

Recent Achievements of ISRO

1) Introduction

- ISRO's vision is to "harness space technology for national development", while pursuing space science research and planetary exploration
- The achievements are remarkable considering the frugal budget of the Indian Space Research Organisation, which has made a name for itself for low-cost, high-return space missions.

2) Achievements by ISRO

- **Mangalyaan, 2014**

- a) India joined an exclusive global club when it successfully launched the Mars Orbiter Mission
- b) Budget that was at least 10 times lower than a similar project by the US
- c) The Rs 450-crore project revolved round the Red Planet and to collect data on Mars' atmosphere and mineral composition.

- **IRNSS, 2016**

- a) The seven-satellite system created India's very own satellite navigation system
- b) Provide services in marine navigation, disaster management, vehicle tracking and fleet management, and navigation aide for drivers.
- c) Indian-owned system will be particularly useful in times of war to gain positional accuracy.

- **Launching 20 satellites, 2016**

- a) The Isro launched 20 satellites in one mission, a record for the space agency
- b) Apart from Isro's own satellites and those built by university students in the country, the mission carried satellites from the US, Canada, Germany and Indonesia
- c) The PSLV carried a weight of 1,288 kilograms, with India's Cartosat-2 series satellite (725.5 kg) taking up most it.
- d) The Cartosat satellite aims at charting urban, rural, coastal land use, and water distribution among others.

- **Reusable Launch Vehicle, 2016**

- a) Isro successfully tested the Reusable Launch Vehicle — Technology Demonstrator (RLV-TD)
- b) Fully re-usable vehicle, seen as the future of low cost, reliable and on-demand space access
- c) The technology will bring down the overall payload delivery cost drastically by almost 80%.

- **Scramjet Engine**

- a) Conventional launchers which carry liquid oxygen or an oxidiser to fire the engine
- b) Scramjet engine inhales air from the atmosphere and uses its oxygen to burn the fuel
- c) Scramjet engine leads to faster and cheaper rockets compared to the traditional liquid or cryogenic engines.

- **GSLV MK III/ LVM 3**

- a) GSLV Mark 3 or LVM 3, is a satellite launcher that will make India completely self-reliant in launching satellites, capable of placing 4 tonne class geosynchronous satellites into orbit
- b) Powered by an indigenously developed Cryogenic engine, the launcher will be used to launch various satellites in the geostationary orbit
- c) It will also be used to launch the first Indian crew vehicle in the future.

3) Mechanisms for reducing cost of access to space

- Bringing down significantly the cost of access to space is a primary goal of space programmes around the world today.
- Improve the payload fraction by adopting newer technologies and improving the overall efficiency of the system
- Including increasing the thrust of the vehicle by more efficient liquid fuel engines, such as semi-cryogenic and cryogenic engines
- Recover the hardware and reuse for multiple launches
- Reduce the initial propellant loading by adopting newer combustion modes such as air-breathing ramjet/scramjet propulsions
- Collaboration among various nations, so that the cost on R&D is reduced
- Research and development by public sector can be augmented with domain specialization and capital of private sector corporations like Space X.

4) Future missions

- **GSAT9**

- a) GSAT 9 is a multi band observation and communication satellite slated for a launch before the end of this year
- b) The 2.3 tonne satellite will carry two payloads, a 12 Ku band transponder, and the GAGAN system that will aims to provide GPS services

- c) A joint project being developed by Airport Authority of India and the ISRO, the system will help pilots flying over the Indian airspace to navigate within an accuracy of 3 m.
- d) The system will also aid in the study of Ionosphere over the Indian region.

- **GSAT11**

- a) Another of India's communication satellite, the GSAT-11 will most likely be launched aboard the new GSLV-Mark III
- b) The satellite's main aim is to provide advanced telecom and DTH services in India.
- c) Capable of transmitting data at a speed of 10 Gigabytes per second, the satellite will take care of the entire country's communication and broadcasting needs

- **NISAR**

- a) A joint project by NASA and ISRO, the NASA-ISRO Synthetic Aperture Radar (NISAR) system aims to co-develop and launch a first of its kind radar imaging satellite
- b) The mission aims to measure the earth's surface including natural hazards like earthquakes, volcanoes and tsunamis
- c) Insights on the evolution and state of Earth's crust and information about the ongoing climate change crisis.

- **Chandrayan-2**

- a) Slated for a launch by the year 2018 using the newly developed heavy lift launcher GSLV Mark III.
- b) The 2nd lunar exploration mission is going to include a lunar orbiter along with a lander and rover.
- c) The main aim of the mission is to develop advanced lander and rover technologies and set the basis for future projects such as the Mangalyaan-2 which will see India landing a Rover/lander on Mars.

- **Mangalyaan 2**

- a) Mangalyaan 2 is the successor mission which aims to land a rover and lander on Mars alongside another orbiter.
- b) The Mangalyaan 2 will be built as a joint venture between India and France
- c) The Mangalyaan 2 will be completed by the year 2020 and will use GSLV III

5) ISRO's technologies can aid in socio-economic development of India

- Mapping of national highways through satellite imaging will help NHAI to lay highways in better way

- Green Highways (Plantation, Transplantation, Beautification and Maintenance) Policy 2015 will also gain better monitoring through projects like IRNSS.
- Precise planning with the help of remote sensing satellites, which can help in the success of Smart city project.
- It can also help in mapping of mineral resources.
- Weather forecasting: Project like RISAT which is solely working to generate accurate weather forecast, can help farmers and coastal people in case of cyclones, etc.
- Communication satellite provide services like health, education to remote areas
- ISRO can effectively remove asymmetries in the information flow by providing accurate data in the event of cyclones, floods, tsunamis etc.
- Bhuvan and Gagan can help in reducing the resource drain of the government from spending on US owned GPS
- ISRO is helping in transforming India & contributing to its' socio-economic development in the most progressive-peaceful-non violent ways and thus rightly deserves Indira Gandhi peace prize 2014

6) Conclusion

- Even though ISRO is one of the youngest space organisations, its achievements are highly commendable and has earned it global repute.
- While NASA, European Space Agency and Russian Space Agency work on a variety of domains, ISRO's main focus is on creating various utilitarian technologies like weather and geographic satellites and launching probes.