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POLITY & GOVERNANCE

1.1. ELECTORAL ROLLS & CITIZENSHIP: THE CONSTITUTIONAL TUSSLE

Context: The Supreme Court is currently interpreting the boundaries between the **Election Commission's (ECI)** power to verify voters and the **Centre's** exclusive power to determine citizenship. This involves a conflict between the **Representation of the People Act (RPA), 1950** and the **Citizenship Act, 1955**.

A. The Source of ECI's Authority

- **Article 324:** Vests the "superintendence, direction, and control" of elections (including preparation of electoral rolls) in the ECI. The ECI argues this gives them **Plenary Power** to verify voter eligibility.
- **Article 326 (Adult Suffrage):** Sets the **constitutional preconditions** for a voter:
  1. Must be a citizen of India.
  2. Must not be disqualified by law (e.g., unsound mind, crime).
     - **NOTE:** Citizenship is a fundamental requirement for the Right to Vote.

B. Parliament's Role

- **Article 327:** Parliament can make laws regarding elections (e.g., RPA 1950, RPA 1951).
  - The Conflict: The ECI argues that while Parliament makes the laws, these laws must align with the ECI's independent power under Art 324.

Statutory Decoding:

A. Representation of the People Act, 1950 (Preparation of Rolls)

- **Section 16:** Explicitly **disqualifies** a person from being registered in the electoral roll if they are **"not a citizen of India."**
- **Section 19:** Conditions for registration:
  1. Age (18 years).
  2. **"Ordinarily Resident"** in the constituency.
- **Section 21(3):** Empowers the ECI to direct a **Special Intensive Revision (SIR)** of electoral rolls for any constituency if "felt necessities" (errors/shifts) arise.

B. Citizenship Act, 1955 (The Centre's Domain)

- **Section 9:** Deals with **Termination of Citizenship**.
  - It states that any citizen of India who voluntarily acquires the citizenship of another country ceases to be an Indian citizen.
  - **The Crucial Distinction:** The ECI argues the Centre's exclusive power is limited to deciding **"when or how"** foreign citizenship was acquired (under Sec 9(2)). It does not stop other authorities (like ECI) from assessing citizenship for specific purposes like voting.

1.2. IDENTITY IN LIMBO: THE CLASSIFICATION CRISIS OF DNTs

Context: The Union Government has clarified in Parliament that there is **no proposal under consideration** to freshly classify Denotified, Nomadic, and Semi-Nomadic Tribes (DNTs) into Scheduled Caste (SC), Scheduled Tribe (ST), or Other Backward Class (OBC) categories.

Who are the Denotified, Nomadic, and Semi-Nomadic Tribes?

- **Denotified Tribes (DNTs):** Communities that were notified as being 'born criminal' during the British regime under the Criminal Tribes Act of 1871. This Act was repealed in 1952, and they were "De-Notified".
- **Nomadic/Semi-Nomadic:** Communities who move from one place to another rather than living in one place comfortably.
- **Current Status:** These groups are the most marginalized, often falling outside the safety net of SC/ST/OBC reservations due to a lack of specific documentation or classification.

What is the Institutional Framework?

To address the specific grievances of these groups, the government has established several bodies over the years:

1. **Idate Commission (2017):** Headed by Bhiku Ramji Idate, it flagged the urgent need for proper classification of these communities into SC, ST, or OBC lists.
2. **DWBDNC (2019):** Following the Idate report, the government constituted the **Development Welfare Board for Denotified, Nomadic, and Semi-Nomadic Communities**.
3. **NITI Aayog Panel:** Entrusted with the task of classification, it commissioned the Anthropological Survey of India (AnSI) to conduct an ethnographic study.

About SEED scheme?

- **Launch & Nodal Agency:** Launched in February 2022 by the **Ministry of Social Justice & Empowerment**.
- **Primary Objective:** To facilitate the economic empowerment of Denotified (DNT), Nomadic (NT), and Semi-Nomadic (SNT) tribes, historically the most marginalized communities.

What are the Four Pillars of Implementation?

The scheme focuses on holistic development through four key components:

- **Educational Support:** Provision of free coaching for Civil Services and professional courses (Medicine, Engineering, MBA).
- **Healthcare Security:** Health insurance coverage extended through the **National Health Authority's PMJAY** (Ayushman Bharat).
- **Livelihood Enhancement:** Income generation support through community-level clusters.
- **Housing Assistance:** Financial aid for housing construction via **PMAY** (Pradhan Mantri Awas Yojana) or **IAY**.

How is the Scheme Administered?

- **Implementing Body:** The **Development and Welfare Board for De-notified, Nomadic and Semi-Nomadic Communities (DWBDNC)**.
- **Fiscal Outlay:** A corpus of **₹200 crore** approved for the five-year period starting 2021-22.
- **Technological Integration:** An online portal acts as a central repository for beneficiary data and ensures seamless registration.

The Policy Trajectory: Evolution of DNT Welfare

I. How did the Institutional Framework Evolve?

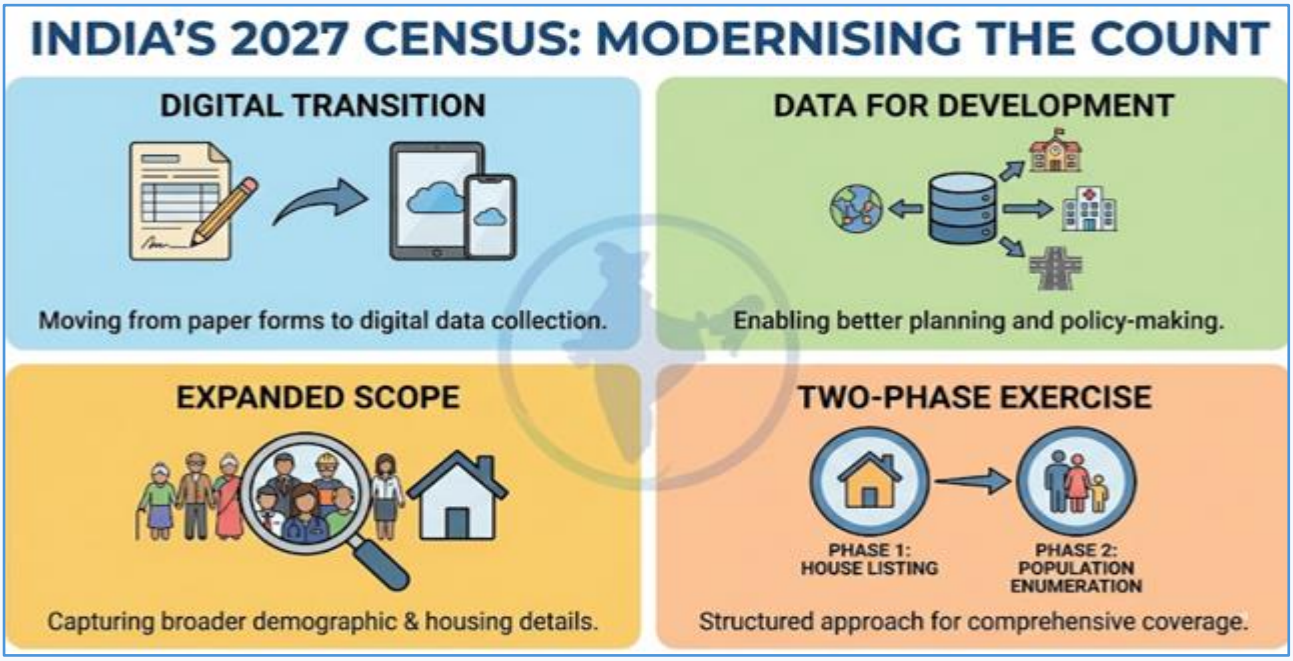
- **Renke Commission (2006):**
  - Headed by **Balkrishna Sidram Renke**; report submitted in 2008.
  - **Key Observation:** Noted that DNTs were deprived of Constitutional support available to SCs/STs.
  - **Population Estimate:** Approx. 10.74 crores (based on Census 2001).
- **Idate Commission (2015):**
  - Headed by **Shri Bhiku Ramji Idate**.
  - **Mandate:** To identify and list DNT communities and evaluate development progress.
  - **Outcome:** Recommendations led to the establishment of the **DWBDNC** in 2019.

II. What Other Initiatives Support DNTs?

- **Dr. Ambedkar Pre-Matric and Post-Matric Scholarship:** A Centrally Sponsored Scheme (w.e.f. 2014-15) specifically for DNT students not covered under SC, ST, or OBC categories.
- **Nanaji Deshmukh Scheme of Construction of Hostels:** Provides hostel facilities for DNT boys and girls; implemented via State Governments and Central Universities (w.e.f. 2014-15).

1.3. CENSUS 2027: A DIGITAL & DEMOGRAPHIC MILESTONE

Context: The Union Cabinet recently approved the proposal to conduct the **Census of India 2027** with an allocated budget of **₹11,718.24 crore**. This exercise marks a significant shift in India's enumeration history, introducing digital methodologies and expanding the scope of data collection.



What Makes Census 2027 Unique?

- **First Digital Census:** The 2027 Census will transition from paper-based enumeration to a fully digital format. Data collection will be executed via **mobile applications** and a dedicated portal named **Census Management and Monitoring System (CMMS)** for real-time monitoring.
- **Caste Enumeration:** For the first time in independent India, the Census will enumerate caste data beyond the Scheduled Castes (SCs) and Scheduled Tribes (STs). The last comprehensive caste census was conducted in **1931**.

The Operational Roadmap

The exercise will be conducted in two distinct phases:

- **Phase I (House Listing):** Scheduled to commence on **April 1, 2026** (Duration: 5–6 months). Focuses on housing characteristics and amenities.
- **Phase II (Population Enumeration):** Scheduled for **February 2027**, culminating by **March 1, 2027**. Focuses on demographic and socio-economic details.

Reference Dates:

- **March 1, 2027:** For the majority of India.
- **October 1, 2026:** For snow-bound and hilly regions (e.g., J&K, Ladakh, Himachal Pradesh).

The Constitutional & Legal Backbone

- **Legal Framework:** Conducted under the **Census Act, 1948** and the **Census Rules, 1990**.
- **Nodal Agency:** The exercise is helmed by the **Office of the Registrar General and Census Commissioner**, under the **Ministry of Home Affairs (MHA)**.
- **Constitutional Provision: Article 246** empowers the Parliament to legislate on the Census. It is listed as **Entry 69** in the **Union List (Seventh Schedule)**.
- **Historical Timeline:**
    - **1872:** First non-synchronous census under Lord Mayo.
    - **1881:** First synchronous (decennial) census under Lord Ripon.

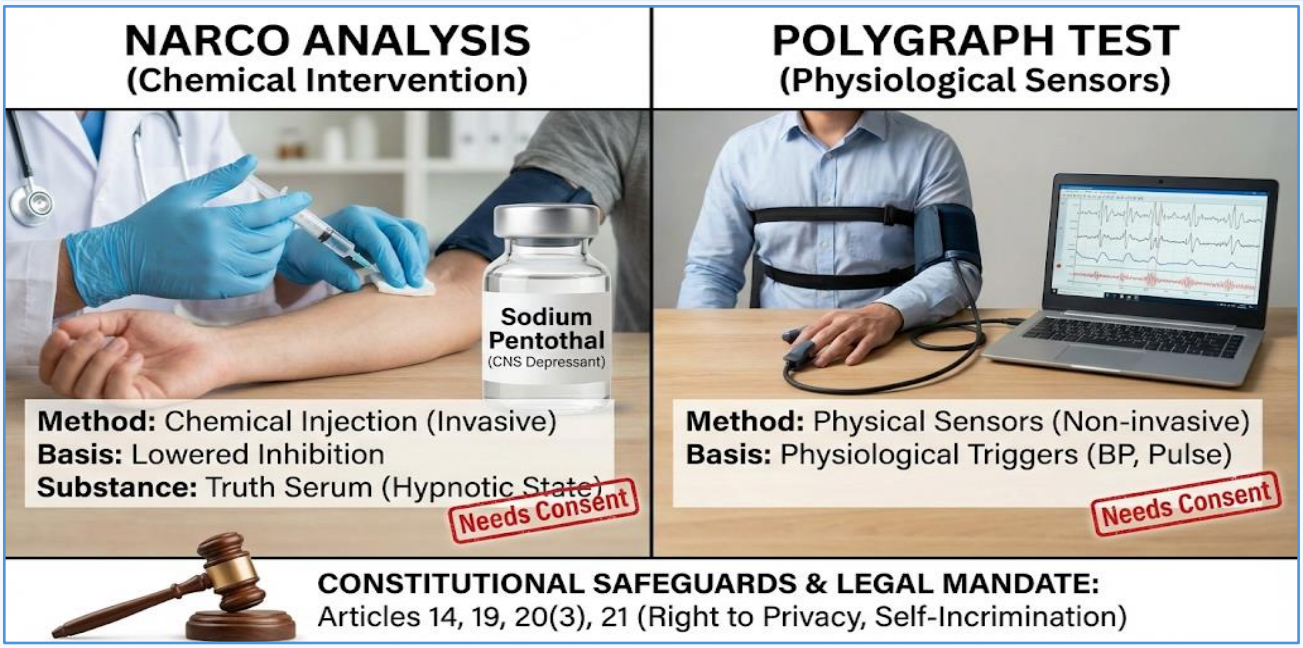
1.4. SILENCE AS A RIGHT: SC RULINGS ON FORCED NARCO TESTS

Context: In the recent case of **Amlesh Kumar v. State of Bihar (2025)**, the Supreme Court (SC) set aside a Patna High Court order, ruling that any **forced or involuntary narco test is unconstitutional**. The Court reiterated that such orders violate the landmark guidelines established in **Selvi v. State of Karnataka (2010)**.

Scientific Mechanism of Narco Analysis:

Unlike Polygraph tests which measure physiological responses (BP, pulse), Narco Analysis relies on chemical intervention.

- **The Substance: Sodium Pentothal** (also known as Sodium Thiopental).
- **The Class:** It is a fast-acting **barbiturate** (acts as a CNS depressant).
- **The Mechanism:** It induces a hypnotic/sedated state, neutralizing the subject's imagination and lowering inhibitions to lie. It is often termed a "Truth Serum."



Feature	Narco Analysis	Polygraph Test
Method	Chemical Injection (Invasive)	Physical Sensors (Non-invasive)
Basis	Lowered inhibition/sedation	Physiological triggers (Pulse, BP)
Legal Status	Needs Consent	Needs Consent

Constitutional Mandate & Legal Safeguards:

The SC has flagged forced tests as a violation of the **'Golden Triangle'** of Fundamental Rights (Articles 14, 19, and 21).

- **Article 20(3) - Self Incrimination:** "No person accused of any offence shall be compelled to be a witness against himself." A forced test effectively compels the accused to speak.
- **Article 21 - Personal Liberty & Privacy:** Forced intrusion into a person's mental process violates the **Right to Privacy** and bodily integrity.

Guidelines & Evidentiary Value?

The **Selvi v. State of Karnataka (2010)** judgment is the bedrock for these procedures.

1. **The Guidelines:**
   - **Consent:** Must be informed and voluntary.
   - **Magistrate:** Consent must be recorded before a Judicial Magistrate.
   - **Legal Aid:** The accused must have access to a lawyer during the process.
2. **Evidentiary Value:**
   - **Not a Confession:** Statements made during the trance are **not admissible** as primary evidence (confessions) because the subject has no conscious control/choice.
   - **Discovery of Facts:** Under the Evidence Act (and corresponding BNSS sections), only **new material facts discovered** based on the statement (e.g., finding a hidden weapon) are admissible.

Landmark Judgments on Narco Analysis:

Maneka Gandhi v. Union of India (1978): Established the 'Golden Triangle' (Art 14, 19, 21).

Selvi v. State of Karnataka (2010): Mandatory consent; forced tests violate Art 20(3).

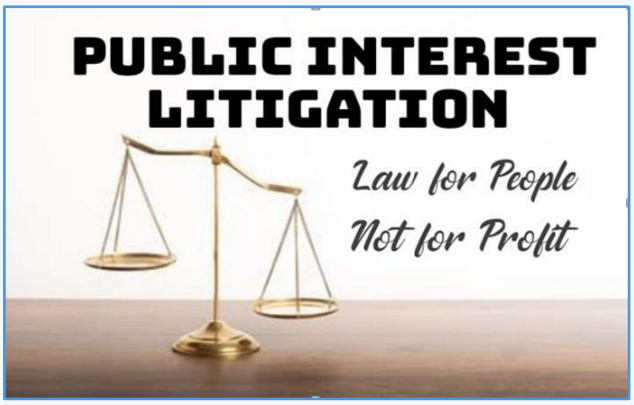
Amlesh Kumar v. State of Bihar (2025): Reaffirmed that forced tests are invalid even for investigation.

1.5. INAS 335 AND THE MODERNISATION OF NAVAL AVIATION

Context: The Indian Navy is set to commission its second squadron of MH-60R "Seahawk" helicopters, designated as **INAS 335 (Ospreys)**. The ceremony will take place on December 17 at **INS Hansa in Goa**, marking a pivotal moment in India's defence modernisation.

1. **About**
   - **Identity:** The MH-60R, often referred to as **"Romeo,"** is a state-of-the-art all-weather multi-role helicopter.
   - **Origin:** Manufactured by the US defence major **Lockheed Martin**.
   - **Arsenal & Avionics:**
     - **Anti-Submarine Warfare (ASW):** It is considered one of the world's best submarine hunters, equipped with the **AN/AQS-22 ALFS dipping sonar** and sonobuoys. It carries **Mk-54 torpedoes** to track and neutralise underwater threats.
     - **Anti-Surface Warfare (ASuW):** Capable of carrying **AGM-114 Hellfire missiles** and precision machine guns to target hostile ships and fast attack craft.
     - **Surveillance:** Features multi-mode radar and electro-optical sensors for day and night maritime surveillance.
2. **Strategic Imperative:**
   - **Blue Water Reach:** The induction significantly extends the Navy's operational horizon, enabling sustained operations far beyond the coastline (Blue Water capabilities).
   - **IOR Deterrence:** Deployment in the **Indian Ocean Region (IOR)** strengthens Maritime Domain Awareness (MDA) and acts as a deterrent against asymmetric threats like enemy submarines and piracy.
   - **Fleet Integration:** The platform is fully integrated with fleet operations, capable of medical evacuation (MEDEVAC), search and rescue (SAR), and ship-borne operations.
3. **Squadron Dynamics: Expanding the Fleet**
   - **INAS 335 (Ospreys):** This new squadron will be based at **INS Hansa, Goa**.
   - **Legacy:** The Indian Navy commissioned its first MH-60R squadron (**INAS 334**) in March of the previous year at **Kochi**, Kerala.

1.6. PUBLIC INTEREST LITIGATION



What is PIL?

- **Origin:** The concept was borrowed from **American Jurisprudence**, designed to represent unrepresented groups like the poor, racial minorities, and environmentalists.
- **Legal Status:** PIL is **not defined in any statute** or act. It is a product of **Judicial Activism** by the courts to protect the "Public Interest".
- **Core Philosophy:** It relaxes the rule of Locus Standi, allowing any public-spirited citizen to approach the court on behalf of those who cannot do so themselves due to poverty or disability.

Evolution in India:

- **The Pioneer:** The seeds were sown by **Justice Krishna Iyer** in 1976 (Mumbai Kamagar Sabha vs. Abdul Thai).
- **First Reported Case:** Hussainara Khatoon vs. State of Bihar (1979) focused on undertrial prisoners, establishing the **Right to Speedy Justice** as a fundamental right.
- **The Expansion: Justice P.N. Bhagwati** (in S.P. Gupta vs. Union of India) ruled that any bonafide citizen can invoke writ jurisdiction for the redressal of public injury, making PIL a potent weapon.

Constitutional Provisions: Where can it be filed?

- **Supreme Court:** Under **Article 32** of the Constitution.
- **High Court:** Under **Article 226** of the Constitution.
- **Magistrate:** Under **Section 133** of the Criminal Procedure Code (CrPC).
- **Respondents:** It is generally filed against the **State** (Central/State Govt, Municipal Authorities) as defined under **Article 12**, and not solely against private parties.

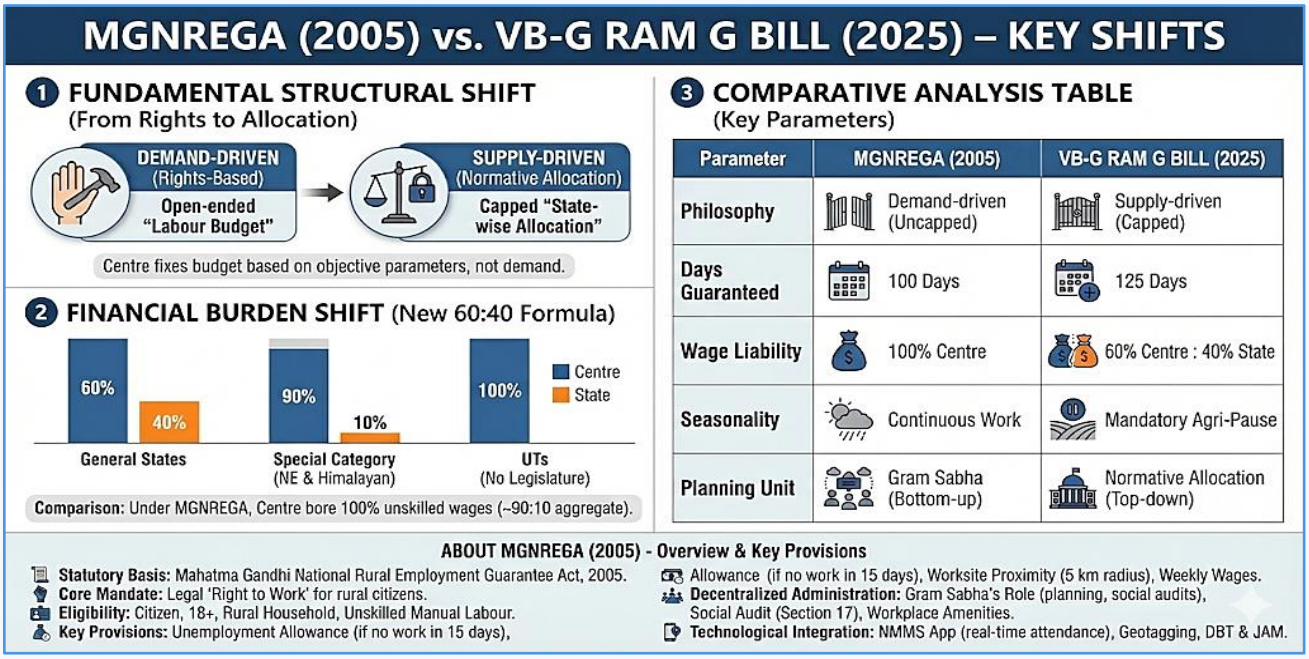
Landmark Judgements: Judicial Innovations

- **Vishaka vs. State of Rajasthan:** Recognized sexual harassment as a violation of Articles 14, 15, and 21; laid down guidelines for workplace safety.
- **M.C. Mehta vs. Union of India:** Established that a petitioner need not be a riparian owner to file a case against river pollution, asserting the right of the public to clean water.
- **Bandhua Mukti Morcha:** The Supreme Court shifted the **burden of proof** to the employer to prove that forced labor was not bonded labor.

Challenges: The Flip Side

- **Judicial Overreach:** Excessive interference in policy matters may violate the principle of **Separation of Powers**.
- **Frivolous Litigation:** Misuse for political or personal gain creates a backlog, diverting attention from genuine human rights issues.
- **Competing Rights:** Decisions (e.g., closing polluting industries) may conflict with the livelihood rights of workers.

1.7. VB-G RAM G BILL: REDEFINING RURAL EMPLOYMENT ARCHITECTURE



Context: The Union government has introduced the [**The Viksit Bharat–Guarantee for Rozgar and Ajeevika Mission (Gramin)} VB-G RAM G Bill]**to repeal and replace the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), 2005, aligning the framework with the vision of **Viksit Bharat @2047**.

What is the Fundamental Structural Shift?

The framework transitions from a **"Demand-Driven"** (Rights-based) model to a **"Supply-Driven"** (Normative Allocation) model.

Unlike the open-ended "Labour Budget" of MGNREGA, the Centre will now fix a **"State-wise Normative Allocation"** based on objective parameters.

How does the Financial Burden Shift?

- **The 60:40 Formula (Section 22):** The Bill drastically alters the funding pattern, increasing the fiscal liability of States.
    - **General States: 60:40** (Centre: State).
    - **Special Category (NE & Himalayan States): 90:10** (Centre: State).
    - **UTs (No Legislature): 100%** Centre.

Comparison: Under MGNREGA, the Centre bore **100% of unskilled wages**, effectively resulting in a ~90:10 aggregate split.

Parameter	**MGNREGA (2005)**	**VB-G RAM G Bill (2025)**
Philosophy	Demand-driven (Uncapped)	Supply-driven (Capped)
Days Guaranteed	100 Days	**125 Days**
Wage Liability	100% Centre	**60% Centre: 40% State**
Seasonality	Continuous Work	**Mandatory Agri-Pause**
Planning Unit	Gram Sabha (Bottom-up)	**Normative Allocation** (Top-down)

About MGNREGA?

Overview & Genesis

- **Statutory Basis:** Enacted as the **Mahatma Gandhi National Rural Employment Guarantee Act, 2005**.
- **Core Mandate:** Legally guarantees the **"Right to Work"** to rural citizens.

Eligibility Criteria

- Must be a **Citizen of India**.
- Age: **18 years** or above.
- Residence: Must belong to a **Rural Household**.
- Nature of Work: Willingness to perform **unskilled manual labour**.

Key Statutory Provisions

- **Unemployment Allowance:** If work is not provided within **15 days** of application, the applicant is entitled to an allowance (1/4th of wage for first 30 days; 1/2 thereafter).
- **Worksite Proximity:** Employment is typically provided within a **5 km radius**; travel allowance is mandatory if the distance exceeds this limit.
- **Wages:** Paid weekly (mandatorily within 15 days) directly to bank accounts.

Decentralized Administration

- **Gram Sabha's Role:** The principal authority for planning and social audits; must recommend at least **50% of the works**.
- **Social Audit (Section 17):** Mandated to ensure transparency, community participation, and accountability in execution.
- **Workplace Amenities:** Implementing agencies must ensure crèche facilities, drinking water, and first-aid at worksites.

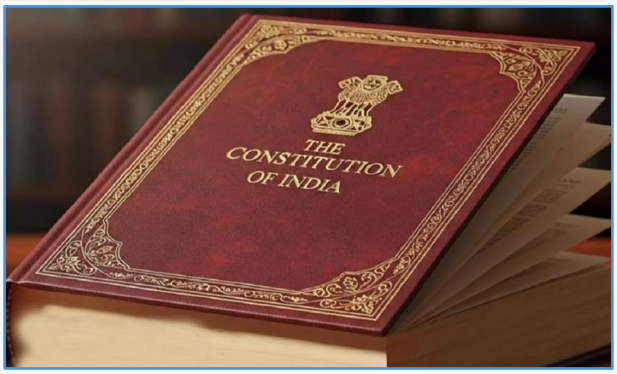
Technological Integration

- **NMMS App:** The **National Mobile Monitoring Software** was made mandatory (Jan 2023) for capturing real-time, geotagged attendance twice a day.
- **Geotagging:** Mandatory geotagging of assets to prevent duplication and fraud.
- **DBT & JAM:** Integration with Jan Dhan-Aadhaar-Mobile for transparent wage transfers.

1.8. SAMVIDHAN DIWAS 2025: CELEBRATING THE LIVING DOCUMENT

Why is November 26 Celebrated?

