To change the path of an asteroid NASA has launched a test mission **DART (Double Asteroid Redirection Test).** NASA DART Mission is a planetary defence-driven test of technologies for preventing an impact on Earth by a hazardous asteroid. The spacecraft will be launched on a SpaceX Falcon 9 rocket from Vandenberg Space Force Base in California. Its purpose is to divert the course of an asteroid called Dimorphos. DART is the first-ever mission dedicated to investigating and demonstrating one method of asteroid deflection by changing an asteroid's motion in space through kinetic impact.

What Is The Dart Mission ?

DART is an inexpensive spacecraft. It is equipped with two solar arrays and is propelled by hydrazine propellant. Additionally, it carries around ten kilogrammes of xenon, which will be used to demonstrate the agency's new thrusters in orbit, named NASA Evolutionary Xenon Thruster–Commercial (NEXT-C).

The NEXT-C gridded ion thruster system is especially suitable for deep space robotic missions due to its mix of performance and spacecraft integration capabilities. Didymos Reconnaissance and Asteroid Camera for Optical Navigation (DRACO)is a high-resolution imager carried by spacecraft. This method will have DART deliberately collide with a target asteroid which poses no threat to Earth, in order to change its speed and path. DART's target is the binary, near-Earth asteroid system Didymos, composed of the roughly 780-meter (2,560-foot) -diameter "Didymos" and the smaller, approximately 160-meter (530-foot)-size "Dimorphos," which orbits Didymos.

DART will impact Dimorphos to change its orbit within the binary system. DART is also carrying a cubesat that will film the larger spacecraft's impact and beam the footage back to researchers on Earth. At the time of DART's impact, Didymos will be visible enough to be a good candidate for study and distant enough to be no danger, at approximately 6.8 million miles (11 kilometers) away from Earth.

Objectives Of NASA DART Mission

DART is the first technology demonstration of the kinetic impactor technique that could be used to **lighten the threat of an asteroid hitting Earth.** The kinetic impactor mitigation technique is the impulsive deflection of the asteroid through the sudden addition of momentum. In simpler terms, DART is being sent to collide with an asteroid to change its orbital period.

Key Objectives

- DART is a test of our ability to achieve a kinetic impact on an asteroid and observe the asteroid's response.
- After DART's kinetic impact with its target asteroid Dimorphos, an investigation team will measure how much the impact changed the asteroid's motion in space using telescopes on Earth.
- This mission engages the international planetary science community and embraces worldwide cooperation to address the global issue of planetary defense.

DART's Mission Objectives:

- Demonstrate a kinetic impact with Dimorphos.
- Change the binary orbital period of Dimorphos.
- Use ground-based telescope observations to measure Dimorphos' period change before and after impact.
- Measure the effects of the impact and resulting ejecta on Dimorphos.

What Are Asteroids?

Asteroids, sometimes called minor planets, are rocky remnants left over from the early formation of our solar system about 4.6 billion years ago. Most of this ancient space rubble can be found orbiting our Sun between Mars and Jupiter within the main asteroid belt.

Asteroids range in size from Vesta (the largest at about 329 miles in diameter) to bodies that are less than 33 feet across. The total mass of all the asteroids combined is less than that of Earth's Moon.

Asteroids are not all round like planets. They have jagged and irregular shapes. Most asteroids are made of different kinds of rocks, but some have clays or metals, such as nickel and iron.

NASA DART Mission Configuration

- **Weight** : A considerably low-cost spacecraft DART weighsabout 610 KG at the time of its launch and will shed a little of its weight during its flight and weigh about 550 KG during the impact.
- **Structure**: The main structure is a box (1.2 × 1.3 × 1.3 metres). It has two solar arrays and uses hydrazine propellant for manoeuvring the spacecraft.
- The spacecraft has been appended with a high-resolution imager called Didymos Reconnaissance and Asteroid Camera for Optical Navigation (DRACO)which will give precise images and information to the scientists to study the impact of the collision on the trajectory of the asteroid.
- DART will also carry a small satellite or CubeSat named LICIACube (Light Italian CubeSat for Imaging of Asteroids).

DART'S Target Asteroid

The binary near-Earth asteroid (65803) Didymos is the target for the DART demonstration. While the Didymos primary body is approximately 780 meters across, its secondary body (or "moonlet") is about 160-meters in size, which is more typical of the size of asteroids that could pose the most likely significant threat to Earth. The Didymos binary is being intensely observed using telescopes on Earth to precisely measure its properties before DART arrives.

Importance Of DART To Planetary Defence

NASA established the Planetary Defense Coordination Office to manage its ongoing mission of planetary defence.

- The PDCO's goals are to provide early detection of potentially hazardous objects, track and characterize the objects, study strategies and technologies for mitigating possible impacts, and play a leading role in U.S. government response planning for an actual impact.
- DART is the first planetary defence test mission for PDCO.

The DART mission can hopefully give NASA and other space agencies in the world the signal to move forward and stop if a giant space rock heads towards us to eliminate the life on earth one day and prevent the judgement day destruction.