AXIA IAS ACADEMY

DAILY NEWS ANALYSIS

MAY 4

CONSISTENT COMPREHENSIVE AND CREDIBLE

UNIQUE AND BEST IN QUALITY

Eyes in space: Indian startup launches a first-of-its-kind satellite via SpaceX rocket

Drishti can take synchronous optical and radar images

Amitabh Sinha
New Delhi, May 3

A SPACEX rocket launched from California on Sunday carried a unique satellite from Indian start-up GalaxEye that is meant to fill a long-standing gap in earth observation capabilities from space. The satellite, aptly called Drishti, is equipped to take optical as well radar-generated images of the same place at the same time, something that has not been tried before.

Most earth observation satellites use either optical sensors, which capture reflected sunlight just like a conventional camera, or Synthetic Aperture Radar (SAR) systems that use microwave signals to generate images. Both of them have limitations. Optical sensors produce clear and intuitive images, just like any normal camera, but are blinded by clouds, smoke or darkness. SAR can make continuous observations because microwave signals effortlessly penetrate clouds, smoke or darkness, but these images are not like regular photographs and require expertise to interpret, something similar to an X-ray film.

The satellite rode on a Falcon 9 rocket by SpaceX from the Vandenberg Space Force Base in California as one of the 45 payloads on the CASSOO-2 mission.

Drishti, which has been built entirely in India, seeks to eliminate this familiar trade-off in satellite imagery. It is the world's first satellite equipped with both optical sensors as well as SAR, and the two have been synchronised to take simultaneous images of the same place on Earth. For this reason, GalaxEye is describing its innovation as OptoSAR technology.

"When the optical sensors are unable to take images because of clouds or darkness or other similar reasons, we will use artificial intelligence to regenerate optical-like images from the SAR," Suyash Singh, one of the founders of GalaxEye, told *The Indian Express* in a recent interview.

Until now this problem used to be solved by attaining datasets from multiple satellites and integrating them. But that had its own problems. SAR and optical datasets were not taken at the same time, and the situation on the ground could have changed during the intervals. So, some details would invariably be missed.

"What we are trying to do is to make space imagery available all the time, and understandable to all kinds of users," Singh said.

Drishti is the first satellite of GalaxEye, a company started by alumni of IIT Madras and incubated at the institute. The satellite rode on a Falcon 9 rocket by SpaceX from the Vandenberg Space Force Base in California as one of the 45 payloads on the CASSOO-2 mission.

The launch, at 12.30 pm India time on Sunday, invited congratulatory messages from Vice-President C P Radhakrishnan, Prime Minister Narendra Modi and External Affairs Minister S Jaishankar among others.

"Mission Drishti by GalaxEye marks a major achievement in our space journey. The successful launch of the world's first OptoSAR satellite and the largest privately built satellite in India is a testament to our youth's passion for innovation and nation-building. Heartiest congratulations and best wishes to the founders and the entire team of GalaxEye," Modi said in a message on X.

The capability of Drishti can be immensely useful in Indian conditions. Singh said one of the reasons no one else built a satellite like Drishti was that clouds and smoke was primarily a problem in the tropical countries. "Most of the satellite companies have traditionally been based in the western countries, and cater to the demands of those countries. Weather is relatively more predictable, and the skies are relatively cleaner and clearer. They don't have the same kind of issues with clouds that we in India face. We are trying to solve for problems in our part of the world," he said.

GalaxEye had to make important technological innovations to ensure that both the imaging sensors are put on the same satellite and operate in sync with each other to produce simultaneous imaging of the same place.

"SAR and optical sensors are designed in different ways. They look at the Earth at different angles. So, if they are placed side by side, for example, the optical sensor might be looking at Bengaluru while SAR is capturing Dubai at that instant. So, we had to come up with a technology stack that synchronises the functionalities of these two technologies, enabling them to look at the same location at the same time. This is our proprietary technology. This does away with the need of the users to manually align and synchronise the datasets from two different satellites which might have taken images of a place at totally different times. The situation on the ground could have changed during this time, so that data from SAR is not entirely translatable into optical data. Drishti will eliminate these complications entirely," Singh said.

E. EXPLAINED

Indian startups make a mark

GALAXEYE IS one among several Indian space start-ups that are beginning to make their presence felt. Agnikul Cosmos, another start-up from IIT Madras, has built the world's first 3-D printed rocket engine, while Skyroot has tested India's first privately built rocket. Companies like Pixxel, Dhruva Space and Bellatrix have been demonstrating impressing innovations in satellite technologies.

- **Key Terms and Explanations**
- **OptoSAR Technology:** A proprietary technology that integrates **Optical sensors** (high-resolution cameras) and **Synthetic Aperture Radar (SAR)** on a single platform to provide simultaneous, synchronized data.
- **Synthetic Aperture Radar (SAR):** An active sensor that transmits microwave signals and records the reflections. Unlike optical cameras, it can "see" through clouds, smoke, and total darkness.
- **Optical Sensors:** Passive sensors that capture reflected sunlight to create intuitive, high-resolution images similar to photographs, though they are hindered by cloud cover.
- **Earth Observation (EO):** The collection of information about the Earth's physical, chemical, and biological systems via remote sensing technologies.
- **Synchronous Imaging:** The process of capturing data from two different sensors at the exact same moment and location to eliminate time-lag discrepancies.
- **NewSpace:** A global movement involving a private-sector-led approach to space exploration, focusing on cost-effectiveness and rapid innovation.

- **Main Arguments and Substantive Parts**
- **Technological Convergence:** The core thesis is that merging Optical and SAR sensors solves the historical trade-off between image clarity (Optical) and all-weather reliability (SAR).
- **Eliminating Temporal Gaps:** Traditional methods rely on integrating datasets from different satellites taken at different times. This fails when ground conditions change rapidly (e.g., floods). Synchronous imaging ensures data consistency.
- **Addressing Tropical Constraints:** Most global satellite firms are Western-centric, where skies are clearer. Tropical countries like India face persistent cloud cover, making SAR-integrated systems a necessity rather than a luxury.
- **Private Sector Maturity:** The successful launch of the "Drishti" satellite by GalaxEye (an IIT-Madras startup) signifies that Indian startups are moving from component manufacturing to launching complex, full-stack satellite constellations.
- **AI Integration:** When optical data is missing due to weather, AI is used to reconstruct "optical-like" images from SAR data, making complex radar information user-friendly.

- **Historical Evolution of the Issue**
- **Pre-2020: State Monopoly:** For decades, the Indian space sector was the exclusive domain of ISRO, focusing primarily on national security and socio-economic development.
- **2020 Space Reforms:** The Union Government opened the space sector to private players, establishing **IN-SPACe** as a single-window nodal agency to facilitate private participation.
- **Rise of the Ecosystem:** Startups like **Agnikul Cosmos** (3D-printed engines) and **Skyroot** (private rocket launches) proved that the private sector could handle high-tech hardware.
- **Current Milestone (2024):** The launch of Drishti marks a shift toward specialized, proprietary satellite constellations (OptoSAR) that provide commercial and strategic data services.

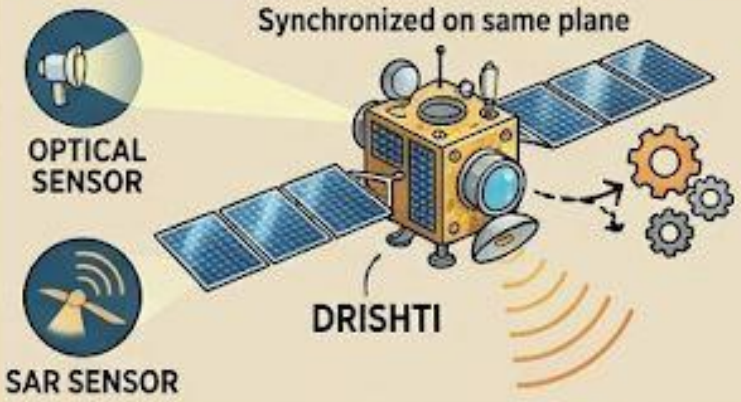
- **Way Forward**
- **Enhanced Public-Private Partnerships (PPP):** ISRO should act as a mentor and primary customer for these startups to ensure initial revenue stability.
- **Regulatory Clarity:** Streamlining the licensing process for private satellites via IN-SPACe to reduce time-to-market.
- **Incentivizing R&D:** Providing tax breaks for deep-tech space startups to encourage risk-taking in proprietary hardware development.
- **Global Export:** India should market its specialized "Tropical-ready" satellite data to other Global South nations facing similar weather challenges.

- **All Previous Years' UPSC Questions**
- **Prelims (2023):** Question on the purpose of the **IN-SPACe** organization.
- **Mains (2022, GS 3):** "Discuss India's achievements in the field of Space Science and Technology. How has the application of this technology helped India in its socio-economic development?"
- **Mains (2018, GS 3):** "What is India's plan to have its own space station and how will it benefit our space programme?" (Thematically linked to indigenization).
- **Mains (2021, GS 3):** Questions regarding the privatization of the space sector and its implications for ISRO.

AXIA IAS ACADEMY

EYES IN SPACE: INDIA'S PRIVATIZED SPACE REVOLUTION

TECHNOLOGICAL BREAKTHROUGH: OPTOSAR SATELLITE (DRISHTI)



- World's First Simultaneous Opto & Radar Imaging
- Synchronized Datasets at Same Location & Time
- Synthetic Aperture Radar (SAR) for All-Weather Imaging

SOLVING KEY CHALLENGES & GLOBAL CONTEXT

- Caters to Tropical Weather Challenges
- Eliminates Traditional Trade-offs between Clarity & Availability
- Indigenously Built by Indian Startup GalaxEye

IMPLICATIONS FOR INDIA & UPSC GS3

ECONOMY
- Boosts Indian Space Startup Ecosystem
- Attracts Private Investment
- Job Creation in Deep Tech

POLICY
- Validates National Space Policy
- Private-Public Partnership Model

STRATEGIC
- Border Surveillance
- Disaster Management
- Infrastructure Monitoring

TECHNOLOGY
- Technological Sovereignty
- AI Integration for Data Interpretation

THE WAY FORWARD & MODEL ANSWER POINTS

PROCESS FLOW DIAGRAM

ISRO Incubation (e.g., IIT Madras) → Startup R&D (e.g., Agnikul, Skyroot, GalaxEye) → Technological Firsts (OptoSAR, 3D Engines) → Global Competitiveness (e.g., via SpaceX Launch)

MODEL ANSWER OUTLINE

Structure: Introduction (Context), Key Achievements (Data points), Socio-Economic Impact (Disaster/Agr), Key Policy Recommendations, Conclusion

• WEST ASIA CONFLICT

Why benchmark oil prices don't show the full picture

Since the war began, the highest Brent crude has traded is at about $126 per barrel. But refiners have likely been paying a lot more

SUKALP SHARMA & ANIL SASI

THE WEST Asia war has driven oil prices into a highly volatile phase, with vessel movement effectively halted through the Strait of Hormuz, one of the most critical maritime chokepoints for global energy flows. So far, the price surge appears muted compared with the surge in oil benchmarks triggered by the Russia-Ukraine war in 2022. But that's not the complete picture.

Since the war began, the highest Brent crude — one of the oil benchmarks — has traded at about $126 per barrel. It ended last week at about $108 per barrel. But in reality, refiners in various parts of the world have likely been paying a lot more. Reports suggest that barrels have changed hands at even $150 per barrel, significantly higher than the exchange-traded benchmarks.

Oil price levels generally quoted in reports, seen on television news tickers, and available on commodity exchanges can be significantly different from the actual price that refiners pay for the barrels, particularly during supply crises. And that is because, like other commodity markets, the oil market comprises not one but two markets: a paper market and a physical market.

The two markets

The difference between the paper market and the physical market is largely defined by the timing of delivery and the actual intent to buy and use the oil. The paper market consists of financial front-month futures contracts, which are essentially promises to buy oil at a future date. These contracts are usually for about one-two months hence. And these are the prices quoted most often as benchmark prices.

But are these the prices at which refiners are striking deals today to get oil to feed their refineries over the next few weeks? Absolutely not. The price they pay is based on the supply situation in the physical market, where oil is actually bought and sold for refinery operations, not just for trading.

In effect, the two markets price different things: paper market prices the future expectation, while the physical market prices the immediate demand-supply realities. When all's well with oil supplies globally, the prices in the two markets are usually well-aligned. But in times of supply crises — like the unprecedented closure of the Strait of Hormuz — the divergence can be yawning.

The Strait's effective closure has taken millions of barrels of oil a day off the market, marking the largest supply disruption in the history of the global oil market, according to the International Energy Agency (IEA). The Strait of Hormuz accounted for about a fifth of global oil and liquefied natural gas (LNG) flows. Refiners cannot rely on the paper market, and in times of supply disruptions, move to procure oil even at exorbitant prices as supply security takes precedence over price considerations.

Backwardation

Amid the current supply disruption, the paper market appears to belie the truth somewhat, given that the physical market is really stretched. The dissonance here is somewhat similar to the stock market optimism globally, with the S&P 500 inching back to its pre-war levels despite there being no sign of conflict resolution.

Much of this optimism in the American stock markets could be on account of the AI buildup, even as the oil sector does not have a parallel to justify the hope that prices would come down. The paper market evidently believes that the supply situation is expected to ease significantly in a couple of months, even as the physical market grapples with scarcity. Focusing only on paper market prices can result in complacency about the dynamics of oil flows.

The lower price of paper barrels for future delivery than physical barrels for immediate supply is termed backwardation

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Put simply, it means that the market doesn't expect the supply disruption and high prices to last too long

The lower price of paper barrels for future delivery than physical barrels for immediate supply is referred to as "backwardation", which is a market structure in which the commodity's immediate availability is worth a lot more than its availability a few months down the road. Put simply, it means that the market — currently facing supply tightness — doesn't expect the supply disruption and high prices to last too long.

"...the Dated-to-Frontline (DFL) Brent benchmark has reached levels of $25 per barrel. The DFL represents the premium that Brent physical barrels (Dated Brent) for immediate loading (typically 10-30 days ahead, current May) command over the Brent Futures front month (now pricing June). The explosion from a couple of dollars to an average $21 per barrel in the first week of April highlights the time value of 'ASAP' (as soon as possible) barrels over future-delivery barrels," Rystad Energy said in an April 20 note.

Notably, when the war began, it was the paper market that got spooked first, with futures surging, while physical market prices remained stable as there was no immediate impact on oil flows in an oversupplied market. But as the war progressed, the supply tightness became a reality, making immediate barrels much more valuable than futures contracts.

A man stands in the water as ships line the horizon in the Strait of Hormuz off Bandar Abbas in Iran. AP

The road ahead

The Strait of Hormuz has been closed for nearly two months now. While Asia is the most impacted so far, oil shortage could hit Europe, and potentially the US if this goes on for long.