- Origin: **The Government of India officially designated November 26 as Constitution Day in** 2015 **to commemorate the** 125th birth anniversary **year of Dr. B.R. Ambedkar.**
- Historical Context: **It marks the** adoption **of the Constitution by the Constituent Assembly in** 1949**.**



- Previous Status: **Prior to 2015, this day was observed informally as** National Law Day **by the legal fraternity.**
- Differentiation: **While** Constitution Day **marks the *adoption* (November 26, 1949),** Republic Day **marks the *enforcement* (January 26, 1950).**

Theme & Key Initiatives (2025)

- Theme: "Hamara Samvidhan – Hamara Swabhiman" **(Our Constitution, Our Pride). It focuses on the Constitution as a source of national dignity rather than just a legal text.**
- Linguistic Inclusion: **To address accessibility gaps, the Constitution has been released digitally in** nine additional regional languages**:**
- **Malayalam, Marathi, Nepali, Punjabi, Bodo, Kashmiri, Telugu, Odia, and Assamese.**
- Nodal Agency: **This digitization project was executed by the** Legislative Department **of the** Union Law Ministry**.**

Making of the Constitution: A Statistical Snapshot

- Drafting Time: **The process spanned** 2 years, 11 months, and 17 days**.**
- The Scale: **It resulted in the world's longest written constitution.**
- Deliberation: **Over** 7,600 amendments **were proposed, with roughly** 2,400 discussed **extensively, showcasing democratic rigor.**
- Leadership: **The Drafting Committee was chaired by** Dr. B.R. Ambedkar**.**

Chronology of Events: From Assembly to Adoption

Date	Key Event
Dec 9, 1946	First meeting of the Constituent Assembly.
Dec 11, 1946	Dr. Rajendra Prasad elected as President.
Dec 13, 1946	Objectives Resolution moved by J.L. Nehru.
Aug 29, 1947	Drafting Committee appointed (Chair: Dr. B.R. Ambedkar).
Nov 4, 1948	Final Draft introduced in the Assembly.
Nov 26, 1949	Adoption of the Constitution (Constitution Day).
Jan 24, 1950	Last session; Constitution signed by members.
Jan 26, 1950	Commencement of the Constitution (Republic Day).

Philosophical Underpinnings: Key Preamble Values

- Justice: **Social, economic, and political fairness.**
- Liberty: **Freedom of thought, expression, belief, faith, and worship.**
- Equality: **Absence of special privileges and provision of adequate opportunities for all.**
- Fraternity: **Promoting the dignity of the individual and the unity/integrity of the nation.**

1.9. DECODING THE PRESIDENT'S PARDONING POWER

Context: President Droupadi Murmu recently rejected the mercy petition of a convict sentenced to death for a heinous crime in Maharashtra. This marks the third mercy plea rejection during her tenure.

Constitutional Source of Power :

- Article 72: Empowers the President to grant pardons, reprieves, respites, or remissions of punishment or to suspend, remit, or commute the sentence of any person.
- Article 161: Empowers the Governor of a State to grant similar reliefs for offences against any law relating to a matter to which the executive power of the State extends.

Constitutional Tools of Mercy:

- Pardon: Completely absolves the convict from all sentences, punishments, and disqualifications. It removes both the sentence and the conviction.
- Commutation: Substitution of one form of punishment for a lighter form (e.g., Death sentence to Rigorous Imprisonment).
- Remission: Reducing the period of a sentence without changing its character (e.g., 2 years Rigorous Imprisonment to 1 year Rigorous Imprisonment).
- Respite: Awarding a lesser sentence due to a special fact (e.g., physical disability or pregnancy of the convict).
- Reprieve: A stay of the execution of a sentence (usually death) for a temporary period to allow the convict time to seek pardon.

Comparative Analysis: Article 72 vs. Article 161

Feature	President (Article 72)	Governor (Article 161)
Jurisdiction	Offences against Union Law.	Offences against State Law.
Court Martial	Can pardon sentences given by a Military Court.	Cannot pardon sentences by a Military Court.
Death Sentence	Can pardon all death sentences (even if under State law).	Cannot pardon a death sentence. Can only suspend, remit, or commute it.

Judicial Review & Established Precedents

The Supreme Court has laid down critical guidelines regarding the exercise of this power:

- Maru Ram vs. Union of India (1980):
- The President and Governor cannot exercise this power on their own discretion.
- They must act on the advice of the Council of Ministers.
- Kehar Singh vs. Union of India (1988):

- The petitioner has no right to an oral hearing by the President.
- The President can examine evidence afresh and take a view different from the court's.
- Judicial Review: The decision is generally not subject to judicial review *except* where the decision is arbitrary, irrational, mala fide, or discriminatory.

1.10. COMPETITION COMMISSION OF INDIA

Origin and Mandate

- **Establishment:** Statutory body established under the Competition Act, 2002. It became fully functional in May 2009.
- **Background:** Replaced the obsolete Monopolies and Restrictive Trade Practices (MRTP) Act, 1969, following the recommendations of the S.V.S. Raghavan Committee.
- **Objective:** To prevent practices having an Appreciable Adverse Effect on Competition (AAEC) in India, promote healthy competition, protect consumer interests, and ensure freedom of trade.

Structure and Composition

- Ministry: Functions under the Ministry of Corporate Affairs.
- Members: Consists of a Chairperson and not less than 2 and not more than 6 members (Total 7 max).
- Appointment: Appointed by the Central Government based on recommendations from a Selection Committee.
- Qualifications: Minimum 15 years of experience in fields like economics, law, international trade, or business.
- Status: It is a quasi-judicial body. Appeals against CCI orders go to the National Company Law Appellate Tribunal (NCLAT) and then to the Supreme Court.

Powers and Functions

- **Advisory:** It is mandatory for statutory authorities to refer competition-related issues to CCI for opinion.
- **Investigative:** Can initiate inquiries suo motu, upon a complaint, or a reference from Central/State Govt. It directs its Director General (DG) to carry out detailed investigations.

Regulatory:

- Prohibition of Anti-competitive Agreements: (Section 3) Bans cartels, price-fixing, and bid-rigging.
- Abuse of Dominant Position: (Section 4) Prevents large firms from exploiting their market power to harm competitors or consumers.
- Regulation of Combinations: (Sections 5 & 6) Reviews Mergers & Acquisitions (M&A) to ensure they don't create monopolies.

- Extra-Territorial Jurisdiction: Can pass orders even if the anti-competitive act took place outside India, provided it affects the Indian market.

Recent Key Updates (Competition Amendment Act, 2023)

- Deal Value Threshold (DVT): Mandatory CCI approval for any M&A deal worth more than ₹2,000 crore, especially targeting "Big Tech" where asset/turnover values might be low but deal values are massive.
- Reduced Timelines: The time limit for CCI to pass an order on a combination was reduced from 210 days to 150 days.
- Global Turnover Clause: Penalties for antitrust violations can now be calculated based on the Global Turnover of the company from all products/services, not just "relevant" (specific product) turnover.
- Leniency Plus: Allows a company under investigation for a cartel to get an additional penalty waiver if it discloses the existence of a *second* separate cartel.
- Settlement and Commitment: Introduces a framework to settle cases and commitments early to avoid lengthy litigation.
- Appeals: To file an appeal against a CCI penalty in NCLAT, a mandatory pre-deposit of 25% of the penalty is now required.

1.11. AD HOC JUDGES

Ad Hoc Judges in the Supreme Court (Article 127)

The provision for Ad Hoc judges in the Supreme Court is invoked specifically to manage the "Quorum" of the court.

- When Appointed: If at any time there is a lack of quorum (minimum number of judges required) to hold or continue a session of the Supreme Court.
- Who Appoints: The Chief Justice of India (CJI).
- Mandatory Requirements:
- Previous Consent of the President is required.
- Consultation with the Chief Justice of the concerned High Court.
- Qualification: The person requested must be a sitting judge of a High Court who is duly qualified to be appointed as a judge of the Supreme Court.
- Priority of Duty: It is the duty of the judge so designated to prioritize Supreme Court sittings over their regular High Court duties.
- Powers & Privileges: While attending, they enjoy all the jurisdiction, powers, and privileges of a Supreme Court judge.

Retired Judges at sittings of High Courts (Article 224A)

Though technically similar to "Ad Hoc," the Constitution uses the term "retired judges" for temporary appointments in High Courts. This provision was inserted by the 15th Constitutional Amendment Act, 1963.

- When Appointed: To address the backlog of cases (judicial pendency) or an extraordinary increase in work.
- Who Appoints: The Chief Justice of the High Court.
- Mandatory Requirements:
- Previous Consent of the President.
- Consent of the Retired Judge (They cannot be compelled to serve).
- Qualification: A person who has held the office of a judge of that High Court or any other High Court.
- Recent Update (2021 & 2025): The Supreme Court in the Lok Prahari v. Union of India case and subsequent orders laid down "trigger points" for these appointments:
- If vacancies in a High Court exceed 20% of sanctioned strength.
- If cases in a specific category (e.g., criminal appeals) are pending for more than 5 years.
- Status: They enjoy the same jurisdiction and powers as a sitting judge but are not deemed to be a regular judge of that court for other constitutional purposes.

Comparison: Supreme Court vs. High Court

Feature	Supreme Court (Article 127)	High Court (Article 224A)
Appointing Authority	Chief Justice of India	Chief Justice of the High Court
Consent Required	President & High Court CJ	President & the Retired Judge
Type of Judge	Sitting High Court Judge	Retired High Court Judge
Primary Reason	Lack of Quorum	Backlog of cases (Pendency)
Tenure	Temporary (specific session)	Fixed term (usually 2-3 years)

Key Points for Prelims

- Not a "Regular Judge": An Ad Hoc judge (HC) is entitled to allowances determined by the President but is not considered a "regular" judge of that court.
- Independence: To ensure independence, the SC ruled that these appointments should not be a substitute for filling regular vacancies. Regular appointments must be initiated first.
- Selection Process: For High Courts, the recommendation must still go through the Supreme Court Collegium (CJI + 2 senior-most judges) for clearance.

1.12. NATIONAL COMMISSION FOR SCHEDULED TRIBES

Origin and Constitutional Evolution

- Initial Provision: Originally, Article 338 provided for a "Special Officer" for SCs and STs.
- 65th Amendment (1990): Replaced the single Special Officer with a high-level multi-member National Commission for SCs and STs.
- 89th Amendment (2003): Bifurcated the combined commission into two separate bodies:
- National Commission for Scheduled Castes (Article 338)
- National Commission for Scheduled Tribes (Article 338A)
- Establishment: The separate NCST came into existence on February 19, 2004.

Structure and Composition

- Members: Consists of a Chairperson, a Vice-Chairperson, and three other members.
- Appointment: Appointed by the President by warrant under his hand and seal.
- At least one member must be a woman.
- Tenure: The term of office is 3 years.
- Reappointment: Members are not eligible for more than two terms.
- Status/Ranks:
- Chairperson: Rank of Union Cabinet Minister.
- Vice-Chairperson: Rank of Minister of State.
- Other Members: Rank of Secretary to the Govt of India.

Powers and Functions

The NCST acts as a "Watchdog" for tribal rights.

- Investigative: Monitors all matters relating to the constitutional and legal safeguards for STs.
- Advisory: Participates and advises on the planning process of socio-economic development of STs.
- Quasi-Judicial Powers: While investigating any matter, the Commission has all the powers of a Civil Court, including:
- Summoning any person from any part of India.
- Requiring the discovery and production of any document.
- Receiving evidence on affidavits.
- Annual Reports: Submits reports to the President annually (or as required). The President places these before Parliament, along with an "Action Taken Report" (ATR).

Specific Functions (Presidential Order, 2005)

In addition to general duties, the President has specified further functions:

- Measures for full implementation of the PESA Act, 1996.

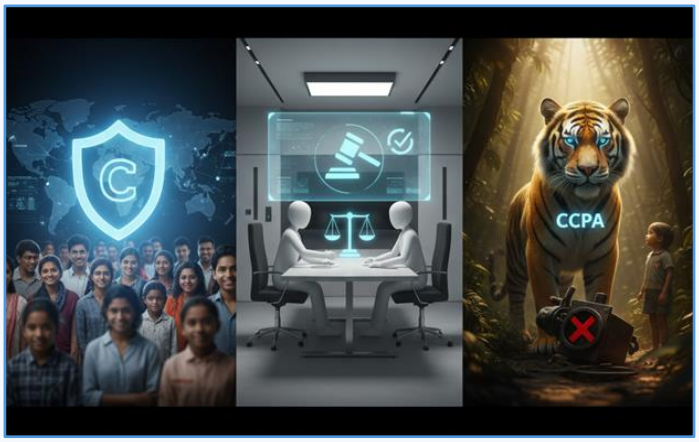
- Measures to confer ownership rights over Minor Forest Produce (MFP) to STs.
- Measures to prevent alienation of tribal land and effective rehabilitation.
- Measures to eliminate the practice of shifting cultivation.

1.13. CONSUMER PROTECTION ACT (CPA) 2019

Key Institutional Framework

A. Central Consumer Protection Authority (CCPA)

This is the most significant addition under the 2019 Act. Unlike the old Act, which was reactive (redressal-based), the CCPA is a regulatory body with proactive powers.



- Establishment: July 2020, under the Ministry of Consumer Affairs, Food & Public Distribution.
- Powers:
- Investigate violations of consumer rights (via an Investigation Wing).
- Suo-moto (on its own) inquiry into unfair trade practices.
- Recall unsafe goods/services and order refunds.
- Impose penalties for misleading advertisements (up to ₹10 lakh and 2 years imprisonment for first offense; ₹50 lakh and 5 years for subsequent).
- Ban endorsers (celebrities) of misleading ads from endorsing any product for up to 1 year (3 years for repeat).

B. Consumer Disputes Redressal Commissions (CDRCs)

A 3-tier quasi-judicial machinery exists at the District, State, and National levels.

Tier	Pecuniary Jurisdiction (2021 Rules Update)
District Commission	Up to ₹50 Lakh
State Commission	₹50 Lakh to ₹2 Crore
National Commission	Above ₹2 Crore

Core Concepts & Rights

Consumer Definition & Rights

- Who is a Consumer?

  Anyone who buys goods or avails services for consideration. It explicitly includes online transactions, tele-shopping, and direct selling.

- Who is NOT?

  Those who obtain goods for resale or commercial purposes (unless for self-employment livelihood), or those who get goods/services free of charge.

- 6 Statutory Rights:
  1. Right to Safety
  2. Right to be Informed
  3. Right to Choose
  4. Right to be Heard
  5. Right to seek Redressal
  6. Right to Consumer Awareness.

Product Liability

A new concept where a manufacturer, service provider, or seller is liable to compensate a consumer for any harm caused by a defective product or deficient service.

- Scope: Covers manufacturing defects, design defects, and lack of adequate usage instructions.

Key Process

- Territorial Jurisdiction: Consumers can now file complaints where they reside or work, not just where the opposite party's office is located (crucial for e-commerce).
- E-Daakhil: Facility for electronic filing of complaints.
- Mediation: The Act provides for Alternate Dispute Resolution (ADR) through Mediation Cells. There is no appeal against a settlement reached through mediation.
- Unfair Contracts: State and National Commissions can declare "unfair contracts" (e.g., excessive security deposits or unilateral termination clauses) as null and void.

Differences: 1986 vs. 2019 Act

Feature	1986 Act	2019 Act
Regulator	No separate regulator	CCPA established
E-commerce	Not covered	All rules apply to E-commerce
Jurisdiction	Where seller has office	Where complainant resides
Product Liability	Civil court matter	Under Consumer Commissions
Adjudication	Only through CDRCs	CDRCs + Mediation

1.14. ENFORCEMENT DIRECTORATE (ED) – INDIA

Context: In December 2025, the ED attached assets worth ₹61.2 crore **of Chaitanya Baghel in connection with the alleged Chhattisgarh liquor scam.**

The scam caused an estimated loss of over ₹3,500 crore **to the exchequer, highlighting ED's role in** investigating economic offences and recovering illicit assets**.**

About the Enforcement Directorate (ED)

- **The** Enforcement Directorate (ED) **is a** domestic law enforcement and economic intelligence agency **in India.**
- **It is responsible for** enforcing economic laws **and** investigating economic crimes**, including** money laundering **and** foreign exchange violations**.**
- Nodal Ministry: Department of Revenue, Ministry of Finance**.**
- Historical Background**:**
- **The ED originated in** May 1956 **as an "enforcement unit" to handle violations of** Foreign Exchange Regulation Act, 1947 (FERA)**.**
- **In** 1957**, it was renamed as the** Enforcement Directorate**.**

Structure of the Enforcement Directorate (ED)

- Headquarters & Leadership: **ED is headquartered in** New Delhi **and is headed by the** Director of Enforcement**.**
- Regional Offices: **Five regional offices are located in** Mumbai, Chennai, Chandigarh, Kolkata, and Delhi**, each led by a** Special Director of Enforcement**.**
- Zonal & Sub-Zonal Offices:
- 10 Zonal Offices**, each headed by a** Deputy Director**.**
- 11 Sub-Zonal Offices**, each headed by an** Assistant Director**.**

Recruitment and Composition of the Enforcement Directorate (ED)

- **Officers are recruited** directly **or** deputed **from other agencies.**
- **Comprises officers from** IRS (Income Tax), IPS (Police), IAS (Administrative Services)**, including** Income Tax, Customs, Excise officers**, and police personnel.**

Tenure and Amendments

- **Initially, ED Directors have a** fixed tenure of 2 years**.**
- 2021 Ordinances **allowed the** tenure to be extended up to 5 years **through** annual extensions.
- **Extensions require recommendations from a** High-Level Committee **(CVC members for ED; PM, Opposition Leader, and CJI for CBI).**
- Supreme Court ruling (July 2023): **Upheld the statutory provision for "piecemeal" tenure extensions but invalidated illegal extensions given to outgoing ED Chiefs.**

Objectives of the Enforcement Directorate (ED)

The primary objective of the ED is the enforcement of three key economic laws**:**

- Foreign Exchange Management Act, 1999 (FEMA) **– regulating foreign exchange and investigating violations.**
- Prevention of Money Laundering Act, 2002 (PMLA) **– combating money laundering and confiscating proceeds of crime.**
- Fugitive Economic Offenders Act, 2018 (FEOA) **– attaching properties of fugitives who evade arrest in India and transferring assets to the government.**

Additionally, ED is the sponsoring agency for preventive detention under COFEPOSA (1974) **in cases related to FEMA violations and smuggling activities.**

Functions of the Enforcement Directorate (ED)

- **Investigates** economic crimes, money laundering, and foreign exchange violations**.**
- **Enforces** FEMA (1999), PMLA (2002), and FEOA (2018)**.**
- Attaches and confiscates assets **acquired through illicit activities.**
- **Summons individuals for** testimony and production of records**.**
- **Acts as a** deterrent against economic offences **through investigation and asset recovery.**
- **Sponsors** preventive detention under COFEPOSA (1974) **for smuggling or FEMA violations.**
- **Tracks** illicit fund flows **and coordinates with domestic and international agencies.**
- **Advises the government on** policy and regulatory measures **to prevent financial crimes.**

Legal Framework of Enforcement Directorate (ED)

- Foreign Exchange Management Act (FEMA), 1999
- **ED investigates** suspected violations of foreign exchange laws**.**
- **It can** adjudicate and impose penalties **for contraventions.**
- Prevention of Money Laundering Act (PMLA), 2002
- **Investigates** money laundering offences**, attaches and confiscates proceeds of crime.**
- Fugitive Economic Offenders Act (FEOA), 2018
- **Mandates** attachment and confiscation of properties **of fugitives who evade Indian law.**
- COFEPOSA, 1974
- **ED sponsors** preventive detention **in cases of smuggling or foreign exchange violations.**

Prevention of Money Laundering Act (PMLA), 2002

- **Enacted in** January 2003**, the PMLA seeks to:**
- Prevent and control money laundering **in India.**
- Confiscate and seize property **obtained from laundered money.**
- **Address other issues connected to** money laundering activities**.**
- Section 3 **defines money laundering as knowingly assisting, being involved in, or projecting proceeds of crime as untainted property.**
- **The Act has been amended several times:**
- 2009 and 2012 Amendments
- Finance Acts 2015, 2018, and 2019
- Powers of Enforcement Directorate (ED) under PMLA**:**
- **Sections 48 & 49:** Empower ED officers to investigate money laundering cases.
- **Section 50(2):** Summon any person for evidence or production of records.
- **Section 50(3):** Mandates attendance and truthful disclosure by summoned individuals.
- **Property Confiscation:** Special powers to attach and seize proceeds of crime.

- **Supreme Court Rulings:** In 2022, SC upheld ED's powers under PMLA, emphasizing adherence to rule of law while clarifying that ED officials are not equivalent to police officers and cannot make arrests under PMLA.

1.15. QUALITY COUNCIL OF INDIA (QCI)

Context: The Quality Council of India (QCI) **marked** 25 years of its establishment **in 2025.**

Launched the campaign "Gunvatta Se Atmanirbharta: India's Quality Movement" **to highlight India's quality hubs, landmark achievements, and initiatives improving citizens' quality of life.**

The QCI also released Next-Gen Reforms **under** Viksit Bharat@2047**, aiming to make accreditation** faster, smarter, digital, and accessible **across** industry, laboratories, healthcare, and MSMEs**.**

Overview of Quality Council of India (QCI)

- Established: **1996–1997 as a** national accreditation body **to promote quality standards across India.**
- Nature: **A** non-profit, autonomous organization**, registered under the** Societies Registration Act, 1860**.**
- Set Up Through Public-Private Partnership (PPP):
- Government of India **in collaboration with premier industry associations:**
- ASSOCHAM **– Associated Chambers of Commerce and Industry of India**
- CII **– Confederation of Indian Industry**
- FICCI **– Federation of Indian Chambers of Commerce and Industry**
- Administrative Control: **Functions under the** Department for Promotion of Industry and Internal Trade (DPIIT)**,** Ministry of Commerce and Industry**.**

Governance of Quality Council of India (QCI)

- Governing Council: **38 members, with** equal representation **from** government, industry, and consumers**.**
- Chairman: **Appointed by the Prime Minister on the recommendation of industry representatives.**
- Executive Bodies: **Boards and committees implement strategies, policies, and operational guidelines as defined by the governing council.**

Objectives of Quality Council of India (QCI)

- **Create a** mechanism for independent third-party assessment **of products, services, and processes.**

- **Promote** adoption and adherence to quality standards **across sectors including** education, healthcare, environment, governance, infrastructure, and social services**.**
- **Lead** national quality campaigns **to raise awareness and improve** citizens' quality of life**.**
- **Support** MSMEs and small businesses **to achieve** global quality benchmarks**.**

Functions of Quality Council of India (QCI)

- **Acts as** India's national accreditation body**, ensuring standards for** products, services, and processes**.**
- **Promotes** Quality Management Systems (QMS)**,** Food Safety Management Systems (FSMS)**, and certification/inspection services through boards such as** NABCB, NABH, NABL, and NDIE**.**
- **Drives** national quality campaigns **through** awareness programs and skill development**.**
- **Supports initiatives like** One District One Product (ODOP) **and** GI tagging **for promoting indigenous products domestically and internationally.**
- **Collaborates with organizations like** Food Corporation of India (FCI) **to improve** food quality and distribution**, using** biometric authentication **and** One Nation One Ration Card (ONORC)**.**
- **Brings** quality consciousness in the coal sector **through** third-party sampling**, leading to significant improvements.**

Key Boards of Quality Council of India (QCI) and Their Roles

1. **NABL – National Accreditation Board for Testing & Calibration Laboratories**
   - **Accredits laboratories for** accuracy, reliability, and technical competence**.**
   - Initiatives:
   - **Skill development for** 5,000 laboratory personnel by 2026**.**
   - 48-hour scope extension **for new tests or analytes.**
   - Zero additional fees **for overlapping accreditation.**
2. **NABH – National Accreditation Board for Hospitals & Healthcare Providers**
   - **Focus:** Patient safety and healthcare quality**.**
   - Programs:
   - MITRA mentoring **for hospitals.**
   - Gunvatta Pathshala **for skilling doctors, nurses, and technicians.**
   - **Relaxed** occupancy norms (20%) **for accreditation.**
   - AI-assisted desktop surveillance **for consistent performers.**
   - Graded penalties **instead of blanket bans.**
3. **NABCB – National Accreditation Board for Certification Bodies**
   - **Ensures** global recognition of Indian products and services**.**
   - Initiatives:
   - Quality Passport for Indian Products **for faster global market access.**
   - **Fast-track accreditation for** new-age tech areas **(drones, cybersecurity).**
   - **Accreditation of** indigenously manufactured products**.**

4. NDIE – National Division for Industry Excellence

- **Supports** 6 crore+ MSMEs **in achieving** global quality standards**.**
- Programs:
- **Mentoring for** ZED and Lean certifications**.**
- Shop floor best practices playbook **for MSMEs.**
- Training in packaging and branding **for** 100,000 MSMEs & SHGs by 2026**.**
- **Reduces certification fees to improve** accessibility and affordability**.**

5. Recent Reforms and Initiatives

- Next-Gen Reforms under Viksit Bharat@2047:
- Q-Mark / Desh ka Haq Mark: **QR-coded transparency for labs, hospitals, and MSMEs.**
- Single, paperless accreditation platform **replacing multiple portals.**
- Expanded assessor pool **for broader reach, including young experts.**
- Quality Setu: **Secure, time-bound grievance and feedback resolution system.**
- ZED Bronze Certification in 24 hours**, fully online process.**
- 4-year lab accreditation **instead of 2 years.**
- Soil Health Card labs and MELT Scheme labs **recognized in** 48 hours**.**

1.16. ELECTORAL TRUSTS IN INDIA

Context: In 2024-25, BJP received ₹6,088 crore, with Prudent Electoral Trust contributing ₹2,668 crore; donations via trusts rose after electoral bonds were scrapped.

While BJP, JD(U), Samajwadi Party, and CPI(ML)L saw increased donations, parties like Congress, Trinamool, YSR Congress, BJD, and TDP recorded a decline.

What are Electoral Trusts?

- Electoral Trusts are non-profit entities created to collect funds from donors and distribute them to eligible political parties in India.
- Introduced in 2013 under The Electoral Trusts Scheme, 2013, these trusts aim to increase transparency in political funding and reduce reliance on unregulated or opaque contributions.
- They have become a key channel for party funding, particularly after the abolition of electoral bonds in February 2024.

Key Features of Electoral Trusts

- Set up by companies to distribute contributions collected from other companies and individuals to political parties.

- The names of the trusts do not indicate the companies or groups that established them, ensuring neutrality.
- Contribution reports and audit reports are submitted to the Election Commission of India annually.
- Distributions are made proportionally to eligible political parties, maintaining fairness in allocation.
- Eligible Donors: Indian citizens, Companies registered in India, Hindu Undivided Families (HUFs), Associations of persons residing in India
- Ineligible Donors: Non-Indian citizen, Non-resident Indians without a passport number, Other electoral trusts, Contributors without PAN

Legal Framework of Electoral Trusts

- Companies Act
- Electoral trusts are established under Section 25 of the Companies Act, 1956, now incorporated under Section 8 of the Companies Act, 2013.
- Only companies registered under Section 8 can apply for approval to operate as an electoral trust.
- These trusts are non-profit entities, and their primary objective is to collect and distribute contributions to political parties.
- Income Tax Act, 1961
- Section 17CA permits donations to electoral trusts from:
- Indian citizens
- Companies registered in India
- Hindu Undivided Families (HUFs)
- Firms
- Associations of persons residing in India
- Donors must provide PAN (Permanent Account Number) for residents or passport number for NRIs.
- Donations made through electoral trusts are eligible for tax deductions under Section 80GGC.
- Electoral Trusts Scheme, 2013
- Specifies eligibility criteria, registration procedure, and operational guidelines for electoral trusts.
- Requires trusts to distribute at least 95% of the total funds collected in a financial year to eligible political parties.
- Allows trusts to retain a maximum of 5% of funds for administrative expenses.
- Trusts must renew their registration every three financial years to continue operations.
- Central Bureau of Direct Taxes (CBDT)
- The CBDT is a statutory authority under the Central Board of Revenue Act, 1963, functioning within the Department of Revenue, Ministry of Finance.
- It supervises the functioning of electoral trusts, ensures compliance with tax provisions, and approves their registration.

