UPSC Daily Current Affairs| Prelimbits 24-06-2025

Ambubachi Mela

Prelims : Current events of national and international importance

Why in News?

Thousands of devotees have arrived in Assam for the Kamakhya Temple's annual Ambubachi Mela.

- It is one of the largest religious gatherings in ***Northeast India.***
- The festival is held during the monsoon, generally in June, at the Kamakhya Temple in Nilachal hills in ***Guwahati, Assam.***
- It is a shrine to the ***Goddess Kamakhya*** and one of the most important centres of ***Tantrik Shaktism.***
- The period of Ambubachi is believed to be the period of the goddess's annual menstruation, and the shrine is closed for this.
- At the end of the period, the shrine's doors are opened ceremonially, and devotees flock for darshan of the deity.
- The festival is *associated with fertility*, with the onset of monsoon, and the common historical association across cultures of the Earth as a fertile woman.
- The name 'Ambubachi' itself translates to *water flowing.*
- Ambubachi Mela is not an image of the Goddess but rather a process, a formal process of menstruation.
- It is believed that during monsoon rain the creative and nurturing power of the menses of mother Earth becomes accessible to devotees at this site during Ambubachi.
- During this period, there is an entire cessation of all ploughing, sowing and other agricultural activities.
- Fragments of cloth stained with the blood-mark of the Goddess are distributed to the devotees and pilgrims preserve these in their houses as protective amulets.

Reference

The Indian Express | Ambubachi Mela

Air Bubbles Trapped in Ice as a Message Storage System

Prelims: Science and technology Current events of national and international importance

Why in news?

Recently, a team of researchers from China and Czechia has developed a novel method of storing information using air bubbles trapped in ice.

- The technique offers an alternative for storing messages in extremely cold environments, where traditional storage methods fail.
- **Inspiration –** The idea is inspired by natural air bubbles preserved in **glaciers**, which have held ancient atmospheric samples for thousands of years.
- Recognizing the ability of ice to trap and preserve air, researchers explored controlled bubble formation to encode information.
- **Working principle** – Freezing air bubbles to store data when water freezes, it traps air bubbles.
- The shape, size, and arrangement of these bubbles depend on the freezing speed.
- By controlling freezing speed, scientists can create bubble patterns representing data, similar to:
    - Morse Code (dots and dashes)
    - Binary Code (0s and 1s)

Morse code is a telecommunications method which encodes text characters as standardized sequences of two different signal durations, called dots and dashes.

- **Types of bubbles formed** – Researchers identified two primary bubble shapes:
    - Egg-shaped bubbles
    - Needle-shaped bubbles
- By measuring bubble height and width, regions within the ice could be categorized as:
    - Egg-shaped only
    - Both egg and needle-shaped
    - Needle-shaped only
    - No bubbles
- **Creating information layers** – Scientists induced rapid temperature changes to **control freezing speed**, generating bubble layers at precise locations.
- Multiple bubble layers can be created in a single ice slice by repeating the temperature control process.
- **Message encoding process –** The storage process involves:
- Converting the desired message (letters/numbers) into a temperature-control pattern.
- Using the pattern to guide the freezing process and form bubble layers.
- Scanning the ice slice with a camera.
- Using a computer algorithm to interpret light and dark bands in the image as encoded information.
- **Potential applications** – Storage of information in extremely cold places, where electronics or paper are impractical in,
    - Arctic and Antarctic regions
    - Moon or Mars missions
- Long-term information preservation in glacial environments or space exploration.

Reference

[The Hindu| Air Bubbles Trapped in Ice as a Message Storage System]

DGCA's Comprehensive Aviation Safety Audit

Prelims: Current events of national and international importance

Why in news?

The Directorate General of Civil Aviation (DGCA) has launched a comprehensive safety audit across India's aviation sector following tragic crash of Air India flight AI-171 in Ahmedabad.