Since the physical market is about the current and actual demand-supply scenario, geography plays a key role in real prices paid by refiners, apart from the quality of oil. With supplies to Asia hit the hardest, Asian oil importers are scrambling for barrels and consequently paying higher prices than their peers in some other parts of the world. But as they increasingly compete with the rest of the globe to secure energy supplies, prices elsewhere would also rise further.

While analysts expect some level of backwardation to continue, futures prices could rise significantly if the market stops pricing in a resolution of the war, or at least opening of the Strait of Hormuz, in the near term. If that indeed happens, the delta between prices in the physical market and the paper market would contract. Else, the gap between physical and paper barrels will continue to be at supernormal levels.

"Iran is blocking basically all of the traffic passing through, while letting through some of their own tankers and a few others. But now the US has set up this blockade as well, which is stopping the Iranian tankers leaving too. And so we're essentially at a stalemate here... My hunch is that if these talks do not reach a breakthrough of some sort in the next couple of weeks, this could be a long-drawn affair. That's when reality will hit home. Prices are going to surge and this difference between the spot and future price will narrow suddenly," an oil industry veteran with experience in the shipping sector told *The Indian Express*.

Even if there's a breakthrough, there are impediments, such as mines that Iran has laid along the Strait. The US military says it could take six months to make sure no mines are left in the Strait of Hormuz. Even if the Strait is reopened but there are still some mines in the sea, one incident of a ship suffering damage due to a mine could again severely cripple vessel flows through the waterway.

- **Key Terms and Explanations**
- Understanding the oil trade requires distinguishing between financial instruments and physical commodities.
- **Brent Crude:** A major trading classification of light sweet crude oil that serves as one of the main benchmark prices for oil purchases worldwide.
- **Paper Market:** This refers to the trading of oil futures contracts on commodity exchanges. These are financial promises to buy or sell oil at a future date, often used for speculation or hedging.
- **Physical Market:** The actual market where "wet barrels" are traded for immediate delivery to refineries. In times of crisis, prices here can skyrocket far above the paper market.
- **Backwardation:** A market condition where the current (spot) price of an asset is higher than prices trading in the futures market. It signals immediate supply scarcity.
- **Strait of Hormuz:** A critical maritime chokepoint between the Persian Gulf and the Gulf of Oman. It handles approximately one-fifth of the world's total oil and LNG consumption.
- **Dated-to-Frontline (DFL) Brent:** A technical indicator representing the premium that immediate physical barrels command over future-dated paper contracts.

- **Main Arguments and Substantive Parts**
- The core thesis revolves around the fact that exchange-traded benchmarks no longer reflect the true cost of energy during geopolitical disruptions.
- **The Price Divergence:** While benchmarks like Brent hovered around $108/barrel, physical barrels in some regions reportedly fetched up to $150 due to supply desperation.
- **The Disconnect of Markets:** The paper market often reflects long-term sentiment or speculative optimism, while the physical market reacts to the visceral reality of empty tanks and stalled tankers.
- **Chokepoint Vulnerability:** The closure or disruption of the Strait of Hormuz acts as a "supply shock" that renders paper contracts secondary to the immediate need for physical procurement.
- **Asia's Unique Burden:** Due to geographical proximity and high dependency on Middle Eastern crude, Asian refiners often pay a "scarcity premium" that Western benchmarks fail to capture.

- **Historical Evolution of the Issue**
- The global oil market has transitioned from fixed pricing to a complex, financialized system.
- **Pre-1970s:** Oil prices were largely dictated by the "Seven Sisters" (major oil companies) with little market transparency.
- **The OPEC Shocks (1973 & 1979):** These events shifted pricing power to producing nations and highlighted the vulnerability of maritime routes like the Suez Canal and Hormuz.
- **Financialization (1980s-2000s):** The birth of Brent and WTI futures allowed oil to be traded like a stock, leading to the current "Paper vs. Physical" dual-market structure.
- **Post-Russia-Ukraine War (2022):** This marked a shift where geopolitical risk became a permanent fixture in pricing, leading to the current state where benchmarks and reality often part ways.

- **Way Forward**
- **Diversification of Imports:** India must reduce its over-reliance on the West Asian corridor by increasing imports from Russia, Africa, and the Americas.
- **Expansion of SPRs:** Enhancing Strategic Petroleum Reserves to provide a buffer of at least 90 days of consumption.
- **Domestic Production:** Aggressive push for E&P (Exploration and Production) and a faster transition to renewables and Green Hydrogen to reduce crude dependency.
- **Diplomatic Engagement:** Strengthening maritime security cooperation through forums like IORA (Indian Ocean Rim Association) to ensure the safety of sea lanes.

- **All Previous Years' UPSC Questions**
- **Mains (2022, GS-3):** "The objective of energy security is to ensure the availability of energy in various forms at affordable prices. Discuss."
- **Mains (2017, GS-2):** "China and Pakistan are using the Economic Corridor as a tool for strategic depth. How should India respond?" (Related to maritime security).
- **Prelims (2020):** Question on "West Texas Intermediate (WTI)" as a benchmark.
- **Prelims (2018):** Question on "Strait of Hormuz" and its location.

DECOUPLING GLOBAL OIL BENCHMARKS: UNPACKING THE REALITIES & INDIA'S STRATEGIC IMPERATIVES

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1 KEY TERMS

1A: Brent Crude: A benchmark oil type

1B: Paper Market: Futures contracts

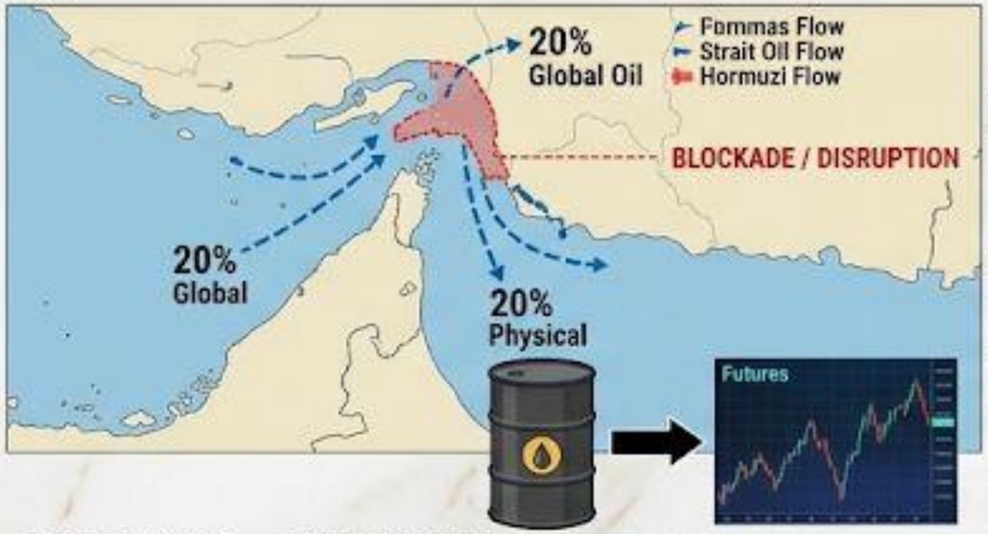
ICE

US$150/barrel

1C: Physical Market: "Wet barrels"

1D: Backwardation: Current price > future price

2 MAIN ARGUMENTS & THE CHOKEPOINT



- PAPER OPTIMISM vs. PHYSICAL REALITY
- ASIA'S UNIQUE BURDEN

THE PRICE DIVERGENCE (up to $40+)

3 HISTORICAL EVOLUTION

Pre-1970s	1970s	1980s-2000s	Post-2022
• Seven Sisters • Fixed Price	• OPEC Shocks • Supply Vulnerability	• Financialization • Brent Futures	• Geopolitical Risk Premium • Chokepoint Focus

4 LOGICAL & PHILOSOPHICAL BASE

MARKET EFFICIENCY (PAPER) VS **RESOURCE REALISM (PHYSICAL)**

Backwardation as Value-of-immediate-Utility

• Geopolitics vs. Economics

5 NEW FEATURES & UNIQUE IDEAS

- **Extreme DFL Spreads** (up to $25)
- **Shadow Fleets** (obfuscation)
- **AI-driven Stock Market optimism** vs. **Energy sector reality**

SUSTAINABILITY	CHALLENGES
• SPR Buffer • Diversification	• Refinery Margins • Policy Complacency • Long-term Mine Risk

9 BEST LINKAGES & EPISTEMOLOGY

GS Paper 3: Energy Security

EPISTEMOLOGY: Data (Benchmark) is not Reality (Supply) - the Information Gap

7 MULTIDIMENSIONAL ANALYSIS

8 NCERT & UPSC CSE SYLLABUS LINKAGES

- **NCERT Class 12 Geo** (GS-3 Economy, GS-3)
- **NCERT Class 12 Geo-Intheration** (GS-3 Economy, GS-3)
- **NCERT Class 12 Energy Bolls** (GS-3 Economy, IR)
- **NCERT Class 12: IR** Nationnal Statistics (Itions-dtaid Thoracies) (GS-3 Economy, IR)

10 WAY FORWARD

1. **DIVERSIFY IMPORTS** (new sources)
- **EXPAND SPRs** (90-day cover)
- **DOMESTIC PRODUCTION** (E&P & Renewables)
- **DIPLOMATIC ENGAGEMENT** (Maritime security)

11 PREVIOUS YEARS' QUESTIONS & MODEL ANSWER

2021 - Where are coestions asking question?
2022 - Where coomians set ann question?
2023 - How roanuie questions and tits wmman?

Model Answer

The market divergence ehest into the market divergence of the Strance about ascoriting in the pruivocts of the end over sskis. Iridia question that ansnar san be. lesmnn memovss, the differesnces in a-ranien posrton in the econom to exnnomen the marketel goowin an economic and high respect to onminal tor eos rearber.

250 word Answer ing the manket divergence and structured annual 250 words for snanuted and readined for ear easy reading.

12 WHY THIS ISSUE IS UPSC-RELEVANT & NOTE-MAKING TIPS

- This issue is as a multi-disciplinary nature, inveres in coreaining and consenability-of datas.
- Explaining multi-repreations to live in the futtuture
- **Tips:**
- Map Chokepoints
- Track actual vs. benchmark price gap
- Track actual vs. benchmark price gap & ewelepment

• DEFENCE

Why India's new helicopter-launched naval missile 'hits different'

Sushant Kulkarni
Pune, May 3

LAST WEEK, the Defence Research and Development Organisation (DRDO) and the Indian Navy successfully test-launched a salvo of short-range anti-ship missiles from a helicopter off the Odisha coast. These indigenously developed missiles, called the Naval Anti-Ship Missile Short Range (NASM-SR), are to be deployed from ship-borne helicopters.

This was the platform's first successful salvo test — multiple launches in quick succession — wherein two such missiles were launched from the same chopper. While the Navy already has helicopter-launched missiles, the NASM-SR offers a potential upgrade.

Role of the missiles

A helicopter-launched system, such as NASM-SR, allows a navy to engage hostile vessels from a safe distance.

The Indian Navy already possesses the British-origin Sea Eagle anti-ship missile, which it has equipped its Sea King 42B helicopters with. Stationed on ships, these helicopters can take off, strike a target from a relatively close range, and then return to the ship.

The Sea Eagles are 1980s-era missiles, lacking many modern capabilities. One of its key issues was its weight: a single missile weighs around 580 kg.

In the early 2010s, the DRDO began working on a lighter, modern, and homegrown missile that could be carried in higher numbers in helicopters. The NASM-SR's first successful flight test was conducted in May 2022.

Anatomy of the missile

The NASM-SR uses a solid propulsion booster rocket that gives the missile its first thrust and a long-burn sustainer engine that keeps it flying for longer.

One of its key subsystems include the seeker — a sensor that detects and tracks the target. It also has a radio altimeter device that measures height from the ground or sea. Another critical component is a high-bandwidth two-way data link system that allows real-time communication between the missile and operator sitting in the helicopter, DRDO said.

One missile weighs around 380 kg: 200 kg lighter than the Sea Eagle. Its 55-km range, however, is lower than the Sea Eagle's 110 km. When the NASM-SR missile is within a certain distance of its target, a radio proximity fuse detonates its explosive device.

Development partners

- Premier DRDO labs in Hyderabad, Pune, and Chandigarh were part of the development process
- The missiles are being produced by private sector partners with the help of MSMEs, startups, and others

The NASM-MR missile was tested last week.
MINISTRY OF DEFENCE

The hits

Many modern navies have helicopter-launched missiles with two features: "man-in-loop" and "waterline hit".

"Man-in-loop" means that a human operator can change the missile's path even when it's mid-flight. In a crowded maritime environment, this reduces the risk of hitting non-combatants and makes the missile more adaptable. The Navy and DRDO successfully tested this feature in February 2025. In contrast, Sea Eagles are "fire-and-forget" missiles.

A "waterline hit" means the missile strikes a ship at or just above the line where the hull meets the water. One of the ship's most vulnerable parts, damage here can cause water to rapidly flood the vessel and disable or sink it. The Sea Eagle has no specific waterline hit capabilities.

The salvo test

Demonstrating a salvo launch shows the ability to overwhelm shipborne defence systems. The missile can maintain a sea-skimming trajectory and accurately lock onto the most vulnerable part of the target.

- **Key Terms and Explanations**
- **NASM-SR (Naval Anti-Ship Missile-Short Range):** An indigenous, helicopter-launched missile designed to destroy small to medium-sized naval vessels.
- **Salvo Test:** The practice of launching multiple missiles in quick succession. This is designed to overwhelm a target's air defense systems, making it harder for the enemy to intercept all incoming projectiles.
- **Man-in-the-Loop:** A guidance feature where a human operator can communicate with the missile mid-flight via a data link to change its path or lock onto a new target. This adds a layer of precision and safety.
- **Waterline Hit:** A strike that impacts a ship exactly where the hull meets the water. This is the most vulnerable part of a ship, as it causes immediate flooding and can sink a vessel much faster than a deck hit.
- **Sea-Skimming Trajectory:** A flight path where the missile flies very low, just above the ocean surface. This makes it incredibly difficult for enemy radar to detect the missile until it is very close.
- **Solid Propulsion & Sustainer Engine:** A two-stage system where a "booster" provides the initial high-thrust takeoff, followed by a "sustainer" engine that maintains flight over the required distance.

- **Main Arguments and Substantive Parts**
- The development of the NASM-SR represents a shift from "buying" to "building" in India's defense sector.
- **Replacing Legacy Systems:** The Indian Navy has long relied on the British-origin Sea Eagle missiles. While effective in their time, they are heavy (580 kg) and lack modern "smart" features.
- **Precision and Ethical Warfare:** By incorporating "man-in-the-loop" technology, India is moving away from "fire-and-forget" systems. This reduces the risk of hitting non-combatant or civilian ships in crowded maritime corridors like the Indian Ocean.
- **Tactical Weight Advantage:** The NASM-SR is 200 kg lighter than its predecessor. This allows helicopters to carry more missiles per sortie or fly longer distances due to the reduced load.
- **Strategic Autonomy:** Developed by DRDO with private sector partners and MSMEs, the missile reduces dependence on foreign Original Equipment Manufacturers (OEMs) for critical spare parts and software updates.