Funding and Distribution Mechanism of Electoral Trusts

- Electoral trusts collect contributions from eligible donors and distribute the funds to political parties registered under the Representation of the People Act, 1951.

- At least 95% of the total funds, including any surplus from previous years, must be allocated to political parties.
- Administrative expenses are limited to 5% of total funds.
- Electoral trusts maintain full disclosure of donors and recipients to ensure transparency and accountability.

Differences Between Electoral Bonds and Electoral Trusts

Feature	Electoral Bonds	Electoral Trusts
Regulation	Regulated by RBI, SBI, and Election Commission	Regulated under Companies Act, monitored by ECI and CBDT
Purpose	Streamline donations while maintaining donor anonymity	Aggregate donations and ensure transparency
Tax Benefits	Eligible for deduction under Section 80GGC	Eligible for deduction under Section 80GGC
Operational Mechanism	Donated directly to political parties via bonds	Trust collects funds and distributes them to political parties
Donor Disclosure	Donor identities remain undisclosed	Donor identities are publicly disclosed
Transparency	Limited transparency; potential for undisclosed corporate influence	Full transparency through public disclosure of donors and recipients

1.17. SEVA TEERTH' COMPLEX

Context: In a significant move under the Central Vista Redevelopment Project, the new Executive Enclave housing the Prime Minister's Office (PMO) has been officially renamed 'Seva Teerth'. This renaming is part of a broader government initiative to decolonize administrative nomenclature and reflect an ethos of service (*Seva*) over power (*Satta*).

What constitutes the 'Seva Teerth' Complex?

Formerly known as the 'Executive Enclave', this high-security zone is designed to function as the nerve center of executive governance. It comprises four key components:

- PMO (Seva Teerth 1): The primary office of the Prime Minister.
- Cabinet Secretariat (Seva Teerth 2): The administrative office coordinating inter-ministerial business.
- National Security Council Secretariat (Seva Teerth 3): The apex body for political, economic, energy, and security issues of strategic concern.
- India House: A dedicated venue for hosting bilateral talks and meetings with visiting foreign dignitaries (similar to the concept of Hyderabad House).

How is the Governance Lexicon Changing?

The renaming is part of a larger pattern to instill values of Kartavya (Duty) and Seva (Service) in public institutions, moving away from colonial-era entitlements.

Old Nomenclature / Context	New Nomenclature	Significance
Executive Enclave	Seva Teerth	Emphasizes governance as a "pilgrimage of service."
Raj Bhavan (Governor's Residence)	Lok Bhavan	Shifts focus from "Raj" (Rule) to "Lok" (People).
Rajpath (Kingsway)	Kartavya Path	Symbolizes the path of duty rather than imperial authority.
Central Secretariat	Kartavya Bhavan	Reinforces the commitment of civil servants to public duty.
Race Course Road	Lok Kalyan Marg	Highlights public welfare (renamed in 2016).

1.18. THE UMEED PORTAL: STANDARDISING WAQF MANAGEMENT IN INDIA

Context: The Ministry of Minority Affairs has strictly adhered to the six-month deadline (ending December 6) for the mandatory registration of Waqf properties on the UMEED Portal.

The Latest Development: Deadline & Compliance

- Strict Deadline: The six-month window mandated by the Waqf (Amendment) Act, 2025 for registration has concluded. The Ministry cited Supreme Court directions for not extending this timeline administratively.
- Humanitarian Relief: No penal action will be taken for the next 3 months against *mutawallis* (custodians) who attempted registration but failed due to technical or procedural delays.
- Remedial Mechanism: Unregistered entities can approach the State Waqf Tribunal, which holds the statutory authority to grant an extension of up to 6 months upon satisfaction of the cause.
- Current Status: Only ~20% (1.5 lakh) of the estimated 8.72 lakh properties have been registered. Top performing states include Karnataka, Punjab, and J&K.

What is the UMEED Portal?

- Acronym: Unified Waqf Management, Empowerment, Efficiency, and Development.
- Nodal Agency: Ministry of Minority Affairs.
- Objective: To serve as a centralized digital repository for real-time uploading, verification, geotagging, and monitoring of Waqf assets, replacing the earlier WAMSI portal.
- Key Mandates:
- Geotagging: Registration requires precise measurements and geolocation data.
- Dispute Trigger: Properties unregistered after the deadline are automatically flagged as "disputed" and referred to the Tribunal.

Legal Framework: Waqf (Amendment) Act, 2025

The portal operates under the aegis of the recently amended Act, which introduced significant structural reforms:

- Judicial Oversight: Decisions of the Waqf Tribunal are now appealable in the High Court (within 90 days), removing the earlier finality of Tribunal orders.
- Women-Centric Protection: Property held in the name of a woman cannot be designated as Waqf. However, women, children, and EWS remain eligible beneficiaries.
- Limitation Period: The Act introduced the rigid 6-month deadline for the digital transition of legacy data.

Term	Definition
Waqf	A permanent dedication of movable or immovable property for religious, pious, or charitable purposes under Islamic Law. Once designated, it cannot be sold, transferred, or inherited.
Mutawalli	The manager or custodian appointed to administer the Waqf property.
Waqf Tribunal	A quasi-judicial body at the state level established to adjudicate disputes regarding Waqf properties.

1.19. THE INFORMATION WATCHDOG: CIC APPOINTMENTS

Context: Prime Minister Narendra Modi chaired a selection committee meeting (Dec 2025) to finalize the appointment of the next Chief Information Commissioner (CIC) and 8 Information Commissioners.

Central Information Commission (CIC):

- Status: It is a Statutory Body, not a Constitutional body.
- *Established under:* Right to Information (RTI) Act, 2005.
- Mandate: To act as the final appellate authority for RTI applicants who are denied information by central public authorities.

Composition & Appointment

- Structure: Consists of 1 Chief Information Commissioner (CIC) and not more than 10 Information Commissioners (ICs).
- Appointed By: The President of India.
- Selection Committee: Recommendations are made by a high-powered committee consisting of:
- Prime Minister (Chairperson)
- Leader of Opposition in Lok Sabha (or leader of the single largest opposition party)
- Union Cabinet Minister (nominated by the PM)

Tenure & Service Conditions (The 2019 Twist)

- Term: They hold office for such term as prescribed by the Central Government or until they attain the age of 65 years, whichever is earlier.
- *Current Rule:* As per RTI Rules 2019, the tenure is fixed at 3 Years. (Previously, it was 5 years in the 2005 Act).
- Reappointment: The CIC is not eligible for reappointment.
- *Note:* An Information Commissioner *can* be elevated to CIC, but their total tenure (IC + CIC) cannot exceed 5 years.

Removal Mechanism

The President can remove the CIC or any IC from office under the following conditions:

- Grounds: Insolvency, conviction of an offense involving moral turpitude, engaging in paid employment outside duties, or infirmity of mind/body.
- For Misbehavior/Incapacity: The President must refer the matter to the Supreme Court for an inquiry. If the SC upholds the charges, the President can remove them.

Powers & Functions

- Civil Court Powers: While inquiring into a matter, the CIC has the powers of a civil court (summoning persons, requiring documents, etc.).
- Suo Motu Power: Can initiate an inquiry on its own if there are reasonable grounds (e.g., non-appointment of PIOs).
- Binding Decisions: The decisions of the Commission on appeals are binding.

1.20. LOKPAL

The institution of Lokpal is a cornerstone of India's anti-corruption framework, established to act as the "People's Ombudsman."

Institutional Profile

- Nature: It is a statutory body (not constitutional) established under the Lokpal and Lokayuktas Act, 2013.
- Current Status (Dec 2025): The current Chairperson of the Lokpal of India is Justice Ajay Manikrao Khanwilkar (former Supreme Court judge), who assumed office in early 2024.

- Origin: The concept originated in Sweden (1809). In India, the term was coined by Dr. L. M. Singhvi in 1963. The First Administrative Reforms Commission (ARC) formally recommended it in 1966.

Composition & Selection

The Lokpal consists of a Chairperson and a maximum of 8 Members.

- Member Ratio: 50% must be Judicial Members (former SC Judge or Chief Justice of HC).
- Social Diversity: At least 50% of members must belong to SC/ST/OBC/Minorities/Women.
- Selection Committee: The President appoints the Lokpal based on the recommendations of a High-Powered Committee:
  1. Prime Minister (Chairperson)
  2. Speaker of Lok Sabha
  3. Leader of Opposition (or Leader of the Single Largest Opposition Party, per the 2016 Amendment)
  4. Chief Justice of India (or a SC Judge nominated by him/her)
  5. One Eminent Jurist (nominated by the President)

Jurisdiction & Powers

- The Prime Minister: The PM is within Lokpal's purview, but with critical exceptions: allegations related to International Relations, External/Internal Security, Public Order, Atomic Energy, and Space.
- Safeguard: Any inquiry against the PM requires a 2/3rd majority of the full Lokpal bench.
- Public Servants: Includes Union Ministers, MPs, and all central government employees (Groups A, B, C, and D).
- NGOs: Bodies receiving foreign contributions above ₹10 Lakh per year (under FCRA) are also covered.
- Investigative Super-power: Lokpal has powers of superintendence and direction over any investigative agency, including the CBI, for cases referred by it. The investigating officer of such a case cannot be transferred without Lokpal's approval.

Key Statutory Limitations

- No Suo Motu Power: The Lokpal cannot initiate an investigation on its own; it requires a formal complaint.
- Limitation Period: Complaints must be filed within 7 years of the alleged offence.
- Anonymous Complaints: These are not allowed.
- Civil Court Powers: During preliminary inquiries, the Lokpal's Inquiry Wing has the powers of a Civil Court.

1.21. FOREST RIGHTS ACT

Context: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, popularly known as the Forest Rights Act (FRA), is a landmark legislation aimed at undoing "historical injustices" faced by forest-dwelling communities.

Institutional Framework

- Nodal Ministry: The Ministry of Tribal Affairs (MoTA) (Not the Ministry of Environment/Forests).

Eligible Groups:

1. Forest Dwelling Scheduled Tribes (FDST): Must reside in the area.
2. Other Traditional Forest Dwellers (OTFD): Must have resided in the forest for at least three generations (75 years) prior to December 13, 2005.

- Cut-off Date: Claims are only valid for land occupied or cultivated before December 13, 2005.

Four Types of Forest Rights

Type of Right	Key Features
Title Rights	Ownership of land being cultivated (max 4 hectares). No new land is granted; it only recognizes existing occupation.
Use Rights	Ownership of Minor Forest Produce (MFP) (bamboo, honey, tendu leaves, etc.), grazing rights, and access to water bodies.
Relief & Development	Right to rehabilitation in case of illegal eviction and access to basic amenities (schools, dispensaries).
Forest Management	Right to protect, regenerate, and manage any "Community Forest Resource" (CFR) traditionally conserved by the community.

The Three-Tier Implementation Process

The process of recognizing rights follows a "bottom-up" approach:

1. Gram Sabha: The primary and most powerful authority. It initiates the process, receives claims, and verifies them through the Forest Rights Committee (FRC).
2. Sub-Divisional Level Committee (SDLC): Examines the resolution passed by the Gram Sabha.
3. District Level Committee (DLC): The final authority that approves or rejects claims. Its decisions are binding.

Powers of the Gram Sabha under FRA

- It is the only body that can initiate the determination of forest rights.

- Consent Power: In Scheduled Areas (V Schedule), the consent of the Gram Sabha is mandatory for the diversion of forest land for non-forest purposes (mining, industry).
- Conservation Role: It is empowered to stop any destructive practices affecting the forest or biodiversity.

Key Updates & Judicial Context

- Supreme Court Defense (Oct 2024–2025): The Central Government defended the FRA in the Supreme Court against petitions seeking mass evictions. MoTA highlighted that rejections of claims were often due to "procedural flaws" and over-reliance on satellite imagery.
- FCA Amendment 2023 Conflict: Critics argue the 2023 Forest Conservation Act amendments (narrowing the definition of 'forest') might undermine the FRA. However, the SC has reiterated that the Godavarman (1996) definition (broad interpretation) remains the standard for protection.
- Bamboo Status: Remember for Prelims—Bamboo is classified as "Minor Forest Produce" under the FRA, giving dwellers the right to its ownership and sale.

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UPSC PRELIMS PRACTICE QUESTIONS

1. With respect to the Constitutional and Statutory interplay in Elections, consider the following statements:

1. While Article 324 grants the Election Commission superintendence over elections, Article 327 empowers Parliament to enact laws governing the preparation of electoral rolls.
2. The constitutional requirement of citizenship for voting under Article 326 allows the Election Commission to independently assess the citizenship status of a voter during the revision of rolls.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (c)

Explanation: Both statements are correct. Parliament has the power to legislate on election matters (e.g., RPA 1950) under Article 327. However, the ECI interprets its plenary powers under Article 324 and the mandate of Article 326 (adult suffrage tied to citizenship) as granting it the authority to verify voter eligibility, including citizenship.

2. With respect to the SEED Scheme (Scheme for Economic Empowerment of DNTs), consider the following statements:

1. The scheme operates under the aegis of the Ministry of Tribal Affairs.
2. The 'Healthcare Security' pillar of the scheme extends health insurance coverage through the National Health Authority's PMJAY (Ayushman Bharat).
3. It includes a component for free coaching for Civil Services and professional courses like medicine and engineering.

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

Ans. (b)

Statement 1 is incorrect: The SEED scheme was launched and is administered by the **Ministry of Social Justice & Empowerment**, not the Ministry of Tribal Affairs.

Statement 2 is correct: Under the 'Healthcare Security' component, the scheme facilitates health insurance coverage for beneficiaries through the National Health Authority's **Pradhan Mantri Jan Arogya Yojana (PMJAY)**.

Statement 3 is correct: The scheme provides **educational support** in the form of free coaching for students aspiring for Civil Services and entry into professional courses such as medicine, engineering, and MBA.

3. With respect to the operational timeline and legal framework of the Census, consider the following statements:

1. The Census is conducted under the provisions of the Census Act, 1948.
2. The reference date for population enumeration is uniformly March 1, 2027, for the entire country including hilly regions.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (a)

Statement 1 is correct: The legal basis for conducting the Census of India is the **Census Act, 1948**, which is administered by the Ministry of Home Affairs.

Statement 2 is incorrect: The reference date is **not uniform**. While **March 1, 2027**, is the reference date for most of the country, an earlier reference date of **October 1, 2026**, is set for inaccessible, snow-bound, or difficult areas (like parts of Ladakh, J&K, Himachal Pradesh, and Uttarakhand).

4. Consider the following pairs regarding scientific tests used in criminal investigations:

	Test	Key Characteristic / Substance
1.	Narco Analysis	Uses Sodium Pentothal to induce a hypnotic state.
2.	Polygraph Test	Measures physiological variables like blood pressure and pulse.
3.	Brain Mapping	Direct injection of barbiturates to map neural responses.

How many of the above pairs are correctly matched?

(a) Only one
(b) Only two
(c) All three
(d) None

Ans. (b)

Pair 1 is Correct: Narco analysis involves injecting Sodium Pentothal (a barbiturate) to lower inhibitions.

Pair 2 is Correct: Polygraph tests use instruments like cardio-cuffs to measure physiological responses (BP, respiration, etc.) to detect lies.

Pair 3 is Incorrect: Brain mapping (P300 test) typically involves measuring electrical brainwaves (EEG) in response to stimuli, **not the injection of barbiturates**. Injection of drugs is specific to Narco Analysis.

5. The term 'INAS 335 (Ospreys)', recently mentioned in the news, is related to which of the following?

(a) A new indigenous artillery gun system
(b) A squadron of multi-role helicopters
(c) A heavy-weight anti-submarine torpedo
(d) A nuclear-powered attack submarine

Ans. (b)

INAS 335 (Ospreys) is the Indian Navy's second squadron of **MH-60R "Seahawk"** helicopters. It serves as a versatile multi-role platform, not an artillery gun or a specific torpedo (though it carries torpedoes). It is being commissioned at INS Hansa, Goa, to boost the Navy's modernisation and "Blue Water" capabilities.

6. With respect to the scope and jurisdiction of PILs, consider the following statements:

1. A PIL can be filed against a private entity alone without making the State a party to the case.
2. In cases of bonded labor, the Supreme Court has placed the burden of proof on the respondent to prove that forced labor is not bonded labor.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (b)

- **Statement 1 is incorrect:** A PIL can be filed against the Central/State Government or Municipal Authorities ("State" under Article 12), but **not** solely against a private party.
- **Statement 2 is correct:** In the Bandhua Mukti Morcha case, the Supreme Court stated it would treat every case of forced labor as a case of bonded labor unless proven otherwise by the employer (**burden of proof on the respondent**).

7. With respect to the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), 2005, consider the following statements:

1. If the government fails to provide employment within 15 days of receipt of the application, the applicant is entitled to a daily unemployment allowance.
2. Section 17 of the Act mandates the Social Audit of all works executed under the scheme.
3. The National Mobile Monitoring Software (NMMS) App is mandatory for capturing real-time attendance at worksites.

How many of the statements given above are correct?

(a) Only one
(b) Only two
(c) All three
(d) None

Ans. (c) All three

Statement 1 is Correct: Under Section 7 of the MGNREGA, 2005, if an applicant for employment is not provided such employment within **15 days** of receipt of the application, they are entitled to a daily **unemployment allowance**.

Statement 2 is Correct: Section 17 of the Act legally mandates the conduct of a **Social Audit** of all works executed under the scheme. This audit is primarily conducted by the Gram Sabha to ensure transparency and accountability.

Statement 3 is Correct: The government has made the use of the **National Mobile Monitoring Software (NMMS)** App mandatory (effective from January 1, 2023) for capturing real-time, geotagged attendance of workers at worksites to check corruption and improve monitoring.

8. With respect to the observance of Constitution Day, consider the following statements:

1. The Government of India officially designated November 26 as Constitution Day in 2015 to commemorate the 125th birth anniversary year of Dr. B.R. Ambedkar.
2. Prior to 2015, November 26 was observed informally as National Law Day by the legal fraternity.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (c) Both 1 and 2

Statement 1 is correct; the notification was issued in 2015 to honor Dr. Ambedkar's contribution.

Statement 2 is correct; the legal community previously celebrated this date as National Law Day.

9. With respect to the jurisdiction over Court Martial sentences, consider the following statements:

1. The President can grant pardons for punishments awarded by a Military Court.
2. The Governor of a State possesses concurrent power to pardon sentences given by a Court Martial.
3. The President can grant pardons for punishments awarded by a Military Court.
4. The Governor of a State possesses concurrent power to pardon sentences given by a Court Martial.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (a) 1 only

Statement 1 is correct: Article 72 explicitly empowers the President to pardon sentences awarded by a Court Martial.

Statement 2 is incorrect: The Governor acts under Article 161 and does not possess any power regarding sentences or punishments awarded by a Military Court.

10. With reference to the 'Competition Commission of India (CCI)', which of the following statements is/are correct?

1. It is a constitutional body established to replace the MRTP Act.
2. It has the power to penalize companies based on their global turnover rather than just relevant turnover.
3. Appeals against its orders are heard by the National Company Law Appellate Tribunal (NCLAT).

Select the correct answer:

(a) 1 and 2 only
(b) 2 and 3 only
(c) 3 only
(d) 1, 2 and 3

Ans. (b) 2 and 3 only.

Statement 1: CCI is a Statutory Body (Not Constitutional) -It was created by an Act of Parliament (Competition Act, 2002) to replace the old MRTP Act, not by a provision in the Constitution.

Statement 2: Penalties are based on Global Turnover -The 2023 Amendment explicitly allows CCI to penalize firms based on their total global turnover from all products and services.

Statement 3: Appeals are heard by the NCLAT -Since 2017, the National Company Law Appellate Tribunal (NCLAT) is the designated body for hearing appeals against CCI orders.

11. With reference to the appointment of Ad Hoc judges in the Indian Judiciary, consider the following statements:

1. The Chief Justice of India can appoint a retired judge of the Supreme Court as an ad hoc judge.
2. For the appointment of an ad hoc judge in the Supreme Court, the previous consent of the President of India is mandatory.
3. Ad hoc judges in High Courts are appointed under Article 224A of the Indian Constitution.

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

Ans. (b) 2 and 3 only

Statement 1 Incorrect: Under Article 127, the Chief Justice of India (CJI) may appoint a sitting judge of a High Court as an ad hoc judge of the Supreme Court. A retired Supreme Court judge is not appointed as an ad hoc judge under this Article.

Statement 2 Correct: For any Ad Hoc appointment in the Supreme Court, the Chief Justice of India (CJI) must obtain the previous consent of the President.

Statement 3 Correct: Article 224A specifically allows the Chief Justice of a High Court to request a retired judge of that or any other High Court to act as a judge for that court.

12. With reference to the National Commission for Scheduled Tribes (NCST), consider the following statements:

I. It was established as a separate body by the 65th Constitutional Amendment Act.
II. The conditions of service and tenure of the members are determined by the President.
III. The Commission has the power to regulate its own procedure.

Which of the statements given above is/are correct?

(a) I and II only
(b) II and III only
(c) III only
(d) I, II and III

Ans. (b) II and III only

Statement I Incorrect: The NCST was established as a separate body by the 89th Constitutional Amendment Act, 2003, which inserted Article 338A.

Statement II Correct: The Chairperson and members are appointed by the President by warrant under his hand and seal, and the President determines their tenure and service conditions.

Statement III Correct: Under Article 338A(4), the Commission has the express power to regulate its own procedure rather than being strictly bound by government-prescribed rules of business.

13. Consider the following statements regarding the Consumer Protection Act, 2019:

1. It establishes a Central Consumer Protection Authority (CCPA) with the power to recall unsafe goods suo-moto.
2. Under the Act, a consumer can file a complaint at a commission where he/she resides.
3. Healthcare is explicitly excluded from the definition of "services" under the Act.

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

Ans. (a) 1 and 2 only

Statement 1 Correct: The 2019 Act created the Central Consumer Protection Authority (CCPA) as a regulator. Unlike the old Consumer Courts, the CCPA can act "suo-moto" (on its own motion), meaning it doesn't need a formal complaint to investigate violations, recall dangerous products, or cancel misleading advertisements.

Statement 2 Correct: This is a major "Ease of Justice" shift from the 1986 Act, where cases had to be filed where the seller's office was located. This change is specifically designed to empower consumers in the E-commerce era, allowing you to sue a company from your home district regardless of where their headquarters are.

Statement 3 Incorrect: Healthcare was in the draft bill but was dropped from the final text to avoid political friction. However, the Supreme Court (reconfirmed in late 2024/2025) has ruled that since the definition of "service" is inclusive and does not explicitly exclude it, medical services remain under the CPA (except for free services).

14. With reference to the Enforcement Directorate (ED), consider the following statements:

1. ED can attach and confiscate properties obtained from proceeds of crime under FEOA and PMLA.
2. ED is empowered to sponsor preventive detention under COFEPOSA (1974).
3. Supreme Court has held that ED officials are equivalent to police officers for making arrests under PMLA.

Which of the statements given above is/are correct?

(a) 1 and 2 only
(b) 1 and 3 only
(c) 2 and 3 only
(d) 1, 2 and 3

Ans. (a) 1 and 2 only

Statement 1 is correct: ED can attach and confiscate assets under PMLA and FEOA.

Statement 2 is correct: ED sponsors preventive detention under COFEPOSA (1974) for smuggling or FEMA violations.

Statement 3 is incorrect: Supreme Court clarified that ED officials are not police officers and cannot make arrests under PMLA.

15. With reference to the Quality Council of India (QCI), consider the following statements:

1. QCI is a non-profit autonomous organization set up under a Public-Private Partnership between the Government of India and premier industry associations.
2. QCI functions under the administrative control of the Ministry of Commerce and Industry.
3. The Chairman of QCI is appointed by the Prime Minister on the recommendation of industry representatives.

Which of the statements given above is/are correct?

(a) 1 and 2 only
(b) 1 and 3 only
(c) 1, 2, and 3 only
(d) 2 and 3 only

Ans. (b) 1, 2, and 3 only

Statement 1 is correct: QCI is a non-profit, autonomous organization established under a PPP model with Government of India and industry bodies ASSOCHAM, CII, and FICCI.

Statement 2 is correct: QCI functions under Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce and Industry.

Statement 3 is correct: The Chairman of QCI is appointed by the Prime Minister based on recommendations from the industry.

16. Consider the following statements about the differences between Electoral Bonds and Electoral Trusts in India:

1. Electoral Bonds maintain donor anonymity, whereas electoral trusts require public disclosure of donor identities.
2. Both Electoral Bonds and Electoral Trusts are eligible for tax deductions under Section 80GGC.
3. Electoral Bonds are regulated under the Companies Act, while Electoral Trusts are regulated by RBI and SBI.

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

Ans. (a) 1 and 2 only

Statement 1 is correct: Donor identities are disclosed in electoral trusts but remain anonymous in electoral bonds.

Statement 2 is correct: Donations under both mechanisms are eligible for tax deductions under Section 80GGC.

Statement 3 is incorrect: Electoral Bonds are regulated by RBI, SBI, and Election Commission, while Electoral Trusts are regulated under the Companies Act and monitored by ECI and CBDT.

17. With respect to the functions of the bodies within 'Seva Teerth', consider the following statements:

1. The National Security Council Secretariat (NSCS) serves as the apex body for political, economic, energy, and security issues of strategic concern.
2. The renaming of 'Rajpath' to 'Kartavya Path' was done to symbolize the path of imperial authority.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (a) 1 only

Statement 1 is correct; the NSCS handles strategic security concerns. Statement 2 is incorrect; the renaming to 'Kartavya Path' symbolizes the **path of duty**, moving away from the concept of imperial authority (Kingsway)

18. With respect to the UMEED Portal and the registration deadline, consider the following statements:

1. The UMEED portal serves as a centralized digital repository for Waqf assets, replacing the earlier WAMSI portal.
2. The Ministry of Minority Affairs has administratively extended the mandatory registration deadline by six months due to low compliance.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (a) 1 only

Statement 1 is correct; UMEED (Unified Waqf Management, Empowerment, Efficiency, and Development) replaces the WAMSI portal. Statement 2 is incorrect; the Ministry cited Supreme Court directions for **not extending** the timeline administratively, though no penal action will be taken for the next 3 months against those delayed by technical issues.

19. With respect to the jurisdiction and powers of the Lokpal, consider the following statements:

1. The Lokpal has the power to initiate a suo motu inquiry against public servants if there is prima facie evidence of corruption.
2. The jurisdiction of the Lokpal includes the Prime Minister, except in matters relating to international relations, external and internal security, public order, atomic energy, and space.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (b) 2 only

Statement 1 is incorrect; the Lokpal and Lokayuktas Act, 2013, does not empower the Lokpal to initiate suo motu inquiries. It can only proceed based on a complaint. Statement 2 is correct; the PM is under its purview with specific subject-matter exclusions.

20. With respect to the types of rights and recent updates regarding the FRA, consider the following statements:

1. Title rights under the Act grant ownership of land being cultivated up to a maximum of 10 hectares.
2. Bamboo is classified as 'Minor Forest Produce' (MFP) under the Act, giving forest dwellers the right to its ownership and sale.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (b) 2 only

Statement 1 is incorrect; Title rights are restricted to land under occupation and shall not exceed **4 hectares**. Statement 2 is correct; **Bamboo** is classified as MFP, and communities have the right to collect and sell it.

21. Consider the following statements regarding the appointment of the Chief Information Commissioner:

1. The Chief Information Commissioner is appointed by the President of India on the recommendation of a committee consisting of the Prime Minister, the Leader of Opposition in the Lok Sabha, and a Union Cabinet Minister nominated by the Prime Minister.
2. The Chief Information Commissioner and Information Commissioners hold office for a fixed term of 5 years or until they attain the age of 65 years, whichever is earlier.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (a) 1 only

Statement 1 is correct: the selection committee includes the PM, LoP (Lok Sabha), and a Union Cabinet Minister. Statement 2 is incorrect; following the 2019 Amendment, the term is no longer fixed at 5 years in the Act itself but is "for such term as may be prescribed by the Central Government" (currently prescribed as 3 years).

