



Date – 4 November 2022

BMD successfully tested

Prelims: Current events of national and international importance in science and technological development.

Mains: GS paper III: Achievements of Indians in science & technology; indigenization of technology and developing new technology.

Significance of Prelims: **BDM**, geographical location, Prithvi Air Defence (PAD), Advanced Air Defence (AAD) Missile, **AD-1 (Air Defence) missile**

Significance of Mains: the difference between Ballistic Missiles and Cruise Missile, other defence missiles.

Context:

- DRDO has conducted the 1st successful flight test of the Ballistic Missile Defence (BMD) interceptor missile.
- This interceptor missile will have capable of neutralising long-range missiles
- The test was successfully conducted from the APJ Abdul Kalam Island off the Odisha Coast on 2nd Nov 2022.
- The test was a successful maiden flight test of phase-II Ballistic Missile Defence (BMD) interceptor AD-1 missile with a large kill altitude bracket.



Ballistic Missile Defence(BMD) programme.

- It is a type of missile which fires warheads at a target by moving the projectile.
- The objective of India's Ballistic Missile Defense (BMD) programme is to come up with an air-defence shield from all types of hostile missiles, even nuclear ones.
- DRDO is developing a two-tier BMD system to put forward a multi-layered shield against ballistic missile attacks.
- The two-tier system is designed in a way that it can destroy an incoming missile, at a higher altitude, in the exo-atmosphere and if that miscarries, an endo-atmospheric interception will take place.
- These weapons are only guided for short periods as most of the flights are unpowered.
- DRDO started the Ballistic Missile Defence(BMD) program of India around the 2000s in view of the development of ballistic assets by Pakistan and China.
- The phase-I of the programme have been completed at the end of the 2010s. It consisted of advanced air defence systems and air defence systems based on the Prithvi missile.
- The 2nd phase focuses on the development of anti-ballistic defence systems like the US's Theatre High-Altitude Area Defence system anti-ballistic defence systems which can neutralize intermediate-range ballistic missiles.

Two -tires of Ballistic Missile Defence(BMD) System

Prithvi Air Defence (PAD) missile

- It is based on Prithvi missile.
- It has the capability to intercept and destroy missiles at exo-atmospheric altitudes of 50–180 kilometres.
- Pradyumna ballistic missile interceptor is replaced by the Prithvi air defence

Advanced Air Defence (AAD) Missile

- It is the 2nd tier of Ballistic Missile Defence(BMD).
- It is for Lower altitude interception

- This is structured in a way so that it can knock down hostile missiles the in the endo-atmosphere at altitudes of 15-40 kilometres.
- Aksh Surface to AirMissiles (SAM) is part of the AAD

AD-1 (Air Defence) missile

- It is a long-range interceptor missile designed for both low exo-atmospheric and endo-atmospheric interception of long-range ballistic missiles as well as aircraft.
- These missiles are developed under Phase II of the Ballistic Missile Defense programme

The Purpose:

- The missile is capable of striking down incoming adversary missiles and aircraft.
- It has been developed under the Phase II of the Ballistic Missile Defence programme.

Its features

- It is propelled by a two-stage solid motor and equipped with an indigenously-developed advanced control system, navigation and guidance algorithm to precisely guide the vehicle to the target.

The difference between Ballistic Missiles and Cruise Missile

Ballistic Missiles	Cruise Missiles
after the launch is propelled only for a short duration.	it is a Self-propelled missile till the end of its flight.
it is similar to a rocket engine.	it is similar to a jet engine.
is a Long-range missile that leaves the atmospheric layers of the earth and returns.	it's flight path is within the earth's atmosphere. it never goes out of it
Due to it being unguided for most of its path and its trajectory depending on gravity, air resistance and Coriolis Force, it has Low precision.	it is designed to hit the targets with high precision as it is constantly propelled.
it can have a very long range (300 km to 12,000 km) as there is no fuel	The range is a cruise missile's small (below 500 km) as it needs to be

requirement after its initial trajectory.	constantly propelled to hit the target with high precision.
it has the capacity to carry heavy payloads and also carry multiple payloads (Multiple Independently targetable Re-entry Vehicles)	it has a limited Payload capacity Usually, it can carry a single payload.
it was developed mainly to carry nuclear warheads.	Developed primarily to carry conventional warheads.
for ex. Prithvi I, Prithvi II, Agni I, Agni II and Dhanush missiles.	for ex. BrahMos missiles

India's other missiles boosting the defence capabilities

- Under the mission Shakti, India also conducted its 1st successful anti -satellites (ASAT) test, in March 2019.
- India is also getting the Russian S-400 triumph Air defence system.
- It is one of the advanced air defence systems
- It can simultaneously track numerous incoming objects and neutralize them
- Recently, the Indian Air force got its 1st deliverable firing unit of a Medium-Range Surface -Air Missile(MRSAM) system
- It provides a point and area of air defence for ground assets from a wide range of threats
- India has come along with an elite group of countries like the US, Russia, China, the UK and France, after the introduction of the Nuclear Missile tracking Ship, the Indian Naval Ship Dhruv

Sources

Britannica

PNB

TheIndianExpress

Further readings

Mission Shakti

About DRDO