- **Safety Audit** – It is a systematic, independent, and documented examination to evaluate the effectiveness of safety management systems and give recommendations for corrective actions to enhance safety.
- **Previous DGCA' safety audits** – Different DGCA directorates conducted independent, area-specific safety checks (pilot licensing, aircraft maintenance, airport safety) without coordination, often planned or unplanned.
- **Lack of holistic oversight –** The isolated approach led to poor cross-department coordination, missed systemic risks, and limited focus on proactive, comprehensive safety assessment.
- **New comprehensive aviation safety audit** – DGCA launched a 360-degree Special Safety Audit, moving beyond fragmented checks to a holistic, ecosystem-wide evaluation to detect systemic vulnerabilities and enhance safety.
- **Aim** – To enhance safety, operational efficiency, and regulatory compliance in line with global standards.

Key Features of the Safety Audit

- **360-Degree evaluation** – The audit will assess the entire aviation ecosystem: safety management, operations, and regulatory adherence.
- **Multidisciplinary teams –** Teams will include experts from:
    - Flight Standards
    - Air Safety
    - Airworthiness
    - Licensing
    - Air Navigation Services
    - Aerodrome Standards
- **Surprise inspections** – Special audits and inspections can be conducted without prior notice.
- **Categorisation of Findings**
    - Level-1: Immediate Corrective Action required for critical safety risks.
    - Level-2: Short-Term Corrective Action for less urgent but necessary improvements.
- **Compliance with global standards –** The audit aligns with the International Civil Aviation Organization (ICAO) Standards and Recommended Practices (SARPs).
- **Significance** – It supports India's commitment to a world-class, safe, and efficient aviation system.
- Establishment of India as a global benchmark for aviation safety oversight

- It looks to restores the public confidence post-Ahmedabad crash

Reference

The Hindu| DGCA's Comprehensive Aviation Safety Audit

Fighting Antimicrobial Resistance (AMR) with Insect-Based Livestock Feed

Prelims: Sustainable development | Current events of national and international importance

Why in news?

Recent studies have shown that the use of insect-based feed can be more cost-effective because it provides better digestible proteins than fishmeal- or soybean-based feeds.

- **Antibiotic overuse in livestock** – Animal husbandry accounts for over 50% of global antibiotic use, expected to reach 200,000 tonnes by 2030, a 53% rise from 2013 levels.
- Antibiotics are used to treat diseases and promote growth, but overuse fosters AMR.
- **AMR in Livestock** – Antibiotic residues in livestock intestines lead to bacteria acquiring resistance genes, which then spread to soil, water and ultimately to humans.

By 2050, antibiotic-resistant infections could cause 10 million deaths annually, up from 700,000 in 2014.

- Human over-exposure to such antibiotics can cause kidney disease, cancer, aplastic anaemia, etc.
- **Insect-Based Feed** – Insect-based feed is more cost-effective than traditional feeds like fishmeal or soybean meal.
- It acts as natural diet for many aquatic and terrestrial animals.
- It provides better digestible proteins, improving growth and immunity in livestock.
- Insects like Black Soldier Flies, House Crickets, Mealworms, etc., are rich in digestible proteins, fats, fibres and micronutrients (zinc, calcium, iron).
- **Nutritional Benefits** – 1 kg fishmeal (standard protein source) can be replaced with:
    - 0.76 kg Crickets
    - 0.85 kg Black Soldier Flies
    - 0.91 kg Locusts
- **AMR mitigation through insect feed** – Healthier livestock require fewer antibiotics for growth promotion or disease prevention, lowering the risk of AMR development.
- **Improves gut health of livestock** – Some insect-based feeds promote better gut microbiota balance, enhancing immunity naturally.
    - It reduces dependence on non-essential antibiotics in livestock production.
    - It limits environmental release of antibiotic-resistant bacteria.
    - It supports safer, more sustainable food chains.
- **Environmentally sustainable** – Insect farming produces far fewer greenhouse gases,

uses less land and water, and converts organic waste into high-quality protein.
- **Indian Initiatives** – ICAR-CIBA (Central Institute of Brackish water Aquaculture) in partnership with private firms, is promoting insect-based feeds for aquaculture (shrimp, seabass) and livestock.