Scan to attempt more questions

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2.1. 50 YEARS OF BIOLOGICAL WEAPONS CONVENTION AND THE LOOMING THREAT

Context: External Affairs Minister S. Jaishankar cautioned that the world remains "not adequately prepared" to counter bioterrorism. & Highlighted rising risks posed by non-state actors using biological agents.


THE BIOLOGICAL WEAPONS CONVENTION

What is the BWC?

Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction.

- **Core Mandate:** It acts as the first multilateral disarmament treaty banning an entire category of **Weapons of Mass Destruction (WMD)**.
- **Definition of Bio-Weapons:** Weapons using disease-causing organisms (bacteria, viruses, fungi, prions) or toxins (animal/plant poisons) to harm humans, animals, or plants.
- **Genesis & Timeline:**
  - Negotiated in **Geneva** (1969–1971) within the Conference of the Committee on Disarmament (CCD).
  - **Entered into Force: 1975**.
- **Membership Status:**
  - **Near Universal:** 188 States Parties.
  - **India:** Signed and Ratified in **1974**.
  - **Outliers:** A few nations like Israel, Chad, Djibouti, and Eritrea remain outside the full purview (either non-signatories or not ratified).

The Mandate:

Prohibitions: Effectively bans development, production, acquisition, transfer, and stockpiling of biological agents.

- **Relation to Geneva Protocol (1925):** The BWC **supplements** the 1925 Protocol.
  - Note: The 1925 Protocol only banned the use of bio-weapons; the BWC bans possession and development.
- **Institutional Support:**
  - **Review Conferences:** Held every 5 years to review operations.
  - **Implementation Support Unit (ISU):** Established in 2006 to provide administrative support and assist in universalization.

India's Role:

India ensures compliance through a robust legal and regulatory framework:

- **WMD Act, 2005:** Weapons of Mass Destruction and their Delivery Systems (Prohibition of Unlawful Activities) Act prohibits unlawful manufacturing, transport, or transfer of WMDs.

- **SCOMET List (Trade Control):**
  - Full Form: **S**pecial **C**hemicals, **O**rganisms, **M**aterials, **E**quipment and **T**echnologies.
  - **Function:** India's National Export Control List for dual-use items.
  - **Relevance: Category 2** of SCOMET specifically regulates micro-organisms and toxins.
- **Environmental Rules (1989):** Regulates the manufacture and storage of hazardous micro-organisms/genetically engineered cells.
- **Global Initiative (Article VII):**
  - India and **France** jointly proposed a database to facilitate assistance under **Article VII**.
  - **Article VII:** Mandates assistance to any State Party exposed to danger due to a violation of the BWC.

Why is it termed a 'Toothless Tiger'?

- **The Verification Vacuum:**
  - Unlike the **Chemical Weapons Convention (CWC)**, the BWC has **NO verification mechanism**.
  - Reason: The **Dual-Use Dilemma**—biotechnology equipment (e.g., fermenters) used for vaccines can easily be switched to produce bio-weapons, making accounting-based verification difficult.
- **Institutional Weakness:** The ISU is severely understaffed (only 4 staff members), limiting its operational capacity.
- **Data Deficit:**
  - Relies on **Confidence-Building Measures (CBMs)** which are politically binding, not legally enforceable.
  - **Low Compliance:** Only ~50% of nations submit CBM reports regularly.
- **National Authority Gap:** While India has a National Authority for Chemical Weapons Convention (NACWC), it lacks a similarly centralized, dedicated executive body for BWC.

Future Roadmap: Strengthening the Shield

- **Modular Verification:** Adopt an incremental approach using modern scientific tools for verification rather than waiting for a grand treaty overhaul.
- **Institutional Expansion:** Proposal to appoint a rotating **Expert Verification Group** under the UN Secretary-General.
- **Tech-Driven Compliance:** Utilize **Artificial Intelligence (AI)** and text mining to simplify and universalize CBM submissions.
- **Non-State Actors:** Integrate BWC protocols with **UNSC Resolution 1540** to prevent terrorists from accessing bio-agents.

2.2. TRAT PROVINCE & THAILAND-CAMBODIA MARITIME DISPUTE

Context: Trat Province (Thailand) has been at the centre of a heated diplomatic and political debate regarding the **2001 Memorandum of Understanding (MOU)** between Thailand and Cambodia.

Geographic Profile

- **Location:** It is the easternmost province of **Thailand**, situated along the Gulf of Thailand.
- **Borders:** It shares a land border with **Cambodia** to the east (specifically the Cardamom Mountains range).
- **Key Islands:** The province includes an archipelago of over 50 islands; the most significant are **Koh Chang** (Thailand's second largest island) and **Koh Kood** (the focus of the current dispute).
- **History:** Trat was briefly occupied by **France** (1904–1907) before being returned to Siam (Thailand) in exchange for territories in western Cambodia (Battambang, Siem Reap) under the **Franco-Siamese Treaty of 1907**.

The Conflict: Overlapping Claims Area (OCA)

- **The Dispute:** Thailand and Cambodia have an **Overlapping Claims Area (OCA)** of approximately **26,000 sq. km** in the Gulf of Thailand, rich in hydrocarbon resources.

The Conflict: Overlapping Claims Area (OCA)

- **The Dispute:** Thailand and Cambodia have an **Overlapping Claims Area (OCA)** of approximately **26,000 sq. km** in the Gulf of Thailand, rich in hydrocarbon resources.
- **The 2001 MOU:** Signed to provide a framework for negotiations, it mandates that **delimitating the maritime border** and **sharing resources** (Joint Development Area) must be discussed simultaneously as an "indivisible package".
- **The Koh Kood Controversy:**
  - Cambodia's continental shelf claim (made in 1972) draws a line that cuts through **Koh Kood island**.
  - **Official Stance:** The Thai government maintains that the **1907 Treaty** explicitly confirms Koh Kood belongs to Thailand, and the MOU is solely a mechanism to resolve the maritime boundary, not a cession of territory.

2.3. CENTRAL PALMYRA REGION

Geography:

- **Location:** Situated in an oasis within the **Syrian Desert (Badiyat al-Sham)**, approximately 215 km northeast of Damascus.
- **Administrative Jurisdiction:** Falls under the **Homs Governorate** of Syria.
- **Topography:** It lies in a valley surrounded by mountain ridges, serving as a vital stopover between the fertile Mediterranean coast (west) and the Euphrates River valley (east).
- **Climate:** Characterized by an arid desert climate with extreme temperature variations.

Historical Profile

- **Ancient Identity:** Historically known as **Tadmur** (City of Dates), a name in use since the 2nd millennium BC.
- **Cultural Zenith:** Flourished as a wealthy caravan city under the **Roman Empire**, linking Persia, India, and China with the Mediterranean.
- **UNESCO Status:** Designated a **World Heritage Site** in 1980; famous for the Temple of Bel and the Great Colonnade, parts of which suffered extensive damage during the conflict in 2015.

Strategic & Economic Significance

- **Hydrocarbon Hub:** The region is critical for Syria's energy security, housing major **phosphate mines** and natural gas fields.
- **Logistics Node:** Its central location controls the **M20 highway**, a key logistic artery connecting Damascus to Deir ez-Zor and the Iraqi border.
- **Military Assets:** Proximity to the **T-4 (Tiyas) Airbase** enhances its value as a staging ground for military operations in central Syria.

2.4. REPUBLIC OF CHILE

Borders & Location

- **Capital:** Santiago.
- **Geography:** A narrow, ribbon-like country in **South America**.
- **Land Borders:**
  - **North:** Peru and Bolivia.
  - **East:** Argentina (Longest border).
- **Maritime Border:** Entire Western coastline faces the **Pacific Ocean**.

Physical Features: The Landscape

- **Tri-Zonal Relief:** Divided into three parallel north-south units:
  1. **Andes Mountains** (East).
  2. **Central Valley** (Intermediate depression).
  3. **Coastal Ranges** (West).
- **Atacama Desert:** The **driest non-polar desert** in the world; located in Northern Chile.
- **Highest Peak: Ojos del Salado** (World's highest active volcano).

- **Longest River: Loa River**.

Strategic Resources: The Lithium Triangle

- **Mineral Wealth:** World's largest producer of **Copper**.
- **Lithium Triangle:** Chile forms this strategic region along with **Argentina** and **Bolivia** (holds >50% of global lithium reserves).

2.5. INDIA-MALDIVES DEFENCE COOPERATION DEEPENS

Context: The 14th edition of the Joint Military Exercise **EKUVERIN** between the Indian Army and the Maldives National Defence Force (MNDF) recently concluded with a validation phase in Thiruvananthapuram, Kerala.

Exercise EKUVERIN:

- **Nomenclature:** "Ekuverin" translates to **"Friends"** in the Dhivehi language, symbolizing the close bilateral ties.
- **Format:** It is an annual bilateral military exercise conducted alternately in India and the Maldives since **2009**.
- **2024 Location:** Thiruvananthapuram, Kerala (India).
- **Participants:** Contingents from the **Indian Army** and the **Maldives National Defence Force (MNDF)**.

Operational Focus & Objectives

- **Core Mandate:** Enhancing interoperability in **Counter-Insurgency (CI)** and **Counter-Terrorism (CT)** operations.
- **Operational Environment:** Drills focused on diverse terrains including **jungle, semi-urban, and coastal areas**, reflecting the contemporary security landscape of the Indian Ocean Region (IOR).
- **Technological Integration:** The 14th edition emphasized the integration of **niche technologies** to refine operational synergy.

Strategic Significance

- **Policy Alignment:** The exercise aligns with India's **"Neighbourhood First"** policy and the **SAGAR** (Security and Growth for All in the Region) vision.
- **Regional Stability:** It reinforces the shared commitment of both nations to maintaining security and stability in the Indian Ocean Region.
- **Crisis Response:** India remains the Maldives' key defence partner and "first responder," a role historically evidenced by **Operation Cactus (1988)** and disaster relief efforts post-2004 Tsunami.

Related Defence Engagements

- **Exercise Ekatha:** A bilateral exercise between India and Maldives focused on diving and special operations.
- **Exercise Dosti:** A **trilateral** coast guard exercise involving **India, Maldives, and Sri Lanka**.

- **Defence Cooperation Dialogue (DCD):** Institutionalized in 2016 at the Defence Secretary level to review bilateral defence cooperation.

2.6. ICGS SARTHAK'S HISTORIC VOYAGE TO CHABAHAR

Context: The **Indian Coast Guard (ICG) Ship Sarthak**, an Offshore Patrol Vessel (OPV), made a port call at **Chabahar, Iran**. This marks the **first-ever visit** of an ICG ship to Chabahar.

Significance: The visit underscores India's ability to secure supply lines to **Afghanistan and Central Asia**, bypassing Pakistan. It aligns with India's broader maritime visions of **SAGAR** and **MAHASAGAR**.

Geo-Strategic Profile: Chabahar Port

- **Location:** Situated in the **Sistan-Balochistan province** of Iran on the **Gulf of Oman**, at the mouth of the **Strait of Hormuz**.
- **Unique Status:** It is the **only Iranian port** with direct access to the **Indian Ocean**.
- **Composition:** The port consists of two separate terminals: **Shahid Beheshti** (developed by India) and **Shahid Kalantari**.
- **Proximity:**
  - Distance from **Kandla (Gujarat):** 550 Nautical Miles (Closer than Mumbai).
  - Distance from **Mumbai:** 786 Nautical Miles.

The Connectivity Corridor: INSTC & Trade

- **Role in INSTC:** Chabahar is a pivotal node in the **International North-South Transport Corridor (INSTC)**.
- **What is INSTC?** A multi-modal transportation route linking the **Indian Ocean** and the **Persian Gulf** to the **Caspian Sea** via Iran, extending to Northern Europe via **St. Petersburg (Russia)**.
- **Strategic Advantage:**
  - Provides an alternative to the traditional Silk Road (China-dominated).
  - Enables India to bypass Pakistan to access landlocked Afghanistan and Central Asian Republics.

The Diplomatic Framework: The Chabahar Project

- **The Agreement:** In **May 2016**, India signed a **Tripartite Agreement** with **Iran and Afghanistan** to develop the **Shahid Beheshti Terminal**.
- **Status:** It is India's **first foreign port project**.
- **Key Infrastructure:** The project includes the construction of a rail line from **Chabahar to Zahedan** to facilitate seamless movement of goods into the hinterland.

Key Concepts:

- **SAGAR: S**ecurity **a**nd **G**rowth for **A**ll in the **R**egion – India's strategic vision for the Indian Ocean Region (IOR).
- **MAHASAGAR: M**aritime **H**eads for **A**ctive **S**ecurity **A**nd **G**rowth for **A**ll in the **R**egion – An outreach initiative to foster high-level maritime cooperation among littoral states.

About Guardian of The Seas: ICGS Sarthak

Type: It is an **Offshore Patrol Vessel (OPV)**, designed as a multi-mission platform capable of concurrent operations.

Series: It is the **fourth** in the series of five OPVs being built indigenously by **Goa Shipyard Limited (GSL)** for the Indian Coast Guard.

Commissioning: Formally inducted into service on **October 28, 2021**.

Technology Stack: Equipped with a state-of-the-art **Integrated Bridge System (IBS)** and **Integrated Machinery Control System (IMCS)**, enabling it to function as a sophisticated command platform

Strategic Base: Stationed at **Porbandar, Gujarat**, it operates along India's **Western Seaboard**.

***

UPSC PRELIMS PRACTICE QUESTIONS

1. With respect to India's regulatory framework for biological agents, consider the following statements:

1. India is a signatory to the BWC and ratified the treaty in 1974.
2. The SCOMET List serves as India's national export control list, with Category 2 specifically regulating dual-use micro-organisms and toxins.
3. India has established a dedicated executive body known as the National Authority for BWC to oversee the treaty's implementation, similar to the NACWC.

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

Ans. (a) 1 and 2 only

Statement 1 is correct: India is a State Party to the Biological Weapons Convention (BWC). The text confirms that India signed and ratified the treaty in 1974.

Statement 2 is correct: The SCOMET (Special Chemicals, Organisms, Materials, Equipment and Technologies) List is India's national export control list for dual-use items. Category 2 of this list specifically regulates micro-organisms and toxins to prevent their misuse.

Statement 3 is incorrect: The text explicitly states under the "National Authority Gap" section that while India has a National Authority for the Chemical Weapons Convention (NACWC), it **lacks** a similarly centralized, dedicated executive body for the BWC.

2. With respect to the geography of Trat Province, consider the following statements:

1. It is the easternmost province of Thailand, situated along the Gulf of Thailand.
2. The Cardamom Mountain range forms its land boundary with Cambodia.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (c) Both 1 and 2

Statement 1 is correct: Trat is identified as the easternmost province of Thailand, possessing a coastline along the Gulf of Thailand.

Statement 2 is correct: The province shares a border with Cambodia to the east, specifically demarcated by the Cardamom Mountains range.

3. Consider the following statements with respect to Central Palmyra region

1. It functions as a vital geographic link between the Mediterranean coast and the Euphrates River valley.
2. The region is a key hub for hydrocarbon resources, including phosphate mines and natural gas fields.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (c) Both 1 and 2

Statement 1 is correct: Geographically, the Palmyra region is an oasis situated in the heart of the Syrian Desert. It serves as a critical natural corridor connecting the fertile Mediterranean coast in the west to the Euphrates River valley in the east.

Statement 2 is correct: The region is economically strategic as a major energy hub. It contains significant deposits of **phosphate**, along with several key **natural gas fields** that are vital for Syria's energy security.

4. With respect to the geographical location of the Republic of Chile, consider the following statements:

1. It shares its northern land borders with Peru and Bolivia.
2. It shares its longest land border with Argentina to the East.
3. Its entire western coastline faces the Atlantic Ocean.

Which of the statements given above is/are correct?

(a) 1 only
(b) 1 and 2 only
(c) 2 and 3 only
(d) 1, 2 and 3

Ans. (b) 1 and 2 only

Statement 1 is Correct: The text states the neighboring countries to the North are Peru and Bolivia.

Statement 2 is Correct: The text states that Argentina lies to the East and shares the longest border.

Statement 3 is Incorrect: The text explicitly mentions that the country is bordered by the **Pacific Ocean** on the West, not the Atlantic.

5. With respect to Exercise EKUVERIN, consider the following statements:

1. It is an annual bilateral military exercise conducted between India and the Maldives.
2. The 14th edition of the exercise was conducted in Thiruvananthapuram, Kerala.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (c) Both 1 and 2

Statement 1 is correct: EKUVERIN is an annual bilateral military exercise focusing on counter-insurgency and counter-terrorism between the Indian Army and the Maldives National Defence Force (MNDF).

Statement 2 is correct: The 14th edition of the exercise concluded its validation phase in Thiruvananthapuram, Kerala, in 2024.

6. With respect to Chabahar Port, consider the following statements:

1. It is situated in the Sistan-Balochistan province of Iran on the Gulf of Oman.
2. It is the only Iranian port having direct access to the Indian Ocean.
3. The distance of the port from Mumbai is less than its distance from Kandla.

How many of the statements given above are correct?

(a) Only one
(b) Only two
(c) All three
(d) None

Ans. (b) Only two

Statement 1 is Correct: The article explicitly states that Chabahar Port is situated in the **Sistan-Balochistan province** of Iran on the **Gulf of Oman**.

Statement 2 is Correct: It is mentioned as the **only Iranian port** with direct access to the Indian Ocean.

Statement 3 is Incorrect: According to the text, the distance from Kandla is **550 Nautical Miles**, while the distance from Mumbai is **786 Nautical Miles**. Therefore, the distance from Mumbai is **more** (not less) than its distance from Kandla.

Scan to attempt more questions


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Experience – 10+ Yrs
Subject – AMC
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Experience – 25+ Yrs
Subject – Essay
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Old Rajinder Nagar, New Delhi
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8100819447
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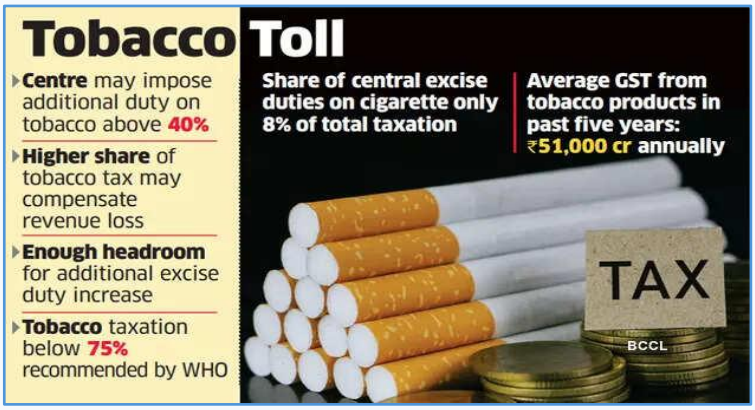
ECONOMY

3.1. FISCAL POLICY UPDATE: RESTRUCTURING TOBACCO TAXATION POST-GST COMPENSATION

- The Union Government has introduced two significant legislations in Parliament:
  1. **The Central Excise (Amendment) Bill, 2025**
  2. **The Health Security se National Security Cess Bill, 2025**
- **Primary Objective:** To maintain the tax incidence on tobacco products and pan masala as the **GST Compensation Cess** is set to be discontinued shortly.

Background: The GST Compensation Cess



- **Origin:** Introduced in **2017** during the rollout of the Goods and Services Tax (GST).
- **Purpose:** To compensate States for revenue losses arising from the transition to GST for a period of **five years**.
- **Extension:** The levy was extended beyond five years to repay loans borrowed by the Centre to compensate States during the COVID-19 revenue shortfall (2020-22).
- **Current Status:** The cess is being discontinued as the loan repayment is nearing completion.

Decoding the New Legislations

A. Central Excise (Amendment) Bill, 2025

- **Rationale:** Once the GST Compensation Cess is removed, the effective tax rate on tobacco would drop, leading to revenue loss and potentially higher consumption (health risk).
- **Mechanism:** The Bill creates fiscal space to **increase the Basic Central Excise Duty** on tobacco products.
- **Outcome:** It ensures the total tax burden (Tax Incidence) remains the same even after the cess is removed.

B. Health Security se National Security Cess Bill, 2025

- **Target Commodity:** Primarily targets **Pan Masala** manufacturing (and other notified goods).
- **Usage of Funds:** Proceeds will be earmarked for **Public Health** and **National Security** expenditure.
- **Key Feature: Capacity-Based Taxation**
  - Instead of taxing the actual quantity produced, the cess is levied based on the **production capacity of machines** installed in the factory.
  - **Self-Declaration:** Manufacturers must declare their machinery; the cess is calculated on the aggregate capacity.

- **Logic:** This method curbs tax evasion in sectors prone to under-reporting production (like pan masala and gutkha).

Static Linkages:

Concept	Explanation
Cess vs. Tax	A **Tax** goes into the Consolidated Fund of India (CFI) and can be used for any purpose. A **Cess** is a tax on tax, earmarked for a specific purpose (e.g., Education Cess, Health Cess).
Article 270	Cess and Surcharges are **NOT shareable** with State Governments (unlike basic Income Tax or GST). The Centre retains 100% of the proceeds.
Excise Duty	An indirect tax levied on the **manufacture/production** of goods within the country. (Tobacco attracts both GST and Central Excise Duty).

3.2. MASALA BONDS UNDER SCANNER: DECODING THE KIIFB-ED STANDOFF

Context: The Enforcement Directorate (ED) has issued a **show-cause notice** to the Kerala Chief Minister, former Finance Minister, and the CEO of KIIFB (Kerala Infrastructure Investment Fund Board).

What are Masala Bonds?

- **Definition:** Rupee-denominated debt instruments issued **outside India** by Indian entities (corporates or statutory bodies).
- **Purpose:** To raise capital from overseas investors without incurring currency risk.
- **Origin:** The first Masala Bond was issued in **2014** by the **International Finance Corporation (IFC)** (an arm of the World Bank) to fund infrastructure projects in India.
- **Key Distinction:** unlike standard External Commercial Borrowings (ECBs) which are usually in Dollars or Euros, these are issued in **Indian Rupees (INR)**.

How do they Benefit the Issuer?

- **Currency Risk Transfer:** The most significant feature is that the **currency risk (exchange rate risk) is borne by the investor**, not the issuer.
- **Protection against Volatility:** If the Indian Rupee depreciates against the Dollar, the issuer's repayment burden does not increase. They pay back the fixed Rupee amount.
- **Cheaper Funds:** It allows Indian companies to access a wider pool of capital at potentially lower interest rates compared to domestic markets.

Who Can Invest?

- **Eligible Investors:** Any investor from a country that is a member of the **Financial Action Task Force (FATF)** and whose securities market regulator is a signatory to the International Organization of Securities Commissions (IOSCO).

- **Target Audience:** Foreign investors who want exposure to the Indian economy but do not have access to the domestic Indian market (FPI route).
- **Examples of Issuers:** HDFC, NTPC, Indiabulls Housing Finance, and KIIFB (Kerala Infrastructure Investment Fund Board).

3.3. RUPEE DEPRECIATION & EXCHANGE RATE MANAGEMENT

Context: The Indian Rupee (INR) has depreciated to an all-time low, breaching the **₹90 per USD** mark.

The Exchange Rate Regime:

- **Official Stance:** India follows a **Managed Floating Exchange Rate System**.
  - **Mechanism:** The exchange rate is determined by market forces (Demand and Supply).
  - **Role of RBI:** The Reserve Bank of India (RBI) intervenes in the foreign exchange market to **contain excessive volatility** and maintain orderly conditions. It does **not** target a specific exchange rate level (e.g., ₹85 or ₹90).

IMF's Classification: In its recent Article IV consultation, the IMF reclassified India's exchange rate regime from "floating" to a **"Stabilized Arrangement"** (or "crawl-like"), citing excessive intervention.

- **Note:** The Government of India contested this, terming the reclassification as "unjustified."

NEER vs. REER: The Competitiveness Indices

Index	Definition	Significance
NEER (Nominal Effective Exchange Rate)	The weighted average of the rupee's value against a basket of currencies of major trading partners.	It tracks the currency's external value but **ignores inflation**.
REER (Real Effective Exchange Rate)	The NEER adjusted for the **inflation differential** between India and its trading partners.	It is the true measure of **Trade Competitiveness**.

REER > 100: Currency is **Overvalued** (Indian goods are expensive abroad → Exports hurt).

REER < 100: Currency is **Undervalued** (Indian goods are cheaper → Exports competitive).

Current Trend: High domestic inflation relative to global partners typically leads to an appreciation in REER, even if the nominal rupee (spot rate) is falling.

Drivers of Depreciation:

1. **Capital Account - FPI Outflows:**
   - When Foreign Portfolio Investors (FPIs) sell Indian stocks/bonds, they convert their rupee proceeds into dollars to repatriate funds.
   - **Result:** Demand for Dollar ↑+ Supply of Rupee ↑ = **Rupee Depreciation**.
2. **Current Account - Trade Deficit:**
   - A delay in trade deals or rising import bills (e.g., oil) increases the demand for dollars by importers.

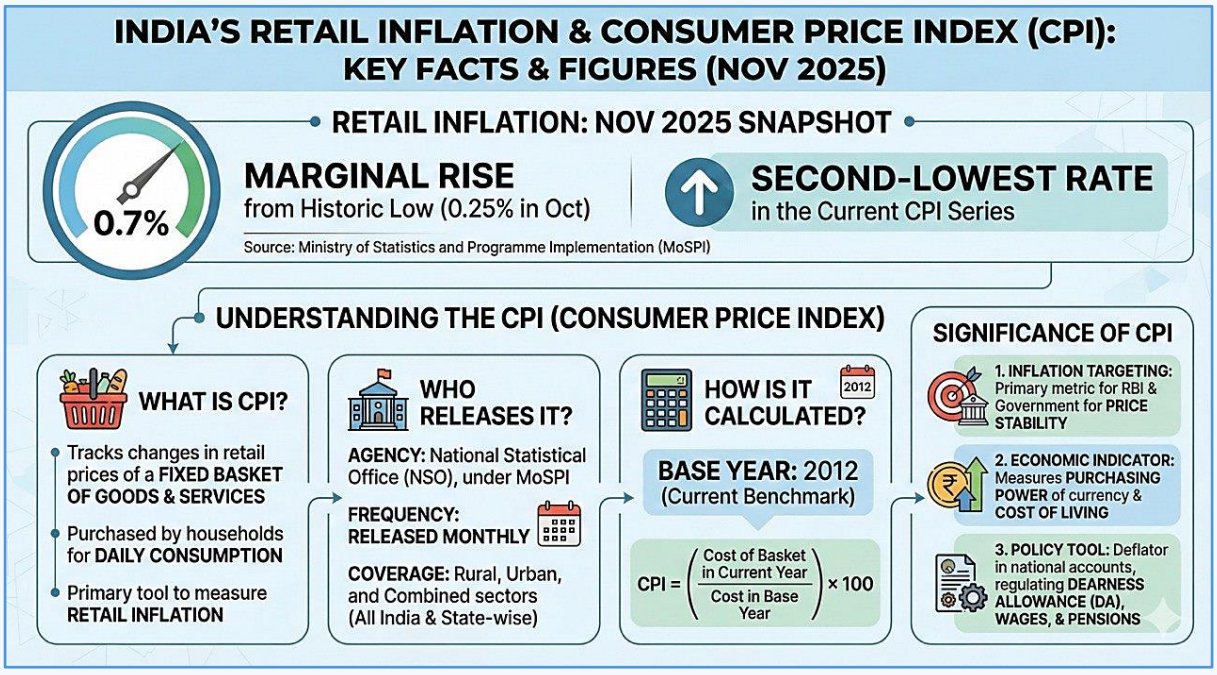
3. **Global Factor - Dollar Index (DXY):**
    - The DXY measures the USD against six major currencies. If DXY rises (due to US economic strength), emerging market currencies like INR typically fall (inverse relationship).

