ANTI - SATELLITE WEAPON - GS III MAINS

Q. Anti-satellite weapons gained momentum recently posing major threats to the country's security. Discuss the consequences associated with it. (10 marks, 150 words)

News: *Is Russia testing a new anti-satellite weapon?*

What's in the news?

- Recently, U.S. National Security Council spokesperson John Kirby confirmed the claims referred to a space-based "anti-satellite weapon" of Russian provenance.

What is an Anti-Satellite weapon?

- Space weapons designed to incapacitate or **destroy satellites for strategic or tactical purposes.**

Purpose:

- **Defensive Measures:** Protecting against adversaries' space-based and nuclear weapons.
- **Force Multiplier:** Enhancing capabilities for a nuclear first strike by targeting adversary satellites.
- **Countermeasure Against ABM**: Disrupting or disabling an adversary's anti-ballistic missile defence systems.
- **Asymmetric Counter:** Leveling the playing field against technologically superior adversaries.
- **Counter-Value Weapon:** Targeting an adversary's satellites to inflict damage on their infrastructure and capabilities.

Types of ASAT Weapons:

1. Kinetic Kill Vehicles (KKVs):

- Function by physically colliding with the target satellite.
- Utilize interceptors launched from Earth or other platforms.
- Examples include ground-launched missiles and air-launched missiles like the Vought ASM-135 ASAT.

2. Co-orbital ASATs:

- Orbit in close proximity to the target before engaging.
- Carry explosives or fragmentation warheads to destroy the target satellite.
- Examples include the Istrebitel Sputnikov (IS) program developed by the Soviet Union.

3. Directed Energy Weapons (DEWs):

- Utilize directed energy beams such as lasers or microwaves to disable or destroy satellites.
- Offer advantages in speed, precision, and potential deniability.
- Research in this area includes ground-based lasers and airborne laser systems.

4. Cyber Weapons:

- Target satellite communication systems and ground control infrastructure.
- Disrupt satellite operations or hijack control using malware or cyber attacks.

India:

- Successful ASAT test in 2019 under Mission Shakti, targeting the Microsat-R satellite.
- Development of necessary technologies for ASAT capabilities, including radars and interceptors.

Other countries:

Country	ASAT Missile/Weapon
USA	Bold Orion air-launched ballistic missile (ALBM)
Russia (Former Soviet Union)	Nudol Missile
China	SC-19 ASAT missile

Strategic Implications and Concerns:

- **Space Debris**: ASAT tests generate debris, increasing collision risks and potential Kessler syndrome.
- **Escalation Risks:** ASAT capabilities could escalate conflicts into space domain, leading to unintended consequences.
- **Arms Race Dynamics:** Rapid advancements may lead to an arms race among space-faring nations, impacting global security and stability.

International Legal and Policy Frameworks:

- **Outer Space Treaty (OST):** Bans the placement of nuclear weapons in space, encourages peaceful use of space.
- **Missile Technology Control Regime (MTCR)**: Aims to limit proliferation of ballistic missiles and related technologies.
- **Bilateral and Multilateral Agreements:** Various nations have agreements on ASAT capabilities and space exploration, promoting transparency and cooperation.

Limits and Challenges:

- **Interception Difficulty:** Challenges in intercepting satellites due to their speed and defensive measures.
- **Tracking and Prediction**: Difficulties in accurately tracking and predicting satellite trajectories, especially with defensive maneuvers.
- **Space Debris:** Potential risks of space debris and unintended consequences, including impacts on other satellites and space operations.