MISSION X

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ICT & ELECTRONICS

UNICORN: India-Japan Stealth Antenna Mast for Warships

NEWS IN BRIEF

- India and Japan are fast-tracking the UNICORN (Unified Complex Radio Antenna) project, their first joint defence equipment development.
- Bharat Electronics Limited is working with Japanese partners to co-develop and co-produce the integrated antenna mast system.
- UNICORN combines multiple communication functions into a single mast, reducing a warship's radar signature and boosting stealth.
- Prospective platforms include India's Project 17B frigates and the upcoming Project 18 Next-Generation Destroyer.

KEY CONCEPTS EXPLAINED

UNICORN: Unified Complex Radio Antenna; an integrated mast combining several communication and sensor functions into one low-signature structure.

Stealth mast: A ship superstructure designed to minimise radar cross-section by consolidating antennas and reducing reflective surfaces.

Co-development pact: A defence agreement where two countries jointly design, build and produce a system, sharing technology and production.

⚡ UNIQUE FACT

UNICORN is the first joint defence equipment co-development project between India and Japan, marking a shift from India's traditional defence partnerships with Russia, France and the United States toward deeper technology-sharing with Japan.

⚠ EXAM TRAP

Do not confuse UNICORN with a weapon or missile system. It is a radio communication and sensor antenna mast meant to improve stealth and connectivity, not an offensive strike system; UPSC often tests whether a defence-tech term refers to a weapon, a sensor, or a platform.

📌 PRELIMS MEMORY BANK

- Full form: Unified Complex Radio Antenna
- Countries: India and Japan (first joint defence project)
- Indian partner: Bharat Electronics Limited (BEL)
- Function: Integrated communications mast, radar-signature reduction
- Target platforms: Project 17B frigates, Project 18 destroyers

PRELIMS PRACTICE MCQ

With reference to the UNICORN project, consider the following statements:

1. It is a joint missile development project between India and Russia.
2. It integrates multiple antenna functions into a single low-signature mast.
3. Bharat Electronics Limited is the Indian partner in its development.

Which of the statements given above is/are correct?

A. 1 and 2 only

B. 2 and 3 only

C. 1 and 3 only

D. 1, 2 and 3

✓ ANSWER: B

SOLUTION EXPLAINED

① THROUGH LOGICAL ANALYSIS

Statement 1 can be eliminated on logic alone: a project repeatedly described as India's 'first joint defence equipment project' with Japan cannot simultaneously be a missile project with Russia, since the partner country and the system type are both misstated.

② THROUGH FACTUAL KNOWLEDGE

UNICORN is an India-Japan joint antenna project, not a missile system, integrating multiple communication functions into a single stealth-enhancing mast, with Bharat Electronics Limited as the Indian development partner, confirming statements 2 and 3.

HEALTH

Dengue Surge: Chennai and Tamil Nadu Monsoon Outbreak

NEWS IN BRIEF

- Chennai recorded 1,290 dengue cases in September 2026, more than double the 605 cases reported in August.
- Tamil Nadu reported over 18,000 dengue cases and 9 deaths statewide through the end of September.
- The Greater Chennai Corporation deployed thousands of domestic breeding checkers across its zones to eliminate mosquito breeding sites.
- Health authorities have intensified fever surveillance and hospital preparedness ahead of the northeast monsoon season.

KEY CONCEPTS EXPLAINED

Dengue: A viral infection spread by Aedes mosquitoes, causing high fever, severe joint pain and, in severe cases, haemorrhagic complications.

Vector surveillance: Monitoring and controlling disease-carrying organisms like mosquitoes to prevent outbreaks, including breeding-site elimination.

Aedes aegypti: The primary mosquito species transmitting dengue, chikungunya and Zika; breeds in clean, stagnant water near human habitation.

⚡ UNIQUE FACT

Unlike malaria-carrying Anopheles mosquitoes that breed in dirty or stagnant water bodies, dengue-carrying Aedes aegypti prefers clean standing water found in household containers, coolers and flowerpots, making urban areas particularly vulnerable.