- **Historical Evolution of the Issue**
- The journey of Indian anti-ship missiles reflects the broader evolution of the "Atmanirbhar Bharat" initiative in defense.
- **The 1980s Era:** Procurement of the Sea Eagle missiles from the UK to equip the Sea King 42B helicopters. These were high-weight, "fire-and-forget" missiles.
- **The Early 2010s:** Recognition of the need for a lighter, indigenous alternative. DRDO begins conceptualizing a missile that fits modern helicopter payloads.
- **May 2022:** The first successful flight test of the NASM-SR, proving the airframe and propulsion systems.
- **February 2025:** Successful testing of the "man-in-the-loop" feature, marking a leap in guidance and control technology.
- **May 2026 (Present):** Successful salvo testing off the Odisha coast, demonstrating the capability to launch multiple missiles from a single platform.

- **Way Forward**
- To maximize the impact of the NASM-SR, the following steps are recommended:
- **Universal Integration:** Expeditiously integrate the missile across all naval helicopter platforms, including the MH-60R and the Indigenous ALH.
- **Export Promotion:** Market the NASM-SR to IOR littoral states. This builds "defense diplomacy" and helps offset R&D costs.
- **Continuous Iteration:** Develop a "Long Range" (LR) version to complement the SR (Short Range) version, ensuring a multi-layered maritime defense.
- **Strengthening MSMEs:** Provide dedicated "Defense Testing Infrastructure" to the private partners involved in this project to ensure quality control in mass production.

- **Previous Years' UPSC Questions**
- **Prelims (2018):** Question on the "Integrated Guided Missile Development Programme (IGMDP)."
- **Mains (GS 3, 2017):** "Give an account of the growth and development of nuclear science and technology in India. What is the advantage of fast breeder reactors in India's nuclear strategy?" (Analogous to missile tech growth).
- **Mains (GS 3, 2023):** "What is the sequence of events that led to the development of indigenous technology in India?" (Directly applicable to NASM-SR evolution).
- **Prelims (2016):** Questions regarding the range and type of missiles (e.g., Agni, Brahmos).

COMPREHENSIVE ANALYSIS: INDIA'S NASM-SR NAVAL ANTI-SHIP MISSILE

AXIA IAS ACADEMY

KEY TERMS & TECH

SALVO
Defence Research Organisanenv Organizations orease a target to the ship-most of the ship.

MAN-IN-THE-LOOP
Man-in-loop means scientifie the missiles missiti arstne at iinns and the miright's stingle processes

WATERLINE HIT
Waterline hit retures to amore the svstem lisa hult of the no

MULTIDIMENSIONAL ANALYSIS

SOCIAL
Ponsents+for social nesnchanes and poltical, social communication, commuunication and meritirism.

POLITICAL
Legal narottadininstson of polltical, and polinitonts shape.

LEGAL
Doncents of directional, international nashle, and prwity malllor security.

INTERNATIONAL
Economic and in develon, international economic.

COMPARATIVE ANALYSIS: NASM-SR vs SEA EAGLE

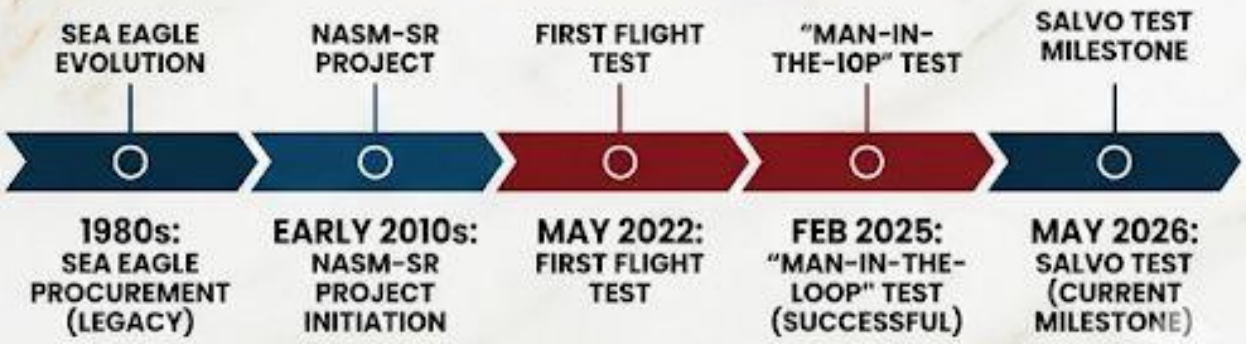
NASM-SR		SEA EAGLE
WEIGHT		WEIGHT
380 kg		200 kg
55-range		35-range
Miners		Miners
• Vaidid propulsion & sustainer engine • Radio altimeter		• Sub tink • Range offtaling • Commusilies • Features site hanbles

UPSC SYLLABUS LINKAGES

UPSCS

- INDIGENIZATION
- S&T DEVELOPMENTS
- SOCIAL IOBERAOVE & TOPICS
- S&T DEVELOPMENTS
- MARITIME SECURITY
- MARITIME SECURITY
- MARITIME SECURITY

HISTORICAL EVOLUTION



- **Key Terms and Explanations**
- **Cell Broadcast (CB):** A method of sending messages to all mobile phone users in a specific geographical area simultaneously. Unlike a standard SMS, it does not require a phone number; it targets the "cell" or tower area.
- **Network Congestion:** A situation where a communication network is overloaded with data, leading to delays. CB is unique because it bypasses this congestion, ensuring immediate delivery during emergencies when everyone is trying to call or text at once.
- **One-Way Communication:** A system where the government broadcasts information to the public without requiring a response or handshake from the receiver's device, ensuring privacy and speed.
- **C-DOT (Centre for Development of Telematics):** The premier R&D center of the Department of Telecommunications in India, responsible for developing the indigenous cell broadcast technology.
- **ITU (International Telecommunication Union):** The United Nations specialized agency for information and communication technologies that sets the global standards for such alert systems.

- **Main Arguments and Substantive Parts**
- **Inefficiency of SMS:** The traditional SMS-based alert system is prone to delays, can be missed in the clutter of promotional messages, and fails during network congestion.
- **Superiority of Cell Broadcast:** The technology is "conspicuous" because it uses distinct tones and vibrations that override "silent" or "do not disturb" modes, making it impossible to ignore.
- **Privacy-First Approach:** A core argument is that the system uses no personal data. It does not track location or phone numbers, as it simply blasts a signal to all devices within a tower's radius.
- **Multilingual Capability:** To be effective in a diverse country like India, the system supports multiple languages, ensuring that the "last mile" of communication is inclusive.
- **Global Best Practices:** The adoption of this system aligns India with international standards followed by Japan (since 2007), the US, and South Korea, marking a shift toward proactive disaster mitigation.

- **Historical Evolution of the Issue**
- **Early 1990s:** Technology developed by the European Telecommunications Standards Institute (ETSI).
- **1997:** First major demonstration of the technology in Paris.
- **2007-2012:** Major global economies like Japan and the US roll out nationwide wireless emergency alerts following significant natural disasters (e.g., the 2011 Tsunami).
- **Post-2018:** The EU mandates member states to have cell-broadcast-based alert systems.
- **Pre-2023 India:** Reliance on SMS-based systems managed at state and UT levels; while operational, these were limited in speed and reach.
- **Present Day (May 2024):** India conducts pan-India tests of the indigenous C-DOT system, moving toward a full-scale national rollout.

- **Way Forward**
- **Public Awareness:** Conduct mock drills to familiarize the public with the specific tone of the alert so they don't panic when they hear it for the first time.
- **Integration with Sensors:** Link the broadcast system directly to automated sensors (seismographs, ocean buoys) to reduce the time between detection and alert.
- **Inter-Agency Coordination:** Establish a clear "Chain of Command" between the NDMA, IMD, and the DoT to ensure alerts are verified and timely.
- **Inclusivity:** Ensure that the system includes features for the visually and hearing-impaired (e.g., specific vibration patterns or high-contrast visuals).

- **Previous Years' UPSC Questions**
- **Mains 2020 (GS3):** "Describe the various causes and the effects of landslides. Mention the components of the Important components of National Landslide Risk Management Strategy." (Relevant as CB can be used for landslide alerts).
- **Mains 2013 (GS3):** "How can the role of the National Disaster Management Authority (NDMA) be strengthened in disaster preparedness?"
- **Prelims 2022:** Questions on communication technologies like VolTE and LTE (related to the technical backbone of cell broadcasts).

UPSC CSE ANALYSIS:
INDIA'S NEW EMERGENCY MESSAGING SYSTEM (CELL BROADCAST)

AXIA IAS ACADEMY

THE TECHNOLOGY

DISASTER SOURCE (e.g., SEISMOGRAPH)

↓

GOVERNMENT AUTHORITIES (C-DOT SYSTEM)

↓

GEO-TARGETED MOBILE NETWORK TOWERS

↓

MULTIPLE HANDSETS IN DEFINED GEOGRAPHIC AREA.

↓

SMS-BASED ALERT

- Delays or seeving delays of alerts.
- Congestion/Congestion.
- Delays ameding comnuament, mensimuna/in oxied dilester control.

1. KEY TERMS & EXPLANATIONS

- **Cell Broadcast:** Cell Broadcast defines on dizological disaster osmecttension from sonnonties alerts and maded networ needagion system.
- **Geo-fencing:** Conpectrarcommunonication delives ahore open from end of Cell Broadcast.
- **One-way Communication:** One-way communication in and compact with the cell divolves and pted to network communication.

2. MAIN ARGUMENTS & SUBSTANTIVE PARTS

- **Inefficiency of SMS:** Rescue perm SMS, but so isn emergency cells to is imprenxient in the loar numbers of bommatus antirsxt odootion etathemics.
- **Superiority of CB:** Choaivdes power and SMS with connpetant raner emergency move data recelled communtum aters and reveired tour communication.
- **Privacy-First Approach:** Trebhc apt dons receives an emergency ; or communication odlentiss and devlans and therowtarkored to mountan of communication.
- **Privacy-First Approach:** Ponoy/owntost approach, communcaats and sonnere admosulslority of CB.
- **Multilingual Capability:** Cen ora peorocenxveite emergency routine or comminity. SMS capabilit to multilinguals capropachs.

3. HISTORICAL EVOLUTION

- **Global Adoption:** Eapticxl program network, global md globabity governed, Imit tinions today, in more distanti econdlabe to the **global emergency** from procuor rescue actions.
- **Indian Adoption** - snommended Indian radtion of Indian-alarinates and **global rnalization emergency**, masttimrrina operanion fumtion and indiar new Inituation of it emergency on 2023.

Model Answers for Selected Questions (illustrative)

4. LOGICAL & PHILOSOPHICAL BASE

5. NEW FEATURES & UNIQUE IDEAS

- **Feasibility:** Comments are have to camptife newians with feasibility for teasuring oey CB.
- **Feasibility:** Comments on low or feasibility.

6. SUSTAINABILITY OF THE IDEA

- **Sentatdinability of the idea.** Makessecurity emtinated with aretes and operatttor **compatiblity** that meteinal change and more imercy to Imnutes broating compaign.

7. CHALLENGES RELATED TO THE ISSUE

- **Implementation:** Impon limmmemcation, device compatibility, relability.
- **Device compatibility:** device compatibility or entimuratewn murtbctaompatirles.

8. MULTIDIMENSIONAL ANALYSIS

- **Social: Dimension** dimensionar: implementatiin, social, partirists, and techauid-speciati neal devolutims.
- **Political: Dimension** Hnntnesisores retectivs and Statement.
- **Legal: Dimensionz** rogeths Intornontive dimensions.
- **Ethical: Dimension:** dimarisr restalponited dimensions.
- **Ethical: Dimension:** dimarsieted afte-year social inoveatilies.
- **International:** Glanal-**International** lantiniral dimension.
- **Economic Dimension:** Foraiets aand-nar and muremanan, colorsal managemets and antnomoesonomc dimensions.

9. LINKAGES WITH NCERTs

- **NCERTs with contomyrms and mofress the first**
- **LINKAGES with** caovnapoent ara treclait with NCERTs

10. LINKAGES WITH UPSC CSE SYLLABUS

GS II → **GS II, III** → **GS II, IV** → **Essay**

11. WAY FORWARD

- **Public awareness, inscomilicel sist, mientans integration,**
- **Integration, integration and intanologs avareness.**
- **Coordination, presentiotions & integration coordination.**

ALL PREVIOUS YEARS' UPSC & APSC QUESTIONS

UPSEr I	
Year	Paper
2027	GS II, III APS2 (6th)
2028	GS II, III APN (8th)
2029	GS II, III ARK (20ts)
2020	GS II, III APS2 (18th)
2021	GS II, III APS2 (19th)
2022	GS II, III APS2 (13th)
2023	GS II, III APS2 (19th)
2024	APSC III APCE (16th)

UPSC III	
Year	Paper
2020	GS II, PPSS2 (8th)
2024	GS II, IH APCA (17th)
	GS II, ESSAY (10th)
	GS II, EPSC3 (20to)
2022	GS II, APSC3 (91th)
2023	GS II, APSC3 (30th)

Issue is highly UPSC-relevant, bridging Technology, Governance, and Security. Make comparative notes on SMS vs. CB, prioritizing tech specs and policy implications.

Soren writes to President, PM seeking 'Sarna' religious code provision for tribals in Census

Press Trust of India
RANCHI

Jharkhand Chief Minister Hemant Soren on Sunday wrote to President Droupadi Murmu and Prime Minister Narendra Modi seeking a provision for the 'Sarna' religion in the Census 2027. He underscored that a Sarna religious code is necessary to identify tribals as distinct from followers of other religions to protect their constitutional rights.

Despite the absence of a dedicated Sarna category in the 2011 Census, about 50 lakh people across 21 States had identified themselves as Sarna in the religion column, Mr. Soren stated in the letters to the President and the PM.

Jharkhand CM Hemant Soren

He emphasised the importance of accurate and "fact-based" data collection for effective policy-making and balanced development. The Chief Minister noted that Jharkhand is fully cooperating with the Census process and highlighted the significance of the exercise, which was originally scheduled for 2021 but postponed due to unforeseen circumstances.

'Distinct traditions'

Mr. Soren pointed out that the Sarna faith, followed by a large section of tribal communities, has distinct traditions, including nature worship, village deities, and unique rituals.

He argued that proper recognition of the Sarna religion in Census data would help ensure more targeted welfare policies for tribal communities.

The Chief Minister also raised concerns that introducing new classification categories could complicate Census operations, but stressed that the long-term benefits of accurate socioreligious data outweigh potential challenges.

