEOS):** LEOS is responsible for research & development and production of electro-optics sensors.

17. **Radar Imaging Satellite-1 (RISAT-1):** Radar Imaging Satellite (RISAT-1) is intended to provide all-weather, day and night imaging capability providing vital inputs for various agricultural and disaster management applications. RISAT-1 weighing 1850 kg is planned to be launched on-board PSLV during 2011-2012.

18. **GSAT-4/GSAT-4R/GSAT-11 EM:** The objective of the GSAT-4 is to conduct various experiments in the communications area and early introduction of geo-based navigation system. The satellite was launched on April 15, 2010 on board GSLV D3, which was unsuccessful. A comprehensive technical assessment of CUS 3 flight stage by Nation Panel of Eminent Experts was carried out and recommendations were implemented. GSAT-4R & GSAT-11 EM are the two experimental Satellites being planned as payloads for future GSLV flights.

19. **Navigation Satellite System (NSS):** The Indian Regional Navigation Satellite System (IRNSS), is planned to be a constellation of 7 satellites. 3 in GEO and 4 in GSO orbit. This satellite is expected to provide position accuracies similar to GPS in a region centered around India with a coverage extending upto 1500 km from India. The configuration of the satellite has been finalized and the Satellite constellation of 11 satellites for IRNSS applications is being studied. The IRNSS spacecraft bus is being realised around I1 K bus specifically configured for PSLV Launch with a lift-off mass of 1370 kg. The first IRNSS satellite (IRNSS-1) is targeted for launch during 2011-2012.

20. **Semi-conductor Laboratory:** SCL is engaged in the Design, Development and Manufacture of Very Large Scale Integrated (VLSIs) devices and Board Level Products to meet the stringent quality requirement of strategic sectors. SCL is to undertake radiation hardened devices and about more than 60 types of ASICs have been identified for development by SCL for Space Programme.

21. **Advanced Communication Satellite (GSAT-11 - including Launch Services):** The main objective is to develop a 4 tonne class communication satellite incorporating advanced technologies of relevance for future. The configuration of the satellite is under finalisation.

22. **Earth Observation - New Missions (Cartostat-3,TES-Hyperspectral, DMSAR-1, ENVISAT, SCATSAT, RISAT-3, Future EO Missions & GISAT):** Indian Earth Observation program is directed towards providing continuity of EO data for resource management applications and enhancing the imaging capability. Towards this, it is planned to undertake development of Technology Experiment Satellite in Hyper Spectral Imaging (TES-Hyperspectral), Radar Imaging Satellite for Disaster Management (DMSAR-1) & advanced cartography satellite (Cartosat-3) & GISAT.

23. **SARAL:** The objective of the Satellite with Argos and Altika (SARAL) mission are to design and develop satellite bus in the weight range of 400 Kg & to establish required ground infrastructure for receiving and processing of the data within India for ocean related applications. Two payloads namely Altika and ARGOS are planned in this mission. Altika is a Ka band altimeter for ocean applications and ARGOS is a data collection platform for collecting variety of data from ocean buoys to animal behavior. SARAL is a co-operative mission between DOS/ISRO and CNES, France with payloads from CNES and the spacecraft bus from DOS/ISRO. SARAL is part of international continuing missions using these payloads. The Spacecraft configuration has been finalised & the Subsystem fabrication activities are in progress.

24. **Satish Dhawan Space Centre-SHAR (SDSC-SHAR):** SDSC-SHAR provides the launch infrastructure as well as solid propellant processing.

25. **ISRO Telemetry, Tracking and Command Network (ISTRAC):** ISTRAC provides spacecraft TTC and Mission Control services to major launch vehicle and spacecraft missions.

26. **Space Applications Centre (SAC):** SAC is the lead Center for the development of communication, meteorological and remote sensing payloads besides R&D in space applications.

27. **Development and Educational Communication Unit (DECU):** DECU is involved in the conceptualisation, definition, planning, implementation and socio-economic evaluation of developmental space applications.

28. **National Natural Resources Management System (NNRMS):** The National Natural Resources Management System (NNRMS) has the objective of ensuring optimal management/utilization of natural resources by integrating information derived from remote sensing data with conventional techniques.

29. **Earth Observation Applications Mission (EOAM):** The main goal of the Earth Observation Application Mission (EOAM) are to (i) evolve newer application/R&D programmes based on technology trends leading to operational applications programmes; (ii) guiding total remote sensing applications programmes towards implementation of remote-sensing based solutions and (iii) steering commercial activities of remote sensing involving development of value-added services.

31. **National Remote Sensing Centre (NRSC):** NRSC is responsible for acquisition, processing, distribution and archiving of data from remote sensing satellites and is continuously exploring the practical uses of remote sensing technology for multilevel (global to local applications). NRSA has been converted from a Registered society to a Government entity called 'National Remote Sensing Centre' (NRSC) w.e.f. 1.9.2008.

32. **Disaster Management Support (DMS):** The main objective of Disaster Management Support Programme is to provide Space inputs & services on a timely & reliable basis for the Disaster Management System in the country.

33. **North Eastern-Space Applications Centres (NE-SAC):** NE-SAC set up as an autonomous society jointly with North Eastern Council, is supporting the North Eastern region by providing information on natural resources utilization and monitoring, infrastructure developmental planning and interactive training using space technology inputs of remote sensing and satellite communication.