⚠ EXAM TRAP

Do not confuse the dengue vector with the malaria vector. Dengue is transmitted by Aedes aegypti (day-biting, breeds in clean water), while malaria is transmitted by Anopheles mosquitoes (night-biting, breeds in dirty or stagnant water); UPSC frequently tests this vector-disease pairing.

📌 PRELIMS MEMORY BANK

- Vector: Aedes aegypti mosquito
- Chennai Sept 2026: 1,290 cases (vs 605 in August)
- Tamil Nadu total: 18,000+ cases, 9 deaths (till Sept)
- Breeding habitat: Clean standing water, urban containers
- Prevention: Source reduction, fever surveillance

PRELIMS PRACTICE MCQ

With reference to dengue fever, consider the following statements:

1. It is caused by a bacterium transmitted through contaminated water.
2. Its primary vector is the Aedes aegypti mosquito.
3. The vector typically breeds in clean, stagnant water.

Which of the statements given above is/are correct?

A. 1 and 2 only

B. 2 and 3 only

C. 1 and 3 only

D. 1, 2 and 3

✓ ANSWER: B

SOLUTION EXPLAINED

① THROUGH LOGICAL ANALYSIS

Statement 1 can be eliminated on logic alone: a disease consistently described in terms of 'mosquito breeding sites' and 'vector surveillance' is, by definition, a vector-borne viral disease, not a waterborne bacterial one.

② THROUGH FACTUAL KNOWLEDGE

Dengue is a viral (not bacterial) disease transmitted by the Aedes aegypti mosquito, which breeds in clean standing water rather than contaminated water bodies, confirming statements 2 and 3 as correct.

HEALTH

Swyer Syndrome: A Rare Disorder of Sexual Development

NEWS IN BRIEF

- Swyer syndrome, a rare genetic condition causing complete gonadal dysgenesis in individuals with an XY chromosome pattern, continues to feature in recent clinical case reports.
- Affected individuals typically have a female external appearance and underdeveloped, non-functional gonads called streak gonads.
- The condition is often linked to mutations in the SRY gene or other genes on the Y chromosome responsible for triggering testicular development.
- Early diagnosis is clinically important because streak gonads carry an elevated risk of developing tumours such as dysgerminoma if left unmonitored.

KEY CONCEPTS EXPLAINED

Gonadal dysgenesis: Incomplete or abnormal development of the gonads (ovaries or testes) during foetal development.

SRY gene: A gene on the Y chromosome that normally triggers testicular development in a genetically male embryo.

Streak gonads: Underdeveloped, non-functional gonadal tissue that fails to differentiate into normal ovaries or testes.

⚡ UNIQUE FACT

In Swyer syndrome, individuals have an XY chromosome pattern typically associated with male development, yet develop a female body structure because the SRY gene fails to trigger testicular formation, leaving the default female developmental pathway to proceed.

⚠ EXAM TRAP

Do not confuse Swyer syndrome with Turner syndrome. Swyer syndrome involves an XY karyotype with failed testicular development, while Turner syndrome involves a missing or partial X chromosome (45,X) in individuals who are otherwise female; both affect sexual development but through entirely different chromosomal mechanisms.

📌 PRELIMS MEMORY BANK

- Chromosome pattern: 46,XY (genetically male pattern)
- External appearance: Typically female
- Key gene involved: SRY (Y chromosome)
- Gonad type: Streak gonads (non-functional)
- Clinical risk: Gonadal tumours (e.g., dysgerminoma) if undiagnosed

PRELIMS PRACTICE MCQ

With reference to Swyer syndrome, consider the following statements:

1. Affected individuals typically have a 45,X chromosome pattern.
2. The condition is associated with failure of normal testicular development.
3. Streak gonads in affected individuals carry an elevated tumour risk.

Which of the statements given above is/are correct?

A. 1 and 2 only

B. 2 and 3 only

C. 1 and 3 only

D. 1, 2 and 3

✓ ANSWER: B

SOLUTION EXPLAINED

① THROUGH LOGICAL ANALYSIS

Statement 1 can be eliminated on logic alone: a condition explained through failure of the Y-chromosome-linked SRY gene necessarily requires the presence of a Y chromosome, which is incompatible with the 45,X pattern that defines a different, unrelated disorder.