Impact of Depreciation on Key Macro-Indicators

Parameter	Trend	Impact
Imported Inflation	**Increases**	Cost of essential imports (Crude Oil, Edible Oil, Fertilizers) rises, pushing up domestic CPI.
Current Account Deficit (CAD)	**Widens**	Since India's import demand (Oil/Gold) is price-inelastic, the import bill rises faster than export earnings.
External Commercial Borrowings (ECB)	**Negative**	Corporates with unhedged dollar loans must pay more rupees to service the same debt.
Remittances	**Positive**	NRIs sending money home get more rupees for every dollar remitted.
Forex Reserves	**Decreases**	If RBI sells dollars to smoothen the fall, the reserves decline.

3.4. RETAIL INFLATION TRENDS

Context: The **Ministry of Statistics and Programme Implementation (MoSPI)** released data indicating that retail inflation rose marginally to **0.7% in November 2025**, up from a historic low of 0.25% in October



What is Driving the Numbers?

- **The Drag Factor (Food Deflation):** The primary reason for low inflation is the **contraction** in food prices.
    - **Cause:** Driven by a high **Base Effect** from last year and falling prices of **TOP crops** (Tomatoes, Onions, Potatoes).

- **Exception: Edible Oils** (Mustard and Coconut) saw a sharp price rise, bucking the general trend.

- **The Push Factor (Fuel Inflation):** Fuel inflation accelerated to **2.3%**, partially offsetting the relief from food prices.

Consumer Price Index (CPI)

What is the CPI?

- **Definition:** An index that tracks changes in the retail prices of a fixed basket of goods and services purchased by households for daily consumption.
- **Indicator:** It serves as a primary tool to measure **Retail Inflation**.

Who releases it?

- **Agency:** The **National Statistical Office (NSO)** under the Ministry of Statistics and Programme Implementation (MoSPI).
- **Frequency:** Released monthly.
- **Coverage:** Compiles data for Rural, Urban, and Combined sectors (All India & State-wise).

How is it calculated?

- **Base Year:** The current base year is **2012**.

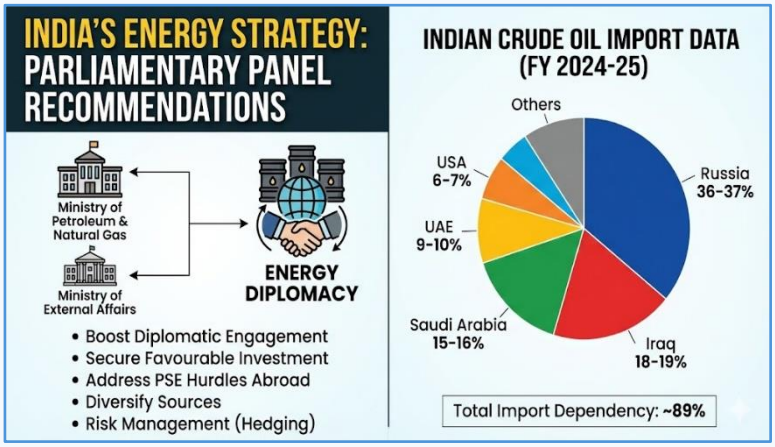
$$\text{CPI} = \frac{\text{Cost of Basket in Current Year}}{\text{Cost of Basket in Base Year}} \times 100$$

Significance of CPI

1. **Inflation Targeting:** It is the primary metric used by the **Reserve Bank of India (RBI)** and the government for inflation targeting and price stability.
2. **Economic Indicator:** Measures the **Purchasing Power** of the currency and the Cost of Living.
3. **Policy Tool:** Used as a deflator in national accounts and for regulating dearness allowance (DA), wages, and pensions.

3.5. BEYOND THE BARREL: SECURING INDIA'S ENERGY FUTURE

Context: The **Parliamentary Committee on Public Undertakings (2025-26)**, headed by MP Baijayant Panda, tabled a report urging a strategic overhaul in how India secures its energy needs. The report highlights India's vulnerability due to a staggering **89% import dependence** on crude oil.



India's Crude Oil Imports (FY 2024-25)

India's crude oil import landscape has witnessed a structural shift. As per the latest data (FY 2024-25):

- **Total Import Dependency:** India imports approximately **89.1%** of its crude oil requirements.
- **Top Suppliers (By Share):**
  1. **Russia:** ~36-37% (Largest supplier, driven by price discounts).
  2. **Iraq:** ~18-19% (Consistently the second-largest traditional supplier).
  3. **Saudi Arabia:** ~15-16%.
  4. **United Arab Emirates (UAE):** ~9-10%.
  5. **USA:** ~6-7% (Growing share, increasingly strategic).
- **Trend:** While Russian imports have seen some volatility recently due to payment and sanction issues, it remains the dominant supplier, significantly altering the traditional dominance of OPEC nations in India's basket.

Indian Crude Oil Basket (COB)

- **Definition:** The Indian Crude Oil Basket is a weighted average of the prices of the specific mix of crude oils that Indian refineries process. It serves as an indicator of the raw material cost for Indian refiners.
- **The Composition (The Mix):** It is calculated based on a mix of two types of crude:
  1. **Sour Grade:** (High sulfur content) – Benchmark is **Oman & Dubai** crude.
  2. **Sweet Grade:** (Low sulfur content) – Benchmark is **Brent Crude** (dated).
- **The Ratio:** The ratio generally leans heavily towards **Sour Grade** (approx. **75:25** Sour to Sweet ratio).
  - Why Sour? Sour crude is generally cheaper than Sweet crude. Indian refineries have upgraded their technology to process this cheaper, "tougher" crude to save costs.

    The price of the Indian Basket is published daily by the **Petroleum Planning and Analysis Cell (PPAC)**. Fluctuations in this basket directly impact the price of petrol/diesel (under deregulation) and the Current Account Deficit (CAD).

3.6. UNDERSTANDING THE EXCHANGE TRADED FUND (ETF) STRUCTURE

Context: An Exchange Traded Fund (ETF) functions as a hybrid investment vehicle, combining the diversification of mutual funds with the trading flexibility of stocks.

- **Basket of Securities:** Represents a diverse collection of investments, including **equities, bonds, or commodities**.
- **Market Liquidity:** Trades directly on stock exchanges, functioning operationally like an individual stock.
- **Cost Efficiency:** Generally offers a more distinct **cost advantage** with lower expense ratios compared to other fund types or physical asset investments.

Gold ETFs:

Gold ETFs are specialized commodity-based instruments designed for investors seeking exposure to the gold market without the challenges of physical storage.

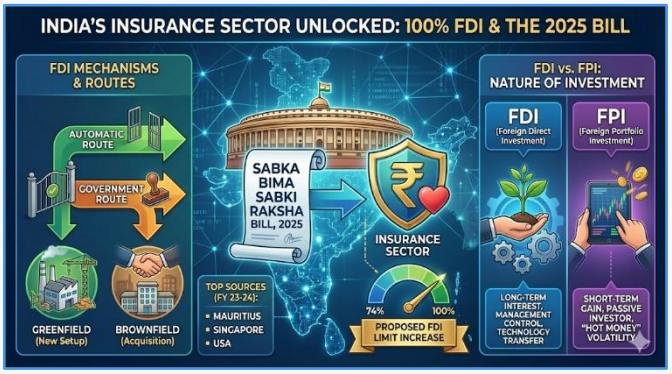
Core Characteristics

- **Underlying Asset:** These are **passive investment instruments** strictly backed by physical gold bullion.
- **Unit Valuation:** Each ETF unit corresponds to **1 gram of high-purity physical gold**, held in paper or dematerialized form.
- **Transparency:** Offers high clarity regarding holdings due to direct correlation with real-time gold pricing.

Trading & Accessibility

- **Exchange Listing:** Fully listed and actively traded on major Indian exchanges: the **National Stock Exchange (NSE)** and **Bombay Stock Exchange (BSE)**.
- **Liquidity:** Provides immediate liquidity similar to equity trading, unlike traditional physical gold.

3.7. INDIA'S INSURANCE SECTOR



Context: To align with the **Budget FY26** announcements, the government has introduced the **Sabka Bima Sabki Raksha (Amendment of Insurance Laws) Bill, 2025**. The core objective is to raise the FDI cap in the insurance sector to accelerate growth and penetration.

Key Legislative Changes

- **FDI Cap Increase:** The Bill proposes increasing the Foreign Direct Investment (FDI) limit in Indian insurance companies from **74% to 100%**.
- **Scope:** This includes aggregate holdings by foreign investors, including **Foreign Portfolio Investors (FPIs)**.
- **Statutory Amendments:** The Bill seeks to amend three parent acts:
  1. **Insurance Act, 1938**
  2. **Life Insurance Corporation (LIC) Act, 1956**
  3. **IRDA Act, 1999**

About FDI

1. **Defining FDI**
   - **Definition:** Investment by a non-resident entity into a resident Indian company.
   - **The 10% Rule:** An investment is classified as FDI if the stake acquired is **10% or more** of the post-issue paid-up equity capital. (Less than 10% is typically treated as FPI).
   - **Nature:** Involves long-term interest and management control.
2. **Types of FDI**
   - **Horizontal:** Expanding the **same business** into a foreign country (e.g., McDonald's opening in India).

- **Vertical:** Acquiring a business within the **supply chain** (e.g., A car maker acquiring a tyre manufacturer abroad).
- **Conglomerate:** Investing in an **unrelated business** (e.g., A tech firm investing in a clothing brand).

3. **Modes of Entry**
   - **Greenfield Investment:** Setting up a **new business** from scratch (e.g., building a new factory).
   - **Brownfield Investment:** Purchasing or merging with an **existing facility/business**.
4. **Entry Routes in India**
   - **Automatic Route:** No prior government approval required (e.g., 100% in E-commerce marketplace).
   - **Government Route:** Requires prior approval from the respective Ministry/Department.

India's FDI Profile

Top Sources of FDI

1. **Mauritius (25%)**
2. Singapore (23%)
3. USA (9%)

Top Sectors Attracting FDI

1. **Services Sector** (Finance, Banking, Insurance) – **16%**
2. Computer Software & Hardware – 15%
3. Trading – 6%

Sector-Specific Limits

Sector	Limit	Route
Insurance (Proposed)	**100%**	(Subject to conditions)
Space Sector	100%	(Mix of Auto & Govt)
Defence	74%	Automatic (100% via Govt)
Print Media	26%	Automatic
Public Sector Banks	20%	Government
Private Banks	74%	(49% Auto + Govt beyond)

Prohibited Sectors (The "Negative List")

FDI is strictly **banned** in:

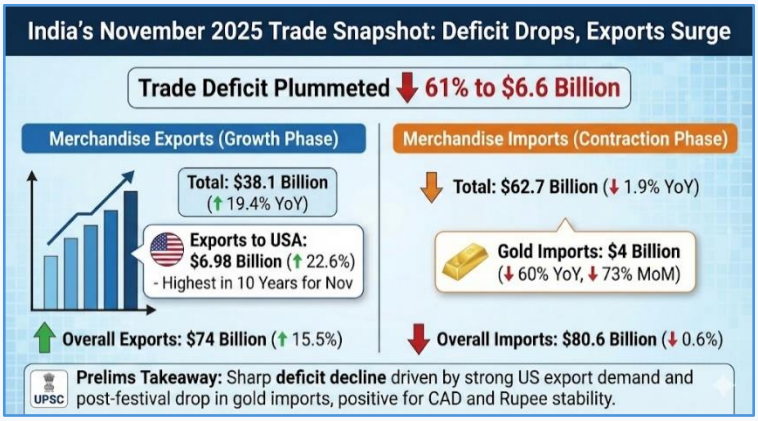
- Gambling, Betting, Casinos.
- Lottery Business (including private/government).
- Chit Funds & Nidhi Companies.
- Real Estate Business (except construction of townships/commercial projects) & Farmhouses.
- Manufacturing of Tobacco products (Cigars, Cigarettes).
- Atomic Energy & Railway Operations.

Comparative Analysis (FDI vs. FPI)

Feature	Foreign Direct Investment (FDI)	Foreign Portfolio Investment (FPI)
Intent	Management Control & Long-term Interest.	Short-term Capital Gain (Financial Investment).
Role	Active Investor (participates in management).	Passive Investor (no management control).
Stability	Stable (hard to sell off assets quickly).	Volatile ("Hot Money" – easy to sell and exit).
Impact	Brings Technology, Capital, & Jobs.	Increases Market Liquidity & Capital depth.

3.8. INDIA'S EXTERNAL TRADE

Context: The **Ministry of Commerce and Industry** released trade data for November 2025, revealing a sharp contraction in India's trade deficit driven by record merchandise exports and a steep decline in gold imports.



A. Balance of Trade (BoT)

- **Definition:** It is the difference between the value of a country's exports and imports of **Goods (Merchandise/Visible Items)** only.
- **Calculation:** BoT = (Value of Exports) – (Value of Imports)
- **Current Status:** India typically runs a **Trade Deficit** (Imports > Exports). The narrowing of this deficit (as seen in Nov 2025) is positive for the economy.

B. Trade Deficit vs. Current Account Deficit (CAD)

- **Trade Deficit:** Deals only with **goods**.
- **Current Account:** Includes **Trade Balance** (Goods) + **Services (Invisibles)** + **Remittances/Transfer Payments**.
- **Linkage:** The Trade Deficit is usually the **largest component** of the Current Account Deficit. Therefore, a sharp fall in the trade deficit (like the $6.6bn figure) usually signals a narrowing **CAD** for that quarter.

C. Impact of Gold Imports

- **Concept:** Gold is categorized as a **Non-Essential Import** in economic terms.
- **Effect:** High gold imports (as seen in October) widen the Trade Deficit and put pressure on the **Rupee (Depreciation)**. A drop in gold imports (as seen in November) stabilizes the exchange rate.

Feature	Balance of Trade (BoT)	Balance of Payments (BoP)
Scope	**Narrow:** A subset of the Current Account.	**Broad:** A comprehensive record of all international transactions.

Coverage	Covers only **Visible Items** (Goods/Merchandise).	Covers **Visible Items** (Goods) + **Invisible Items** (Services, Income, Transfers) + **Capital Transactions**.
Components	Exports of Goods – Imports of Goods.	**Current Account** + **Capital Account** + **Errors & Omissions**.
Outcome	Can be Surplus, Deficit, or Balanced.	Must theoretically always balance (Accounting sense); practically shows Surplus or Deficit.
Significance	Indicates the industrial competitiveness of a nation.	Indicates the overall economic health and external strength of a nation.

India's External Trade (2025)

- **Trade Deficit:** Plummeted to **$6.6 Billion** (↓ 61%). (Nov. 2025)
- **Reason:** High Merchandise Exports + Low Gold Imports.
- **Key Trend:**
  - **Exports to USA: Highest ever** for November (↑ 22.6%). (Nov. 2025)
  - **Gold Imports: Crashed** by 60% (Post-festival dip).

Direction of Trade (2024- 2025 Nov Rankings)

Top Export Destinations (Buyers):	**Top Import Sources (Sellers):**
1. USA	1. China
2. UAE	2. Russia
3. Netherlands	3. UAE
4. China	4. USA

Composition of Trade (The Basket)

Top Exports:	**Top Imports:**
1. Engineering Goods	1. Crude Oil
2. Petroleum Products	2. Electronics
3. Electronic Goods (Fastest growing)	3. Gold
4. Gems & Jewellery	4. Coal

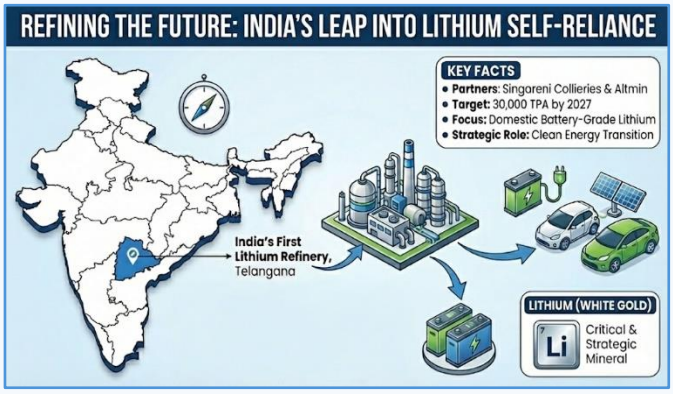
3.9. INDIA'S LEAP INTO LITHIUM SELF-RELIANCE

Context: India is set to establish its **first large-scale battery-grade lithium refinery**. The Singareni Collieries Company (SCCL) and Hyderabad-based Altmin have signed a Memorandum of Understanding (MoU) to set up this strategic facility in **Telangana**.

The Project:

- **Partners:** Joint Venture between **Singareni Collieries Company Ltd (SCCL)** (jointly owned by Telangana Govt & GOI) and **Altmin**.

- **Location:** Telangana.
- **Capacity:** 30,000 tonnes-per-annum (TPA) of lithium carbonate.
- **Target Timeline:** Operations to commence by **2027**.
- **Objective:** To localise lithium refining, secure long-term raw material supply from overseas, and support India's EV and energy storage ecosystem.



Strategic Significance

- **Import Substitution:** Reduces dependency on imported battery-grade materials (currently dominated by China).
- **Critical Mineral Supply Chain:** Positions Telangana at the forefront of India's transition to clean energy.
- **Energy Security:** Ensures a steady supply of raw materials for the "Make in India" EV sector.

Lithium (The 'White Gold')

What is Lithium?

- **Nature:** A non-ferrous, soft, silvery-white **alkali metal**.
- **Properties:**
  - **Lightest solid element** (least dense metal) under standard conditions.
  - **Highly Reactive:** Must be stored in vacuum, inert atmosphere, or mineral oil (like kerosene).
  - **Electrochemical Potential:** High electrochemical potential makes it ideal for batteries.
- **Occurrence:** Never occurs freely in nature. Found in **Pegmatitic minerals** (hard rock) and **Brines** (saline groundwater/ocean water).

Global Landscape: Reserves vs. Production

- **The Lithium Triangle:** Holds ~54% of global reserves. Comprises **Argentina, Bolivia, and Chile**.
- **Top Reserves (Resource Base):**
  1. Bolivia
  2. Argentina
  3. Chile
- **Top Producers (Extraction):**
  1. Australia (Hard rock mining)
  2. Chile (Brine extraction)
  3. China

Lithium in India

- **Status:** Classified as a **"Critical and Strategic Mineral"** under the **MMDR Amendment Act, 2023**.
- **Known Reserves:**
  - **Reasi District (Jammu & Kashmir):** 5.9 million tonnes (inferred resources).
  - **Mandya (Karnataka):** Smaller reserves.

- **Potential Belts:** Mica belts of Rajasthan, Bihar, Andhra Pradesh; Pegmatite belts of Odisha, Chhattisgarh; Rann of Kutch (Gujarat).

Government Initiatives for Security

- **KABIL (Khanij Bidesh India Ltd):** A JV of three CPSEs (NALCO, HCL, MECL) to identify and acquire overseas mineral assets (e.g., in Argentina).
- **Mineral Security Partnership (MSP):** India recently joined this US-led alliance to secure critical mineral supply chains.
- **Auctioning:** The government has started auctioning critical mineral blocks to the private sector.

Applications & Concerns

- **Uses:** Li-ion batteries (EVs, mobiles), Alloys (with Al/Mg for aerospace), Thermonuclear reactions, **CO2 absorption** (in spacecraft/submarines).
- **Environmental Concerns:** High **water footprint** (especially in brine extraction), chemical pollution, and energy-intensive processing.

3.10. FOREX DYNAMICS: DECODING THE RUPEE'S SLIDE

Context: The Indian Rupee (INR) has faced a sharp **4.3% depreciation** in the current calendar year, driven by "Twin External Shocks" of geopolitical tariffs and commodity price surges.

Key Drivers of Depreciation

- **Global Dollar Strength:** Appreciation of the US Dollar (DXY Index) puts pressure on emerging market currencies.
- **Tariff Shock:** Imposition of **50% tariffs** by the US has hit export competitiveness.
- **Capital Flight:** Depreciation is currently driven by **capital outflows** rather than weak fundamentals.
- **Gold Import Surge:** A sharp rise in gold imports (**$14.72 bn** in Oct) and a **200% spike** in Gold ETF demand have widened the trade deficit to a record **$41.7 billion**.

Regional Performance Analysis

- **Comparative Weakness:** INR has underperformed against the **Indonesian Rupiah** and **Philippine Peso**.
- **Chinese Yuan (CNY):** Remained relatively stable due to strong intervention by the PBOC (People's Bank of China).
- **Major Currencies:** INR has still performed better than structurally weak currencies like the **Japanese Yen (JPY)** and **South Korean Won (KRW)**.

Concepts Booster

Depreciation vs. Devaluation

- **Depreciation:** A fall in the value of a currency in a **floating exchange rate system** due to market forces (Demand & Supply).

- **Devaluation:** A deliberate downward adjustment of a currency's value by the government/central bank in a **fixed exchange rate system**.

NEER vs. REER

- **NEER (Nominal Effective Exchange Rate):** The weighted average of the rupee's value against a basket of currencies of major trading partners.
- **REER (Real Effective Exchange Rate):** NEER adjusted for the **inflation differential** between India and its trading partners.
  - Significance: REER is a better indicator of **trade competitiveness**.
  - Rule of Thumb: If REER > 100, the currency is **overvalued** (Exports become expensive).

Impact of Depreciation

- **On Exports:** Generally makes exports **cheaper and competitive** (unless demand is inelastic).
- **On Imports:** Makes imports **expensive** (leads to "Imported Inflation" particularly for oil and gold).
- **On CAD:** May initially worsen the **Current Account Deficit** (J-Curve Effect).

Managed Float System

- India follows a **Managed Float** exchange rate system. The RBI intervenes in the forex market (buying/selling dollars) only to **curb volatility**, not to target a specific exchange rate level.

3.11. INDIAN RUPEE: ASIA'S WORST PERFORMING CURRENCY (2025) & MACRO-ECONOMIC IMPACTS

Context: The Indian Rupee (INR) has depreciated by 4.3% against the US Dollar (USD) in the calendar year 2025 (Jan-Dec).

- Asian Standing: Analysts categorize INR as the worst-performing currency in the Asian region for this period.
- Exchange Rate: The currency breached the 89.66 mark against the USD in the spot market (November 2025), surpassing the RBI-defended level of 88.8.

Devaluation vs. Depreciation

- Devaluation: A deliberate downward adjustment of the currency's value by the Central Bank. It is a policy tool often used to boost export competitiveness.
- Depreciation: A decline in currency value driven by market forces (supply and demand), capital flows, and global economic sentiment.

Drivers of Rupee Depreciation

Domestic Triggers

- Inflationary Pressure: High domestic inflation erodes purchasing power and increases production costs, reducing export competitiveness.

- Trade Deficit: High import volume (especially crude oil) creates excess demand for foreign currency.
- Fiscal Deficit: Persistent imbalances signal structural economic weakness.
- Policy Uncertainty: Frequent shifts in exchange rate policies can rattle investor confidence.

External Catalysts

- Global Dollar Strength: Aggressive rate hikes by the US Federal Reserve (Fed) strengthen the Dollar Index (DXY), weakening emerging market currencies.
- US Tariffs: The imposition of a 50% tariff by the US administration has severely hit Indian exports.
- Capital Flight: Foreign Portfolio Investors (FPIs) withdraw funds seeking safer yields in the US/EU markets.
- Geopolitical Instability: Conflicts (e.g., Russia-Ukraine) disrupt supply chains, spiking energy prices and inflating the import bill.

Economic Implications

- Imported Inflation: Costlier imports (fuel, electronics) push up domestic consumer prices.
- Current Account Deficit (CAD): Higher import bills worsen the CAD, straining forex reserves.
- Debt Servicing: External Commercial Borrowings (ECBs) and government debt denominated in dollars become more expensive to service.
- Investment Climate: Volatility triggers capital flight as foreign investor confidence wanes.
- Export Paradox: While a weaker rupee theoretically aids exports, high input costs (due to inflation) often negate the competitive advantage.

Strategic Interventions

- 1.Monetary Measures (RBI)
- Forex Intervention: Selling dollars from reserves to absorb excess liquidity and arrest volatility.
- Policy Rate Hikes: Increasing the Repo rate to widen the interest rate differential, attracting foreign capital.
- Currency Swaps: Utilizing bilateral swap agreements to pay for trade in local currencies, bypassing the dollar.

Fiscal Measures (Government):

- Import Substitution: Promoting domestic manufacturing (e.g., Make in India) to reduce reliance on imported goods.
- Export Promotion: Incentivizing exporters to boost foreign currency earnings.
- FDI Liberalization: Easing regulations to attract long-term stable capital (Foreign Direct Investment).

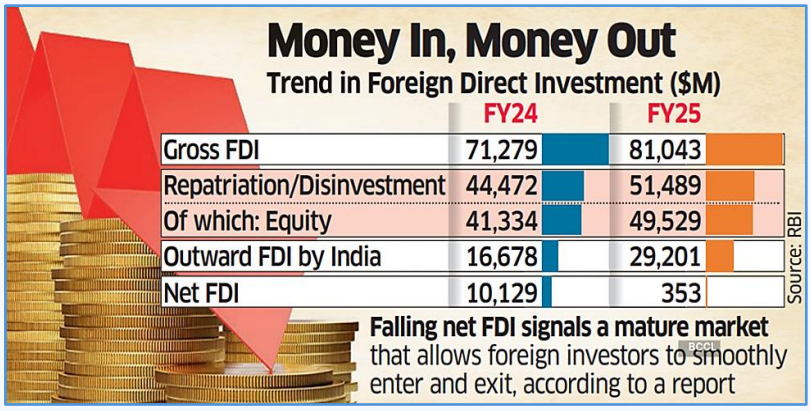
The Strategic Outlook

- Structural Reforms: Move towards a robust, defined exchange rate framework to minimize speculative attacks.
- Self-Reliance: Focus on energy independence (renewables) to reduce the oil import burden.

- Reserve Diversification: Accumulate a multi-currency forex basket to reduce over-reliance on the US Dollar

3.12. FOREIGN DIRECT INVESTMENT (FDI) IN INDIA: FRAMEWORK, TRENDS, AND OUTLOOK

Context: For the second consecutive month (September 2025), India recorded a Negative Net Foreign Direct Investment (FDI).



Conceptual Framework and Regulation

- **Definition:** FDI refers to investment through equity instruments by a non-resident entity in an unlisted Indian company, or 10% or more of the paid-up equity capital in a listed Indian company.
- **Regulatory Architecture:** Governed by the Consolidated FDI Policy (2020) and FEMA (Non-Debt Instruments) Rules, 2019.

Gross vs. Net FDI:

- Gross FDI: Total direct investment inflows into productive assets.
- Net FDI: Gross Inflows minus Outflows (Repatriation of profits + Outward Direct Investment by Indian firms).

Investment Routes and Prohibitions

- Automatic Route: No prior approval required from the RBI or Government. Currently, 90% of FDI enters via this route.
- Permitted Sectors: Agriculture, Telecom, Oil & Gas, Airports (Greenfield), Industrial Parks, etc.
- Government Route: Mandatory prior approval required to ensure compliance with specific conditions.
- Prohibited Sectors: Lottery, Gambling/Betting (including casinos), Chit Funds, Nidhi Companies, and sectors closed to private players (e.g., Atomic Energy, Railway Operations).

Strategic Significance of FDI

- Non-Debt Capital: Serves as a sustainable, long-term financial resource that facilitates technology transfer and strategic development.
- Economic Stability: Bolsters forex reserves; as of May 2025, reserves cover 11+ months of imports and 96% of external debt (RBI Bulletin).
- Greenfield Growth: Capital expenditure in greenfield projects is projected to rise by ~25% to USD 110 billion in 2024 (UNCTAD WIR 2025).
- Sustainable Finance: India leads as the largest issuer of carbon credits in the Verra Registry.

Analysis: Reasons for Declining Net FDI

- Despite robust gross inflows, Net FDI has faced downward pressure due to:
- Surge in Outward Investment (ODI): Indian entities are investing globally, aided by liberalized Overseas Direct Investment (ODI) guidelines (2022). FY25 saw Indian ODI rise to $12.5 billion.
- Increased Repatriation: Higher profit-booking and exit by foreign investors indicate a maturing market cycle.