Reference

The Hindu| Fighting AMR with Insect-Based Livestock Feed

Debt Mutual Funds

Prelims: Indian Economy| Current events of national and international importance

Why in news?

RBI has recently started a rate-cutting cycle and FD rates declining, which makes investors shifting to debt funds.

- **Debt Mutual Funds** – Investment funds that pool money to buy **fixed-income securities** like government bonds, corporate bonds, treasury bills, etc.
- **Regulated by** – Securities and Exchange Board of India (SEBI).
- **Lower risk** – It generates steady returns with lower risk compared to equities.
- It is popular among risk-averse investors and those looking for diversification.
- **Categories of Debt Funds as per SEBI,**
    - Liquid Funds
    - Ultra-Short Duration Funds
    - Short Duration Funds
    - Gilt Funds
    - Dynamic Bond Funds
    - Credit Risk Funds

Significance of Debt Mutual Funds

- **Stable returns** – It offers more predictable and stable returns compared to equity funds.
- **Diversification for investors –** They provide an opportunity to diversify portfolios, balancing risk especially for conservative investors or those nearing financial goals.
- **Better tax efficiency** – Debt funds that held for more than 3 years can enjoy indexation benefits, reducing the tax liability compared to fixed deposits.
- **Liquidity –** Most debt mutual funds offer higher liquidity than traditional fixed deposits, allowing investors to redeem investments partially or fully.
- **Relationship with interest rates** – The debt fund performance is closely tied to the Monetary Policy stance of the RBI's Monetary Policy Committee (MPC) and is in inverse relationship with interest rates that means,
- When interest rates fall, bond prices rise and Debt fund returns increase.
- When interest rates rise, bond prices fall and Debt fund returns decline.
- **Reason** – Existing bonds offer higher fixed returns than newly issued bonds during

falling interest rates, making them more attractive.
- During rising interest rates, new bonds offer better yields, reducing demand and price for existing bonds.

Reference

The Hindu| Debt Mutual Funds

One Liners 24-06-2025

Geography

Lightning Strickes

Tragically, **13 people died from lightning strikes in Bihar** in last week . The **Bihar government announced Rs4 lakh ex-gratia** for each bereaved family and urged adherence to safety guidelines.

• **What is Lightning? -** Is a **natural electrostatic discharge** from thunderstorm clouds, generating extreme heat and thunder.

• **Prone Regions in India - Eastern and Northeastern states**, including Bihar, Jharkhand, and West Bengal, are particularly vulnerable.

• **How it occurs -** It results from charge separation in thunderclouds, leading to electrostatic build-up and a violent discharge when the electric field strength exceeds air's insulating capacity.

• **Deadly Hazard** - Lightning is a major natural disaster killer in India, causing over 2,000 deaths annually, disproportionately affecting outdoor workers.

• **Key Indian Initiatives -** India uses the Damini App for real-time alerts, a Lightning Detection Network, and IMD forecasts to mitigate risks.

• **Safety & Awareness -** The Lightning Resilient India Campaign and NDMA guidelines aim to reduce deaths through education and infrastructure.

International Relations and Issues

Operation Midnight Hammer

In a recent stunning move, the U.S. launched Operation Midnight Hammer against Iran's nuclear infrastructure, announced by President Donald Trump.

• **Precision Strikes -** The operation targeted Fordow, Natanz, and Isfahan, aiming to severely degrade Iran’s nuclear weapons capacity.

• **Covert Execution** - A highly classified mission, it involved B-2 Spirit stealth bombers launching from the U.S., employing deception tactics.

• **Coordinated Infiltration -** After an 18-hour flight with multiple refuelings, bombers linked with escort and support aircraft over the Middle East.

• **Pre-Strike Deception -** A U.S. submarine launched Tomahawk cruise missiles, coinciding with fighter aircraft maneuvers to confuse Iranian defenses.