34. **Physical Research Laboratory (PRL):** PRL, an autonomous institution funded by the Department of Space through grant-in-aid, is one of the premier research institutions in the country carrying out basic research in several areas of experimental & theoretical physics and earth sciences. PRL is also responsible for the administration of Udaipur Solar Observatory.

35. **National Atmospheric Research Laboratory (NARL):** NARL, a registered Society, is responsible for carrying out advanced research in atmospheric and space sciences and related disciplines.

36. **National Institute of Climate Change & Environment Studies (NICES):** It is envisaged to set up an Institute to carry out focused research in Climate Change & Environment.

37. **RESPOND:** The (RESPOND) Programme of ISRO supports sponsored research activity in Space Science, Space Applications and Space Technology in various national academic/research institutions and Space Technology Cells in premier technological institutes of the country through grants-in-aid.

38. **Sensor Payload Development/Planetary Science Programme:** It includes funding requirement for advance action for activities related to scientific payload developments for space science and planetary exploration studies in different institutions and universities.

39. **Megha-tropiques Project:** Megha-tropiques is an ISRO-CNES (France) joint mission and is intended for studying tropical atmosphere and climate related to aspects such as monsoons, cyclones, etc., using a satellite platform. The data to be received at the ISTRAC Ground Station will be shared between the two agencies.

40. **ADITYA:** The ADITYA-1 Project will be the first Indian Space based solar coronagraph, which will be available for solar coronal observation to all the Indian researchers in the field of Solar Astronomy. The major scientific objective of the ADITYA-1 is to achieve a fundamental understanding of the physical processes that heat the solar corona (base to the extended), accelerate the solar wind and produce Coronal Mass Ejections (CMEs). Work on ADITYA-1 has been initiated. The payload specifications and interface details are being worked out and procurement plan for long lead/critical materials & components is in progress.

41. **Astrosat 1 & 2:** The objective of the Astrosat project is to build and launch an astronomical observatory satellite for expanding the scientific knowledge about the evolution of stellar objects and gather valuable scientific data on high energy Astronomy and Astrophysics research. The mainframe structure is positioned in clean room and subsystem & payload fabrication and testing activities are in progress. The satellite is planned to be launched on-board PSLV during 2011-2012.

42. **Indian Lunar Missions Chandrayaan-1 & 2:** The main objective of Indian Lunar Chandrayaan-1 is for expanding the scientific knowledge about the moon, upgrading the technological capability and providing the challenging opportunity for planetary research for a large number of growing young people of the country benefiting the human society at large. The Chandrayaan-1 was successfully launched on October 22, 2008 on-board PSLV-C11. The follow-on mission Chandrayaan-2 has been planned to be launched during 2013. The baseline mission objective of Chandrayaan-2 is to soft land at a suitable site on the lunar surface and to carry out in-situ chemical analysis.

43. **ISRO Geosphere-Biosphere Programme (ISRO-GBP):** ISRO-GBP encompasses the study of land and ocean interaction, past climate, changes in atmospheric composition, aerosols, carbon cycle, bio-mass estimation, bio-diversity and other related areas of scientific investigation.

44. **Atmospheric Science Programmes:** Atmospheric Science Programmes are intended to develop advanced observation tools & techniques of atmospheric modeling, leading to operational end user products in different domains of atmospheric science.

45. **Small Satellite for Atmospheric Studies & Astronomy:** The project envisages development of small satellites for study of Earth's near-space environment, magnetometer studies, study of aerosol and gases, tropical weather and climate studies.

46. **Other Schemes:** These includes Microgravity Research, Space Science promotion, Multi-institutional research programs, Space Station experiment, setting up of Digital workflow systems, support for conferences, symposia, etc.

47. **Special Indigenisation/Advance Ordering:** Indigenisation envisages ISRO to have interface with the Indian Industry to develop various electronic components, materials, chemicals, etc., for the space programme. The scope of the scheme also includes procurement of certain long lead and critical items for futuristic missions and upgradation of VLSI fabrication facilities at SCL.

48. **Others:** Under this, provision has been included for ISRO Headquarters, International Co-operation and Central Management.

49. **Master Control Facility:** MCF is responsible for initial orbit raising, payload testing and in-orbit operation of all geo-stationary satellites.

50. **INSAT-3 Satellites (including Launch Services):** The objective of INSAT-3 Spacecraft Project are to (i) build five INSAT-3 satellites (INSAT-3A to INSAT-3E) keeping the flexibility for mid-course corrections to accommodate emerging requirements, carry out mission planning, launch campaign and initial phase operations and (ii) establish required programme elements for carrying out the same. INSAT-3D, the last satellite in INSAT-3D series has been configured as an advanced meteorological Satellite with new payloads such as Imager and Sounder. The Spacecraft is targeted for launch during 2011-2012.

51. **INSAT-4/GSAT Satellites (including Launch Services and Leasing of Transponders):** The fourth generation INSAT-4/GSAT Satellite series has been planned to meet the capacity and service requirements projected by various users and development needs of the country. INSAT-4A, 4B & 4CR satellite in the INSAT-4 series have been launched & operationalised. Work on INSAT-4D, 4E, 4F (User funded) and INSAT-4G, GSAT-9, GSAT-10 & GSAT-12 are in progress. Configuration of INSAT-4D has been finalised and payload integration is in progress.