Global Headwinds:

- Geopolitical Tension: Rising trade tariffs (specifically by the USA) and weak global demand.
- Global Decline: Worldwide FDI contracted by 11% (YoY) in 2024.

Government Interventions and Reforms

- Sectoral Liberalization: Increased FDI caps in strategic sectors (e.g., Union Budget 2025 raised Insurance sector FDI to 100%).
- Regulatory Ease: The Jan Vishwas Act, 2023 decriminalized 183 provisions to improve the business climate.
- Institutional Support: Establishment of Project Development Cells (PDCs) and promotion of Competitive Federalism via BRAP and LEADS rankings.
- Strategic Agreements: Signing of Bilateral Investment Treaties (UAE, Uzbekistan) and TEPA with EFTA.

Way Forward:

- Policy Stability: Emulate models like Vietnam's 10-year economic plans to offer regulatory predictability.
- Digital Economy: Leverage the 14% global rise in digital economy investments by shaping coherent multilateral rules.
- Fiscal Incentives: Utilize targeted tax breaks and subsidies to steer capital into high-priority sectors.
- International Reform: Advocate for a reformed international financial system to manage global investment risks and hybrid capital lending.

3.13. INDIA'S LEAP INTO CRITICAL MINERALS: THE REPM SCHEME

What is the New Scheme?

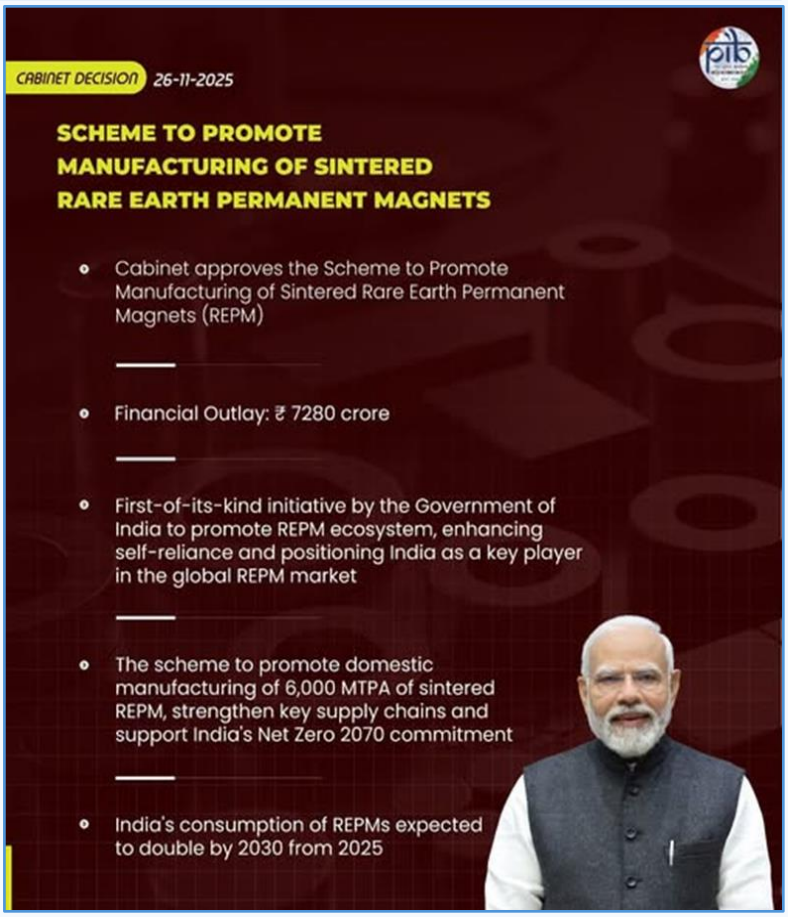
- Approval: The Union Cabinet has approved the 'Scheme to Promote Manufacturing of Sintered Rare Earth Permanent Magnets' (REPM).
- Strategic Goal: To establish a domestic capacity of 6,000 Metric Tonnes Per Annum (MTPA) of integrated REPM manufacturing.
- First-of-its-Kind: This initiative marks India's entry into the complete value chain converting rare earth oxides to metals, metals to alloys, and alloys to finished magnets.

SCHEME AT A GLANCE

Key Features & Financials

- Total Outlay: ₹7,280 Crore.

- Incentive Structure:
- Sales-Linked Incentives: ₹6,450 Crore (disbursed over 5 years).
- Capital Subsidy: ₹750 Crore for setting up facilities.
- Beneficiaries: 5 entities will be selected via global competitive bidding (max capacity of 1,200 MTPA each).
- Duration: 7 Years total (2-year gestation period for plant setup + 5 years for incentive disbursement).



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What are Rare Earth Permanent Magnets (REPM)?

- Definition: Permanent magnets manufactured from alloys of rare earth elements.
- Key Properties:
- High Magnetic Strength: Significantly stronger than standard ferrite or alnico magnets.
- Resistance: High resistance to demagnetization.
- Efficiency: Offers superior performance-to-size ratio, essential for miniaturization.

Major Types & Applications

- Neodymium Iron Boron (NdFeB):
- Composition: Neodymium, Iron, and Boron.
- Trait: The strongest commercially available permanent magnet.
- Uses: Electric Vehicle (EV) motors, hard disk drives, and consumer electronics.
- Samarium Cobalt (SmCo):
- Composition: Samarium and Cobalt.
- Trait: Excellent thermal stability and corrosion resistance; retains magnetism at high temperatures.
- Uses: Aerospace, defence systems, and high-speed motors.

Strategic Applications

- Green Energy: Vital for wind turbine generators.
- Mobility: Critical for traction motors in Electric Vehicles (EVs).
- Defence: Used in guidance systems, radar, and actuators.

3.14. TEX-RAMPS SCHEME: REVITALIZING INDIA'S TEXTILE ECOSYSTEM

Context: The Cabinet has approved the 'Textiles Focused Research, Assessment, Monitoring, Planning and Start-up (Tex-RAMPS) Scheme' to boost research, innovation, and competitiveness in the textile sector.

Key Scheme Details

- Full Form: Textiles Focused Research, Assessment, Monitoring, Planning, and Start-up.
- Ministry: Ministry of Textiles.
- Type: Central Sector Scheme (100% funded by the Union Government).
- Total Outlay: ₹305 Crore.
- Duration: FY 2025-26 to FY 2030-31 (aligned with the next Finance Commission cycle).

Core Objectives

- Research & Innovation: To promote R&D in niche areas like smart textiles, sustainable manufacturing, and high-tech advancements.
- Data-Driven Policy: To replace ad-hoc assessments with robust data systems for evidence-based policymaking.

- Start-up Ecosystem: To nurture entrepreneurship through incubators, hackathons, and industry-academia collaboration.

Strategic Pillars (Sub-Components)

- Integrated Textiles Statistical System (ITSS): A real-time data and analytics platform for accurate sectoral monitoring.
- Employment & Supply Chain Mapping: Conducting periodic employment assessments and mapping supply chains to identify gaps.
- 'India-Size' Study: Expanding the anthropometric study to create a standardized Indian sizing chart for apparel.
- State-Level Capacity Building: Strengthening state planning capabilities to ensure federal cooperation in textile growth.

Significance for India

- Global Competitiveness: Aims to position India as a leader in sustainability and technology, moving up the value chain.
- Quality Culture: Encourages a shift from low-cost production to high-value, quality-driven manufacturing.
- Sustainability: Focuses on green technologies and processes to meet global environmental standards (e.g., EU's ESG norms).

Here are 3 MCQs based on the topic provided, adhering to the format used in previous turns.

3.15. INDIA TO HOST INTERNATIONAL FLEET REVIEW (IFR) 2026

Context: The Indian Navy is scheduled to host the International Fleet Review (IFR) **in** February 2026 **at** Visakhapatnam**. This event underscores India's evolving role as a "Preferred Security Partner" in the Indian Ocean Region (IOR).**

International Fleet Review (IFR) 2026: Key Highlights

- Venue: **Visakhapatnam, Andhra Pradesh (Eastern Naval Command).**
- Theme: "United through Oceans" **and** "Bridges of Friendship"**.**
- Significance:
- **The event coincides with the** 75th Anniversary of the Republic of India**.**
- **It serves as a platform to showcase India's naval prowess and commitment to multilateralism.**
- **Historical Context :**
- 1st IFR: **Held in** 2001 **in Mumbai (marking the 50th Republic Day).**
- 2nd IFR: **Held in** 2016 **in Visakhapatnam.**
- 2026: **Will be the** third **International Fleet Review hosted by India.**

Strategic Framework: SAGAR to MAHASAGAR

India's maritime strategy has evolved from SAGAR **(Security and Growth for All in the Region) to the broader vision of** MAHASAGAR**.**

- MAHASAGAR: **Stands for** M**utual** A**nd** H**olistic** A**dvancement for** S**ecurity** A**nd** G**rowth** A**cross** R**egions.**
- Objective: **To expand engagement beyond the IOR to include Africa, ASEAN, and Pacific Island nations, promoting collective security against threats like piracy and illegal fishing.**

Key Pillars of Recent Maritime Diplomacy

The article highlights specific instances of India's capacity-building efforts:

- Vietnam: **Gifting of the missile corvette** INS Kirpan **(Khukri-class) to the Vietnam People's Navy.**
- Mozambique: **Gifting of** Fast Interceptor Crafts (FICs) **to aid counter-insurgency efforts in Cabo Delgado province.**
- Sri Lanka: **Commissioning of a** Maritime Rescue Coordination Centre (MRCC) **to enhance search and rescue capabilities.**

Institutional Mechanisms & Exercises

- Indian Ocean Naval Symposium (IONS):
- Launched: 2008 **by India.**
- Nature: A voluntary initiative to increase maritime cooperation among navies of the littoral states of the IOR.
- Current Status: **India is set to assume the Chairmanship for** 2025-27**.**
- Key Naval Exercises:
- Multilateral: MILAN **(hosted by India),** Malabar **(Quad nations),** RIMPAC**.**
- Bilateral:
- SIMBEX: India-Singapore
- Varuna: India-France
- CORPAT: Coordinated Patrols (with Indonesia, Thailand, Bangladesh, etc.)
- Konkan: India-UK

3.16. THE PRIME MINISTER'S INTERNSHIP SCHEME (PMIS)

Context: The Ministry of Corporate Affairs (MCA) recently tabled data in Parliament regarding the pilot phase of the PM Internship Scheme. Despite exceeding the target for internship offers, the scheme has witnessed low acceptance rates and high attrition among the youth.

About:

- Origin: Announced in the Union Budget 2024.
- Objective: To provide internship opportunities to 1 crore youth in the top 500 companies over the next five years.

- Current Target: The pilot project aimed to provide 1.25 lakh opportunities in FY 2024-25.
- Nodal Ministry: Ministry of Corporate Affairs (MCA).

How is the Financial Architecture Structured?

- Stipend: Total ₹5,000 per month.
- Government Share: ₹4,500 (via Direct Benefit Transfer).
- Corporate Share: ₹500 (funded through Corporate Social Responsibility – CSR funds).
- Incidental Grant: A one-time grant of ₹6,000 provided upon enrollment.
- Social Security: Insurance coverage under PM Jeevan Jyoti Bima Yojana and PM Suraksha Bima Yojana.

Eligibility:

- Age Limit: Candidates aged between 21 and 24 years.
- Educational Qualification:
- Must have passed High School (Class 10) or above.
- Exclusions: Graduates from premier institutes (IITs, IIMs, IISERs) and those with professional qualifications (CA, CMA, CS) are not eligible.
- Employment Status: Candidate must not be in full-time employment or engaged in full-time education.
- Economic Criteria:
- Family income must not exceed ₹8 lakh per annum.
- Families with government employees are ineligible.

What does the Pilot Data Indicate?

- Supply vs. Demand: While companies offered 1.65 lakh positions (exceeding the 1.25 lakh target), only 20.2% of these offers were accepted by candidates.
- Attrition: Approximately 20% of candidates who accepted the offers dropped out before completion.
- Key Hurdles: Location constraints, role mismatch, and duration of the internship were cited as primary reasons for the low uptake.
- Budget Utilization: Consequently, the budget estimate for the pilot was revised downward from ₹840 crore to ₹380 crore for FY 24-25.

3.17. REGIONAL RURAL BANK

Genesis and Establishment

- Recommendation: Based on the Narasimham Working Group (1975) on rural credit.
- Legal Framework: Established under the Regional Rural Banks Act, 1976 (initially set up via an Ordinance in 1975).
- First RRB: Prathama Bank, Moradabad (UP), sponsored by Syndicate Bank, established on October 2, 1975.
- Objective: To provide banking services to rural areas, particularly to small/marginal farmers, artisans, and small entrepreneurs, combining the "local feel" of cooperatives with the "business efficiency" of commercial banks.

Ownership and Regulation

- Ownership Structure:
- Central Government: 50%
- State Government: 15%
- Sponsor Bank: 35%
- Regulation & Supervision:
- Regulator: Reserve Bank of India (RBI) under the Banking Regulation Act, 1949.
- Supervisor: NABARD (National Bank for Agriculture and Rural Development).
- Tax Treatment: For taxation purposes, RRBs are treated as Cooperative Societies under the Income Tax Act.

Operational Mandates

- Priority Sector Lending (PSL): Unlike Scheduled Commercial Banks (40%), RRBs have a higher target of 75% for PSL.
- CRAR (Capital to Risk Weighted Assets Ratio): Must maintain a minimum CRAR of 9%.
- Recapitalization: In 2021–2023, the government infused over ₹10,000 crore to strengthen their capital base.

Structural Transformation: Amalgamation

India is currently transitioning towards a "One State, One RRB" model to improve efficiency and scale.

- Impact of 2025 Amalgamation: 26 RRBs were merged into 11 entities across 11 states/UTs.
- Reach: As of late 2025, these 28 RRBs cover 700 districts with over 22,000 branches.

Committees

- Dantwala Committee (1977): Investigated RRB operations; recommended their extension to areas with weak credit structures.

- Kelkar Committee (1986): Recommended no new RRBs be established; suggested strengthening existing ones.

Feature	Regional Rural Banks (RRBs)	Scheduled Commercial Banks (SCBs)
Ownership	Tripartite (50:15:35)	Multiple (Public/Private/Foreign)
PSL Target	75%	40%
Supervisor	NABARD	RBI
Area	Regional (Districts/State)	National/International

3.18. NATIONAL PENSION SYSTEM

Core Concept & Regulation

- Definition: National Pension System is a voluntary, defined contribution retirement savings scheme.
- Regulator: Pension Fund Regulatory and Development Authority (PFRDA), established under the PFRDA Act, 2013 (Statutory body).
- History: Launched in Jan 2004 for new Central Government recruits (except Armed Forces).
- Opened to all citizens (voluntary) in 2009.

Eligibility Criteria

- Age: 18 to 70 years (can be extended to 75).
- Citizenship: Open to Resident Indians, Non-Resident Indians (NRIs), and Overseas Citizens of India (OCI).
- Exclusions: Hindu Undivided Families (HUFs) and Persons of Indian Origin (PIOs) are not eligible.
- PRAN: Each subscriber gets a unique Permanent Retirement Account Number.

Operational Structure: Tier-I vs. Tier-II

NPS operates via two distinct, linked accounts: Tier-I (mandatory, tax-saving retirement account, locked until age 60) and Tier-II (voluntary, flexible savings account, no tax benefits for most)

Feature	Tier-I (Mandatory)	Tier-II (Voluntary)
Purpose	Retirement Saving	Short-term Saving
Withdrawal	Restricted (Lock-in till 60)	Unrestricted (Flexible)
Tax Benefit	Available (Sec 80C, 80CCD)	Generally None*
Eligibility	Open to all	Must have a Tier-I account first

Investment Choices

Subscribers can choose their asset allocation via two modes:

1. Active Choice: Subscriber decides the mix of Equity (E), Corporate Bonds (C), and Government Securities (G). *Equity cap is 75%.*

2. Auto Choice: Investment mix changes automatically based on the subscriber's age (Life cycle fund).

Withdrawal & Exit Rules

- At Maturity (Age 60):Lump Sum: Up to 60% of the corpus can be withdrawn (completely tax-free).
- Annuity: Remaining 40% must be used to buy an annuity (regular pension).
- Full Withdrawal: Allowed if total corpus is ₹5 Lakh (₹8 Lakh for some government categories in 2025).
- Partial Withdrawal: Allowed after 3 years of membership.
- Max 25% of own contribution only.
- Allowed max 4 times (updated from 3) for specific reasons like education, marriage, or medical emergencies.

Recent Policy Shift: Unified Pension Scheme (UPS)

- Context: Effective April 1, 2025, the government introduced UPS as an option for Central Government employees.
- The Difference: While NPS is market-linked, UPS provides an assured pension (50% of last 12 months' average basic pay).
- Flexibility: Existing NPS subscribers (post-2004) can choose to switch to UPS.

Comparison: NPS vs. UPS

Feature	National Pension System (NPS)	Unified Pension Scheme (UPS)
Nature of Scheme	Defined Contribution: Benefit depends on market returns.	Defined Benefit: Benefit is fixed and guaranteed by the Govt.
Pension Amount	Variable; based on the corpus accumulated and market performance.	Guaranteed: 50% of the average basic pay of the last 12 months.
Eligibility	All citizens (Govt & Private).	Currently for Central Govt employees (States can opt-in).
Minimum Service	No strict minimum for some payout; varies by tier.	25 years for full pension; 10 years for minimum ₹10,000/month.
Employee Contribution	10% of Basic Pay + DA.	10% of Basic Pay + DA (Remains unchanged).
Govt Contribution	14% of Basic Pay + DA.	18.5% of Basic Pay + DA (Increased by Govt).
Inflation Protection	No direct link to inflation.	Dearness Relief (DR) provided based on All India Consumer Price Index.
Family Pension	Based on the annuity purchased from the corpus.	Guaranteed: 60% of the employee's pension after their demise.

3.19. INDEX OF EIGHT CORE INDUSTRIES

Context: India's core sector output, measured by the Index of Eight Core Industries (ICI), recorded a modest year-on-year growth of 1.8% in November 2025.

This marks a recovery from a contraction of -0.1% in October 2025, driven primarily by strong performances in cement (14.5%), steel (6.1%), fertilisers (5.6%), and coal (2.1%).

However, contractions in energy-related sectors like crude oil, natural gas, refinery products, and electricity tempered the overall growth.

What are Core Sector Industries?

- The core sector comprises eight key infrastructure industries: Coal, Crude Oil, Natural Gas, Refinery Products, Fertilisers, Steel, Cement, and Electricity.
- These industries form the backbone of economic activity and serve as a leading indicator of industrial growth and broader economic health.

Significance of Core Sector Industries

- Economic Barometer: Acts as a barometer for the economy's industrial performance, helping predict trends in overall growth and future economic outlook.
- Indicator of Sectoral Demand: Strong core sector growth signals robust demand in key areas like construction, manufacturing, agriculture (via fertilisers), and energy supply.
- Multiplier Effect through Linkages: These industries have strong forward and backward linkages with other sectors, creating a multiplier effect—e.g., increased steel and cement production boosts infrastructure projects, while electricity powers factories and homes.
- Role in Infrastructure Development: Essential for infrastructure development (roads, bridges, power plants) and supporting allied sectors like manufacturing, services, and exports.
- Weight in Industrial Production: The eight core industries collectively account for 40.27% of the weight in the Index of Industrial Production (IIP), making them a critical driver of overall industrial output.
- Broader Macroeconomic Impact: Impacts GDP growth, employment generation, investment cycles, and inflation (e.g., stable refinery output controls fuel prices).
- Utility in Policy Formulation: Used extensively by policymakers (Ministry of Finance, RBI, banks) for fiscal planning, monetary policy, and infrastructure financing.

What is the Index of Eight Core Industries (ICI)?

- The ICI is a monthly production volume index compiled and released by the Office of the Economic Adviser (OEA), Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce & Industry.
- Base Year: 2011-12

Index of Eight Core Industries- Weightage

Core Industry	Weightage (%)
Refinery Products	28.04
Electricity	19.85
Steel	17.92
Coal	10.33
Crude Oil	8.98
Natural Gas	6.88
Cement	5.37
Fertilisers	2.63

What is Index of Industrial Production (IIP)?

- The Index of Industrial Production (IIP) tracks short-term variations in the output levels of major sectors of the Indian economy, including mining, electricity, and manufacturing.
- Released by: National Statistical Office (NSO), Ministry of Statistics and Programme Implementation (MoSPI), Government of India.
- Base Year: 2011–12 (updated from 2004–05).
- Covered Sectors: Mining, Manufacturing, Electricity.
- Objective: To evaluate industrial performance, inform policymaking, and act as an early indicator of economic activity.
- Release Schedule: Monthly, published with a one-month delay.
- Economic Significance: Aids in analyzing sectoral growth, inflation patterns, and overall industrial development.

3.20. ADDITIONAL TIER-1 (AT1) BONDS

Context: The Insurance Regulatory and Development Authority of India (IRDAI) **has** permitted insurers and reinsurers to invest in Additional Tier-1 (AT1) Bonds **and certain** Tier-2 capital instruments **issued by** RBI-regulated All India Financial Institutions (AIFIs)**.**

This follows the RBI's decision (effective April 1, 2024) **allowing AIFIs to raise capital through** AT1 Bonds and Tier-2 instruments **under the** Basel III Capital Framework**.**

What is a Bond?

- **A** bond **is a** fixed-income financial instrument **through which an investor lends money to a** government or corporate entity**.**
- **In return, the issuer pays** regular interest (coupon payments) **to the investor.**

- **Bonds are issued for a** specified time period**, known as the** term to maturity**, after which the principal is repaid.**
- **Funds raised through bonds are used for purposes such as** business expansion, refinancing existing debt, infrastructure development, or welfare activities**.**

What are Additional Tier-1 (AT1) Bonds?

- AT-1 bonds are perpetual bonds**, meaning they** do not have a maturity date**.**
- **Investors** do not have a contractual right to receive back the principal**.**
- **These bonds form part of a bank or financial institution's** Tier-1 Capital**, along with** Common Equity Tier-1 (CET-1)**.**
- **Due to their** perpetual nature and loss-absorption features**, AT-1 bonds are often** treated closer to equity than conventional debt**.**

Key Characteristics of AT1 Bond

- Perpetual in nature: **No fixed redemption date.**
- Higher interest (coupon) rate: **Offered to compensate for higher risk.**
- Discretionary coupon payments: **Issuer may** skip interest payments **without it being treated as a default.**
- Call option available: **Issuer may buy back the bonds after a specified period (usually** 5 years**), subject to** RBI approval**.**
- No put option: **Investors** cannot demand early redemption **from the issuer.**
- Listed instruments: **Investors can exit only through** secondary market sale**.**
- Subordinated debt: **In liquidation, AT-1 bonds rank** below all other debt instruments**, but above equity.**

How are AT-1 Bonds Issued?

- **AT-1 bonds are** issued by banks and eligible financial institutions **in accordance with** RBI guidelines**.**
- **They are issued primarily to meet** Capital Adequacy Requirements (CAR)**.**
- Capital Adequacy Ratio (CAR):
- **Measures a bank's capital in relation to its** risk-weighted assets**.**
- **Ensures banks can absorb losses and protect depositors.**
- **The CAR framework in India is aligned with the** Basel III Accord (2009)**, introduced after the** 2008 global financial crisis**.**

Basel III Norms and AT-1 Bonds

- Basel III **strengthened bank capital norms to improve financial stability.**
- Tier-1 Capital
- Common Equity Tier-1 (CET-1): **Equity and retained earnings.**
- Additional Tier-1 (AT1): **Perpetual, loss-absorbing instruments.**
- Tier-1 Capital: **CET-1 + AT-1**

- Tier-2 Capital
- **Subordinated debt and certain** non-cumulative preference shares**.**
- **Funds raised through AT-1 bonds act as a** shock absorber **during financial stress.**

AT-1 Bonds as Contingent Convertible Bonds (CoCos)

- **AT-1 bonds are a form of** Contingent Convertible Bonds (CoCos)**.**
- **If a bank's capital falls below a specified threshold:**
- **AT-1 bonds can be** converted into equity**, or**
- Written down (partially or fully)**.**
- **This mechanism helps the bank** reduce debt and restore capital strength**.**

Risks Associated with AT-1 Bonds

- Principal loss risk: **The principal can be** written down permanently**.**
- Equity conversion risk: **Bonds may be converted into equity at stressed valuations.**
- Coupon cancellation risk: **Interest payments can be** skipped indefinitely**.**
- Regulatory intervention risk: RBI can trigger write-down or conversion **without investor consent if the bank is under stress.**
- Perpetual risk: **No certainty of redemption due to absence of maturity.**
- Subordination risk: **AT-1 bondholders are paid** after all other creditors **in liquidation.**
- High suitability risk: **These instruments are** unsuitable for conservative investors**.**

About All India Financial Institutions (AIFIs)

- AIFIs **are RBI-regulated development financial institutions that provide** long-term finance **to priority sectors.**
- Examples **include** NABARD, SIDBI, EXIM Bank, NHB and NaBFID**.**
- **They play a crucial role in** infrastructure financing, MSME support, and export promotion**.**

Regulatory Change for Insurers

- Earlier: **Insurers were allowed to invest only in** AT1 Bonds and Tier-2 instruments issued by banks**.**
- Now: **IRDAI has expanded the investment universe to include** AT1 and Tier-2 instruments issued by AIFIs**.**
- Objective:
- Portfolio diversification **for insurers.**
- **Better** risk-adjusted returns**.**
- **Improved** asset–liability management (ALM) **for long-term liabilities.**

Infrastructure SPVs – Proposed IRDAI Norms

- **IRDAI is considering allowing insurers to invest in** Special Purpose Vehicles (SPVs) **in the** infrastructure sector**.**
- Conditions include:

- **The project must have** commenced commercial operations**.**
- Cash flows should be stabilised**.**
- **No requirement of** parent company guarantee**,** net worth**, or** credit rating**.**
- Proposed investment limit: **Insurers may invest** up to 20% of the debt **issued by eligible public-limited infrastructure SPVs.**

3.21. CRITICAL MINERALS IN INDIA

On December 23, 2025**, Air Marshal Ashutosh Dixit,** Chief of Integrated Defence Staff**, highlighted that** critical minerals are vital for national security, defence capabilities, and technological sovereignty**.**

He stressed that global supply chains of critical minerals are highly concentrated **and increasingly subject to** export controls and geopolitical pressures**, making excessive import dependence a** strategic vulnerability**.**

Recent initiatives include the identification of critical minerals**, the** National Critical Mineral Mission**, and** government efforts to strengthen the value chain **from extraction to recycling.**

These remarks were made at the discussion 'Minerals that Matter: Geopolitics, Sovereignty and Value Chains'**, emphasising India's need for** self-reliant defence manufacturing **and** resilient mineral supply chains**.**

What Are Critical Minerals?