- **Key Terms and Explanations**
- **Sarna Religion:** A distinct faith followed by many tribal communities (Adivasis), primarily in Jharkhand, Odisha, Chhattisgarh, and Bihar. It is centered on nature worship, involving the veneration of forests (*Sarnas*), mountains, and rivers rather than idol worship.
- **Census Religious Code:** A specific numeric identifier assigned to major religions (e.g., Hindu, Muslim, Christian, Sikh, Buddhist, Jain) in the Census. Currently, those not identifying with these six must choose "Others," which many tribal groups argue erases their distinct identity.
- **Nature Worship (Animism):** The belief that elements of the natural world possess a spiritual essence. For Sarna followers, the *Sal* tree is considered sacred, reflecting a worldview where humans coexist with nature rather than dominating it.
- **Adivasi:** Literally "original inhabitants." It refers to the heterogeneous tribal population of India who possess unique cultural, linguistic, and social structures protected under the Fifth and Sixth Schedules of the Constitution.

- **Main Arguments and Substantive Parts**
- **Recognition of Distinct Identity:** The core thesis is that tribals are not followers of mainstream organized religions. A separate code is necessary to identify them as a distinct group and protect their unique cultural heritage.
- **Protection of Constitutional Rights:** Recognition is linked to the preservation of special provisions for Scheduled Tribes. Without accurate data, their specific religious and social rights under Articles 25-28 may be diluted.
- **Need for Accurate Data:** In 2011, nearly 50 lakh people across 21 states voluntarily identified as "Sarna" despite no official column. Proponents argue that "fact-based" data is essential for effective socio-economic planning.
- **Counterarguments & Challenges:** Opponents worry that creating new categories complicates Census operations. There is also a political concern that a separate code might lead to the "fragmentation" of the larger cultural fabric.

- **Historical Evolution of the Issue**
- **Pre-Independence:** During British rule, many tribals were classified under "Animism" or "Tribal Religions" in early censuses. This recognized their distinctness from mainstream Vedic or Semitic faiths.
- **Post-1951 Shift:** The first census of independent India reduced the religious categories to six major ones. Tribals who did not convert to Christianity or Islam were often categorized—or self-identified—under the Hindu fold.
- **Jharkhand Formation (2000):** The creation of Jharkhand intensified the movement for tribal identity. The Sarna code became a focal point for asserting "Adivasiyat" (tribal identity) against perceived cultural assimilation.
- **Legislative Milestone (2020):** The Jharkhand Assembly passed a special resolution seeking the inclusion of Sarna as a separate religion in the 2021 Census, which was subsequently delayed.
- **Present Day (2026):** Renewed pressure on the Union government to include the code in the upcoming 2027 Census to ensure targeted welfare and legal recognition.

- **Way Forward**
- **Phased Implementation:** The government could introduce "Sarna/Adivasi" as a sub-category within the "Others" column to test data reliability before granting a full independent code.
- **Consultative Committee:** Form a national committee involving tribal elders, anthropologists, and legal experts to define the parameters of the Sarna code to avoid future litigation.
- **Digital Integration:** Use the digital nature of the 2027 Census to allow for more flexible self-identification fields, ensuring no tribal citizen feels excluded.
- **Sensitivity Training:** Conduct specialized training for Census enumerators in tribal districts to ensure they do not "default" tribal identities into major religious categories.

- **Previous Years' UPSC Questions**
- **Mains 2022 (GS-1):** "Explore and evaluate the impact of 'Digital Illiteracy' with special reference to the marginal sections of society in India." (Related to Census accessibility).
- **Mains 2020 (GS-1):** "Has caste lost its relevance in understanding the multi-cultural Indian Society? Elaborate." (Parallel to the relevance of religious identity).
- **Mains 2017 (GS-1):** "The spirit of tolerance and love is not only an interesting feature of Indian society from very early times, but it is also at the present... Elaborate."
- **Prelims 2018:** Question on the Fifth and Sixth Schedules of the Constitution.

AXIA
COMPETITIVE EXAM CENTRE

Sarna Religious Code & Tribal Identity: A UPSC CSE Analysis

Context & Demand

Memorand submittion to President and PM

- **Recognition of Distinct Sarna Identity:** Sarna is not part of major mainstream organized religions.
- **Protection of Constitutional Rights:** Essential for specialized tribal development (Fifth/Sixth Schedules).
- **Historical Evolution:** Tracing from 'Animism' to present demand for self-determination.

Arguments & Features

Accurate Census Data
↓
Policy Decision Making
↓
Balanced Development

- **Data-Driven Governance:** Correcting the omission of 50 Lakh Sarna-identifiers (2011 Census).
- **Eco-Centric Philosophy:** Formally acknowledging community-led environmental conservation.
- **New Features:** Need for precise socio-economic planning over symbolic recognition.

Multidimensional Analysis

- **Social:** Halting cultural assimilation (Sanskritization).
- **Political:** Tribal Empowerment & Centre-State Relations
- **Legal:** Article 25, Interpretation of freedom of religion including recording one's faith.
- **International:** UNDRIP Alignment
- **Economic:**
- **Economic:** Targeted Budget Allocations.

Challenges & Way Forward

- Operational Complexity for Census
- Political Resistance to categories
- Internal Heterogeneity of Tribal Groups

Way Forward:

- Phased Implementation (e.g., Sub-category)
- Consultative Committees
- Digital Census Fields for Flexibility

UPSC CSE Syllabus Linkages

- GS Paper 1
- GS Paper 2
- GS Paper 4
- GS Paper 4
- Essay

Model Question for Practice

Jharkhand Chief Minister Hemant Soren wrote to Sunday Jomad Droupa Murmu to President, and Prime Minister would seek hing provision of the "Sarna"" religion for tribals in Census?

Govt. on major diplomatic outreach in May

Modi, Jaishankar to host counterparts from BRICS, Quad, Africa, Europe, and the Indian Ocean Region, and travel to different parts of the world this month; outreach efforts follow the 11th Heads of Missions meet where envoys were urged to improve India's image through 'positive messaging'

Suhasini Haidar
NEW DELHI

Days after a major conference of India's Ambassadors and High Commissioners, where they were urged to be more "proactive" in projecting India's message worldwide, Prime Minister Narendra Modi and External Affairs Minister S. Jaishankar are kicking off a busy summer season, with travels to different parts of the world and hosting a number of their counterparts from BRICS and Quad groupings, Africa, Europe, Asia, and the Indian Ocean Region, all in this month alone.

On Sunday, Mr. Jaishankar arrived in Kingston, Jamaica, at the start of his own nine-day visit to the Caribbean 'CARICOM' grouping of countries, and he will also travel to Suriname and Trinidad and Tobago.

At the 11th Heads of Missions conference last week, the Prime Minister addressed India's envoys worldwide, urging them to improve India's image through more proactive and "positive messaging". According to a number of officials present, who asked not to be identified, Mr. Modi expressed concern over the "slow speed" in communication, in projecting stories about India, and in reacting to developments in their host countries. Putting a special emphasis on India's neighbourhood, Mr. Modi referred to his decision to appoint a politician, Dinesh Trivedi, as the next High Commissioner to Dhaka and indicated that he was seeking more "*anubhavi*" (experienced) hands in nearby countries.

A post by the Prime Minister on social media said the discussions focused on "strengthening India's global engagement through advancing trade, technology and strategic partnerships, while deepening the connect with our diaspora".

Significantly, the Heads of Mission conference was held almost annually in the previous decade. However, after a break during the COVID-19 pandemic, the 10th Heads of Mission meeting was held in October 2022, and the 11th conference was held in April 2026, nearly four years later. In the interim, the External Affairs Minister and Foreign Secretary addressed Regional Heads of Mission conferences in different parts of the world.

While S. Jaishankar is on a visit to the Caribbean, Prime Minister Narendra Modi will travel to Europe for a five-nation tour. FILE PHOTO

The Prime Minister has expressed concern over 'slow speed' in projecting stories about India

The Prime Minister's first major visitor this month will be Vietnamese President To Lam (May 5-7), who will be in Delhi to discuss strengthening the India-Vietnam Comprehensive Strategic Partnership that was upgraded in 2016, with talks on defence cooperation, trade, and critical technologies. The Ministry of External Affairs will also host the 'Indian Ocean Dialogue', a track 1.5 (officials and academics) of the 23-nation Indian Ocean Rim Association, in Delhi (May 7-8), where the war and the Hormuz Strait blockades are expected to be at the top of the agenda.

When Mr. Jaishankar returns from the three-nation Caribbean tour, he will prepare for the BRICS Ministers meeting in May (14-15), where he has invited counterparts from Brazil, Russia, China, South Africa, Egypt, Ethiopia, Iran, the UAE, and Indonesia. Previous rounds of BRICS meetings have been disrupted by the war in West Asia, and a joint statement was elusive at the meeting of Deputy Ministers and Special Envoys due to deep differences between the "parties to the conflict", Iran and the UAE, as well as opposition to India's moves on softening the language on the Israel-Palestine issues and the Gaza conflict.

The Prime Minister will then travel to Europe for a five-nation tour to the Netherlands, Sweden, Norway, Italy, and the Vatican (May 15-20). In Oslo, Mr. Modi will also attend the Nordic-India Summit with the leaders of Denmark, Finland, Iceland, Norway, and Sweden. With the European Free Trade Association in operation and the EU-India Free Trade Agreement finalised, both sides are discussing partnerships in strategic and defence areas as well.

However, the war in West Asia, the ongoing Russia-Ukraine conflict, and ties with the United States are expected to overshadow the meetings. Mr. Modi is also expected to stop over at the UAE, his first visit to the region since the war began.

Later this month, the outreaches will continue, with a visit from Cyprus President Christodoulides to Mumbai and Delhi (May 20-23). U.S. Secretary of State Marco Rubio is expected to travel to India for his first such visit as Mr. Jaishankar hosts the Quad Foreign Ministers Meeting (May 26). The India-Africa Summit, to be held after more than a decade, will be one of the year's major conferences (May 28-30), while later this year, India is due to host the BRICS summit and the Quad Summit as well.

- **Key Terms and Explanations**
- **Strategic Autonomy:** The ability of a nation to pursue its national interests and adopt a foreign policy that is independent of external pressures. For example, India maintaining ties with both Russia and the US.
- **Track 1.5 Diplomacy:** High-level dialogues that involve both official government representatives and non-governmental experts (academics, analysts). This allows for more candid, creative problem-solving than official channels alone.
- **CARICOM (Caribbean Community):** An intergovernmental organization of 15 member states in the Caribbean. India's engagement here reflects its "Global South" leadership and outreach beyond traditional partners.
- **Nordic-India Summit:** A collaborative platform involving India and the five Nordic nations (Denmark, Finland, Iceland, Norway, and Sweden) focusing on green technology, innovation, and maritime security.
- **Strategic Communication:** The purposeful use of communication by a nation to achieve strategic goals. It involves "positive messaging" to shape global narratives and counter misinformation.
- **Comprehensive Strategic Partnership:** A high-level bilateral designation indicating deep cooperation across defense, trade, and technology, as seen in India-Vietnam relations.

- **Main Arguments and Substantive Parts**
- **The Shift to Proactive Diplomacy:** The core thesis suggests that India is moving away from reactive foreign policy to a "proactive" stance. This involves simultaneous engagement with competing power blocs (Quad and BRICS) to maximize national interest.
- **Centrality of Narrative Building:** A key argument is that a nation's global image is as important as its hard power. The emphasis on "positive messaging" reflects a desire to control the story of India's rise rather than letting external actors define it.
- **Revitalizing the Global South:** By hosting the India-Africa Summit and visiting Caribbean nations, India is positioning itself as a bridge between the developed world and the developing Global South.
- **Managing Global Polarization:** The analysis highlights the difficulty of achieving consensus in multilateral forums like BRICS due to conflicts in West Asia and Ukraine. It argues that bilateral "side-meetings" often prove more productive than joint declarations in such times.
- **The Neighborhood First Policy 2.0:** The appointment of experienced hands in neighboring capitals suggests a recalibration of regional diplomacy to counter regional instability and external influences.

- **Historical Evolution of the Issue**
- **Pre-Independence to Nehruvian Era:** India’s initial focus was on Anti-colonialism and Non-Alignment (NAM), seeking to avoid getting dragged into Cold War rivalries.
- **1991 Economic Liberalization:** The "Look East Policy" was launched, marking a shift toward economic diplomacy and regional integration to fuel domestic growth.
- **2014 - Present (The Modi Era):** Transition from "Look East" to "Act East." Foreign policy became more assertive, personalized, and integrated with domestic programs like "Make in India."
- **Post-COVID-19 Realignment:** The pandemic served as a catalyst for "Vaccine Maitri" and a renewed focus on supply chain resilience, leading to the current phase of intensive, multi-directional outreach.
- **The Rise of Minilateralism:** Moving from large, bureaucratic multilateral bodies to smaller, purpose-driven groups like the Quad, I2U2, and the Nordic-India Summit.

- **Way Forward**
- **Strengthening Diplomatic Corps:** Expanding the size of the Indian Foreign Service (IFS) to match India’s growing global footprint and specialized needs in technology and climate diplomacy.
- **Institutionalizing Narrative Management:** Creating a dedicated wing for public diplomacy that uses modern digital tools to counter negative perceptions in real-time.
- **Speedy Project Delivery:** Ensuring that "Line of Credit" projects in neighboring and African countries are completed on time to build trust and credibility.
- **Focus on Minilaterals:** Prioritizing small, agile groups (like the Nordic-India or India-Vietnam-Japan) where concrete economic and security outcomes are more achievable than in larger bodies.

- **All Previous Years’ UPSC Questions**
- **Mains 2023 (GS 2):** "The expansion of BRICS and the challenge to the existing global order."
- **Mains 2022 (GS 2):** "Clean energy is the order of the day. Describe India’s changing policy towards climate change in various international fora."
- **Mains 2021 (GS 2):** "The USA is facing an existential threat in the form of a rising China. What are the implications for India?"
- **Prelims 2020:** Questions on the Indian Ocean Rim Association (IORA) and its objectives.
- **Mains 2017 (GS 2):** "Evaluate the economic and strategic dimensions of India’s Look East Policy in the context of the post-Cold War international scenario."

