MIRV TECHNOLOGY - DEFENCE & SECURITY

What is Multiple Independently Targetable Re-entry Vehicle (MIRV) technology? What makes MIRV technology lethal? (10 marks, 150 words)

News: *Mission Divyastra: PM Modi Hails First Flight Test Of Made In India Agni-5 Missile With MIRV Tech*

What's in the news?

- Prime Minister Narendra Modi hailed Mission Divyastra, India's first flight test of indigenously developed Agni-5 missile with Multiple Independently Targetable Re-entry Vehicle (MIRV) technology.

Mission Divyastra:

- Mission Divyastra is the first test flight of India's indigenously developed Agni-5 missile with MIRV technology, led by the DRDO.

Agni-5 Missiles:

1. Indigenous Development:

- Agni missiles, developed by the Defence Research and Development Organisation (DRDO), have been integral to India's defence arsenal since the early 1990s.

2. MIRV Technology:

- The latest variant of Agni incorporates Multiple Independently Targetable Re-entry Vehicle (MIRV) technology, a sophisticated capability possessed by only a handful of countries globally.

MIRV Technology:

- MIRV stands for Multiple Independently Targetable Re-entry Vehicle.
- It is a missile technology that enables one missile to carry multiple nuclear warheads, each capable of hitting different targets.
- These missiles can be launched from either land-based platforms or submarines at sea.

Features of MIRV:

- The strategic shift started by MIRV has enabled many nations to greater target damage and reduce the effectiveness of enemy missile systems, altering the landscape of global nuclear deterrence.
- The warheads on MIRVs can be launched at different speeds and in different directions. Some MIRVed missiles can hit targets as far as 1,500 km apart.

- The technology requires a delicate combination of large missiles, small warheads, precise guidance, and a complex mechanism for releasing warheads sequentially during flight.

Developments in MIRV Technology:

1. Targeting Versatility:

- MIRV technology enables a single missile to target multiple locations, potentially hundreds of kilo meters apart, significantly enhancing its operational effectiveness.

2. Range and Strategic Focus:

- Agni, equipped with nuclear warheads, boasts a range exceeding 5,000 km, primarily aimed at countering threats from China.

3. Limited MIRV-Equipped Nations:

- Currently, major nations possessing MIRV-equipped missiles include the United States, Russia, China, France, and the United Kingdom, with emerging capabilities in Pakistan and Israel.

4. Complex Technology:

- Developing MIRV technology requires miniaturization of warheads, independent guidance systems, and sequential release mechanisms, making it a challenging endeavor.

Strategic Significance of the Mission Divyastra:

1. Versatile Strike Capabilities:

- MIRV-equipped missiles enable simultaneous strikes on multiple targets, overwhelming enemy defenses and maximizing damage potential.

2. Deterrence and Defense Penetration:

- These missiles pose a significant challenge to missile defense systems, as multiple warheads with independent trajectories can thwart interception efforts.

3. Strategic Balance and Deterrence:

- For nations like India with a no-first-use policy, MIRV technology enhances the credibility of response strikes, serving as a potent deterrent against aggression.

Go back to basics:

Agni Missiles:

- Agni missiles are long range, nuclear weapons capable of surface to surface ballistic missiles.
- The first missile of the series, Agni-I was developed under the Integrated Guided Missile Development Program (IGMDP) and tested in 1989.
- After its success, the Agni missile program was separated from the IGMDP upon realizing its strategic importance.

- It was designated as a special program in India's defence budget and provided adequate funds for subsequent development.

Variants of Agni Missiles:

- **Agni I:** It is a Medium Range Ballistic Missile with a Range of 700-800 km.
- **Agni II:** It is also a Medium Range Ballistic Missile with a Range more than 2000 km.
- **Agni III:** It is also an Inter-Medium Range Ballistic Missile with Range of more than 2,500 Km.
- **Agni IV:** It is also an Inter-Medium Range Ballistic Missile with Range is more than 3,500 km and can fire from a road mobile launcher.
- **Agni-V:** Currently it is the longest of the Agni series, an Inter-Continental Ballistic Missile (ICBM) with a range of over 5,000 km.
- **Agni- VI:** The longest of the Agni series, an ICBM with a range of ICBM 11,000–12,000 km.