Critical minerals are minerals that are strategically and economically essential **for a country, and whose** scarcity, limited geographic distribution, or dependence on imports **can create** supply chain vulnerabilities**.**

Applications and Availability of Key Critical Minerals in India

Mineral	Major Applications	Availability in India
Lithium	EV batteries, rechargeable batteries, lubricants, glass, ceramics	Salal-Haimana, J&K
Cobalt	EV batteries, aerospace, corrosion-resistant alloys	Not available; fully imported
Graphite	Batteries, fuel cells, EVs	9 million tonnes reserves
Rare Earth Elements	Permanent magnets, electronics, defence, renewable energy	Monazite in beach sands (55–65% REO)
Titanium	Aircraft, spacecraft, missiles, metal alloys	Coastal districts: Tamil Nadu, Andhra Pradesh, Odisha, Kerala, Gujarat, Maharashtra

Vanadium	Steel alloys, military armor, nuclear components	24.63 million tonnes ore reserves (2015)
Tungsten	Cutting tools, rockets, missiles, superalloys	Not available; imported
Gallium	Semiconductors, LEDs, specialized thermometers	By-product of alumina refining
Copper	Electrical wiring, solar panels, automotive	Domestic production meets 4% of demand; imports required
Phosphorus	Fertilizers, detergents, food additives	Rajasthan, Jharkhand, MP

Note: Most critical minerals like Beryllium, Germanium, Indium, Rhenium, Selenium, Tantalum, Tellurium **are** not available domestically **and fully imported.**

Importance for India

- Reduces Import Dependence:
- **India is** fully dependent on imports **for minerals such as** Beryllium, Germanium, Indium, and Cobalt**, making** domestic production and exploration crucial**.**
- Supports Strategic Autonomy and Resource Planning:
- **Ensures** self-reliance in defense, high-tech industries, and green energy sectors**.**
- **Example: Identification of** Lithium reserves in Salal-Haimana, Jammu & Kashmir**, and** REEs from Indian beach sands**, to reduce reliance on global suppliers like China.**
- Economic and Technological Security: **Secure access to critical minerals enables India to** manufacture EVs, solar panels, and defense equipment **without external disruptions.**

Five Pillars of the Critical Minerals Value Chain

- Geoscience and Exploration
- **Geological mapping by the** Geological Survey of India (GSI) **identifies regions with** Obvious Geological Potential (OGP) **for minerals like Gold, Tin, Rare Earth Elements (REEs), Cobalt, Nickel, and Tungsten.**
- Mines and Minerals (Development and Regulation) Amendment Act, 2021 **allows private participation in exploration, supported by the** National Mineral Exploration Trust (NMET)**.**
- Mineral Extraction
- **Extraction is done via** surface and underground mining**, involving drilling, blasting, excavation, and transport for processing.**
- Intermediate Processing
- **Focuses on** environmentally sustainable refining technologies**.**
- **Advanced methods like** vapor metallurgy **are promoted to process critical minerals with minimal ecological impact.**
- Advanced Manufacturing
- **Processed metals are used to manufacture high-tech products:**

- Permanent magnets **for EV motors and wind turbines**
- Electronics, telecom, solar PV modules, batteries
- White goods **like ACs and LEDs**
- Recycling
- End-of-life recycling **of electronics, batteries, and solar panels can recover significant mineral content.**
- **Recycling is expected to become a** major source of minerals by 2040**, reducing reliance on primary extraction.**

Key Initiatives for Critical Minerals in India

1. **Planning and Assessment**
   - NITI Aayog (2011): **Identified** 12 strategic minerals **including Tin, Cobalt, Lithium, Gallium, and Tungsten.**
   - Ministry of Mines (2011): **Set up a steering committee to evaluate** rare earths and energy-critical minerals**, covering production, consumption, and reserves.**
   - CEEW Study: **Identified** 13 critical minerals by 2030**, including Rhenium, Beryllium, Heavy REEs, Germanium, Graphite, Tantalum, Zirconium, and Silicon.**
   - Geological Survey of India & Atomic Mineral Division: **Developed a** strategic plan for Rare Earth Element (REE) exploration**.**
   - Centre for Socio-Economic Progress (CSEP, 2023): **Assessed** 43 non-fuel minerals **for criticality based on** economic importance and supply risk**.**
2. **Policy and Regulatory Measures**
   - Mines and Minerals (Development and Regulation) Amendment Act, 2021: **Enables** private and public sector participation **in exploration and mining of critical minerals.**
   - National Mineral Policy, 2019: **Promotes** sustainable mining, domestic exploration, and beneficiation **of critical minerals.**
   - Union Budget 2024-25: Eliminated customs duties **on most critical minerals to boost domestic availability.**
3. **Exploration and Domestic Production**
   - Geological Survey of India (GSI): **Conducting** extensive exploration **for lithium, rare earths, and other critical minerals.**
   - Lithium Discovery (2023): **Significant deposits identified in** Reasi, Jammu & Kashmir**.**
   - Strategic Mineral Reserves: **Plans underway to establish reserves for critical minerals like** Lithium and Cobalt**.**
4. **International Collaborations and Trade**
   - Khanij Bidesh India Limited (KABIL, 2019): **A** joint venture under Ministry of Mines **to acquire critical mineral assets globally.**
   - **KABIL has partnerships with countries like** Argentina, Australia, and others**.**
   - Minerals Security Partnership (MSP, 2023): **India joined this** US-led initiative **to ensure a** stable and secure global critical minerals supply chain**.**

National Critical Mineral Mission (NCMM)

- Genesis: **Announced in the** Union Budget 2024-25 **to strengthen India's critical mineral ecosystem.**
- Key Objective: **To** secure India's critical mineral supply chain **by ensuring availability from both** domestic and international sources**.**
- Scope and Coverage: **Encompasses the** entire critical mineral value chain**, including:**
- Exploration and mining
- Beneficiation and processing
- Recovery from end-of-life products

Key Features of National Critical Mineral Mission (NCMM)

- **Provides** financial incentives **for exploration and recovery of minerals from** overburden and tailings**.**
- **Introduces a** fast-track regulatory approval process **for critical mineral mining projects.**
- **Promotes** acquisition of critical mineral assets abroad **by Indian PSUs and private companies.**
- **Facilitates** enhanced trade **with resource-rich countries.**
- **Plans for** stockpiling of critical minerals **within India.**
- **Supports the creation of** mineral processing parks**.**
- **Includes** offshore mining**, targeting polymetallic nodules containing** Cobalt, REEs, and other minerals**.**

Governance of National Critical Mineral Mission (NCMM)

- **Activities will be coordinated by the** Empowered Committee on Critical Minerals**, with the** Ministry of Mines **as the administrative authority.**

Committee on Critical Minerals

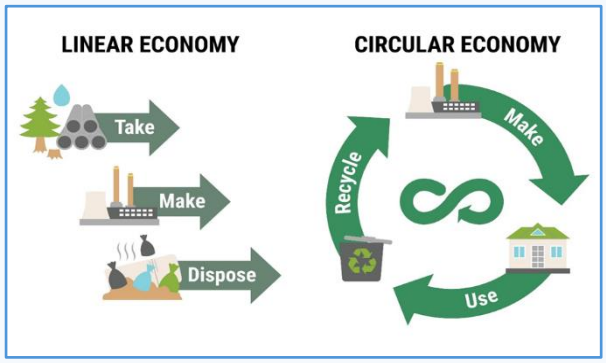
- **Chaired by** Dr. Veena Kumari Dermal**, Ministry of Mines.**
- Objective: **Identify minerals critical for India, considering** availability, monopoly, frontier technology applications, substitutability, supply risk, and recycling**.**
- Methodology:
- **Studied** critical mineral strategies of other nations **(USA, Australia, Canada, Japan, South Korea, UK).**
- **Conducted** inter-ministerial consultations **with ministries like Power, New & Renewable Energy, and Atomic Energy.**
- **Performed** statistical assessment **of substitutability, cross-cutting indices, and import reliance.**
- Outcome: 30 minerals identified as most critical**, including 2 fertilizer minerals.**

Recommendations

- **Establish a** National Institute for Critical Minerals **similar to Australia's** CSIRO**.**
- **Set up a** Centre of Excellence for Critical Minerals (CECM) **under the Ministry of Mines.**
- **Focus on** discovering next-generation mineral deposits**, periodic updating of the** critical minerals list**, and formulating a** national critical mineral strategy**.**

3.22. INDIA TO HOST WORLD CIRCULAR ECONOMY FORUM (WCEF) 2026

Context: India is set to host the World Circular Economy Forum (WCEF) in October 2026, marking a significant milestone in its sustainability journey. In the run-up to the event, Finland (a key partner) will conduct roadshows across Indian cities to advocate for circular economy principles beyond just waste management.



What is the World Circular Economy Forum (WCEF)?

- Global Platform: It is one of the world's leading events for circular economy solutions.
- Organizer: Founded by the Finnish Innovation Fund (SITRA).
- 2026 Edition: India will host the event, aiming to shift the narrative from "waste management" to "upstream product design" (extending product lifespan at the manufacturing stage).

Why is this Transition Critical for India?

- Economic Potential: The circular economy in India is projected to reach a market value of $2 trillion and create 10 million jobs by 2050 (Govt. of India estimates).
- UNDP Projection: Adopting circular models could yield $4.5 trillion in global economic benefits by 2030.
- Shift in Focus: The current focus is largely on waste management/recycling. The goal is to move towards resource efficiency and securing supply chains, a priority for 70% of CEOs globally.

Regional 3R and Circular Economy Forum

While WCEF is a global event, India recently engaged with the Regional 3R Forum, a key Asia-Pacific platform.

- Origin: Launched in 2009.
- Predecessor: The Hanoi 3R Declaration (2013-2023) set the initial voluntary goals.
- Current Mandate (Jaipur Declaration):
- Name: Jaipur 3R and Circular Economy Declaration (2025-2034).
- Goal: To achieve a resource-efficient, clean, resilient, and low-carbon society.
- Key Launch:Cities Coalition for Circularity (C-3).
- *Purpose:* A multi-nation alliance for city-to-city collaboration and private sector partnerships.
- *Structure:* A working group of member nations will finalize its framework.

Key Government Interventions

- CITIIS 2.0 (City Investments to Innovate, Integrate and Sustain):
- A sub-component of the Smart Cities Mission.
- Provides financial/technical assistance for integrated waste management.
- *Recent Update:* Memorandum of Understanding (MoU) signed to promote circular economy at the city level.

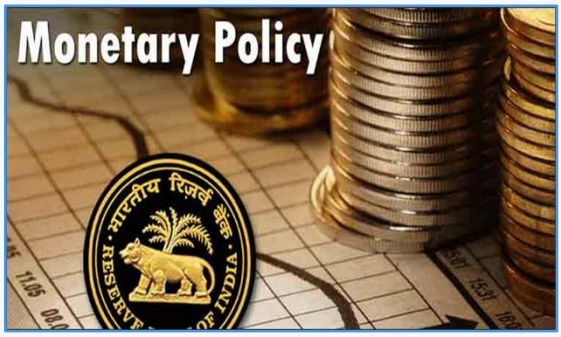
- Other Initiatives: Swachh Bharat Mission, GOBAR-Dhan Scheme, E-Waste Management Rules 2022, and Mission LiFE (Lifestyle for Environment).

Circular vs. Linear Economy

Feature	Linear Economy	Circular Economy
Model	Take → Make → Consume → Throw away	Share, Lease, Reuse, Repair, Recycle
Resource Use	Intensive; finite resources are depleted.	Regenerative; materials are kept in use.
End Game	Waste generation.	Zero waste; closing the loop.

3.23. MONETARY POLICY FRAMEWORK

Context: The Reserve Bank of India's Monetary Policy Committee (MPC) has announced a unanimous decision to recalibrate policy rates to foster growth momentum while managing inflation dynamics.



Key Policy Developments

- Repo Rate Adjustment: The MPC has reduced the policy repo rate by 25 basis points (bps), bringing it to 5.25%.
- Cumulative Impact: This marks a total reduction of 125 bps over the last four policy cycles.
- Policy Stance: The committee retained a "Neutral Stance," allowing flexibility to adjust rates in either direction based on incoming data.
- Revised Liquidity Rates:
- Standing Deposit Facility (SDF): 5.00%
- Marginal Standing Facility (MSF) & Bank Rate: 5.50%

Rationale: The Growth-Inflation Dynamics

- Disinflationary Trends:
- Headline inflation averaged 1.7% in Q2 2025-26, breaching the RBI's lower tolerance threshold of 2% for the first time under the flexible inflation targeting framework.
- October 2025 recorded a historic low inflation of 0.3%, driven primarily by benign food prices.
- Core inflation remains low, with minimal pressure from precious metal prices (~50 bps impact).
- Growth Trajectory:
- Real GDP growth accelerated to 8.2% in Q2, showing resilience.
- The rate cut utilizes the available policy space created by low inflation to preemptively support growth as it is expected to soften slightly.

Understanding Repo Rate

Definition: The interest rate at which the RBI lends short-term funds to commercial banks against Government Securities (G-Secs).

Implications of a Rate Cut (Current Scenario):

- Credit Cost: Lowers the cost of borrowing for banks, leading to cheaper home, auto, and corporate loans.
- Investment: Encourages capital expenditure (Capex) by businesses due to lower financing costs.

- Liquidity: Injects liquidity into the system, stimulating consumption demand.

Implications of a Rate Hike (Inverse Scenario):

- Inflation Control: Increases borrowing costs to curb excessive spending and stabilize prices.
- Currency Support: Higher rates can attract foreign portfolio investment (FPI), supporting the Rupee.

Institutional Framework: The Monetary Policy Committee (MPC)

- Mandate: Statutory body under the RBI Act, 1934, responsible for fixing the benchmark policy rate (Repo Rate) to maintain price stability (Inflation Target: 4% +/- 2%) while keeping growth in mind.
- Composition (6 Members):
- Chairperson: RBI Governor.
- Internal Members: Deputy Governor (Monetary Policy) + One Officer appointed by Central Board.
- External Members: Three experts appointed by the Central Government.
- Decision Making: Decisions are taken by a majority vote; the Governor holds a casting vote in case of a tie.

3.24. PLI 2.0: RECALIBRATING INDIA'S MANUFACTURING ARCHITECTURE

Context: The Department for Promotion of Industry and Internal Trade (DPIIT) recently released its year-end review, reporting that PLI schemes have attracted actual investments exceeding ₹1.88 lakh crore and generated over 12.3 lakh jobs across 14 sectors.

The Foundational Framework

- Launch & Objective: Introduced in April 2020, the Production-Linked Incentive (PLI) scheme aims to boost domestic manufacturing, attract global Original Equipment Manufacturers (OEMs), and reduce import dependence.
- Mechanism: It incentivizes incremental sales (over a base year) for products manufactured in domestic units.
- Scope: Currently covers 14 strategic sectors, including electronics, semiconductors, pharmaceuticals, and specialty steel.

Key Performance Indicators

- Investment Inflow: Actual investment exceeding ₹1.88 lakh crore across 14 sectors (As of June).
- Economic Impact: Incremental production/sales recorded over ₹17 lakh crore; Exports exceeded ₹7.5 lakh crore.
- Employment Generation: Created over 12.3 lakh jobs (direct and indirect).
- Sectoral Performance:
- High Growth: Mobile phones, pharmaceuticals, and food processing.
- Lagging Sectors: IT hardware, advanced chemicals, textiles, and specialty steel.
- Allied Ecosystem Growth:
- Startups: DPIIT recognized 2,01,335 startups, creating over 21 lakh jobs.
- Digital Commerce: ONDC processed over 326 million orders (as of October).

Structural Bottlenecks & Challenges

- Low Domestic Value Addition (DVA): Even in successful sectors like mobile manufacturing, local value addition remains in single digits due to reliance on imported sub-assemblies.
- Import Dependence: Critical components (semiconductors, PCBs) are largely imported, maintaining vulnerability in the supply chain.
- Market Constraints: Sectors like telecom face limited domestic demand; export-led growth is required to achieve economies of scale.
- Competitiveness: Indian manufacturers struggle with cost competitiveness compared to counterparts in China and Vietnam.
- R & D Deficit: Lack of indigenous investment in Research & Development for high-tech sectors keeps Indian firms dependent on foreign technology.

PLI 2.0: Proposed Reforms for Sustainable Growth

- Shift in Incentive Metrics: The government is considering linking incentives to Domestic Value Addition (DVA) and incremental exports rather than solely on incremental sales.
- Localization Focus:
- Promoting local manufacturing of PCBs and semiconductors.
- Encouraging Joint Ventures (JVs) for technology transfer from foreign OEMs.
- MSME Integration: Proposed special incentives and credit support to integrate MSMEs into the Global Value Chain (GVC) as component manufacturers.
- Strategic Inspiration: Mirrors industrial policies of China, Japan, and South Korea, which utilized foreign OEMs to build domestic capacity before transitioning to export-led growth.

***

UPSC PRELIMS PRACTICE QUESTIONS

1. With respect to Constitutional provisions on Cess and Excise Duty, consider the following statements:

1. A Cess is a tax on tax earmarked for a specific purpose, whereas a standard tax enters the Consolidated Fund of India for general utilization.
2. Under Article 270 of the Constitution, proceeds from Cesses and Surcharges are part of the divisible pool and must be shared with State Governments.
3. Tobacco products in India are a unique category that attracts both the Goods and Services Tax (GST) and Central Excise Duty.

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

Ans. (c) 1 and 3 only

Statement 1 is correct: A Cess is indeed often referred to as a "tax on tax" levied for a specific purpose (e.g., Health Cess, Education Cess). Unlike standard taxes which are generally used for any government expenditure, cess proceeds are earmarked for specific objectives.

Statement 2 is incorrect: Under Article 270 of the Constitution, cesses and surcharges levied by the Centre are **excluded** from the divisible pool of taxes. This means the Centre retains 100% of the proceeds and is not required to share them with State Governments.

Statement 3 is correct: Tobacco products are a unique exception in the indirect tax regime. They attract **both** GST (Goods and Services Tax) and Central Excise Duty, unlike most other goods which only attract GST.

2. With respect to the eligibility and regulatory criteria for Masala Bonds, consider the following statements:

1. The issuance of Masala Bonds is strictly restricted to government statutory bodies and Public Sector Undertakings (PSUs) to fund public infrastructure projects.
2. A mandatory prerequisite for subscription is that the investor must be from a country whose securities market regulator is a signatory to the International Organization of Securities Commissions (IOSCO).

Which of the statements given above is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

Ans. (b) 2 only

Statement 1 is incorrect: The issuance of Masala Bonds is not restricted to government bodies or PSUs. Corporate entities (e.g., HDFC, Indiabulls Housing Finance) are also eligible to issue these bonds to raise capital.

Statement 2 is correct: To ensure regulatory compliance and transparency, it is a mandatory requirement that the investor must be from a country that is a member of the Financial Action Task Force (FATF) and whose securities market regulator is a signatory to the International Organization of Securities Commissions (IOSCO).

3. With respect to Competitiveness Indices (NEER and REER), consider the following statements:

1. The Nominal Effective Exchange Rate (NEER) tracks the currency's external value against a basket of currencies but ignores inflation differentials.
2. A Real Effective Exchange Rate (REER) greater than 100 implies that the currency is undervalued, which makes domestic goods cheaper for foreign buyers.
3. High domestic inflation relative to global trading partners typically leads to an appreciation in the REER.

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

Ans. (c) 1 and 3 only

- **Statement 1 is correct:** The **Nominal Effective Exchange Rate (NEER)** is the weighted average of the rupee's value against a basket of currencies of major trading partners. It reflects the external value of the currency but does **not** account for the inflation differentials between the countries.
- **Statement 2 is incorrect:** A **Real Effective Exchange Rate (REER)** greater than 100 indicates that the currency is **overvalued**. An overvalued currency means that domestic goods are relatively expensive in the international market, which hurts export competitiveness. Conversely, an REER less than 100 implies undervaluation, making exports cheaper.
- **Statement 3 is correct:** REER is calculated by adjusting the NEER for inflation differentials. If domestic inflation is **higher** than that of trading partners, the REER increases (appreciates). This indicates that despite any nominal depreciation, the higher cost of production domestically (due to inflation) is eroding trade competitiveness.

4. With respect to the Consumer Price Index (CPI), consider the following statements:

1. It serves as the primary metric used by the Reserve Bank of India (RBI) for inflation targeting.
2. The index is compiled and released by the Office of the Economic Adviser under the Ministry of Commerce and Industry.
3. It is used as a tool to regulate the dearness allowance (DA) and wages.

Which of the statements given above are correct?

(a) 1 and 2 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) 1, 2 and 3

Ans. (c) 1 and 3 only

Statement 1 is correct: In 2014, the Reserve Bank of India (RBI) adopted the Consumer Price Index (Combined) as the primary metric for measuring inflation and for its inflation targeting framework.

Statement 2 is incorrect: The CPI is compiled and released by the **National Statistical Office (NSO)** under the Ministry of Statistics and Programme Implementation (MoSPI). The Office of the Economic Adviser (Ministry of Commerce) releases the Wholesale Price Index (WPI).

Statement 3 is correct: CPI data, specifically CPI-IW (Industrial Workers), is the benchmark used to calculate the Dearness Allowance (DA) for government employees and to adjust wages and pensions to offset the cost of living.

5. Arrange the following countries in decreasing order of their share in India's crude oil imports for the FY 2024-25:

1. Saudi Arabia
2. Russia
3. Iraq
4. USA

Select the correct answer using the code given below:

(a) 2 - 3 - 1 – 4
(b) 3 - 2 - 1 - 4
(c) 2 - 1 - 3 - 4
(d) 3 - 1 - 2 – 4

Ans. (a) 2 - 3 - 1 – 4

The correct order of share (highest to lowest) is:

1. **Russia** (~36%)
2. **Iraq** (~18-19%)
3. **Saudi Arabia** (~15-16%)
4. **USA** (~6-7%)

6. With respect to Exchange Traded Funds (ETFs) and Gold ETFs, consider the following statements:

I. An ETF is a basket of securities that can contain various types of investments such as stocks, commodities, or bonds.
II. ETFs trade on an exchange similar to how individual stocks are traded.
III. Gold ETFs can be held in dematerialised form.

Which of the statements given above are correct?

(a) I and II only
(b) II and III only
(c) I and III only
(d) I, II and III

Ans. (d) I, II and III

Statement 1 is Correct: ETFs function as a collection of diverse investments, including stocks, commodities, and bonds.

Statement 2 is Correct: Unlike traditional mutual funds, ETFs are listed and traded directly on stock exchanges like individual equities.

Statement 3 is Correct: Gold ETF units represent physical gold and can be securely held in paper or dematerialised (electronic) form.

7. With respect to the regulatory framework of Foreign Direct Investment (FDI) in India, consider the following statements:

1. Any equity investment by a non-resident entity which is less than 10% of the post-issue paid-up equity capital is classified as FDI.
2. The Consolidated FDI Policy is issued by the Department for Promotion of Industry and Internal Trade (DPIIT).
3. 'Greenfield Investment' refers to Foreign Direct Investment involving the acquisition or merger with an existing facility in the host country.

How many of the statements given above are correct?

(a) Only one
(b) Only two
(c) All three
(d) None

Ans. (a) Only one

Statement 1 is Incorrect: An investment is classified as FDI if it is **10% or more**. Less than 10% is typically treated as Foreign Portfolio Investment (FPI).

Statement 2 is Correct: The DPIIT (Ministry of Commerce) issues the Consolidated Policy, while FEMA is administered by the RBI.

Statement 3 is Incorrect: This definition describes **Brownfield Investment**. Greenfield refers to building a **new** operation from the ground up.

8. With respect to the 'Balance of Trade' (BoT) and 'Balance of Payments' (BoP), consider the following statements:

1. The Balance of Trade includes the value of both goods and services exchanged between a country and the rest of the world.
2. A deficit in the Balance of Trade necessarily implies a deficit in the Current Account of the Balance of Payments.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (d) Neither 1 nor 2

Statement 1 is Incorrect: The **Balance of Trade (BoT)** refers strictly to the difference between the value of a country's exports and imports of **Goods (Merchandise/Visible items)** only. It does **not** include services. Trade in services (like software, tourism, consulting) is recorded separately under the 'Invisibles' section of the Current Account.

Statement 2 is Incorrect: A deficit in the Balance of Trade (Trade Deficit) does **not necessarily** imply a deficit in the **Current Account**. The Current Account is a broader measure that includes the Balance of Trade **plus** Net Invisibles (Services + Income + Transfers).

9. With respect to the properties and occurrence of Lithium, consider the following statements:

1. It is the lightest solid element under standard conditions and possesses a high electrochemical potential.
2. Due to its high reactivity, it is naturally found in its pure metallic form within pegmatite belts.
3. It serves a critical function in carbon dioxide absorption systems in confined environments like spacecraft.

Which of the statements given above is/are correct?

(a) 1 and 2 only
(b) 1 and 3 only
(c) 2 and 3 only
(d) 1, 2 and 3

Ans. (b) 1 and 3 only

- **Statement 1 is correct:** Lithium is described as the least dense solid element with high electrochemical potential, making it ideal for batteries.
- **Statement 2 is incorrect:** Lithium never occurs freely in nature; it is found in pegmatitic minerals or brines.
- **Statement 3 is correct:** The text confirms its use in CO_2 removal and air purification in spacecraft and submarines.

10. With respect to Exchange Rate metrics, consider the following statements:

1. Real Effective Exchange Rate (REER) is the Nominal Effective Exchange Rate (NEER) adjusted for inflation differentials between trading partners.
2. An REER value exceeding 100 indicates that the currency is undervalued and exports are highly competitive.
3. REER is considered a better indicator of trade competitiveness than NEER.

Which of the statements given above is/are correct?

(a) 1 and 2 only
(b) 1 and 3 only
(c) 2 and 3 only
(d) 1, 2 and 3

Ans. (b) 1 and 3 only

Statement 1 is correct: The **Real Effective Exchange Rate (REER)** is indeed the weighted average of a country's currency against a basket of other currencies (NEER), adjusted for the effects of inflation (price differentials) between the home country and its trading partners.

Statement 2 is incorrect: An REER value **exceeding 100** (or rising) indicates that the domestic currency is **overvalued** in real terms. An overvalued currency makes domestic goods more expensive abroad, thereby rendering exports **less competitive**. Conversely, an REER below 100 indicates undervaluation, making exports more competitive.

Statement 3 is correct: Since **REER** accounts for relative price levels (inflation) across countries, it provides a more accurate picture of the external competitiveness of a country's tradable goods compared to the **Nominal Effective Exchange Rate (NEER)**, which only reflects nominal exchange rate changes.

11. With respect to the Economic Implications of Weak Currency, consider the following statements:

1. A weaker currency generally reduces the burden of servicing External Commercial Borrowings (ECBs).
2. A rise in import costs due to depreciation can worsen the Current Account Deficit (CAD).

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (b) 2 only

Statement 1 is incorrect; servicing dollar-denominated debt becomes more expensive as more local currency is needed to buy dollars.

Statement 2 is correct; costlier imports (like fuel and electronics) inflate the import bill, straining the CAD.

12. With respect to Foreign Direct Investment (FDI) metrics, consider the following statements:

1. Net FDI is calculated by subtracting repatriation of profits and Outward Direct Investment (ODI) from Gross FDI inflows.
2. Investment in a listed Indian company is classified as FDI only if it constitutes less than 10% of the paid-up equity capital.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (a) 1 only

Statement 1 is correct; Net FDI accounts for outflows like repatriation and ODI. Statement 2 is incorrect; for listed companies, FDI requires an equity stake of 10% or more; less than 10% is typically treated as Foreign Portfolio Investment (FPI).

13. With respect to the REPM (Rare Earth Permanent Magnets) Scheme, consider the following statements:

1. The scheme aims to establish a complete domestic value chain, converting rare earth oxides to finished magnets.
2. Samarium Cobalt (SmCo) magnets are identified under the scheme as the strongest commercially available permanent magnets.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (a) 1 only

Statement 1 is correct; the initiative targets the entire value chain from oxides to magnets. Statement 2 is incorrect; Neodymium Iron Boron (NdFeB) is the strongest commercially available magnet, while SmCo is known for thermal stability.

14. With respect to the 'Tex-RAMPS' Scheme, consider the following statements:

1. It is a Centrally Sponsored Scheme where the financial burden is shared between the Union and State Governments.
2. The scheme is implemented for a period aligning with the next Finance Commission cycle (FY 2025-26 to FY 2030-31).

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (b) 2 only

Statement 1 is incorrect; it is a Central Sector Scheme, 100% funded by the Union Government. Statement 2 is correct; the duration aligns with the next Finance Commission cycle.

15. With respect to India's Maritime Strategy and Diplomacy, consider the following statements:

1. The vision of 'MAHASAGAR' aims to expand engagement beyond the IOR to include Africa, ASEAN, and Pacific Island nations.
2. As part of capacity-building initiatives, India gifted the missile corvette INS Kirpan to the Sri Lankan Navy.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (a) 1 only

Statement 1 is correct; MAHASAGAR (Mutual And Holistic Advancement for Security And Growth Across Regions) targets a broader geographical scope. Statement 2 is incorrect; INS Kirpan was gifted to the Vietnam People's Navy.