② THROUGH FACTUAL KNOWLEDGE

Swyer syndrome involves a 46,XY karyotype (not 45,X) with failed SRY-driven testicular development, resulting in non-functional streak gonads that carry an elevated risk of tumours like dysgerminoma, confirming statements 2 and 3.

SPACE

Tiangong Space Station's Planned Expansion

NEWS IN BRIEF

- China has confirmed plans to expand its Tiangong space station from a T-shaped, three-module outpost into a larger 'double-T' configuration.
- A new 20-ton-class multipurpose module will dock with the Tianhe core module as the first addition, followed by two more experiment modules.
- The expansion will roughly double Tiangong's mass from about 90 tonnes to 180 tonnes once complete.
- The move positions Tiangong to become the largest permanently crewed orbital outpost once the International Space Station retires.

KEY CONCEPTS EXPLAINED

Tiangong: China's modular space station, meaning 'Heavenly Palace', assembled in orbit during 2021-2022 around the Tianhe core module.

Core module: The primary module of a space station that provides life support, propulsion and docking ports for other modules, such as Tianhe.

Modular space station: A station built by launching and docking separate modules in orbit, allowing it to be expanded over time.

⚡ UNIQUE FACT

China's new Mengzhou crew spacecraft, expected to debut around this period, can carry up to seven astronauts to orbit at once, more than double the three-person capacity of the Shenzhou spacecraft currently used to crew Tiangong.

⚠ EXAM TRAP

Do not confuse Tiangong with the International Space Station (ISS). Tiangong is China's independently operated station, while the ISS is a multinational collaboration involving the US, Russia, Europe, Japan and Canada; as the ISS nears retirement, Tiangong is positioned to become the sole continuously crewed station.

📌 PRELIMS MEMORY BANK

- Meaning: 'Heavenly Palace' (Chinese space station)
- Core module: Tianhe
- Current mass: ~90 tonnes; expanding to ~180 tonnes
- New shape: T-shaped to 'double-T' configuration
- Crew spacecraft: Shenzhou (current, 3-person), Mengzhou (upcoming, 7-person)

PRELIMS PRACTICE MCQ

Consider the following statements regarding China's Tiangong space station:

1. It is a multinational space station jointly operated by China, the US and Russia.
2. Its planned expansion will roughly double its total mass.
3. The Tianhe module serves as its core module.

Which of the statements given above is/are correct?

A. 1 and 2 only

B. 2 and 3 only

C. 1 and 3 only

D. 1, 2 and 3

✓ ANSWER: B

SOLUTION EXPLAINED

① THROUGH LOGICAL ANALYSIS

Statement 1 can be eliminated on logic alone: a station described as being expanded unilaterally by China to outlast the multinational ISS is, by definition, independently Chinese-operated, not a joint China-US-Russia venture.

② THROUGH FACTUAL KNOWLEDGE

Tiangong is China's own space station (not multinational), built around the Tianhe core module, and its planned expansion will roughly double its mass from 90 to 180 tonnes, confirming statements 2 and 3.

SPACE

CHIME Telescope Maps the Universe's Earliest Hydrogen Glow

NEWS IN BRIEF

- Canada's CHIME radio telescope has directly mapped the faint glow of hydrogen from the early universe for the first time on its own.
- This achievement opens a new, independent way to study the universe's accelerating expansion and dark energy.
- CHIME, short for Canadian Hydrogen Intensity Mapping Experiment, uses a stationary array of radio dishes with no moving parts.
- The telescope's expanded Outrigger stations have also significantly boosted its ability to detect and localise fast radio bursts.

KEY CONCEPTS EXPLAINED

CHIME: Canadian Hydrogen Intensity Mapping Experiment; a radio telescope that maps hydrogen gas across cosmic time using a fixed dish array.

Fast radio burst (FRB): A brief, intense burst of radio waves from deep space whose exact origin is still being studied by astronomers.

Dark energy: A mysterious force thought to be driving the accelerating expansion of the universe, studied by mapping cosmic structures like hydrogen gas.