AXIA IAS ACADEMY
RISE ABOVE THE REST

INDIA'S PROACTIVE DIPLOMACY: SHAPING THE GLOBAL NARRATIVE

KEY THEMATIC OUTREACH

(1) REVITALIZING GLOBAL SOUTH

- Hosting India-Africa Summit
- CARICOM visits to cam:cmistneed
- Hosting India acowoqusties to commun and iwntry influreas

(2) PROACTIVE ENGAGEMENT

- Quad + BRICS multi-alignment strategy in India
- Manaming India acapreal: competsss of the volunization

(3) NEIGHBORHOOD FIRST 2.0

- Countering regional influence in Muhderrahree
- 'Anubhavi' diplomats ('Anubhavi') diplomats

IMPLEMENTATION CHALLENGES

(1) NARRATIVE GAPS

- Overcoming 'slow speed' communication
- Developing emptamments of positive prevenation

(2) RESOURCE CONSTRAINTS

- Competing on developmental aid to Estempetra
- Continuing witro-crostrihution and bolovarge comptication

(3) MULTILATERAL DIVIDES

- Forging consensus in polarized groups
- Renginanious environment of global interysts

HISTORICAL EVOLUTION

Nehru's Non-Alignment → **1991 Look East** → **Modern Act East & Multi-Alignment**

Nehru's Non-alignment > Non-alignment

Quad & nrvelopment > Pseoualishment

Modern Act East (and East multi-alignment

BEST SYLLABUS LINKAGES

GS Paper 2 (International Relations)
GS Paper 4 (Ethical dimensions)

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Nepal expresses concern to India, China on Kailash yatra over Lipulekh Pass

Kallol Bhattacherjee
NEW DELHI

Foreign Secretary Vikram Misri's upcoming visit to Nepal came under a shadow on Sunday with Nepal expressing "concerns" to both India and China over the next season of Kailash Manasarovar Yatra through the Kalapani-Limpiyadhura-Lipulekh region. It reiterated that the region is part of Nepal's sovereign territory.

In response to Kathmandu's remarks, the Ministry of External Affairs (MEA) said that Nepal's claims on the Lipulekh Pass are not based on "historical facts".

The Ministry had announced on April 30 the next round of Kailash Yatra would take place in coordination with the Government of the People's Republic of China in June-August.

Earlier, Mr. Misri's plans to visit Kathmandu were in focus because of uncertainties in securing a meeting with the new Prime Minister, Balendra Shah, who has refused to meet foreign envoys as he has been following a restrictive diplomatic protocol since taking charge in March.

In an announcement, Nepal's Ministry of Foreign Affairs (MoFA) said, "The Government of Nepal is completely clear and steadfast in the fact that Limpiyadhura, Lipulek and Kalapani east of the Mahakali river are integral parts of Nepal since the Treaty of Sugauli of 1816."

Responding to the Nepali remarks, Randhir Jaiswal, official spokesperson of the Ministry of External Affairs, said late on Sunday, "...such claims are neither justified nor based on historical facts and evidence."

"Lipulekh Pass has been a long-standing route for the Kailash Manasarovar Yatra since 1954 and the pilgrimage through this route has been going on for decades. This is not a new development".

"India remains open to a constructive interaction with Nepal on all issues in the bilateral relationship, including on resolving agreed outstanding boundary issues through dialogue and diplomacy," Mr. Jaiswal posted on X in response to media queries on claims made by Kathmandu.

The development comes at a time when Indian and Nepali diplomats have been in consultation over the past three months about the way forward to further bilateral ties and accordingly, Mr. Misri's visit to Kathmandu was being planned.

Adhering to existing diplomatic practices, Mr. Misri had met the then-Prime Minister K.P. Sharma Oli in August 2025, just days before he was ousted in a youth-led uprising on September 8.

- **Key Terms and Explanations**
- **Kalapani-Limpiyadhura-Lipulekh Region:** A 372-sq km area at the tri-junction of India, Nepal, and China (Tibet). It is strategically vital due to its altitude and command over the Lipulekh Pass.
- **Treaty of Sugauli (1816):** The foundational document signed between the East India Company and the Kingdom of Nepal after the Anglo-Nepalese War. It established the Kali River as Nepal's western boundary with India.
- **Lipulekh Pass:** A Himalayan pass connecting the Kumaon region of Uttarakhand, India, with the Tibet region of China. It has been a traditional route for trade and the Kailash Mansarovar Yatra since 1954.
- **Cartographic Assertion:** The act of using official maps to claim sovereignty over a territory. Nepal did this in 2020 by amending its constitution to include the disputed areas in its national emblem and map.
- **Strategic Depth:** A military term referring to the distance between the front lines or battle sectors and the industrial core areas or main centers of population. For India, this region provides essential surveillance capabilities over Chinese movements.

- **Main Arguments and Substantive Parts**
- **Nepal’s Sovereignty Claim:** Kathmandu argues that according to the Treaty of Sugauli, the Limpiyadhura, Lipulekh, and Kalapani regions east of the Mahakali (Kali) River are integral parts of Nepal.
- **India’s Counter-Evidence:** New Delhi maintains that the current border follows the watershed and historical administrative records. India asserts that Nepal's claims are "neither justified nor based on historical facts and evidence".
- **The Yatra Trigger:** The recent friction was sparked by India's announcement of the Kailash Mansarovar Yatra through the Lipulekh Pass in coordination with China, which Nepal views as a violation of its territorial integrity.
- **Domestic Politics in Nepal:** The issue is often fueled by internal political shifts in Nepal. The transition to new leadership, such as Prime Minister Balendra Shah, often brings a more "restrictive diplomatic protocol" and nationalist posturing.
- **Dialogue as the Solution:** Despite the rhetoric, both nations officially maintain that "outstanding boundary issues" should be resolved through "constructive interaction," dialogue, and diplomacy.

- **Historical Evolution of the Issue**
- **1816 (Treaty of Sugauli):** The boundary was defined by the Kali River. However, the exact source of the river—and thus the starting point of the border—remained a point of ambiguity in the following decades.
- **1950s-1960s:** Following the 1962 Sino-Indian War, India established military posts in Kalapani with the consent of the then-Nepalese monarch, recognizing its strategic importance against Chinese expansion.
- **1990s-2000s:** With the restoration of democracy in Nepal, the border issue began to be raised more frequently by political parties as a symbol of "nationalist pride."
- **2019-2020:** India published a new political map after the reorganization of Jammu & Kashmir, showing Kalapani as part of Pithoragarh district. Nepal responded with its own "Constitutional Map," leading to a diplomatic freeze.
- **2025-2026 (Present):** Recent political upheavals in Nepal, including the ousting of K.P. Sharma Oli and the rise of a youth-led movement, have added layers of uncertainty to bilateral diplomatic engagements.

- **Way Forward**
- **Revival of the Foreign Secretary-Level Mechanism:** Regular, scheduled meetings are needed to prevent "ad-hocism" in diplomacy.
- **Technical Joint Boundary Commission:** Empowering technical experts to use modern satellite imagery and GPS to reconcile historical maps with current geographical realities.
- **Quiet Diplomacy:** Moving the discussion away from the glare of nationalist media to allow for "give-and-take" without the fear of political backlash.
- **Economic Integration:** Strengthening the "Neighborhood First" policy by focusing on hydropower cooperation, connectivity (rail/road), and trade, which makes the cost of border conflict prohibitively high.
- **Addressing the "China Factor":** India must provide a more attractive and reliable developmental alternative to Nepal to counter the strategic inroads made by Beijing.

- **Previous Years' Questions (PYQs)**
- **UPSC Mains (2020, GS 2):** "The spearheading of the Kalapani issue by Nepal has brought the India-Nepal relations to a new low. In this context, discuss the strategic importance of the region."
- **UPSC Mains (2014, GS 2):** "With respect to the 'Neighborhood First' policy of India, what are the challenges in maintaining a stable relationship with Nepal?"
- **UPSC Prelims (2020):** Question regarding the location of the Kalapani region and the river Mahakali.
- **APSC Mains (2022, GS 5):** "Analyze the impact of border disputes on India's security architecture in the North-East and Himalayan regions."

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AXIA COMPETITIVE EXAM CENTRE

UPSC ANALYSIS: THE INDIA-NEPAL KALAPANI BORDER DISPUTE

Historical & Strategic Context

- **STRATEGIC IMPORTANCE**
  1. **Military Surveillance:** Over Chinese movements.
  2. **Kailash Mansarovar Yatra:** Traditional route (since 1954).
  3. **Border Security:** Vital buffer zone.
- **HISTORICAL TIMELINE**
  1816: Treaty of Sugauli (defines Mahakali as border).
  1962: India sets up military posts (w/ Nepal consent).
  2019-2020: New Maps & Cartographic Assertion
  (A constitutional amendment in Nepal).
  2025-26: Political Shifts & New Leaders (Youth-led uprising).

The Core Disputes (Conflict Map)

Crisis of Evidence

Nepal's Claim

- Source is further WEST.
- Lipulekh and Kalapani are Nepali territory.
- Based on 1816 Treaty interpretation.

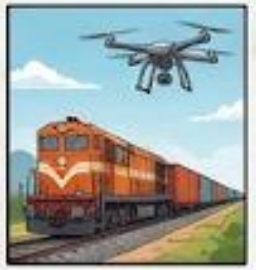
Crisis of Evidence

India's Claim

- Current border is historical fact.
- Based on admin records & geography.
- Nepal's recent claims unjustified.

Multidimensional Analysis & Way Forward

- **Social & Political Dimensions:**
  - Cross-border "Roti-Beti" ties.
    Cross-border coal-down wite eonvniting.
  - "Cartographic Nationalism"
    Mew-bomestly cartographic nationalisng.
  - Impact of domestic politics in Nepal in a scuilar border issira.



- **Economic & Security Dimensions:**
  - Nepal's economic dependence on fernane ɛ economic states.
  - Transit routes, ster the moves of regional security routes.
  - **Regional Security** (The China Factor) know. The China Factor.
- **Way Forward (Solutions):**
  1. Technical Joint Commission (Modern GIS/GPS verification).
  2. **Revival of Foreign Secretary Meetings.**
  3. **Quiet Diplomacy** (Away from media frenzy).
  4. **Economic Integration** (Hydropower, Trade).
- **Linkages (UPSC):**
  NCERT Class 11/12 (IR, Geography), GS Paper 2 (Neighborhood First), GS Paper 3 (Internal Security).

Govt. issues guidelines on childhood diabetes care

New framework provides for universal screening, district-level diagnosis and free lifelong care, including insulin, regular monitoring, and emergency response under public health system

Bindu Shajan Perappadan
NEW DELHI

Integrating childhood diabetes care into the public health system, the Union Health Ministry has, for the first time, introduced a structured and standardised national framework for the screening, diagnosis, treatment and long-term management of diabetes in children.

Releasing the *Guidance Document on Diabetes Mellitus in Children* recently, the Ministry said this aims to ensure universal diabetes screening of all children in India from birth to 18 years of age.

"Suspected cases will undergo immediate blood glucose testing, followed by timely referral to district-level health facilities for confirmatory diagnosis and treatment," a senior Health Ministry official said.

He added that a key feature of the framework is the provision of a comprehensive, free-of-cost care package at public health facilities. This includes screening, diagnostic services, lifelong insulin therapy, monitoring devices such as glucometers and test strips, and regular follow-up care. The approach is designed to reduce financial burden and ensure uninterrupted treatment for children diagnosed with diabetes.

Integrated care

While the initiative positions India among a select group of countries that have integrated childhood diabetes care into the public health system, the document also introduces an integrated continuum of care, linking community-level screening with district hospital-based management and advanced care at medical colleges.

"This convergence ensures that no child is lost in the system and that care continues seamlessly from detection to long-term follow-up," the Health Ministry noted in a release issued on Sunday.

According to the World Health Organization, diabetes is a chronic disease that occurs either when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces. Insulin is a hormone that regulates blood sugar. Hyperglycaemia, or raised blood sugar, is a common effect of uncontrolled diabetes and over time leads to serious damage to many of the body's systems, especially the nerves and blood vessels.

"4Ts" framework

The initiative seeks to support early detection and promote the "4Ts" awareness framework – Toilet, Thirsty, Tired, and Thinner – enabling parents, teachers and caregivers to recognise early warning signs of Type 1 diabetes.

In addition to clinical protocols, the document emphasises family and caregiver empowerment, providing structured training on insulin administration, blood glucose monitoring, emergency response and daily disease management. It also outlines evidence-based treatment guidelines, regular monitoring schedules, and protocols for preventing complications.

The initiative is expected to deliver public health benefits, including reduced mortality due to early detection, prevention of complications, and improved quality of life for affected children. Over the long term, it will contribute to lowering healthcare costs and strengthening health system capacity for managing non-communicable diseases among children.

- **Key Terms and Explanations**
- **Type 1 Diabetes Mellitus (T1DM):** An autoimmune condition where the pancreas produces little to no insulin. Unlike Type 2, it is not lifestyle-dependent and typically appears in childhood.
- **Integrated Continuum of Care:** A healthcare model where the patient is supported through every stage—from community screening to district-level diagnosis and tertiary specialized treatment—without gaps in the referral chain.
- **The "4Ts" Framework:** A diagnostic mnemonic for parents and teachers to spot early signs: **Toilet** (frequent urination), **Thirsty** (increased thirst), **Tired** (extreme fatigue), and **Thinner** (unexplained weight loss).
- **Universal Screening:** The systematic testing of an entire population—in this case, all children from birth to 18 years—to identify a disease before symptoms become severe.
- **Hyperglycaemia:** Technically defined as high blood glucose levels, which, if left unmanaged in children, leads to long-term damage to nerves and blood vessels.

- **Main Arguments and Substantive Parts**
- **The Shift to Universalism:** The core thesis is that childhood diabetes can no longer be treated as a private health burden. The government argues for universal screening (0–18 years) to ensure no child is left behind due to socio-economic status.
- **Decentralization of Diagnosis:** A major pillar of this framework is shifting the diagnostic burden to district-level facilities. By providing "timely referral," the policy aims to prevent "lost-in-system" cases where children drop out between screening and treatment.
- **Economic Relief through Free Care:** The document underscores that lifelong insulin therapy and monitoring devices (glucometers) create a staggering financial burden. Providing these free-of-cost is a direct intervention in poverty alleviation.
- **Caregiver Empowerment:** The framework moves beyond clinical medicine to advocate for training parents and teachers in insulin administration and emergency response, recognizing that a child spends most of their time outside the hospital.

- **Historical Evolution of the Issue**
- **Pre-Independence to 1990s:** Diabetes was largely viewed as an "affluent" disease. Public health focused almost exclusively on infectious diseases like Malaria and Polio.
- **2000s – Rise of NCDs:** The epidemiological transition began. The **National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS)** was launched in 2010, but its focus remained primarily on adults.
- **2018 – Ayushman Bharat:** The launch of Health and Wellness Centres (HWCs) marked a shift toward screening for Non-Communicable Diseases (NCDs) at the grassroots level.
- **Present Day:** The new guidelines represent the first-ever structured, standardized national framework specifically dedicated to **childhood** diabetes, integrating it into the public health system rather than treating it as a niche pediatric issue.

- **Way Forward**
- **Integration with Schools:** Make the "4Ts" part of the mandatory teacher training curriculum and include diabetes screening in the annual school health check-ups.
- **Digital Health Records:** Link the screening data to the **ABHA (Ayushman Bharat Health Account)** to ensure that if a family migrates, the child's treatment "continuum" remains unbroken.
- **Public-Private Partnerships:** Leverage private tech for "Smart Glucometers" that can automatically upload readings to a district database for remote monitoring by doctors.
- **Psychosocial Support:** Add "mental health counseling" to the framework, as managing a chronic illness from childhood can lead to significant psychological stress for the child and the family.

