

DART- Planetary Defense at NASA

- DART (Double Asteroid Redirection Test) spacecraft collided with the space rock Dimorphos (just 160 metres wide).
- Double Asteroid Redirection Test (DART)
- DART is a spacecraft designed to impact an asteroid as a test of technology. DART's target asteroid is NOT a threat to Earth. This asteroid system is a perfect testing ground to see if intentionally crashing a spacecraft into an asteroid is an effective way to change its course, should an Earth-threatening asteroid be discovered in the future.
- 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.
- 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, and the DART Investigation Team will compare the results of DART's kinetic impact with Dimorphos to highly detailed computer simulations of kinetic impacts on asteroids.
- Doing so will evaluate the effectiveness of this mitigation approach and assess how best to apply it to future planetary defense scenarios, as well as how accurate the computer simulations are and how well they reflect the behavior of a real asteroid.
- This kinetic impact technique, which appears as the climax of Hollywood sci-fi movies like Deep Impact and Armageddon, is also known as the 'kick' method.
- It could one day save humanity from a potential cataclysmic collision by safely deflecting a killer asteroid on its course towards earth.
- It could also fuel space mining technologies and unleash the space economy in decades to come.

What was NASA's mission?

- NASA, to put it simply, undertook the 'kick' technique. Compared to the massive Dimorphos, DART is a tiny

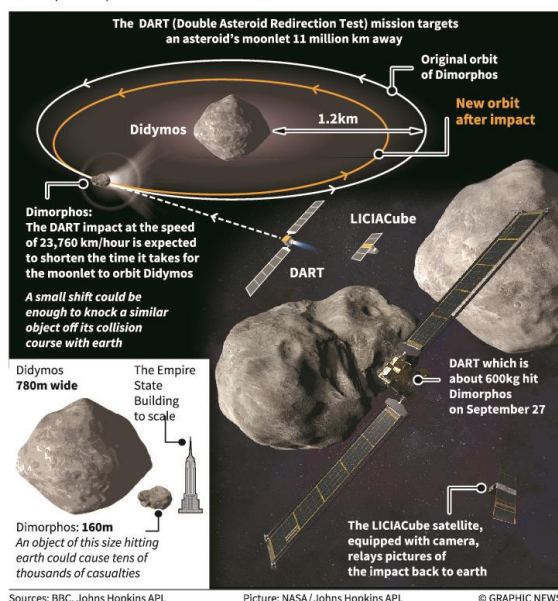
Goliath close-up images transmitted by the DART moments before the fatal collision indicate that Dimorphos is more like a pile of rubble loosely held by gravity.

- If true, the impact will eject a cascade of debris, each piece carrying away a bit of momentum and energy.
- And as a net result, the asteroid will suffer a considerable loss.
- It will speed up more, and the orbit will become nearer to Didymos.
- The orbital period will then reduce by as much as 10 minutes.

THE HINDU

Ready, set, crash!

NASA's DART spacecraft collided with the space rock Dimorphos (which orbits around Didymos, the primary asteroid) and has therefore, deflected the trajectory of the pair of space rocks



What has been the impact assessment?

- The DART craft carried a high-resolution DRACO (Didymos

Reconnaissance and Asteroid Camera for Optical navigation) camera to observe the collision and its consequences.

- The close-up images until its fatal crash are being analysed.
- In addition, like a kangaroo with a baby in its pouch, a tiny toaster-sized Italian Space Agency-built Light Italian CubeSat for Imaging of Asteroids (LICIACube) took a piggyback ride with the DART.

What are the other possibilities of this technique?

- At the heels of NASA, China is set to deflect a 40m diameter earth-crossing asteroid called 2020 PN1 sometime in 2026.
- While ostensibly the drive comes from the desire to protect earth from killer asteroids, perhaps the lure of space mining lurks behind.
- Mining rare earth elements comes with a high environmental cost.
- In the coming years, the penalty for polluting could make space mining economically viable.
- The 'kick' technique that deflects asteroids can then be used to move a small asteroid into a convenient position for space mining.
- Now shelved, NASA's Asteroid Redirect Mission (ARM) aimed at precisely this by bringing a 20-tonne

space rock near earth to study and mine.

- In a way, the DART mission is also part of this frame.
- For developing green energy technologies electric vehicles, solar panels, wind turbines, and energy storage devices and ushering in the low carbon economy of the future, rare earth elements such as yttrium, niobium, rhodium, palladium, osmium, iridium and scandium are critical.
- They are short in supply, and asteroid mining, it is believed, could solve the rare earth supply problem.
- From the robotic Soviet Luna 16 in the 1970s to U.S. Apollo missions and China's first lunar sample-return mission, Chang'e 5 all have brought back lunar soil.

Planetary Defense at NASA

- Near-Earth objects (NEOs) are asteroids and comets that orbit the Sun like the planets, but their orbits can bring them into Earth's neighbourhood within 30 million miles of Earth's orbit. Planetary defense is "applied planetary science" to address the NEO impact hazard.
- NASA established the Planetary Defense Coordination Office (PDCO)

to manage its ongoing mission of planetary defense. The PDCO:

- Provides early detection of potentially hazardous objects (PHOs) the subset of NEOs whose orbits predict they will come within 5 million miles of Earth's orbit; and of a size large enough (30 to 50 meters) to damage Earth's surface;
- Tracks and characterizes PHO's and issues warnings of the possible effects of potential impacts;
- Studies strategies and technologies for mitigating PHO impacts; and
- Plays a lead role in coordinating U.S. government planning for response to an actual impact threat.