⚡ UNIQUE FACT

CHIME has no moving parts and no mirrors or lenses like traditional telescopes; instead, it uses a stationary array of half-pipe-shaped radio reflectors and relies entirely on digital signal processing to electronically 'steer' its view across the sky.

⚠ EXAM TRAP

Do not confuse CHIME with an optical telescope. CHIME observes the universe using radio waves, not visible light, which is why it can map faint hydrogen gas emissions and detect fast radio bursts that optical telescopes cannot directly observe.

📌 PRELIMS MEMORY BANK

- Full form: Canadian Hydrogen Intensity Mapping Experiment
- Type: Stationary radio telescope, no moving parts
- Key feat: First standalone map of early-universe hydrogen
- Relevance: New probe for dark energy and cosmic expansion
- Also known for: Detecting fast radio bursts (FRBs)

PRELIMS PRACTICE MCQ

With reference to the CHIME telescope, consider the following statements:

1. It is an optical telescope that uses large mirrors to observe visible light.
2. It has been used to map hydrogen gas from the early universe.
3. It has contributed to the detection of fast radio bursts.

Which of the statements given above is/are correct?

A. 1 and 2 only

B. 2 and 3 only

C. 1 and 3 only

D. 1, 2 and 3

✓ ANSWER: B

SOLUTION EXPLAINED

① THROUGH LOGICAL ANALYSIS

Statement 1 can be eliminated on logic alone: a telescope described as detecting faint hydrogen gas emissions and fast radio bursts, phenomena observable only at radio wavelengths, cannot simultaneously be a visible-light optical telescope relying on mirrors.

② THROUGH FACTUAL KNOWLEDGE

CHIME is a stationary radio telescope, not an optical one, and has been used both to map early-universe hydrogen gas and to detect fast radio bursts, confirming statements 2 and 3 as correct.

SPACE

TAPAS-1: India's First Private Thermal-Imaging Nanosatellite

NEWS IN BRIEF

- TAPAS-1, India's first privately developed thermal-imaging nanosatellite payload, was deployed via a SpaceX Falcon 9 rideshare mission in October 2026.
- The satellite was built by Satleo Labs, an Ahmedabad-based spacetech startup founded in 2023.
- TAPAS-1 operates in a 500-km Sun-Synchronous Low Earth Orbit with a planned operational lifetime of three years.
- It aims to provide affordable, high-resolution thermal intelligence for commercial, civic and defence users, including urban heat mapping and wildfire detection.

KEY CONCEPTS EXPLAINED

Nanosatellite: A small satellite typically weighing between 1 and 10 kg, often built as a CubeSat for low-cost space missions.

Sun-Synchronous Orbit (SSO): A near-polar orbit where a satellite passes over the same local solar time at each location, ideal for consistent Earth imaging.

Thermal imaging: A remote-sensing technique that detects infrared heat signatures, used for applications like wildfire detection and urban heat mapping.

⚡ UNIQUE FACT

TAPAS-1 weighs just 1.5 kg yet is designed to deliver sovereign thermal-intelligence capability, reflecting a broader global trend of private nanosatellites performing tasks once possible only with large government-built Earth observation satellites.

⚠ EXAM TRAP

Do not confuse TAPAS-1 (a private Indian thermal-imaging nanosatellite by Satleo Labs) with DRDO's TAPAS-BH drone (Tactical Airborne Platform for Aerial Surveillance), an unmanned aerial vehicle; despite the similar name, one is a satellite and the other is a drone.

📌 PRELIMS MEMORY BANK

- Developer: Satleo Labs (Ahmedabad-based startup)
- Type: Private thermal-imaging nanosatellite (1.5 kg)
- Launch: SpaceX Falcon 9, Transporter-18 rideshare, Oct 2026
- Orbit: 500-km Sun-Synchronous Low Earth Orbit
- Use cases: Urban heat mapping, agriculture, wildfire detection

PRELIMS PRACTICE MCQ

Consider the following statements regarding TAPAS-1:

1. It is an unmanned aerial vehicle developed by DRDO.
2. It was developed by a private Indian spacetech startup.
3. It is designed to provide thermal-imaging data from orbit.

Which of the statements given above is/are correct?