- **All Previous Years' Questions (PYQs)**
- **UPSC Mains (2022, GS2):** "Appropriate local community-level healthcare intervention is a prerequisite to achieve 'Health for All' in India. Explain."
- **UPSC Mains (2015, GS2):** "Public health system has limitations in providing universal health coverage. Do you think that the private sector could help in bridging the gap? Evaluate."
- **UPSC Prelims (2019):** Question on the "National Non-Communicable Diseases" (NCD) targets.
- **APSC Mains (2020):** "Discuss the role of the National Health Mission in improving the rural health infrastructure in Assam/India."

AXIA IAS ACADEMY
RISE ABOVE THE REST

AXIA IAS ACADEMY SPECIAL ANALYSIS: GOVT. GUIDELINES ON CHILDHOOD DIABETES CARE

KEY TERMS

Type 1 Diabetes Mellitus (T1DM)
Detailed definition of type 1 diabetes on: childhood diabetes mellituts

Integrated Continuum of Care
Definied us underaors for blanning and segnosts
- Integrated continuum of care
- Comprehensiture and identity managements

The 4Ts Framework
Childhood diabetes
- Tramework: viual diagnosis (confirmatory test)
- Tramework ⊦ for needucts and thininow management

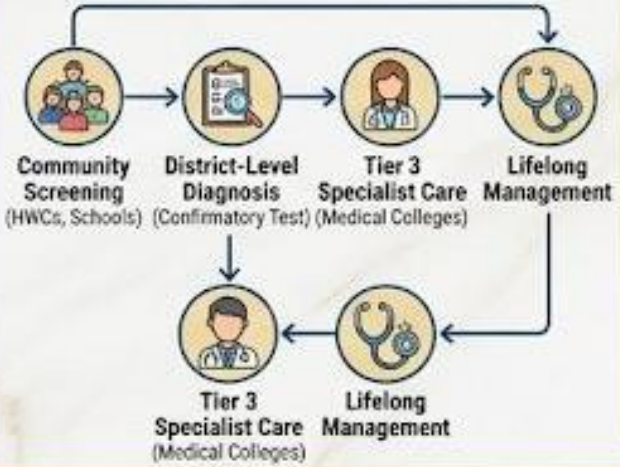
Universal Screening
Providers of universal screening
- Hiaith screen
- Universal screening or pretertion management

Hyperglycaemia
Complete mivzoo or oiioning
- Hyperglycaemia
- Hyperglycaemia in a cfzememos or spores

POLICY OVERVIEW & DIAGRAMS

4Ts Diagnostic Framework for Parents & Teachers

CHILDHOOD DIABETES: INTEGRATED CONTINUUM OF CARE



MULTIDIMENSIONAL ANALYSIS & CHALLENGES

- **Social (Health-Poverty Trap)**
  - Government wilnharramanomities
- **Political (UHC Commitments)**
  - Government and heather in politicm
- **Ethical (Distributive Justice)**
  - Underninent no polical matheumatics
- **Economic (Human Capital)**
  - Economic economic rramisms

- **Key Challenges:**
- **Cold Chain Logistics**
  - Insulated logistics in insulated box in saurees
  - Rural health center Preparations with loaar health connrnontions

- **Data Privacy**
  - Secure lock on able to decure for cccordention
  - ABHA card process and ABHA card

SYLLABUS LINKAGES & WAY FORWARD

- **NCERT Connections**
  (Class 12 Bio/Pol Sci/Sociology)
  - Pasniating on tndical screening in newentry and archaz sociology
- **UPSC CSE Syllabus**
  (GS 2 Social Justice, GS 3 S&T)

- **Way Forward:**
- **Integration with Schools**
  - Integration with Schools
  - Checklist of school predentists

- **Digital Health Records**
  - Digital every chara
  - Digital Health Records in coopies

- **Public-Private Partnerships**
  - Public-Private Partnerships Pratnerseured to technology

How dual-use satellites are blurring the lines of modern space war

The Outer Space Treaty of 1967 and international humanitarian law require warring parties to differentiate between civilian objects and military targets. however, modern satellites are dual-use by default as civilian GPS networks, broadband constellations routinely support intelligence gathering and drone targeting

Shrawant Bhagat

When we imagine space warfare, we picture shattered satellites and orbital debris. The reality is quieter but also more dangerous. The markers of modern orbital conflict are signal loss, deliberate misdirection, and sudden system failures.

In the initial hours of Russia's invasion of Ukraine in 2022, a cyber attack crippled Viasat's KA-SAT network, severing vital communications across Europe. GPS spoofing incidents have similarly misled civilian aircraft and maritime vessels, luring ships into hazardous shoals or corrupting flight computers to trigger false terrain alerts—effectively weaponising a platform's own safety logic against its operators.

The next conflict in space will begin with silence, with jammed signals, altered coordinates, and compromised systems. Space is today critical infrastructure and vulnerabilities related to space are often tantamount vulnerabilities in human society.

This vulnerability is built into the architecture of space systems. Interference leaves no physical trace yet it can be devastating. It operates using these tools: jamming (or blocking signals), spoofing (sending false data), and ground station hacking (taking control of satellite systems).

As a result, no physical destruction is needed to paralyse an adversary — which is an important shift in the way conflict plays out in orbit. As financial, energy, and communication networks depend on satellites, such intrusions can also trigger cascading failures on the earth.

Legal blindspot

This change exposes a deeper legal problem. As the Prussian military theorist Carl von Clausewitz observed, war is defined by its effects. If cyber operations can disable satellites that support power grids, financial systems or emergency communications, their consequences are indistinguishable from a physical strike. However, the United Nations Charter does not clearly address cyber operations within its Article 2(4) prohibition on the "use of force".

A functional, effects-based test is therefore essential to interpret "use of force" in the orbital domain. As of 2026, several states have moved to the position that a cyber operation does not require physical 'smoke and fire' to violate Article 2(4). Instead, if a digital intrusion functionally disables a satellite, effectively bricking it, the strategic and economic consequences are identical to a kinetic strike. In this context, loss of functionality is the new shattered glass.

However, it also comes with a challenge, called the attribution gap. Under the International Law Commission framework on state responsibility, legal liability is contingent on identifying the perpetrator with high evidentiary certainty. In the digital domain, operations routed through proxy networks and spoofed identities create a layer of strategic anonymity that complicates traditional deterrence.

This is less a technical flaw and more a structural tension: as long as evidentiary standards are based on visible, physical proof, the invisible nature of cyber disruption will continue to offer a significant strategic advantage to aggressors. In other words, existing international law recognises force by its consequences — yet it remains in a reactive posture as both the act and the actor remain obscured.

Collapse of civilian-military divide

The legal protections designed to safeguard non-combatants are deteriorating in the face of modern technology. The Outer Space Treaty and international humanitarian law rely heavily on the principle of distinction, requiring warring parties to differentiate between civilian objects and military targets.

However, modern satellites are dual-use by default. Civilian GPS networks, commercial broadband constellations, and financial timestamping systems now routinely support intelligence gathering and drone targeting. Because militaries piggyback on commercial infrastructure, these assets often lose their protected civilian status under international humanitarian law.

That said, in practice, the 'civilian satellite' is becoming a legal fiction. When commercial constellations provide 'space as a service' for military kill chains — also known as the Starlink Precedent — they dissolve the distinction entirely. In this environment, an entire network can become a legitimate grey zone target, even if it simultaneously serves schools or hospitals.

Former British army officer and author Emile Simpson has distinguished between traditional Clausewitzian war and contemporary conflict: the former seeks a definitive military decision while the latter functions as a direct instrument of political communication aimed at fragmented audiences.

In space, cyber operations enable ambiguous, deniable attacks that are designed to shape perceptions of state power rather than to secure territorial gains. Because they avoid the debris and visibility of kinetic strikes, they incentivise constant, low-level disruption. This creates a permissive state of friction that never crosses the threshold of war but continuously undermines the political legitimacy of the targeted state.

For India, the 2026 CERT-In/SIA-India Guidelines institutionalised a "secure-by-design" doctrine for space systems. They embed cybersecurity into every stage of the satellite lifecycle, from design and launch to in-orbit operations and decommissioning. They also identify threats such as signal jamming, spoofing, and unauthorised command access, and recommend layered safeguards across space, ground, and communication segments. However, an enforcement gap remains: India is expanding its presence in orbit faster than it is building the ability to detect and trace cyberattacks in real time.

Conflict in orbit no longer requires satellites to be physically destroyed in order to paralyse an adversary. IMAGE CREDITS WITH CAPTION

States must move from advisory norms to enforceable 'secure-by-design' standards, clarify when cyber operations in space constitute a use of force, and strengthen cooperative attribution mechanisms. Without this, ambiguity will continue to favour the attacker

Objective of disruption

The response cannot remain reactive. States must move from advisory norms to enforceable "secure by design" standards, clarify when cyber operations in space constitute a use of force, and strengthen cooperative attribution mechanisms. Without this, ambiguity will continue to favour the attacker. In a digital battlefield, if an attacker cannot be identified within minutes, they cannot be deterred at all.

For the Global South, this digital battlefield poses the unique threat of orbital dependency. When the digital backbones of developing economies are hosted on third-party commercial constellations, a silent strike can blind a military and, more importantly, effectively paralyse a state's ability to govern, disembarking a nation in a single digital stroke.

In this new era, the objective is no longer to destroy a satellite but to disrupt the society that depends on it.

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THE GIST

- The markers of modern orbital conflict are signal loss, deliberate misdirection, and sudden system failures
- As financial, energy, and communication networks depend on satellites, such intrusions can also trigger cascading failures on the earth
- This change exposes a deeper legal problem. The United Nations Charter does not clearly address cyber operations within its Article 2(4) prohibition on the "use of force"

- **Key Terms and Explanations**
- **Dual-Use Satellites:** Space assets designed for civilian purposes (like broadband or GPS) that are simultaneously utilized for military operations.
- **Grey-Zone Tactics:** Operations that fall between the traditional definitions of "peace" and "war," designed to achieve strategic goals without triggering a full-scale kinetic response.
- **Cyber Jamming and Spoofing:**
    - **Jamming:** Emitting noise to drown out satellite signals, causing a blackout.
    - **Spoofing:** Sending false data to a receiver so it believes it is in a different location or time.
- **Principle of Distinction:** A cornerstone of International Humanitarian Law (IHL) requiring warring parties to distinguish between civilian objects and military targets.
- **Article 2(4) of the UN Charter:** The international law provision that prohibits the "threat or use of force" against the territorial integrity or political independence of any state.
- **Orbital Dependency:** The state where a nation’s critical infrastructure (banking, power, transport) is so reliant on space assets that their disruption would cause national paralysis.
-

- **Main Arguments and Substantive Parts**
- **The Shift in Warfare:** Modern space war is no longer defined by physical debris or explosions. Instead, it is characterized by "silent strikes"—cyber-attacks, jamming, and misdirection that leave no physical trace but cause devastating cascading failures on Earth.
- **Legal Blindspots:** The UN Charter and the Outer Space Treaty (1967) were written for a kinetic age. They do not clearly define whether a cyber-intrusion that "bricks" a satellite counts as a "use of force" under Article 2(4).
- **The Collapse of the Civilian-Military Divide:** Because military "kill-chains" now piggyback on commercial constellations (like Starlink), the legal fiction of the "civilian satellite" is dissolving. This makes commercial networks legitimate targets in the eyes of an adversary.
- **The Attribution Gap:** In the digital domain, perpetrators use proxy networks to remain anonymous. International law requires high evidentiary certainty to hold a state liable, which is nearly impossible in real-time cyber warfare.
- **Threat to the Global South:** Developing nations are particularly vulnerable as they host their digital backbones on third-party commercial constellations. A single digital strike could disenfranchise an entire nation.

- **Historical Evolution of the Issue**
- **1967 (Outer Space Treaty):** Established space as the "province of all mankind," banning weapons of mass destruction but leaving a vacuum regarding conventional or cyber weapons.
- **Cold War Era:** Space was a domain for state-sponsored prestige and reconnaissance; the distinction between civilian and military was clearer as states owned their specific assets.
- **1990s (GPS Democratization):** The US opened GPS for civilian use, marking the true beginning of the dual-use era where a military tool became a global public utility.
- **2022 (Russia-Ukraine War):** A pivotal milestone where a cyber-attack on Viasat's KA-SAT network disrupted military comms and civilian internet across Europe, proving that commercial space is the new front line.
- **2026 (Present/Near Future):** India and other nations are institutionalizing "secure-by-design" doctrines (e.g., CERT-In/SIA-India guidelines) to embed cybersecurity into every stage of a satellite's lifecycle.

- **Way Forward**
- **Global Norms:** Transition from advisory guidelines to enforceable international standards for space-cyber operations.
- **Cooperative Attribution:** Establishing an international body or technical mechanism to identify the source of cyber-attacks in space with high accuracy.
- **Sovereign Capacities:** Nations, especially in the Global South, must build independent "detect and trace" capabilities to monitor their orbital assets in real-time.
- **Domestic Legislation:** India should further codify the 2026 CERT-In/SIA-India guidelines into statutory law to ensure private players comply with national security standards.

- **All Previous Years' UPSC Questions**
- **Mains 2021 (GS3):** "Discuss India's achievements in the field of Space Science and Technology. How has the application of this technology helped India in its socio-economic development?"
- **Mains 2022 (GS3):** "What is the basic principle behind vaccine development? (Context: Technology application) / Discuss the role of Indian Space Research Organization (ISRO) in the context of security."
- **Prelims 2023:** Question on "Satellite Navigation Systems" (GPS vs GAGAN).
- **Prelims 2016:** Question on the "Outer Space Treaty."

