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Halina

- Recently, Anti-Tank Guided Missile (ATGM) Helina has been successfully test-fired by India in Pokhran.
- According to the Defense Research and Development Organization (DRDO), it is one of the world's most advanced anti-tank weapons.
- The test was part of the validation trials of the third generation 'Fire and Forget' class missiles developed by DRDO.

Helina:

- HELINA has been developed by the Defense Research and Development Laboratory (DRDL), Hyderabad under the Missiles and Strategic Systems (MSS) cluster of DRDO.
- The missile has been successfully test fired from the year 2018.

Properties:

- It has a maximum range of seven kilometers and has been designed and developed for integration with the weaponized version of the Advanced Light Helicopter (HAL).
- The missile system can be launched at any time of the day and night and is capable of hitting battle tanks with conventional armor and explosive reactive armor.
- It has been developed for integration with helicopters in both Army and Air Force.
- The Air Force version of HELINA is also known as 'Dhruvstra'.
- Helina can target in both Direct Hit Mode as well as Top Attack Mode.
- **Top Attack Mode:** In this, the missile after launch accelerates to a certain height and then turns downwards to hit the designated target.
- **Direct Hit Mode:** In this the missile hits the target directly at low altitude.

Other anti-tank missiles:

DRDO has designed and developed a range of anti-tank missile technologies which include:

- **Nag:** It is a third generation anti-tank missile based on the principle of 'Fire-and-Forget', which has been developed to attack enemy tanks.
- **MPATGM:** It is a man-portable anti-tank guided missile with a range of 2.5 km with fire-and-forget and top attack capability for infantry use.
- **SANT:** It is a smart stand-off anti-tank missile which is being developed to be launched from Mi-35 helicopter for anti-tank mission of Air Force.
- **Arjuna Main Battle Tank (MBT) MK-1A:** Arjuna Main Battle Tank is a laser-guided, precision-guided warfare material. These include indigenously developed 120mm rifles and Armor Piercing Fin-stabilized Discreet Sabot (FSAPDS) munitions.

Advanced Pinaka Mk-I Rocket System (EPRS)

- The Advanced Pinaka Mk-I Rocket System (EPRS) was successfully test fired at the Pokhran range in Rajasthan.
- Area Denial Munition (ADM) was also successfully tested as part of the same set of trials.
- The tests also validated the performance of a variety of warheads and fuses that can be used in the Pinaka rocket system.
- ADM is a category of ammunition that is used to prevent the enemy from occupying or passing through a particular area.

What is EPRS?

- EPRS is an improved version of the Pinaka variant which is in service of the Indian Army for the past decade.
- Designed and developed by Pune based DRDO (Defence Research and Development Organisation) laboratories- Armament Research and Development Establishment (ARDE) and High Energy Materials Research Laboratory (HEMRL).
- Upgrades include advanced technologies that increase the range to meet the evolving needs of the battlefield.

- While the range of Mark-1 is 38 km. The upgraded version of the Mark-1, which was tested in the last fortnight, has a range of 45 km with some major additional features.
- The new incarnation of the Pinaka represents one of the few examples of the development process being developed with an indigenous Indian weapon system.

Pinaka Missile:

- Pinaka Rocket System is a multi-barrel rocket system, named after the bow of Lord Shiva.
- It has been developed by the Pune-based Armament Research and Development Establishment (ARDE) and the High Energy Materials Research Laboratory (HEMRL).
- The development of the 'Pinaka' multi-barrel rocket system was initiated by the Defense Research and Development Organization (DRDO) in the late 1980s. It was developed as an alternative to Russia's 'Multi Barrel Rocket Launcher' system (also known as 'Grad').
- After the successful trials of Pinaka Mark-1 in the late 1990s, it was successfully used on the battlefield for the first time during the Kargil War of 1999. This was followed by several regiments of the system in the 2000s.

Features:

- As a key strategy in long-range artillery combat, launch vehicles typically have to 'shoot and scoot' detectable due to its back blast to ensure that they themselves don't be a target.
- It can fire 12 rockets in a duration of 44 seconds.
- A battery of the Pinaka system consists of six launch vehicles, including a loader system, radar and links with network-based systems, and a command post. One battery 1 km. area can be neutralized.

Version:

- The Defense Research and Development Organization has also developed and successfully test-fired the Mk-II and Guided variants of the Pinaka, which have a range of about 60 km, while the Guided Pinaka system has a range of 75 km and also has an integrated navigation, control and guidance system.
- The navigation system of the Guided Pinaka missile is also aided by the Indian Regional Navigation Satellite System (IRNSS).

Solid Fuel Ducted Ramjet

- Recently India has successfully test-fired a missile system- 'Solid Fuel Ducted Ramjet' (SFDR) booster at 'Integrated Test Range' (ITR) at Chandipur off Odisha coast.
- Defense Research and Development Organization (DRDO) first started developing SFDR in the year 2017 and conducted successful trials in the year 2018 and also in the year 2019.

'Solid Fuel Ducted Ramjet' (SFDR):

- It is a missile propulsion technology jointly developed by India and Russia.
- SFDR technology is a missile propulsion system, which is based on the concept of 'ramjet engine' principle.
- A ramjet engine is a variant of the air-breathing jet engine that uses the vehicle's forward motion to compress the incoming air for combustion without a rotating compressor.
- In ramjets high pressure is generated by using the forward motion of the vehicle. The outside air introduced into the propulsion system becomes the working fluid.
- Ramjet works only when the vehicle is already moving; The ramjet cannot function when the engine is stationary.
- The system uses a solid fueled ramjet engine.
- Unlike solid propellant rockets, ramjets take oxygen from the atmosphere during flight. Thus it is lighter in weight and can carry more fuel.
- SFDA has been developed by Defense Research and Development Laboratory, Hyderabad in collaboration with other DRDO laboratories such as Research Center Imarat, Hyderabad and High Energy Materials Research Laboratory, Pune.

Importance:

- It protects the missile from air threats over very long distances at supersonic speed.
- At present such technology is available with only a few countries in the world.
- Air-to-air missiles that use SFDR technology are capable of long range strikes as they do not require oxidizers, that is, oxygen from the atmosphere.
- The missile based on SFDR takes off at supersonic speed and ensures high maneuverability so that the target aircraft does not take off from the missile.

Defense Research and Development Organization (DRDO):

- Defense Research and Development Organization (DRDO) works under the administrative control of the Ministry of Defense, Government of India.
- It works with a vision to empower India to achieve a state of self-reliance in cutting edge and critical defense technologies and systems.
- DRDO was established in the year 1958 by combining the Technical Development Establishment (TDEs) of the Indian Army with the Defense Science Organization (DSO) and the Directorate of Technical Development and Production (DTDP).
- It has an important role in developing the Integrated Guided Missile Development Program (IGMDP).

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