# **Reusable Launch Vehicle-Technology**

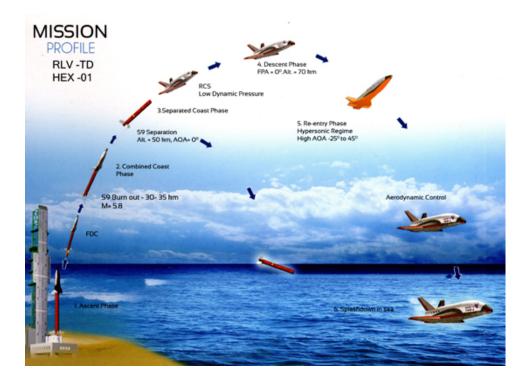
#### Why in News?

Recently, Indian Space Research Organisation (ISRO) and its partners successfully demonstrated a precise landing experiment for a <u>Reusable Launch Vehicle (RLV)</u> at the **Aeronautical Test Range** (ATR), Chitradurga, Karnataka.

• An Indian Air Forces (IAF) Chinook helicopter was used to drop the RLV-TD from a 4.5 km altitude and ISRO executed the landing experiment of the RLV-TD as planned.

## What is ISRO's RLV Project?

- About:
  - According to ISRO, the series of experiments with the winged Reusable Launch Vehicle-Technology Demonstration (RLV-TD) are part of efforts at "developing essential technologies for a fully reusable launch vehicle to enable low-cost access to space".
  - In the future, this vehicle will be scaled up to become the first stage of India's reusable two-stage orbital (TSTO) launch vehicle.
- Features and Application:
  - ISRO's RLV-TD looks like an aircraft. It consists of a **fuselage**, a nose cap, double delta wings, and twin vertical tails.
  - The RLV-TD will be used to develop technologies like hypersonic flight (HEX), autonomous landing (LEX), return flight experiment (REX), powered cruise flight, and <u>Scramjet Propulsion Experiment (SPEX)</u>.
- Significance:
  - With the costs acting as a major deterrent to space exploration, a reusable launch vehicle is considered a low-cost, reliable, and on-demand mode of accessing space.
    - By using **RLVs the cost of a launch can be reduced by nearly 80%** of the present cost.
- Other Previous Experiment:
  - ISRO had earlier demonstrated the re-entry of its winged vehicle **RLV-TD in the HEX** mission in May 2016.
  - In **HEX**, the vehicle landed on a **hypothetical runway over the Bay of Bengal.** Precise landing on a runway was an aspect not included in the HEX mission.
    - The **LEX mission** achieved the final approach phase that coincided with the reentry return flight path exhibiting an autonomous, **high speed (350 kmph) landing.**



- Other Agencies Using RLV or Partial RLV:
  - Reusable space vehicles have been in existence for a long time with NASA space shuttles carrying out dozens of human space flight missions.
  - <u>SpaceX</u> has been demonstrating partially reusable launch systems with its <u>Falcon 9</u> and **Falcon Heavy** rockets since 2017.
    - SpaceX is also working on a fully reusable launch vehicle system called Starship.

#### Conclusion

The successful landing experiment of the RLV-TD programme marks a significant milestone in India's space technology development. The RLV-TD is an important step towards achieving low-cost access to space, and its successful implementation will benefit **India's space program in the future.** 

## **UPSC Civil Services Examination, Previous Year Question (PYQ)**

# Q. With reference to India's satellite launch vehicles, consider the following statements: (2018)

- 1. PSLVs launch the satellites useful for Earth resources monitoring whereas GSLVs are designed mainly to launch communication satellites.
- 2. Satellites launched by PSLV appear to remain permanently fixed in the same position in the sky, as viewed from a particular location on Earth.
- 3. GSLV Mk III is a four-staged launch vehicle with the first and third stages using solid rocket motors, and the second and fourth stages using liquid rocket engines.

#### Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 and 3
- (c) 1 and 2
- (d) 3 only

Ans: (a)

#### Source: IE

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