A. 1 and 2 only

B. 2 and 3 only

C. 1 and 3 only

D. 1, 2 and 3

✓ ANSWER: B

SOLUTION EXPLAINED

① THROUGH LOGICAL ANALYSIS

Statement 1 can be eliminated through careful reading: the passage distinguishes TAPAS-1, a private satellite launched via rocket into orbit, from DRDO's similarly named TAPAS-BH drone, so attributing the satellite's achievement to a government UAV misreads which 'TAPAS' is involved.

② THROUGH FACTUAL KNOWLEDGE

TAPAS-1 is a private nanosatellite built by Satleo Labs, not a DRDO drone, and is designed to capture thermal-imaging data from Sun-Synchronous orbit, confirming statements 2 and 3 as correct.

DEFENCE TECHNOLOGY

Misagh-2: Iran's MANPADS Deployed Against Drone Threats

NEWS IN BRIEF

- Russian forces have begun using Iranian-origin Misagh-2 man-portable air defence systems, reportedly spotted in the Rostov region in late September 2026.
- The deployment is aimed at countering the persistent threat posed by Ukrainian drones to Russian forces and infrastructure.
- Analysts suggest the move reflects either lower costs or shortages of comparable Russian-made air defence systems.
- Misagh-2 is an Iranian infrared-guided, shoulder-fired missile believed to be derived from Chinese MANPADS technology.

KEY CONCEPTS EXPLAINED

MANPADS: Man-Portable Air Defence System; a shoulder-fired missile used by a single soldier to engage low-flying aircraft, helicopters or drones.

Infrared-guided missile: A missile that homes in on the heat signature of a target, operating on a 'fire-and-forget' principle without continuous operator control.

Fire-and-forget: A guidance capability allowing a missile to track and hit its target independently after launch, freeing the operator to take cover or reload.

⚡ UNIQUE FACT

Misagh-2 is believed to be reverse-engineered from Chinese QW-1M technology, illustrating how MANPADS technology has proliferated across Iran, China and now into Russian frontline use against drone threats, despite being originally designed to counter aircraft and helicopters, not small drones.

⚠ EXAM TRAP

Do not confuse a MANPADS like Misagh-2 with a large, vehicle-mounted air defence system. MANPADS are shoulder-fired, short-range (around 6 km) weapons operated by a single soldier, unlike vehicle-mounted systems with longer range and radar-guided tracking.

📌 PRELIMS MEMORY BANK

- Type: MANPADS (shoulder-fired, infrared-guided)
- Origin: Iran (based on Chinese QW-1M technology)
- Range: ~6 km; Ceiling: ~5 km
- Recent use: Russia, against Ukrainian drones (Rostov region)
- Guidance: Infrared, fire-and-forget

PRELIMS PRACTICE MCQ

With reference to the Misagh-2 missile system, consider the following statements:

1. It is a vehicle-mounted, radar-guided long-range air defence system.
2. It is a shoulder-fired missile using infrared guidance.
3. It has reportedly been used by Russian forces against drone threats.

Which of the statements given above is/are correct?

A. 1 and 2 only

B. 2 and 3 only

C. 1 and 3 only

D. 1, 2 and 3

✓ ANSWER: B

SOLUTION EXPLAINED

① THROUGH LOGICAL ANALYSIS

Statement 1 can be eliminated on logic alone: a weapon consistently described as a MANPADS, operated by one soldier and carried on the shoulder, is by definition man-portable and short-range, which rules out it being a vehicle-mounted, radar-guided long-range system.

② THROUGH FACTUAL KNOWLEDGE

Misagh-2 is a shoulder-fired, infrared-guided MANPADS, not a radar-guided vehicle-mounted system, and has recently been reported in Russian use against Ukrainian drones, confirming statements 2 and 3 as correct.

DEFENCE TECHNOLOGY

FP-7 'Pelican': Ukraine's Indigenous Ballistic Missile

NEWS IN BRIEF

- Ukraine's Fire Point FP-7, nicknamed 'Pelican,' achieved its first successful combat use in early October 2026.
- The domestically built tactical ballistic missile has a range of 200 to 300 km and carries a 150-200 kg warhead.
- President Zelensky confirmed the strike, emphasising it as a step toward Ukraine's self-reliant missile production.
- A larger variant, the FP-9, with an 850 km range and 800 kg warhead, is expected to follow in 2026-2027.