THE HINDU

Quality engineering education

- The All-India Council for Technical Education (AICTE) has already approved an adequate number of institutions in engineering and technology to admit at least 23.67 lakh students.
- That is twice the number of aspirants for engineering education.
- There is, thus, neither a scarcity of seats nor capacity constraints.
- The nation is, in fact, staring at a dearth of institutions offering quality

engineering education at an affordable cost.

- In business parlance, that is the ability to deliver value for money. A quick review of the data reveals that the task is daunting.
- AICTE has so far approved 5,926 institutions to offer programmes in engineering and technology.
- Of these only 1,249 (21.07%) came forward to get ranked under the NIRF in 2022. India probably doesn't need more institutions.
- The scope of enhancing the intake in the existing quality institutions also appears limited.
- What is needed is improvement in the overall quality of technical higher education across the board.
- The youth are aspirational. Monetary rewards are a major attraction.
- But that does not mean that they are not orientated towards national development.
- Headline placements serve the purpose of sustaining such motivations.
- It is now for the nation to mitigate the widening gap between the best and the rest, and ensure equality of opportunity in access to quality technical higher education.

THE HINDU

Banning online content

- The Government's order asking YouTube to remove 45 videos from 10 channels can be seen as a justified response to growing concern over the propagation of hate and communally sensitive material over the free video sharing website.
- Section 69A of the IT Act, which empowers the Government to block content, was upheld by the Supreme Court only after it noted that the rules provided procedural safeguards, including the need to issue notice to the originators or the intermediary, before a blocking order.
- The latest order invokes the Information Technology (Intermediary Guidelines and Digital Media Ethics Code) Rules, 2021.
- It has a procedure by which an inter-departmental committee considers complaints on content and makes recommendations.
- The Authorised Officer has to take the approval of the Secretary, I&B, before directing the publisher or intermediary to block the relevant content.
- There is an emergency provision under which the Secretary may order content blocking as an interim

measure, and thereafter confirm it after getting the committee's views.

- All such blocking orders are meant to be examined by a review committee, which ought to meet once in two months, but it is not known whether the panel meets regularly.

THE HINDU

Hydro diplomacy between India and Nepal

- The Investment Board Nepal signed a Memorandum of Understanding (MoU) with India's National Hydroelectric Power Corporation (NHPC) Limited to develop the West Seti and Seti River (SR6) projects a total of 1,200 MW.



- In an MoU in 2012, China's Three Gorges International Corporation was assigned to develop the project, but it withdrew in 2018, citing issues of resettlement and rehabilitation

- India is already involved in the Mahakali Treaty (6,480 MW), the Upper Karnali Project (900 MW) and the Arun Three projects (900 MW) in western and eastern Nepal, respectively.
- This will also help India minimise the geopolitical influence of China and firm its presence in Nepal, considering that the West Seti Hydroelectric Project was a major Chinese venture under the Belt and Road Initiative
- The project has the potential to enhance cross-border power exchanges between the two countries.
- India's severe deficit in coal-based thermal power plants in recent years, which meet 70% of India's electricity demand, has compelled the Government to arrange supplies through coal imports, accelerating the search for better alternatives.
- Steps
- First, the revised cost around the construction process has increased to \$2.04 billion
- Second, Nepal is concerned that the electricity rates and supply from India is inadequate to meet the rising demands.
- Third, the project can also be extended to other regional partners under the Bangladesh-Bhutan-India-

Nepal (BBIN) framework for cross-border energy cooperation.

THE HINDU

Permanent membership of UNSC

- The inescapable fact is that none of the P-5 wants the UNSC's ranks to be increased.
- One or the other of them might make some noise about supporting one or more of the aspirants.
- Each is confident that someone among them will torpedo the enlargement of the club
- There is considerable unhappiness among membership at large in the UN about the right of veto.
- The debate about veto is most often raked up when the western members of the P-5 club are not able to have their way
- There are four declared candidates for permanent membership: India, Japan, Brazil and Germany, called the G-4. Africa and Latin America and the Caribbean are unrepresented in the permanent category at present.
- Africa's claim for two permanent seats has wide understanding and support, but the Africans have yet to decide which two countries these are to be.
- As for India, we can discount Pakistan's opposition; China will not support India nor will it ever support Japan. Brazil has regional opponents and claimants.
- As for Germany, Italy is firmly opposed to its claim. Italy has an interesting argument.
- There is quite a debate going on about whether the aspiring countries should accept permanent membership without the right of veto
- Changing the membership of the Council requires amending the Charter.
- This involves consent of two-thirds of the total membership of the U N, including the concurring votes of P-5.
- This means that each of the five has a veto.
- The Charter was amended once in the 1960s to enlarge the Council by additional non-permanent seats.
- Even now, if the proposal was to add a few non-permanent seats only, it would be adopted with near unanimity or even by consensus.
- It is the permanent category that poses the problem.
- One can have a good idea of the difficulty of amending the Charter by the fact that the 'enemy clause' contained in Article 107 of the

Charter remains in it even though some of the enemy states such as Germany, Japan, Italy, etc. are very active members, often serve on the Council, and are close military allies of some of the victors in the war.

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