EDITORIAL

One Missile, Many Weapons

Background

- In a major technological breakthrough and building in redundancy into the country's nuclear weapons programme, Prime Minister Narendra Modi on 11th March 2024 announced the successful test firing of Agni-V ballistic missile with Multiple Independently Targetable Re-entry Vehicle (MIRV) technology by the Defence Research and Development Organisation (DRDO) under Mission Divyastra.
- The maiden flight test of Agni-V, India's longest range ballistic missile with a "range of more than 5000 kms" was conducted in April 2012 and has since been tested multiple times.
- It has also been canistered, which improves ease of handling and operation. Agni-V uses a three-stage solid fuelled engine and is capable of striking targets at ranges of over 5,000 Kms and can reach most parts of China.

Key Points of the Article

- Multiple Independently Targetable Re-entry Vehicle (MIRV) Technology.
- It is the capability that allows multiple warheads to be loaded on a single missile delivery system and programmed to hit different targets, thus greatly enhancing the missile's destructive potential.
- The development of MIRV capability marks a significant upgrade for India's missile systems, and expands its nuclear options.
- Traditional missiles carry a single warhead, or weapon, that goes and hits the intended target. MIRV-equipped missiles can accommodate multiple warheads, each of which can be programmed to strike a separate target.
- They can all be made to hit the same location too, one after the other, thus ensuring complete annihilation of the target.
- It was developed in the 1960s and first deployed in the 1970s by the United States and the then Soviet Union. But it is a complicated technology.
- The warheads have to be miniaturized, be equipped with independent guidance and navigation controls, and released sequentially from the delivery system.
- Over the years, France, the United Kingdom, and eventually China have developed this technology. Pakistan too has claimed to have tested an MIRV-equipped missile called Ababeel, first in 2017 and then in 2023.
- However, an MIRV-equipped missile has never been used so far in any conflict situation. Arms control advocates argue that MIRV technology incentivizes the urge to strike first, thus increasing the risk from nuclear weapons.

Advantages of MIRV Technology

- MIRV (Multiple Independently targetable Reentry Vehicle) technology offers several advantages :

- Increased Target Coverage: MIRV-equipped missiles can deliver multiple warheads to different targets, significantly expanding the coverage area compared to single-warhead missiles. This allows for a more comprehensive and effective strike against a wider range of potential targets, enhancing the strategic flexibility of a nation's nuclear arsenal.
- Enhanced Survivability : MIRV technology enhances the survivability of a nuclear arsenal by increasing the difficulty of intercepting all incoming warheads. With multiple independently targetable reentry vehicles, the adversary's missile defense systems must successfully intercept each warhead separately, making it more challenging to neutralize an incoming missile attack completely.
- Reduced Vulnerability to Countermeasures : MIRV payloads can incorporate decoys and penetration aids alongside actual warheads. This complicates the adversary's defense efforts by introducing multiple objects to track and discriminate between, making it harder to distinguish actual warheads from decoys. As a result, MIRV-equipped missiles are more resilient against anti-ballistic missile systems and other countermeasures.
- Economical Use of Resources : Instead of deploying multiple single-warhead missiles, MIRV technology allows a nation to achieve similar or greater strike capabilities with fewer missiles. This results in cost savings in terms of production, deployment, and maintenance of the missile force, making MIRV systems a more resource-efficient option for achieving strategic goals.
- Deterrence and Strategic Stability : The presence of MIRV-equipped missiles in a nation's nuclear arsenal enhances its deterrence posture by presenting a credible and formidable threat to potential adversaries. The ability to strike multiple targets simultaneously or in rapid succession reinforces the notion of assured retaliation, contributing to strategic stability by dissuading adversaries from initiating a nuclear conflict.
- Overall, MIRV technology provides nations with a potent and versatile means of enhancing their nuclear deterrent capabilities, offering greater flexibility, survivability, and efficiency in addressing diverse strategic challenges and threats.

Significance of Agni-5 MIRV Technology

- Increased Strike Capability : Agni 5 MIRV technology allows a single missile to carry multiple warheads, enabling India to strike multiple targets with precision accuracy in a single launch.
- Enhanced Deterrence : The development and deployment of Agni 5 MIRV technology reinforce India's deterrence posture by demonstrating advanced capabilities to potential adversaries.
- Improved Survivability : MIRV-equipped missiles like Agni 5 enhance survivability by complicating enemy missile defense systems.
- Strategic Flexibility : Agni 5 MIRV technology provides India with greater flexibility in its strategic planning and response options.
- Technological Advancement : Developing and deploying MIRV technology represents a significant technological achievement for India's defense research and development sector.
- Therefore, the development was significant enough for Prime Minister Narendra Modi to himself tell the nation about it, much like he had done five years earlier when DRDO had successfully carried out an anti-satellite test, an equally notable technological achievement that put India among a handful of nations with the capability to strike at an enemy's space-based assets, such as satellites.

Source : *Indian Express*