KEY CONCEPTS EXPLAINED

Tactical ballistic missile: A short-to-medium range missile that follows a ballistic trajectory, typically used to strike military targets within a few hundred kilometres.

Indigenous weapons production: The domestic design, development and manufacture of defence equipment, reducing dependence on foreign suppliers or donors.

Warhead payload: The explosive portion of a missile; its weight and design determine the destructive effect delivered to the target.

⚡ UNIQUE FACT

The FP-7 was developed using adapted commercial technology, including carbon fibre materials, allowing Ukraine's Fire Point to rapidly rebuild ballistic missile capability that the country had largely lost after Soviet-era production lines closed following the 1991 breakup of the USSR.

⚠ EXAM TRAP

Do not confuse the FP-7 'Pelican' (a ballistic missile) with the FP-5 'Flamingo' (a separate Fire Point system, reported to be a long-range cruise missile or drone-missile hybrid). Both are Fire Point products used together in recent strikes but are distinct weapon types.

📌 PRELIMS MEMORY BANK

- Developer: Fire Point (Ukrainian defence firm)
- Nickname: 'Pelican'
- Type: Tactical ballistic missile
- Range: 200-300 km; Warhead: 150-200 kg
- Future variant: FP-9 (850 km range, 800 kg warhead)

PRELIMS PRACTICE MCQ

Consider the following statements regarding Ukraine's FP-7 missile:

1. It is a long-range cruise missile developed with NATO assistance.
2. It is a domestically developed tactical ballistic missile.
3. Its first combat use was confirmed in October 2026.

Which of the statements given above is/are correct?

A. 1 and 2 only

B. 2 and 3 only

C. 1 and 3 only

D. 1, 2 and 3

✓ ANSWER: B

SOLUTION EXPLAINED

① THROUGH LOGICAL ANALYSIS

Statement 1 can be eliminated on logic alone: a weapon repeatedly emphasised as a marker of Ukraine's 'self-reliant' and 'sovereign' missile production, built by a domestic firm, is inherently inconsistent with being developed through NATO assistance.

② THROUGH FACTUAL KNOWLEDGE

The FP-7 is a domestically developed Ukrainian tactical ballistic missile, not a NATO-assisted cruise missile, and its first confirmed combat use came in October 2026, validating statements 2 and 3.

DEFENCE TECHNOLOGY

NMESIS: US Marine Corps' Mobile Anti-Ship Missile System

NEWS IN BRIEF

- The US Marine Corps has been expanding deployment of its NMESIS mobile anti-ship missile system across the Indo-Pacific's First Island Chain.
- NMESIS launchers were airlifted to the Philippines, positioned near the strategically important Luzon Strait close to Taiwan.
- The system fires the Naval Strike Missile, known for low-altitude flight and autonomous target recognition against naval targets.
- The US Marine Corps plans to acquire 32 NMESIS launchers and 103 Naval Strike Missiles under its latest budget request.

KEY CONCEPTS EXPLAINED

NMESIS: Navy-Marine Expeditionary Ship Interdiction System; a remotely operated, mobile land-based launcher for anti-ship missiles.

Anti-ship missile: A missile specifically designed to detect, track and destroy naval vessels, often using sea-skimming flight paths to evade detection.

First Island Chain: A strategic line of islands from Japan through Taiwan to the Philippines, central to US and allied maritime strategy in the Indo-Pacific.

⚡ UNIQUE FACT

NMESIS is remotely operated and unmanned, allowing US Marines to rapidly reposition the launcher across austere island terrain without putting personnel directly at risk, which supports a strategy of creating unpredictable, distributed coastal strike threats against hostile naval forces.

⚠ EXAM TRAP

Do not confuse NMESIS with a traditional naval-based anti-ship missile system. NMESIS is a land-based, mobile launcher operated from coastlines and islands, unlike anti-ship missiles fired directly from warships or aircraft; this land-sea distinction is a key point for maritime strategy questions.