• **Flawless Strikes -** All three sites were struck with pinpoint accuracy, with no U.S. casualties or retaliation.

• **Strategic Success -** The Pentagon hailed the mission as a "masterclass in stealth warfare," demonstrating U.S. power and precision.

Strait of Hormuz

The Strait of Hormuz, a vital 33 km-wide chokepoint connecting the Persian Gulf and Gulf of Oman, faces threats of blockage amidst US-Iran tensions, impacting global energy.

• **Critical Energy Lifeline** - Over one-quarter of global seaborne oil (20 million barrels daily) and 83% of LNG trade transit the Strait of Hormuz.
• **Economic Fallout** - A blockage would trigger a sharp surge in global oil and gas prices, increasing shipping costs and destabilizing markets.
• **Iran's Dilemma** - While Iran has historically avoided full blockage, doing so would jeopardize its own oil exports, particularly to China, and alienate allies.
• **US Military Presence** - The U.S. 5th Fleet in Bahrain provides a rapid response capability, though military engagement risks severe shipping disruptions.
• **India's Vulnerability** - India, importing 84% of its crude oil through the Strait in 2024, would face significant energy insecurity and economic volatility.
• **Limited Alternatives** - Existing alternative pipelines from Saudi Arabia and UAE cannot fully compensate for the Strait's vast transport volume, ensuring widespread impact.

GENIUS Act

The US Senate passed the GENIUS Act in June 2025, a landmark bill regulating stablecoins, signifying a major shift in US digital asset policy.

• **Stablecoin Overview** - Stablecoins, digital currencies pegged to traditional assets like the US dollar, boast a market capitalization of $251.7 billion in 2025.
• **GENIUS Act Features** - The act mandates anti-money laundering (AML) compliance, full reserve backing, and monthly audits for stablecoins to ensure transparency.
• **Market Impact** - Following approval, Circle Internet Group shares surged 33.82%, reflecting strong investor confidence in the regulated stablecoin market.
• **Treasury Outlook** - US Treasury Secretary Scott Bessent forecasts stablecoin market growth to $3.7 trillion by decade-end, reinforcing USD supremacy.
• **Policy Comparison** - Unlike the STABLE Act's narrower reserve focus, the GENIUS Act provides a broader framework for stablecoin regulation.
• **Global Strategy** - Amid de-dollarization talks, the GENIUS Act aims to solidify the US dollar's dominance by promoting dollar-pegged stablecoins globally.

Samson Option

With Recent escalating regional conflicts, attention is on Israel's Samson Option, its presumed doctrine of massive nuclear retaliation against existential threats.

• **What is it?** - The Samson Option refers to Israel's unconfirmed but widely believed policy of nuclear retaliation if facing an existential threat.
• **Biblical Reference** - Named after the biblical Samson, it signifies a 'last resort' act of apocalyptic retaliation, even if it means self-destruction.
• **Policy of Ambiguity** - Israel maintains "amimut" (deliberate ambiguity) regarding its nuclear arsenal, which analysts estimate to be between 80 and 400 warheads.
• **Seymour Hersh's Role** - The term gained prominence with Seymour Hersh's 1991 book, *The Samson Option*, solidifying its place in public discourse.
• **Purpose** - It's designed to ensure Israel's survival, a last-resort use of nuclear weapons against a non-nuclear adversary to avert defeat.
• **Not First Strike** - The Samson Option isn't for deterring a nuclear first strike, as Israel is the region's sole nuclear power.

Fattah hypersonic missile

In recent strikes on Israel, Iran deployed its Fattah hypersonic missile, demonstrating its capability to bypass advanced defense systems like Iron Dome and raising global security concerns.

• **Fattah** - Is a medium-range hypersonic ballistic missile developed by Iran's Islamic Revolutionary Guard Corps (IRGC), designed for precision strikes and evasion of air defense systems.

• **Developed** - In November 2022 and inducted into the IRGC's arsenal in 2023, it commemorates Hassan Tehrani Moghaddam.