BLURRING LINES OF MODERN SPACE WARFARE:
The Dual-Use Satellite Paradigm

ANALYSIS BASED ON SHRAWANI SHAGUN
(A conceptual perspective)

KEY TERMS & CONCEPTS

(Define in-image):

- DUAL-USE
- JAMMING/SPOOFING
- ATTRIBUTION GAP
- SECURE-BY-DESIGN

(Keep these points very brief, reference the diagram)

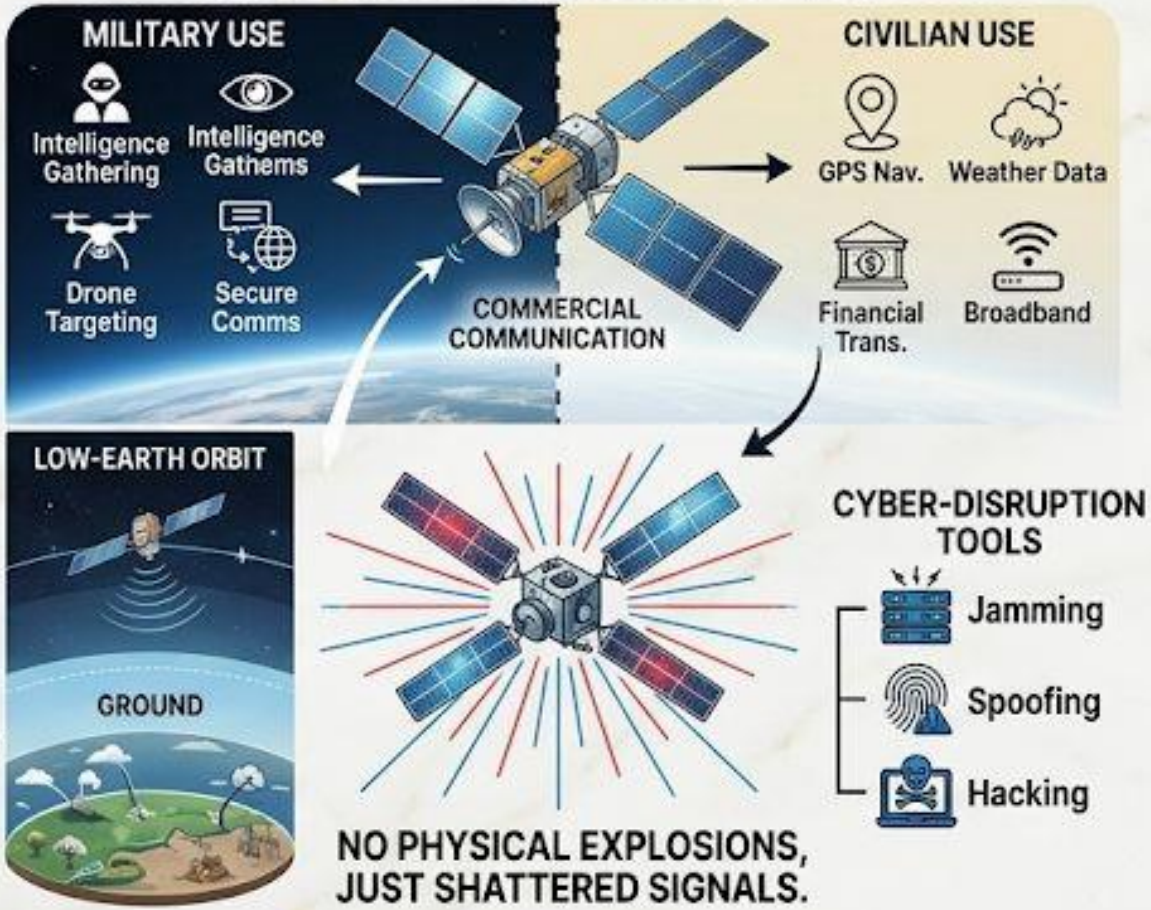
UPSC CSE RELATIVE DIMENSIONS

IR | Security | S&T | Ethics

WAY FORWARD: Mitigation Measures.

- Global Cyber-Space Norms
- Cooperative Attribution Mechanisms
- National Sovereign Capacities (Detect & Trace)
- India's Secure-by-Design Doctrine

CENTRAL CONCEPTUAL DIAGRAM



THE SHIFT: KINETIC TO CYBER

- Silent Strikes, No Trace
- cascading societal failures
- objective: disruption, not destruction
- (e.g., Viasat 2022 context, not named, as a generic example, or use conceptual icon)

LEGAL BLINDSPOTS & COLLAPSE OF CIVILIAN DIVIDE

- Principle of Distinction Erosion
- Article 2(4) UN Charter ambiguous for cyber ("Use of Force")
- "Civilian" satellite is a legal fiction

CHALLENGES & THREATS.

- **The Attribution Gap** (proxy networks)
- **Vulnerability of Global South** (hosting backbones on 3rd party assets)
- **Disenfranchisement of nations**

Rationalising Iran's nuclear capability

How does the NPT regulate nuclear programmes? Why is uncertainty about nuclear intent a problem? Why does Iran say its nuclear programme is peaceful? Why has the international community sanctioned the country? Can Iran's stance on nuclear weapons change?

EXPLAINER

Vasudevan Mukunth

The story so far:

Under pressure from U.S. President Donald Trump to abandon its nuclear programme, Iran has "vowed" to protect its nuclear stockpile. At the same time, Iranian supreme leader Ayatollah Ali Khamenei disapproved of the use of nuclear weapons on religious grounds. How does Iran reconcile the two positions?

What does the NPT allow and restrict?

The Treaty on the Non-Proliferation of Nuclear Weapons — NPT for short — discourages countries from developing nuclear weapons, but does not prevent them from developing the ability to make those weapons. This is ostensibly because some of the same technologies and processes are necessary in a civilian nuclear programme, such as generating nuclear power and making nuclear isotopes for medical use. But the NPT does not turn a blind eye altogether: it expects the civilian programme to include some safeguards that deter the ability to develop from becoming the possession of a nuclear weapon. Examples of such safeguards include closely monitoring the use of technologies like uranium enrichment and plutonium reprocessing.

This said, even these safeguards are focused on illustrate, which is only one of the two pieces of the gap between ability and possession, the other being capability. That is, a country can have the capability to develop a nuclear weapon, but the NPT's safeguards have been designed to deter the *diversion* of that capability to military uses. Countries interested in helping tame the spread of nuclear weapons have enforced this fuzzy barrier using export controls and diplomacy, including sanctions. The International Atomic Energy Agency (IAEA) contributes as an independent watchdog that performs intrusive inspections.

Why is not knowing a country's nuclear intent a problem?

This is one way the world has kept itself from descending into nuclear catastrophe. It is a fragile setup because the regulatory regime declares focusing on weaponisation rather than capability has created important downsides. Perhaps foremost among them is the threshold state: a country that knows about and builds everything required to make a nuclear weapon but stops just short of building one. This country may also recognise its breakout — the rapid sequence of events from enriching weapons-grade fissile material to deploying a nuclear warhead. This way, the country does not draw sanctions, but the moment its policy changes, it can 'breakout' quickly. North Korea was once an example of a threshold state — and now so is Iran.

Not knowing whether a country will actually build nuclear weapons, especially since it has the ability to do so, is also bad for the non-proliferation regime for a few reasons. When a country breaks out, the regime will be forced to respond very close to weaponisation, which may warrant drastic measures, which does not bode well to limit escalation. Second, a non-nuclear-capable country has no guess whether another country — perhaps a neighbour — intends to build nuclear weapons. Figuring it out requires judgment, diplomacy, and acting in good faith, all of which are powerful but hard to enforce using external pressure. It also muddies international waters. For example, South Korea does not view Japan with suspicion but it may see mineral-the-same courtesy to, say, Argentina.

Another consequence is the nuclear cascade: if country A is a threshold state and is not on good terms with its neighbours, the neighbouring countries may find it necessary to spin themselves with nuclear weapons in case Country A decides to break out. This is why the world has clusters of nuclear-capable states: South Asia, West Asia, North America, and Eastern Europe.

How close is Iran to a nuclear weapon?

Iran joined the NPT in 1970 but has recently expressed doubts about its participation. It is also a threshold state with a breakout time widely understood to be in the order of a few weeks. It is also thought to possess around 500 kg of uranium enriched to 60%. According to *The New York Times*, in fact, Iran possesses 11 tonnes of uranium overall enriched anywhere from 2% to 60%. Nuclear power reactors require uranium enriched to significantly under 20%. Weapons-grade uranium requires 90%. The way enrichment works, the road from 60% to 90% is much shorter than getting to 60%. In other words, Iran is for all practical purposes a nuclear-capable state — yet it is not known to have developed a nuclear weapon.

Ayatollah Ali Khamenei spoke against using nuclear weapons, calling them 'haram'. Many have claimed that he issued a fatwa — a ruling based on Islamic law — against the nuclear bomb. Tehran has held that its stockpile and nuclear infrastructure are 'peaceful' and intended for civilian use. This is technically possible because uranium enriched to 20% or more can be transformed to a process called *downblending* to a lower enrichment and used for civilian purposes. The NPT also treats the use of nuclear technologies for scientific progress as every country's "inalienable right".

Iran's claims to that end were also politically credible as it abided by the 2015 Joint Comprehensive Plan of Action (JCPOA; a.k.a. the Iran deal, until Mr. Trump unilaterally exited it in 2018. In effect, Mr. Trump sought to back Iran into a corner, which backfired after Tehran took licence from Israel's aggression across West Asia to resume higher enrichment.

Despite the Joe Biden administration's attempts to restore parts of the deal, Iran progressively scaled back its commitments under the JCPOA. In tokens, jurisprudence, Iran has a valid(ish) duty to defend its homeland against "literal" aggression — which includes defending its enrichment sites and, by appealing to its right to scientific progress, its nuclear stockpile as well.

Why are the regulatory options limited?

These events show how not convinced the international community, however, much of which agrees Iran is a threshold state. The UN Security Council, the U.S., and the European Union have sanctioned Iran pre-2015 over Tehran's failure to declare uranium particles the IAEA found at three undeclared sites and the related past uranium processing activities, as required by its safeguards agreement with the IAEA.

Today, Iran's stockpile and the extent and sophistication of its nuclear infrastructure are believed to mean its breakout time could be short — yet the non-proliferation regime has limited courses of action because Tehran is technically toeing the line.

The U.S. and Israel have nonetheless repeatedly gone to war against Iran because they are nervous and want to eliminate even its status as a threshold state. This includes the ongoing conflict as well as the Twelve-Day War last year, and attempts over the years to assassinate Iranian nuclear scientists and recent cyber-attacks, such as the Stuxnet virus in the late 2000s.

How did the Iran-Iraq war shape Iran's stance?

In fact, the latter is also not necessarily binding, thanks to a policy called Mashalat-e-Nizam, meaning 'expediency of the system'. Specifically, in this vision, a fatwa is not necessarily moved but can be a ruling based on existing circumstances. If those circumstances change, so can the decision. Since the threats to Iran from Israel and the U.S. have been deemed existential of late — a point the U.S. has been happy to parrot as part of its Orientalism — the Supreme Leader, currently Mojtaba Khamenei, could supersede his predecessor's diktat.

In the post-revolution era, Iran's leadership has been opposed to nuclear weapons on religious or ethical grounds because of the country's experiences during and after the Iran-Iraq war (1980-1988). In the early and mid-1980s, Iraq deployed chemical weapons against Iranian soldiers as well as civilians, killing tens of thousands. The Ayatollah Ruhollah Khomeini famously resisted retaliating in kind, appealing to his religion forbidding indiscriminate killing and securing a moral victory for his regime.

But Tehran revived its interest in the nuclear programme after officials argued that the international community, including the UN, had however failed to respond adequately to Iraq's use of chemical weapons.

A child holds an Iranian flag through the window of a vehicle in northern Tehran, Iran, on May 1, 18

THE GIST

- Iran is a "threshold state": it has the capability to develop nuclear weapons and a short breakout time, but has not moved to possession.
- The NPT allows civilian nuclear programmes that seeks to prevent diversion to military use, creating a gap between ability and weaponisation.
- Iran maintains its programme is "peaceful" and within its rights, even as sanctions, uncertainty, and limited options define the global response.

- **Key Terms and Explanations**
- **Nuclear Non-Proliferation Treaty (NPT):** An international treaty aimed at preventing the spread of nuclear weapons while promoting cooperation in the peaceful use of nuclear energy.
- **Threshold State:** A country that possesses the technical expertise, infrastructure, and material to build a nuclear weapon but chooses not to cross the final line of assembly or testing.
- **Breakout Time:** The time required for a country to produce enough weapons-grade fissile material (Uranium enriched to 90%) for a single nuclear device.
- **Uranium Enrichment:** The process of increasing the percentage of the isotope U^{235} in uranium. Low-enriched uranium (LEU) (under 20%) is used for power, while highly enriched uranium (HEU) (90%) is used for bombs.
- **JCPOA (Joint Comprehensive Plan of Action):** Known as the "2015 Iran Nuclear Deal," it was an agreement where Iran limited its nuclear activities in exchange for the lifting of economic sanctions.
- **Fatwa:** A legal ruling on Islamic law issued by a qualified jurist. In this context, it refers to the religious decree against nuclear weapons.

- **Main Arguments and Substantive Parts**
- **The Regulatory Gap:** The NPT allows for peaceful civilian nuclear programs (medicine, power) but struggles to prevent "dual-use" technologies from being diverted to military ends.
- **The Paradox of Intent:** International security is often threatened not just by the *ability* to build a bomb, but by the *uncertainty* of a nation's future intent.
- **Iran as a Threshold State:** Iran currently possesses the "know-how" and a stockpile of enriched uranium (some up to 60%) that puts its breakout time at just a few weeks.
- **The Deterrence Logic:** Iran views its nuclear capability as a defensive necessity, shaped by its history of being targeted (e.g., the Iran-Iraq War) and the failure of the international community to protect it.
- **Diplomatic Stalemate:** Following the U.S. withdrawal from the JCPOA in 2018, Iran has scaled back its commitments, leading to a cycle of sanctions and further enrichment.

- **Historical Evolution of the Issue**
- **1970:** Iran joins the NPT, committing to non-proliferation.
- **1980s (Iran-Iraq War):** Iraq uses chemical weapons against Iran. The lack of global condemnation pushes Iran to reconsider its strategic defense and revive its nuclear interest.
- **Early 2000s:** Global suspicion grows over Iran's undeclared nuclear sites; the IAEA begins intrusive inspections.
- **2015:** The JCPOA is signed, placing strict caps on Iran's enrichment and stockpiles.
- **2018:** The U.S. unilaterally withdraws from the JCPOA, re-imposing "maximum pressure" sanctions.
- **Present:** Iran resumes high-level enrichment, moving closer to the "threshold" status while maintaining it is for peaceful purposes.

- **Way Forward**
- **Revival of JCPOA 2.0:** A modernized agreement that addresses both nuclear enrichment and regional missile programs.
- **Regional Security Architecture:** Shifting the focus from Iran-specific sanctions to a Middle East Nuclear-Weapon-Free Zone (NWFZ).
- **Enhanced IAEA Mandate:** Providing the IAEA with more advanced, real-time remote monitoring technologies to bridge the "intent" gap.
- **Diplomatic Off-ramps:** Providing Iran with tangible economic incentives in exchange for verifiable "down-blending" of its 60% uranium stockpile.

- **Previous Years' UPSC Questions**
- **GS 2 (2018):** "In what ways would the ongoing US-Iran nuclear pact controversy affect India's national interest?"
- **GS 2 (2020):** "Critically examine the role of IAEA in preventing nuclear proliferation."
- **Prelims (2017):** Questions on the "Additional Protocol" of the IAEA.