📌 PRELIMS MEMORY BANK

- Full form: Navy-Marine Expeditionary Ship Interdiction System
- Operator: US Marine Corps
- Missile fired: Naval Strike Missile
- Recent deployment: Philippines, near Luzon Strait
- Strategic zone: First Island Chain (Indo-Pacific)

PRELIMS PRACTICE MCQ

With reference to the NMESIS system, consider the following statements:

1. It is a missile system launched exclusively from naval warships.
2. It is a mobile, land-based anti-ship missile launcher.
3. It has been deployed in the Philippines near the Luzon Strait.

Which of the statements given above is/are correct?

A. 1 and 2 only

B. 2 and 3 only

C. 1 and 3 only

D. 1, 2 and 3

✓ ANSWER: B

SOLUTION EXPLAINED

① THROUGH LOGICAL ANALYSIS

Statement 1 can be eliminated on logic alone: a system described as being 'airlifted' to islands and operated from 'austere island terrain' is inherently land-based and mobile, which directly contradicts a claim that it launches exclusively from warships.

② THROUGH FACTUAL KNOWLEDGE

NMESIS is a mobile, land-based anti-ship missile launcher, not a warship-based system, and has recently been deployed in the Philippines near the Luzon Strait, confirming statements 2 and 3 as correct.

MISCELLANEOUS - CONSTRUCTION TECH

3D Concrete Printing: Andhra Pradesh's Rural Housing Pilot

NEWS IN BRIEF

- Andhra Pradesh has launched a pilot project to build India's first 3D-printed rural houses under the PMAY-G (Pradhan Mantri Awas Yojana-Gramin) scheme.
- The state plans to construct around 177 houses using 3D concrete printing technology alongside conventional PMAY-G construction.
- 3D concrete printing uses computer-controlled nozzles to layer concrete directly into wall structures, reducing construction time and labour needs.
- The pilot is expected to demonstrate faster, more cost-effective construction methods for affordable rural housing at scale.

KEY CONCEPTS EXPLAINED

3D concrete printing: A construction technique where a computer-controlled machine extrudes concrete layer by layer to build walls and structures without traditional formwork.

PMAY-G: Pradhan Mantri Awas Yojana-Gramin; a central government scheme providing affordable pucca houses to rural households.

Additive construction: A building method that adds material layer by layer to create a structure, as opposed to traditional subtractive or assembly-based construction.

⚡ UNIQUE FACT

3D concrete printing can reduce construction time for a basic house from several weeks to just a few days, since the technology eliminates the need for traditional brick-laying and most formwork, while also cutting down on construction waste.

⚠ EXAM TRAP

Do not confuse 3D concrete printing with prefabricated or modular construction. 3D printing builds structures in place by extruding material layer by layer, while prefabrication involves manufacturing building components off-site and assembling them later; both aim to speed up construction but use fundamentally different methods.

📌 PRELIMS MEMORY BANK

- State pilot: Andhra Pradesh
- Scheme link: PMAY-G (Pradhan Mantri Awas Yojana-Gramin)
- Target: ~177 houses under the pilot
- Method: Layer-by-layer computer-controlled concrete extrusion
- Advantage: Faster construction, lower labour and material waste

PRELIMS PRACTICE MCQ

Consider the following statements regarding 3D concrete printing technology:

1. It involves assembling pre-manufactured building components on-site.
2. It builds structures by extruding concrete layer by layer.
3. Andhra Pradesh has piloted it for rural housing under PMAY-G.

Which of the statements given above is/are correct?

A. 1 and 2 only

B. 2 and 3 only

C. 1 and 3 only

D. 1, 2 and 3

✓ ANSWER: B

SOLUTION EXPLAINED

① THROUGH LOGICAL ANALYSIS

Statement 1 can be eliminated on logic alone: a technology defined by a computer-controlled nozzle extruding material directly into wall structures is, by definition, an in-place additive process, not the assembly of components manufactured elsewhere.

② THROUGH FACTUAL KNOWLEDGE

3D concrete printing builds structures through layer-by-layer extrusion rather than assembling prefabricated parts, and Andhra Pradesh has piloted this method for rural housing under PMAY-G, confirming statements 2 and 3 as correct.