• **Hypersonic Speed** - It travels at Mach 13 to Mach 15 (up to 15,000 km/h) with a range of 1,400 km, planned to extend to 2,000 km.

• **Advanced Evasion** - The Fattah boasts exceptional maneuverability, shifting direction mid-flight, and features a plasma shield for reduced radar detection and radio signal jamming.

• **Operational Use** - The missile was actively deployed by Iran in its 2025 strikes on Israel (Operation Honest Promise 3).

• **Future Variants** -An upgraded variant, Fattah-2, is currently under development with an extended range.

Environment

Reintroduction of king Cobra in Madhya Pradesh

The recent death of a **king cobra** at Bhopal's Van Vihar zoo has spurred discussions on reintroducing them in Madhya Pradesh to curb snakebite fatalities, though the plan faces significant ecological and feasibility challenges.

• **King Cobra Traits -** King cobras (Ophiophagus hannah), reaching 15 feet, prefer humid, dense forests and are found in India's Western and Eastern Ghats, and Northeast.

• **Historical Absence -** No confirmed historical records exist in Madhya Pradesh's dry deciduous forests, which lack sufficient water and dense vegetation for a stable population.

• **Taxonomic Shift -** Recent genetic studies identify four distinct king cobra lineages, with the Western Ghats population now classified as a separate species, Ophiophagus kaalinga.

• **Hybridisation Risk -** Introducing non-local king cobras, like those from the Western Ghats, risks hybridization, which can dilute genetic integrity and undermine conservation.

• **Census Challenges -** A proposed snake census lacks established protocols, rendering it unfeasible and unnecessary for effective conservation.

• **Expert Concerns -** Many experts question the scientific basis of reintroduction plans, citing poor captive breeding success and potential unintended ecological consequences.

Security

INS Tamal

Indian Navy will commission INS Tamal, a Krivak/Tushil class stealth multi-role frigate, at Kaliningrad, Russia.

• **Pivotal moment** - Being the last foreign-built warship to join India's fleet, signifying a major leap towards naval self-reliance under 'Atmanirbhar Bharat'.
• **Key Commissioning** - INS Tamal, built at Russia's Yantar Shipyard, will be commissioned on July 1, 2025, by Vice Admiral Sanjay J. Singh.
• **End of Imports** - This commissioning ends a two-decade era of Russian warship imports, reinforcing India's 'Make in India' initiative
• **Advanced Capabilities** - The 125-meter, 3,900-ton frigate boasts stealth design, BrahMos missiles, and a crew of 250+.
• **Indigenisation Drive** - Starting with 26% indigenous content, the ship's Made-in-India systems have increased to 33%.
• **Domestic Construction-** Two sister frigates of the Triput class are being built in India at Goa Shipyard Ltd, with Russian collaboration.
• **Strategic Impact -** INS Tamal joins the Western Fleet, symbolizing India's growing defence autonomy and integrating cutting-edge technology.

Miscellaneous

International Olympic Day

June 23 marks **International Olympic Day**, celebrating the birth of the modern Olympic Games and promoting the values of excellence, friendship, and respect through sport.

• **Origins in Paris -** Established in 1948, this day commemorates the International Olympic Committee's (IOC) founding on June 23, 1894, by Baron Pierre de Coubertin in Paris.
• **Global Significance -** More than symbolic, it promotes **physical activity**, sportsmanship, and inclusion, inspiring healthier lifestyles worldwide.
• **2025 theme**, "Let's Move?" - A joint IOC and WHO initiative, urges everyone to combat inactivity with simple, enjoyable movements.
• **Community Celebrations -** The day sees Olympic Day Runs, cycling events, yoga sessions, and fitness workshops fostering unity and wellness.
• **Educational Outreach -** Schools and community centers host workshops, quizzes, and competitions to educate on Olympic history and values.
• **Digital Engagement -** Millions participate digitally using **#OlympicDay** and **#LetsMove**, amplifying the message of an active lifestyle.

SHANKAR IAS PARLIAMENT
Information is Empowering