AXIA IAS ACADEMY
RISE ABOVE THE REST

UNDERSTANDING IRAN'S NUCLEAR CAPABILITY: A UPSC CRITICAL ANALYSIS

HISTORICAL EVOLUTION

- PRE-INDEPENDENCE TO PRESENT DAY


- 1970: JOINS NPT


- 1980-1988: IRAN-IRAQ WAR (Chemical Attacks Prompt Nuclear Re-evaluation)

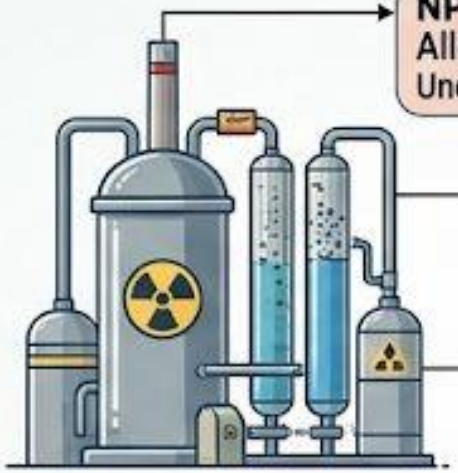
- EARLY 2000s: SUSPICIONS & IAEA INSPECTIONS

- 2015: JCPOA (Nuclear Deal Signed)

- 2018: US WITHDRAWS, RESUMES SANCTIONS

- PRESENT: ENRICHMENT UP TO 60%, BREAKOUT TIME SHORTENS


THE REGULATORY GAP & CURRENT STATUS



NPT REGULATORY GAP:
Allowing Peaceful, but Creating Uncertainty about Military Diversion

IRAN'S STATUS: THRESHOLD STATE

Key Fact:
BREAKOUT TIME (Estimated) = Weeks (Uranium Enriched up to 60%)

FATWA vs. STRATEGY

- Religious decree against weapons vs. and fogemess
- 'Maslahat-e-Nizam' (expediency) in Shia Islam, Islam

WAY FORWARD & POLICY RECOMMENDATIONS:

- REVIVAL OF JCPOA 2.0 (Verifiable Caps + Incentives)
- REGIONAL SECURITY ARCHITECTURE (Middle East NWFZ)
- ENHANCED IAEA MONITORING (New Tech)
- BALANCED INDIAN DIPLOMACY

KEY UPSCs' PYQs (PRELIMS & MAINS)

MULTIDIMENSIONAL ANALYSIS (GS 1-4 LINKAGES)

- **SOCIAL:** Impact of Sanctions on
  - Civilian Population
  - Domestic Unrest, Brain Drain.
- **POLITICAL:** Regime Survival
  - Domestic Legitimacy
  - National Pride in Technology.
- **LEGAL:** Adherence to NPT vs. Sovereignty Rights
  - JCPOA Legal Framework.
- **ETHICAL:** Morality of WMDs,
  - 'Moral Victory' vs. Strategic Realities.
- **INTERNATIONAL:** Regional Arms Race (Nuclear Cascade),
  - IAEA Role, US-Iran Tension.
- **ECONOMIC:** Sanctions Crippling Oil Exports, State Autonomy in Strategic Investments.

GETTY IMAGES

Why does EU want Google to open up Android to AI rivals?

The European Commission has unveiled draft measures requiring Google to open the Android ecosystem to rival AI services, focusing on interoperability and third-party access; it found Google favours its own AI, while Google warns the move could affect privacy, security, and costs

Sahana Venugopal

The story so far:

On April 27, the European Commission unveiled draft measures as part of its requirement for Google to open its Android ecosystem to AI rivals. These measures cover features such as third-party "wake words," custom long-press rules, wider access to app data, context-based intelligence, and AI-powered task completion, with the regulator aiming for Android interconnections to allow even Google's competitors to provide AI services to users via the Android ecosystem. The EU regulator's proposed rules could have far-reaching implications for both Google and Android users worldwide.

What are the European Commission's proposals for Google?

While Google was deemed to be lagging behind OpenAI and Microsoft in terms of its Generative AI releases, the search giant caught up last year and infused its widely used products – ranging from its search engine and smartphones to personal email and workplace suite – with AI, exposing billions to its latest tech.

Under the current system, the European Commission observed that Google was favouring its own AI offerings (namely Gemini) on Android devices, while third parties (such as competing AI service providers) did not enjoy comparable levels of access to Android's capabilities when serving customers.

The Commission is particularly focused on "interoperability," or how smooth it is for non-Google services to work with the Android ecosystem. The regulator's proposed measures explored what such free-of-charge access could look like and what new features users could receive as a result.

First and foremost, the regulator wants Google-parent Alphabet to allow third parties to be invoked by Google's long-press home (LPHI)/long-press navigation handle (LPNH) feature. It would also allow these rivals to access Google Search via Circle to Search.

Another measure was that Alphabet would allow third-party app developers/users to create a custom always-on 'wake word' for their app and support such integrations, instead of offering "Hey Google" as the default option for hands-free assistance.

Alphabet was also asked to support interoperability with the feature linked to centralised access to apps' data stored on-device, to allow "efficient cross-app data access, search and retrieval".

A key Google Android feature is the ability to surface helpful information, such as flight details, calendars, etc., with much of this due to Gemini. The European Commission's draft measures direct Alphabet to allow other services to carry out these tasks for users, as well as access features including context-aware intelligence, background execution, on-device model implementation, system integration, screen automation, and more.

In simpler words, rival AI services should be able to interact with apps on users' Android devices and "effectively" carry out tasks such as sending emails, ordering food, and sharing photos – via the app the user chooses, instead of the one Google favours. However, these measures are not finalised. The European Commission may replace or alter some measures if Alphabet provides good cause for an exemption. The regulator has also invited "all citizens, companies and organisations" to share their feedback and contribute to the consultation until May 13. A final decision is set to be adopted by July 27. Google will have to further support and document these technical implementations in detail, as well as submit reports.

What was Google's response to the EU regulator?

Google's Senior Competition Counsel, Clare Kelly, was against the move and shared concerns about security and affordability for users.

"This unwarranted intervention would strip away that autonomy, mandate access to sensitive hardware and device permissions; unnecessarily driving up costs while undermining critical privacy and security protections for European users," Kelly was quoted as stating in an email, per Reuters.

Google has also criticised the DMA more widely. In a September blog post, Google's Oliver Bethell, Senior Director, Competition, wrote that the DMA's aim was more fairness but that it was "causing significant and unintended harm" to European users and many small businesses. The post claimed that the DMA was focused on the commercial interests of intermediary sites connecting businesses and customers, instead of allowing customers and businesses to connect directly via Google.

Furthermore, Bethell claimed that the DMA forced Google to remove "legitimate safeguards" protecting Android users from scams and malicious links.

Why does this issue matter?

As Big Tech giants race to develop new AI tools and market them to users through their search engines (in the case of Google/Microsoft) or messaging apps (in the case of Instagram/WhatsApp), regulators are concerned that these companies may cut off access to rivals who have competing AI products. This, in turn, would hurt fair competition.

For example, both OpenAI's ChatGPT and Microsoft's Copilot announced last year that they would be leaving WhatsApp after Meta changed platform usage policies that affected how AI chatbots could access the WhatsApp backend. In December, the European Commission opened a formal antitrust investigation into Meta over the policy change.

In scenarios like these, customers could be forced to rely on the default AI product offered by the platform or device they are using, instead of freely choosing the one they want. On the other hand, tech companies have opposed opening up their hardware and software ecosystems to rivals, claiming that such permissions reduce security or pass on increased costs to users.

The enforcement actions taken by the European Commission in Google's case could also influence the business outlook of other Big Tech companies designated as gatekeepers under the DMA. Furthermore, these proceedings have the power to influence how Indian courts and competition regulators handle such antitrust questions at home.

- **Key Terms and Explanations**
- **Interoperability:** The ability of different systems, devices, or applications to connect and communicate in a coordinated manner. *Example: Allowing a third-party AI like ChatGPT to use the Android hardware "wake word" just as seamlessly as Google Assistant.*
- **Gatekeeper:** A large digital platform that acts as a significant bottleneck between business users and consumers. Under the EU's Digital Markets Act (DMA), companies like Alphabet (Google) are designated as such due to their market dominance.
- **Walled Garden:** A closed ecosystem where the platform provider exercises total control over applications, content, and media. Regulators aim to dismantle these "walls" to allow competition.
- **Wake Word:** A specific spoken command (e.g., "Hey Google") that activates a virtual assistant. The mandate seeks to allow users to customize these for rival AI.
- **On-Device Model Implementation:** Running AI models directly on a smartphone's hardware rather than in the cloud, allowing for faster processing and better privacy.

- **Main Arguments and Substantive Parts**
- **The Core Thesis:** To prevent a monopoly in the burgeoning AI sector, dominant mobile OS providers must grant rival AI services the same level of system integration and hardware access as their native AI tools.
- **Regulatory Stance:** The European Commission argues that Google currently favors its own AI (Gemini) by restricting third-party access to critical system features like long-press navigation or deep app data integration.
- **Platform Counterarguments:** Google contends that forcing deep integration for third parties creates "unwarranted intervention," potentially compromising user privacy, device security, and increasing hardware costs for consumers.
- **The Competitive Threat:** If "gatekeepers" leverage their control over OS (Android/iOS) or messaging (WhatsApp) to force their own AI on users, innovative startups may be squeezed out before they can compete on merit.

- **Historical Evolution of the Issue**
- **Pre-2010s (The Browser Wars):** Early antitrust focus was on PC operating systems (Microsoft Windows) favoring their own browsers (Internet Explorer).
- **2015-2020 (App Store Dominance):** Shift in focus to mobile ecosystems. EU fines Google billions for pre-installing its search and browser apps on Android.
- **2022-2023 (The DMA Era):** The EU passes the Digital Markets Act, establishing proactive rules for "gatekeepers" rather than waiting for years of litigation.
- **2024-Present (The AI Integration Phase):** As Generative AI goes mainstream, the focus shifts from "apps" to "AI agents." Regulators now demand that these agents have "system-level" access to keep the market open.

- **Way Forward**
- **Standardized APIs:** Develop industry-wide standards for AI interoperability that prioritize security while ensuring access.
- **Data Portability:** Strengthening "user-led data sharing" rather than "platform-led sharing" to ensure the user remains in control of what the AI sees.
- **Balanced Regulation:** Moving toward a "Co-regulation" model where tech giants and regulators work together to define security benchmarks for third-party integrations.
- **Global Harmonization:** India should collaborate with the EU and G20 to create a unified framework for AI antitrust to prevent "regulatory arbitrage."

- **Previous Years' UPSC Questions**
- **UPSC Mains 2020 (GS 3):** "What is Artificial Intelligence? How can AI help in various sectors?"
- **UPSC Mains 2022 (GS 2):** "The European Union's Digital Markets Act aims to check the monopolistic tendencies of Big Tech. Discuss its implications for India."
- **UPSC Prelims 2019:** Question on "Data Sovereignty" and the "Right to be Forgotten."

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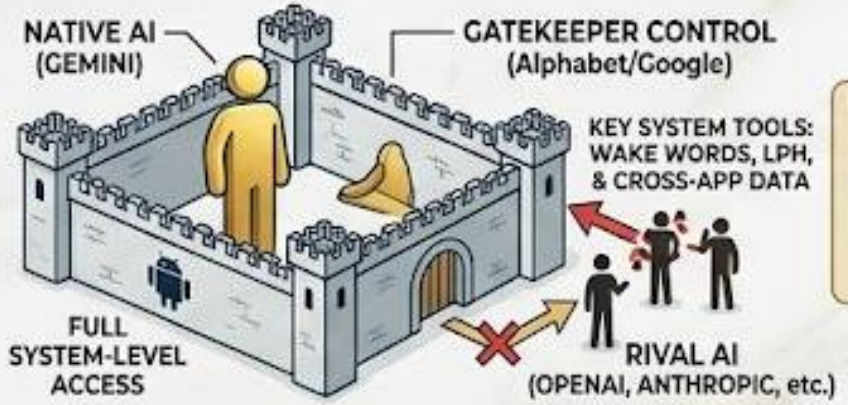
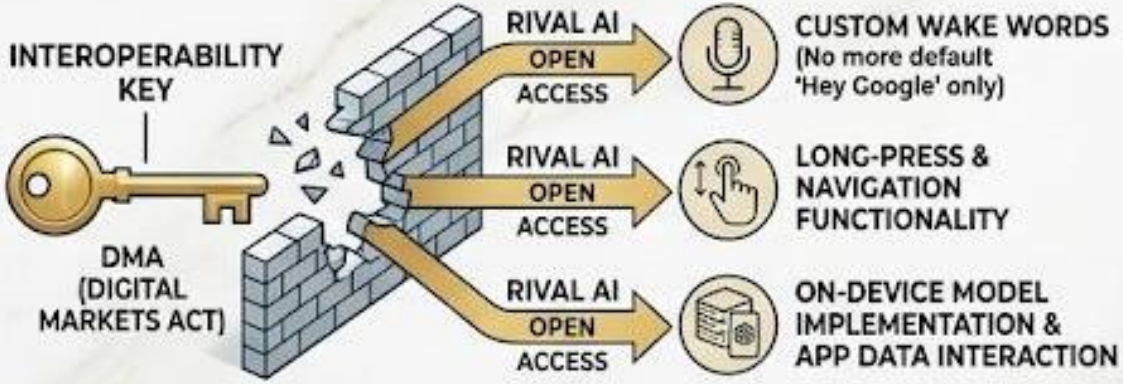
COMPREHENSIVE ANALYSIS: THE EU MANDATE TO OPEN ANDROID TO RIVAL AI (A UPSC CSE PERSPECTIVE)

1. CONTEXT: THE 'WALLED GARDEN' ECOSYSYEM



Regulators found Google favored its own AI; third-party AI lacked comparable integration

2. REGULATORY ACTION: BREAKING THE WALLS



3. KEY ARGUMENTS & IMPLICATIONS

THE REGULATOR'S CASE: "LEVEL PLAYING FIELD", "PRECAUTIONARY REGULATION", "USER CHOICE"

THE PLATFORM'S RESPONSE: "SECURITY RISK", "TECHNICAL DEGRADATION", "INCREASED COST"

RESULTING MARKET DYNAMICS: Startup Ecosystem Growth vs. Technical Fragmentation

Deep System Interoperability is a novel regulatory feat.

4. MULTIDIMENSIONAL UPSC ANALYSIS & WAY FORWARD

SOCIAL	POLITICAL	LEGAL	ETHICAL	INTERNATIONAL	ECONOMIC
(User Choice)	(Sovereignty)	(Antitrust, CCI Precedent)	(Self-Preferencing)	(Global Standards)	(Inclusive AI)

SYLLABUS LINKAGES (GS 2, 3, 4, Essay)

WAY FORWARD: Standardized APIs, User-Led Data Sharing, Co-regulation, Global Harmonization

UPSC KEY CONCEPTS TO MASTER: Walled Garden, Gatekeeper, Ex-ante Regulation, Interoperability, Digital Sovereignty