Anti-Tank Missiles [UPSC Notes]

The Defence Research and Development Organisation (DRDO) successfully test launched the indigenously developed laser-guided variant of the Anti-Tank Guided Missile (ATGM) on two different times lately, and it will undergo more validation testing in the coming days before it is ready for user trials. When dealing with armoured vehicles, we look at the importance of the weapons system.

The indigenously produced Army and Air Force versions of anti-tank guided missile systems 'Helina' and 'Dhruvastra' were successfully test-fired in the Pokhran range Thar Desert Rajasthan.

What are Anti Tank Missiles?

Anti-Tank Missiles (ATMs) are precision-guided missiles meant to destroy or damage heavily armoured vehicles like tanks. They're guided missiles that use a variety of guiding algorithms, such as wire-guided missiles, laser-guided missiles, and have a number of parameters, which are listed below:

Parameters of Anti-Tank Missiles	
Size	ATMs come in various sizes: Small ATMs that can be carried by one person and thrown over the shoulder. Medium-sized weapons that require a group of soldiers to transport and launch. Large ATMs can be installed on planes or Main Battle Tanks and launched from great distances.
Technology	Due to their lack of penetration firepower, ATMs would need to be launched close to the target armoured vehicle at first. They can now be fired from a great distance and still do damage to light and medium armoured vehicles, thanks to advances in technology.
Warhead	Depending on the size and armour of the target, different ATMs utilise different warheads. The High Explosive Anti

	Tank (HEAT) Warhead is one of those warheads. A metal spike in the HEAT warhead pierces the metal armour.
Guidance System	1st Generation: Guided by manual commands and the missile is steered to the target.
	2nd Generation: Semi-automatic commanded missiles. The operator would need to keep the sight fixed on the target until impact.
	3rd Generation: This type of guided missile relies on an electro-optical imager (IIR) seeker, a laser or a W-band radar seeker in the nose of the missile. These are 'fire-and-forget' missiles where the operator can retreat right after firing as there is no more guidance required.

When did ATGMs first come into use?

Since World War I, there has been a race to find ammunition that can pierce tank armour and materials that can survive such ammo. Armies around the world didn't start using ATGMs, missile systems that can strike and neutralise armoured vehicles like tanks, until the following World War.

While the Indian Army primarily employs several imported anti-tank guided missiles, as part of the Integrated Guided Missile Development Program, the DRDO has been developing ATGMs that can be launched from a variety of platforms.

In September of last year, the indigenously produced low-weight, fire-and-forget Man Portable Anti-Tank Guided Missile (MPATGM) was successfully tested. ATGM Nag was successfully tested in the desert in February 2018. All of these systems are in varying stages of development and are mostly utilised by Army infantry units. Meanwhile, the government said in December 2019 that it has purchased Anti-Tank Spike Missiles from Israel, as well as allied systems, to suit the Indian Army's operational needs.

How are laser-guided ATGMs different?

The laser-guided ATGM, which was successfully tested on September 22 and later on October 1, differs from all ATGMS created to date primarily in one area. This ATGM, which has yet to be given a name, is intended to be launched from tanks. It locks and tracks targets with the use of laser designation to assure precision in attacking the target, with a range of 1.5 to 5 kilometres. A 'tandem' High Explosive Anti Tank (HEAT) warhead is used by the missile. The term tandem refers to missiles that use several detonations to efficiently overcome defensive armour. This missile is capable of piercing armoured vehicles that are equipped with specifically built armour plates to deflect such projectiles.

The Armament Research and Development Establishment (ARDE) and the High Energy Materials Research Laboratory (HEMRL) of the DRDO's Armament and Combat Engineering Cluster in Pune, in collaboration with the Instruments Research and Development Establishment (IRDE) in Dehradun, developed this Laser Guided ATGM.

It is now being tested to see if it can be incorporated into India's Arjun Main Battle Tank (MBT). More experiments for striking targets at various ranges and testing other flying parameters are planned in the coming days, according to DRDO scientists. The system will be ready for the Army's user trial after a series of validation tests, when it will be tested for various weather conditions, among other things.

These tests were carried out from the MBT Arjun on the field ranges of the Indian Army's Armoured Corps Centre and School (ACC&S) in the outskirts of Ahmednagar, Maharashtra. The missile was tested for a target at a range of 3 kilometres on September 22. It was successfully test fired for a slightly longer range on October 1.

Anti-Tank Missiles in India

The DRDO Anti-Tank Missile (DRDO ATM) was a 1st Generation missile with Wire Guided guidance technology developed by the Defence Research and Development Organisation (DRDO). In the table below, anti-tank missiles in India are discussed:

Name	Developer	Details
DRDO ATM	Defence Research and Development Organisation (DRDO)	1st Gen Speed: 300 ft/s (91 m/s) Range: up to 1.6 km Warhead: 106mm HEAT Warhead
AMOGHA	Bharat Dynamics Ltd (BDL)	2nd Gen Range: up to 2.8 km Various versions of AMOGHA are developed by BDL: AMOGHA 2- Land Version AMOGHA 3- Improved version; 3rd Gen
NAG	Bharat Dynamics Ltd (BDL); Uses the IGMDP developed by DRDO.	3rd Gen Fire & Forget Tech Range: 500m – 20km Various versions of NAG: Land version Air Version HeLiNa- Helicopter Launched NAG NAMICA – NAG missile Carrier Dhruvastra
JASMINE	VEM Technologies Pvt Ltd	Still in development 3rd Gen
Spike ATGMs	Rafael Advanced Defence Systems of Israel	

Important Points

1. The Helina (Army version) and Dhruvastra (Indian Airforce version) are third-generation anti-tank guided missiles that are launched from helicopters (the Nag missile system).

2. The missile systems were created and developed by the DRDO in-house.
3. The missile system is capable of defeating battle tanks with conventional and explosive reactive armour in any weather conditions.
4. Both the 'Helina' and the 'Dhruvastra' can engage targets in direct hit and top attack modes.

- Direct Hit Mode - The missile descends to a lower height and strikes the target directly.
- Top attack mode: After launch, the missile must climb swiftly and travel at a predetermined altitude before plunging on top of the target.

5. The Nag missile has a maximum range of 4 kilometres, but the Helina has an extended strike range of around 8 kilometres.

What were the previously tested ATGMs?

- ATGM Nag was successfully tested in the desert in 2018.
- The low-weight, fire-and-forget Man-Portable ATGM (MPATGM), developed in-house, was successfully tested in 2019.
- All of these systems are still in the early phases of development and are primarily used by Army infantry units.
- In 2019, the government announced that it has purchased Anti-Tank Spike Missiles from Israel to suit the Indian Army's needs.

What is Man-Portable Anti Tank Guided Missile?

The Indian Army's infantry and parachutists (Special Forces) will use the Man-Portable Anti-Tank Guided Missile. It is 'Soft' launched from a canister using an Ejection Motor and uses a state-of-the-art IIR seeker for homing onto the target. The man-portable missile, which is launched from a tripod, has a launch weight of less than 15 kilogrammes.

This topic is linked to General Studies paper 3's Defense and Security issues. The UPSC Syllabus includes a section on defence

that is both significant and dynamic. Because DRDO is such an important aspect of the country's defence system, it is a hot issue among IAS candidates. The Commission has asked a number of questions about missile launches, their sorts, and so forth. It is necessary to know various facts and numbers relevant to the topic in order to answer such factual questions in the UPSC Prelims.