16. With respect to the financial architecture of the PM Internship Scheme, consider the following statements:

1. The total monthly stipend is ₹5,000, which is fully funded by the Central Government via Direct Benefit Transfer.
2. Interns are provided a one-time incidental grant of ₹6,000 upon enrolment.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (b) 2 only

Statement 1 is incorrect; of the ₹5,000 stipend, the government provides ₹4,500, while the company contributes ₹500 from CSR funds. Statement 2 is correct; a one-time grant of ₹6,000 is provided.

17. With reference to Regional Rural Banks (RRBs) in India, consider the following statements:

I. They were established based on the recommendations of the Dantwala Committee.
II. The State Government holds the smallest equity share among the three stakeholders.
III. They are regulated by NABARD under the Regional Rural Banks Act, 1976.

Which of the statements given above is/are correct?

(a) I and II only
(b) II only
(c) I and III only
(d) II and III only

Ans. (b) II only

Statement I is incorrect: they were recommended by the Narasimham Committee.

Statement II is correct: State Govt (15%) < Sponsor Bank (35%) < Centre (50%).

Statement III is incorrect: they are regulated by RBI and supervised by NABARD.

18. With reference to the 'National Pension System (NPS)', consider the following statements:

I. It is mandatory for all Central Government employees, including the Armed Forces.
II. Overseas Citizens of India (OCI) are eligible to join the scheme.
III. The lump sum withdrawal of 60% at maturity is completely exempt from income tax.

Which of the statements given above is/are correct?

(a) I and II only
(b) II and III only
(c) III only
(d) I, II and III

Ans. (b) II and III only

Statement 1: Incorrect

NPS is mandatory for all Central Government recruits who joined after January 1, 2004, but it specifically excludes the Armed Forces.

Statement 2: Correct

As per the 2019/20 PFRDA guidelines, OCI card holders are eligible to open and contribute to an NPS account.

Statement 3: Correct

Upon reaching age 60, a subscriber can withdraw up to 60% of the total corpus as a lump sum, and this entire amount is exempt from income tax.

19. With reference to India's Core Sector, consider the following statements:

1. The eight core industries collectively account for more than 40% of the weight in the Index of Industrial Production (IIP).
2. Cement, steel, fertilisers, coal, and natural gas together make up over 50% of the weight in the Index of Eight Core Industries (ICI).
3. The Index of Eight Core Industries (ICI) is compiled and released by the Central Statistical Organisation (CSO).

Which of the statements given above is/are correct?

(a) 1 and 2 only
(b) 3 only
(c) 1 only
(d) 1 and 3 only

Ans. (c) 1 only

Statement 1 is correct: The eight core industries collectively account for 40.27% of the IIP, making them a critical driver of industrial output.

Statement 2 is incorrect: The weightages of the core industries are: Refinery Products (28.04%), Electricity (19.85%), Steel (17.92%), Coal (10.33%), Crude Oil (8.98%), Natural Gas (6.88%), Cement (5.37%), Fertilisers (2.63%). Cement, steel, fertilisers, coal, and natural gas together sum to ~42.36%, not over 50%.

Statement 3 is incorrect: The ICI is compiled and released by the Office of the Economic Adviser (OEA), DPIIT, Ministry of Commerce & Industry, not by CSO. CSO compiles the IIP.

20. With reference to Additional Tier-1 (AT1) Bonds in India, consider the following statements:

1. AT1 bonds are perpetual instruments and form part of a bank's Tier-1 Capital under the Basel III framework.
2. Interest payments on AT1 bonds are mandatory, and non-payment is treated as a default by the issuer.
3. AT1 bonds can be written down or converted into equity if the issuing institution's capital falls below prescribed regulatory thresholds.

Which of the statements given above is/are correct?

(a) 1 and 2 only
(b) 1 and 3 only
(c) 2 and 3 only
(d) 1, 2 and 3

Ans. (b) 1 and 3 only

Statement 1 is correct: AT1 bonds are perpetual (no maturity) instruments and are included in Tier-1 Capital, along with Common Equity Tier-1 (CET-1), as per Basel III norms.

Statement 2 is incorrect: Coupon payments on AT1 bonds are discretionary. The issuer may skip interest payments without it being treated as a default.

Statement 3 is correct: AT1 bonds are loss-absorbing instruments and may be written down (partially or fully) or converted into equity when capital adequacy falls below regulatory thresholds.

21. With reference to Critical Minerals in India, consider the following statements:

1. Critical minerals are essential for strategic sectors such as defense, renewable energy, and high-tech industries.
2. India is completely self-sufficient in all critical minerals and does not depend on imports.
3. The National Critical Mineral Mission (NCMM) aims to secure critical minerals across the entire value chain, including exploration, processing, and recycling.

Which of the statements given above is/are correct?

(a) 1 and 2 only
(b) 1 and 3 only
(c) 2 and 3 only
(d) 1, 2 and 3

Ans. (b) 1 and 3 only

Statement 1 is correct: Critical minerals are vital for sectors like defense, EVs, renewable energy, aerospace, and high-tech manufacturing, making them strategically important.

Statement 2 is incorrect: India is not fully self-sufficient and imports minerals like Beryllium, Cobalt, Indium, and Germanium.

Statement 3 is correct: The NCMM covers the full value chain of critical minerals, including exploration, mining, beneficiation, processing, manufacturing, and recycling to strengthen supply security.

22. With respect to the core principles of a Circular Economy, consider the following statements:

1. It is an economic system aimed at eliminating waste and the continual use of resources.

2. The model relies primarily on the "take-make-dispose" approach to maximize industrial output.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (a) 1 only

Statement 1 is correct; the circular economy focuses on keeping resources in use for as long as possible. Statement 2 is incorrect; "take-make-dispose" is the definition of a **Linear Economy**, which the circular model seeks to replace

23. With respect to the institutional framework of the Monetary Policy Committee (MPC), consider the following statements:

1. The MPC is a statutory body constituted under the Reserve Bank of India Act, 1934.
2. The RBI Governor holds a veto power to override the majority decision of the committee in case of a disagreement.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (a) 1 only

Statement 1 is correct; the MPC has a statutory mandate under the RBI Act. Statement 2 is incorrect; the Governor does not have a veto power but holds a **casting vote** only in the event of a tie.

24. With respect to the proposed reforms (PLI 2.0) for sustainable growth, consider the following statements:

1. The government is considering a shift in incentive metrics to link payouts to Domestic Value Addition (DVA) and incremental exports rather than solely on sales.
2. The proposed reforms aim to integrate MSMEs into the Global Value Chain (GVC) by providing special incentives for them to operate as component manufacturers.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (c) Both 1 and 2

Statement 1 is correct; this shift aims to cure the low DVA issue. Statement 2 is correct; integrating MSMEs to build a robust supply chain is a key part of the proposed reforms.

Scan to attempt more questions

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ENVIRONMENT & GEOGRAPHY

4.1. BIODIVERSITY VS. DEVELOPMENT: THE GREAT NICOBAR DILEMMA

Context: Two potentially new species—a wolf snake (Lycodon irwini) and a bird (Great Nicobar Crake)—have been documented on **Great Nicobar Island**. This discovery comes amidst the ongoing implementation of the massive **Great Nicobar Mega Infrastructure Project**, raising fresh debates on the island's ecological sensitivity.

Species in News:

A. Lycodon irwini (Wolf Snake)

- **Naming:** Named after the late Australian conservationist **Steve Irwin**.
- **Discovery:** Described by researchers from Pondicherry University and Max Planck Institute.
- **Status:** Due to its rarity and restricted range, researchers have recommended it be classified as **"Endangered"** under the **IUCN Red List**.
- **Habitat:** Found on the east coast of Great Nicobar.

B. Great Nicobar Crake (Rallina sp)

- **Type:** A potentially new species of bird belonging to the genus Rallina.
- **Observation:** Photographed only thrice in a decade; details on its population and biology are "data deficient."
- **Significance:** It shows distinct morphological features different from known crake species.

Biodiversity Profile of Great Nicobar

- **Fauna:** Home to over 1,800 species with **24% endemism** (species found nowhere else).
- **Recent Trends:** Nearly 40 new species (frogs, crabs, geckos) described since 2021.

The Great Nicobar Project: Strategic Masterplan

A. Project Overview

- **Nodal Agency:** Andaman and Nicobar Islands Integrated Development Corporation (**ANIIDCO**).
- **Conceived By:** NITI Aayog (Approved in 2021).
- **Four Key Components:**
    1. **International Transshipment Port:** At **Galathea Bay** (Deep-sea port).
    2. **Greenfield International Airport.**
    3. **Power Plant:** 450 MW (Gas + Solar).
    4. **Modern Township.**

B. Why is it Strategically Vital?

- **Location:** The island lies at the mouth of the **Malacca Strait**, a global shipping choke-point.
- **Maritime Hub:** Aims to capture transshipment cargo currently handled by Colombo or Singapore.
- **Defense:** Enhances the **Tri-Service Command's** reach in the Indo-Pacific.

What are the Critical Concerns?

A. Ecological Risks

- **Galathea Bay:** It is a prime nesting site for the **Leatherback Sea Turtle** (World's largest sea turtle) and a biologically rich wetland.
- **Coral Reefs:** Dredging for the port poses a threat to surrounding coral colonies.
- **Deforestation:** Involves felling nearly 9.6 lakh trees, impacting carbon sequestration.

B. Tribal & Geological Risks

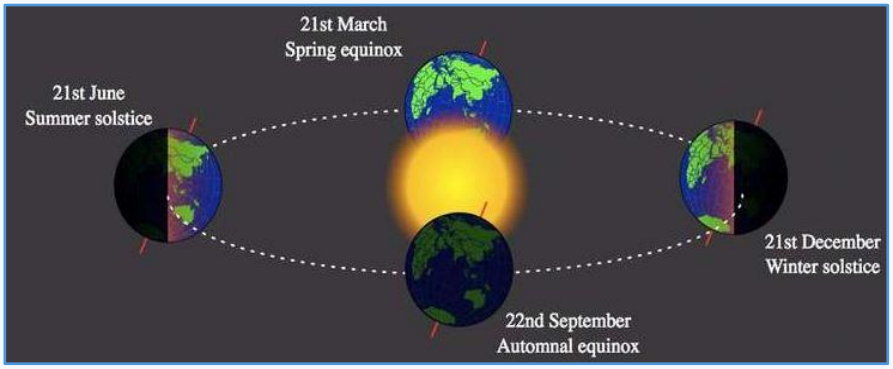
- **Tribal Rights:** The project overlaps with the habitat of the **Shompens** (a **PVTG** - Particularly Vulnerable Tribal Group) and the **Nicobarese**.
- **Seismic Vulnerability:** The island sits on the "Ring of Fire" (seismic zone) and is close to the epicenter of the 2004 Tsunami

Key Geographical Location:

Galathea Bay	Located on the **Southern Coast** of Great Nicobar; nesting site for Leatherback Turtles.
Shompen Tribe	**PVTG** indigenous to the interior forests of Great Nicobar; largely isolated.
Ten Degree Channel	Separates the **Andaman Islands** (North) from the **Nicobar Islands** (South).
Indira Point	Southernmost point of India's territory, located on Great Nicobar Island.

4.2. THE WINTER SOLSTICE: CELESTIAL MECHANICS & SIGNIFICANCE

What Drives the Solstice?



- **The Mechanism:** The phenomenon is driven by Earth's axial tilt of **23.4 degrees**. The solstice occurs when one of the Earth's poles is tilted **furthest away** from the Sun.
- **The Result:** It marks the **shortest day** and the longest night of the year in that hemisphere.
- **Etymology:** The term is derived from the Latin solstitium (sol = Sun, stitium = to stop), implying the sun stands still in its seasonal movement before reversing direction.

Global Timing: Northern Vs. Southern Hemispheres

- **Northern Hemisphere:** The Winter Solstice typically falls on **December 21 or 22**.
  - During this time, the North Pole points away from the Sun.
  - It experiences the fewest hours of sunlight.
- **Southern Hemisphere:** The Winter Solstice occurs on **June 20 or 21**.
- **Post-Solstice Trend:** In the Northern Hemisphere, every day following the December solstice gradually becomes longer until the **Summer Solstice** in June.

Cultural & Astronomical Relevance

- **Symbolism:** Historically, it symbolizes the "death and rebirth" of the Sun.
- **Monuments:** Ancient structures like **Stonehenge** are aligned with the sunset or sunrise of the winter solstice.
- **Cosmic Coincidence:** The December solstice often coincides with the peak of the **Ursid Meteor Shower**, caused by debris from comet **8P/Tuttle**.

4.3. PROJECT ELEPHANT

Context: India hosts the largest population of Asian elephants, accounting for **over 60%** of the global wild count. The latest 'Status of Elephants in India: DNA-based Synchronous All-India Population Estimation' estimates **22,446** elephants in India.

Conducting Body: The exercise was executed by the **Wildlife Institute of India (WII)** under the aegis of **Project Elephant (1992)**.

Paradigm Shift in Methodology:

- **Old Method:** Visual and dung-based counts (prone to errors).
- **New Method: DNA Mark–Recapture Technique**. It uses unique genetic markers to identify individual elephants, similar to tiger estimation.
- **Significance:** It overcomes the challenge of elephants lacking distinctive physical features, providing a scientifically accurate count using **Spatially Explicit Capture–Recapture (SECR)** models.

Regional Distribution & Trends

- **State-wise Population (Top States):**
  1. **Karnataka:** 6,013 (Highest).
  2. **Assam:** 4,159.
  3. **Tamil Nadu:** 3,136.
  4. **Kerala:** 2,785.
- **Regional Trends:**
  - **Western Ghats:** Remains the stronghold with 11,934 elephants, though numbers have declined.
  - **Northeastern Hills:** Significant decline observed (6,559 elephants).
  - **Central Indian Highlands:** Decline recorded (1,891 elephants).
  - **Shivalik–Gangetic Plains:** Population remains nearly **unchanged/stable** (2,062 elephants).

Critical Concerns: Habitat & Conflict

- **Habitat Fragmentation:** Expansion of **coffee and tea plantations**, farmland fencing, and infrastructure projects are severely fragmenting habitats, particularly in the **Western Ghats**.

- **The Conflict Paradox in Central India:**
  - Central India holds **less than 10%** of the country's elephant population.
  - However, it accounts for **45% of human deaths** caused by elephants, highlighting intense Human-Elephant Conflict (HEC).
- **Conflict Hotspots:** Highest in **Assam** (Sonitpur, Golaghat) and Central India (Jharkhand, Chhattisgarh, Odisha).
- **Threat Assessment:** While **poaching incidents have declined**, habitat degradation has emerged as the primary threat.

Species Profile (Static Concepts)

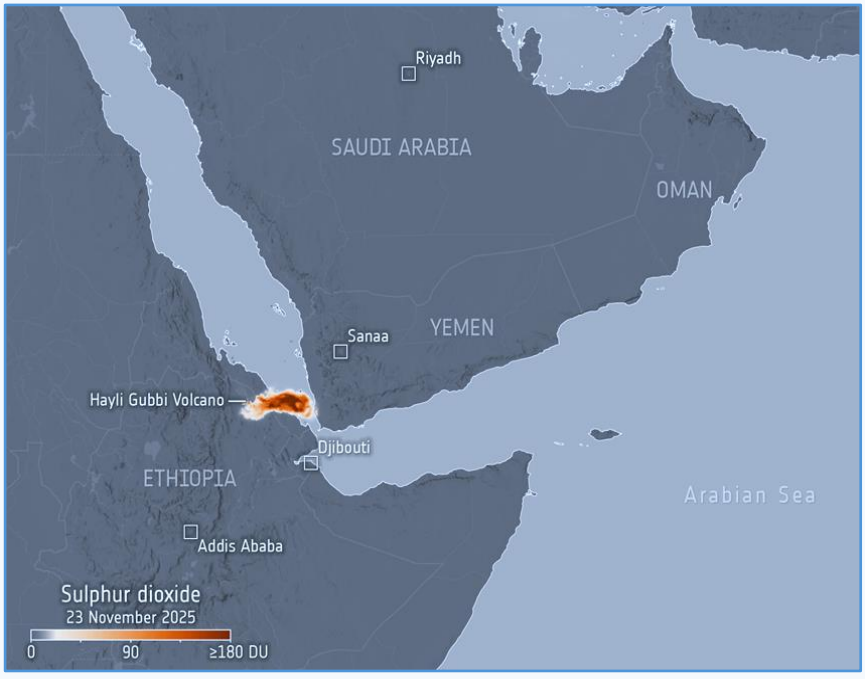
- **Subspecies:** Indian, Sumatran, and Sri Lankan.
- **Social Structure:** Led by a **Matriarch** (oldest female).
- **Reproduction:** Longest gestation period among mammals (**22 months/680 days**).
- **Protection Status:**
  - **IUCN Red List:** Endangered.
  - **Wildlife (Protection) Act, 1972:** Schedule I.
  - **CITES:** Appendix I.

Government Initiatives

- **Mike Programme:** Monitoring the Illegal Killing of Elephants (International collaboration).
- **Gaj Yatra:** Awareness campaign to celebrate elephants.
- **Compensation:** Ex-gratia for loss of life/property due to conflict.
- **Legal Shield:** Schedule I status under WPA, 1972 prohibits hunting.

4.4. THE HAYLI GUBBI ERUPTION (2025)

Event Overview & Trajectory



- The Event: On November 23, 2025, the Hayli Gubbi volcano in Ethiopia, dormant for nearly 12,000 years, experienced a massive Sub-Plinian eruption.
- Plume Dynamics: The eruption generated an ash column rising to 45,000 ft (FL450).
- Dispersion Path: Driven by high-altitude westerly winds and jet streams, the plume drifted across the Red Sea, Yemen, and Oman, moving toward the Arabian Sea and Western India.

- Current Concern: Primary risks involve aviation safety (due to volcanic glass in engines) and upper-atmosphere visibility. Ground-level air quality impact in India is expected to be minimal due to the plume's high altitude.

Geological Setting & Tectonics

- Location: Situated in the Afar Depression (Ethiopia), within the Erta Ale volcanic range.
- Volcano Type: Shield Volcano—characterised by a broad, low-gradient structure formed by fluid basaltic lava flows.
- Tectonic Driver: The volcano sits on the East African Rift System (EARS), a divergent boundary where the Nubian Plate and Somali Plate are separating.
- The "Triple Junction": The region is geologically unique as the meeting point of the Red Sea Rift, Gulf of Aden Rift, and East African Rift, aided by a deep mantle plume that thins the crust.

Mechanism of Eruption

- Plate Divergence: The pulling apart of tectonic plates creates deep fissures.
- Crustal Thinning: Reduced pressure allows magma from the mantle plume to ascend rapidly.
- Seismic Precursors: The eruption was likely preceded by earthquake swarms indicating magma movement through fissures.

Plume Composition & Atmospheric Impact:

- Constituents: The cloud contains silicate ash, rock fragments, volcanic glass shards, and Sulphur Dioxide (SO_2).
- Aviation Hazard: Volcanic glass (silica) melts inside jet engines, causing failure; this necessitates flight diversions.
- Climatic Effect: High-altitude aerosols and SO_2 can reflect solar radiation, potentially causing temporary localized cooling or haze.

Socio-Economic & Environmental Consequences

- Aviation & Trade: Disruption of flight routes over the Red Sea and Arabian Peninsula increases logistics costs and travel delays.
- Agriculture (Local): In the Afar region, heavy ashfall threatens crop yields, contaminates water bodies, and affects livestock grazing.
- Ecological Damage: Ash deposits alter soil pH and damage local vegetation, while gas emissions degrade regional air quality.

Regional Fact File: Ethiopia & African Volcanology

- Geopolitical Borders: Ethiopia is landlocked, bordered by Eritrea (North), Djibouti (Northeast), Somalia (East), Kenya (South), South Sudan (West), and Sudan (Northwest).
- Other Notable African Volcanoes:
- Mt. Nyiragongo (DR Congo): Famous for fast-moving lava lakes.
- Erta Ale (Ethiopia): Known for persistent lava lake activity.
- Dabbahu & Alayta (Ethiopia): Active rift volcanoes in the Afar region.

Event Overview & Trajectory

- The Event: On November 23, 2025, the Hayli Gubbi volcano in Ethiopia, dormant for nearly 12,000 years, experienced a massive Sub-Plinian eruption.
- Plume Dynamics: The eruption generated an ash column rising to 45,000 ft (FL450).
- Dispersion Path: Driven by high-altitude westerly winds and jet streams, the plume drifted across the Red Sea, Yemen, and Oman, moving toward the Arabian Sea and Western India.
- Current Concern: Primary risks involve aviation safety (due to volcanic glass in engines) and upper-atmosphere visibility. Ground-level air quality impact in India is expected to be minimal due to the plume's high altitude.

Geological Setting & Tectonics

- Location: Situated in the Afar Depression (Ethiopia), within the Erta Ale volcanic range.
- Volcano Type: Shield Volcano—characterised by a broad, low-gradient structure formed by fluid basaltic lava flows.
- Tectonic Driver: The volcano sits on the East African Rift System (EARS), a divergent boundary where the Nubian Plate and Somali Plate are separating.
- The "Triple Junction": The region is geologically unique as the meeting point of the Red Sea Rift, Gulf of Aden Rift, and East African Rift, aided by a deep mantle plume that thins the crust.

Mechanism of Eruption

- Plate Divergence: The pulling apart of tectonic plates creates deep fissures.
- Crustal Thinning: Reduced pressure allows magma from the mantle plume to ascend rapidly.
- Seismic Precursors: The eruption was likely preceded by earthquake swarms indicating magma movement through fissures.

Plume Composition & Atmospheric Impact:

- Constituents: The cloud contains silicate ash, rock fragments, volcanic glass shards, and Sulphur Dioxide (SO2).
- Aviation Hazard: Volcanic glass (silica) melts inside jet engines, causing failure; this necessitates flight diversions.
- Climatic Effect: High-altitude aerosols and SO2 can reflect solar radiation, potentially causing temporary localized cooling or haze.

Socio-Economic & Environmental Consequences

- Aviation & Trade: Disruption of flight routes over the Red Sea and Arabian Peninsula increases logistics costs and travel delays.
- Agriculture (Local): In the Afar region, heavy ashfall threatens crop yields, contaminates water bodies, and affects livestock grazing.
- Ecological Damage: Ash deposits alter soil pH and damage local vegetation, while gas emissions degrade regional air quality.

Regional Fact File: Ethiopia & African Volcanology

- Geopolitical Borders: Ethiopia is landlocked, bordered by Eritrea (North), Djibouti (Northeast), Somalia (East), Kenya (South), South Sudan (West), and Sudan (Northwest).
- Other Notable African Volcanoes:
- Mt. Nyiragongo (DR Congo): Famous for fast-moving lava lakes.
- Erta Ale (Ethiopia): Known for persistent lava lake activity.
- Dabbahu & Alayta (Ethiopia): Active rift volcanoes in the Afar region.

4.5. NATIONAL TIGER CONSERVATION AUTHORITY (NTCA)

Legal & Administrative Framework

- Statutory Body: Established under the Wildlife (Protection) Act, 1972 (amended in 2006).
- Ministry: Operates under the Ministry of Environment, Forest and Climate Change (MoEFCC).
- Composition:
- Chairperson: Union Minister of MoEFCC.
- Vice-Chairperson: Minister of State, MoEFCC.
- Members: Three Members of Parliament (2 from Lok Sabha, 1 from Rajya Sabha), eight experts in wildlife conservation, and various ex-officio government secretaries.
- Objective: To provide statutory authority to Project Tiger (launched in 1973) and ensure legal compliance for tiger conservation plans.

Key Powers & Functions

- Approval of Plans: Approves the Tiger Conservation Plan (TCP) prepared by State Governments.
- Ecological Oversight: Evaluates sustainable ecology and can prohibit unsustainable land uses (mining, industry) within tiger reserves.
- Normative Standards: Lays down standards for tourism in tiger reserves.
- Dispute Resolution: Provides for management focus in addressing human-wildlife conflict and emphasizes coexistence.
- Binding Directions: The NTCA can issue written directions to any person or authority for tiger protection, and they are legally bound to comply.

Landmark Initiatives

- M-STrIPES: (Monitoring System for Tigers – Intensive Protection and Ecological Status). A software-based tool using GPS, GPRS, and remote sensing to monitor patrolling and ecological trends.
- Project Cheetah: NTCA is the nodal agency for the inter-continental translocation of cheetahs to Kuno National Park and now expanding to Gandhi Sagar Wildlife Sanctuary (MP) and Banni Grasslands (Gujarat).
- Tiger Census (AITE): Conducts the All India Tiger Estimation every four years.
- Latest (5th Cycle): India has 3,682 tigers (as of 2023 reports), showing a 6% annual growth rate.
- 6th Cycle (2025): The 6th cycle was officially launched in late 2024/early 2025 with an emphasis on DNA profiling.
- MEE (Management Effectiveness Evaluation): A global framework used by NTCA to rate the performance of Tiger Reserves (Categories: Excellent, Very Good, Good, Fair).

Quick Facts for Revision

Feature	Details
Total Tiger Reserves	58 (Recently added: Guru Ghasidas-Tamor Pingla (Chhattisgarh), Ratapani (Madhya Pradesh), Madhav (Madhya Pradesh)
Project Tiger Logo	Recently updated for the 50th anniversary (1973–2023).
International Link	India has MoUs with Cambodia (reintroduction) and Bangladesh (Sundarbans).
Funding Pattern	90:10 for NE and Himalayan States; 50:50 for others (Centrally Sponsored Scheme).

4.6. GOA TIGER RESERVE: THE CEC'S STRATEGIC BLUEPRINT

Context: The Development: The Supreme Court-appointed Central Empowered Committee (CEC) has recommended notifying the Goa Tiger Reserve in a phased manner.

The Trigger: A legal battle between the Goa Foundation (NGO) and the State Government over a Bombay High Court order (July 2023) directing the notification of a Tiger Reserve.

The Conflict: The State opposed the move citing "human displacement" (approx. 1,274 households) and claimed tigers were merely "transient" (passing through) rather than "resident."

How will the Reserve be Notified?

The CEC proposes a "least disruptive" strategy by prioritizing areas with minimal human presence.

Phase	Included Areas	Role in Reserve	Rationale
Phase I	Netravali WLS & Cotigao WLS	Core Zone	Direct contiguity with Kali Tiger Reserve (Karnataka); Low habitation (~91 households).
Phase I	Bhagwan Mahavir WLS (North) & National Park	Buffer Zone	Contiguous with Kali's Buffer; Minimal habitation (~11 households).
Phase II (Deferred)	Mhadei WLS & Bhagwan Mahavir (South)	Future Consideration	High human population (~612 households). Needs consultation before inclusion.

The 'Greater Landscape' Concept

Total Proposed Area: 468.60 sq. km (Phase I).

- **Ecological Contiguity:** The new reserve will merge with the 1,345 sq. km core/buffer of Karnataka's Kali Tiger Reserve.
- **Significance:** Together, they create a massive 1,814 sq. km protected block, vital for the genetic dispersal of tigers in the Western Ghats.

How is a Tiger Reserve Notified? (Legal Procedure)

- **Governing Law:** Wildlife (Protection) Act, 1972 (specifically Section 38V).
- **The Authority:** Notified by the State Government.
- **The Recommendation:** Must be recommended by the National Tiger Conservation Authority (NTCA).

Structure:

- Core Area: Inviolate area; no human activity allowed (Critical Tiger Habitat).
- Buffer Area: Peripheral area; promotes coexistence; limited human activity allowed.

Geography Check: The Protected Areas involved

- **Kali Tiger Reserve:** Located in Uttara Kannada, Karnataka. The Kali River is its lifeline. (Formerly Dandeli-Anshi TR).
- **Mhadei Wildlife Sanctuary:** Located in North Goa; famous for the Mhadei River (Mandovi) catchment area. Known for semi-evergreen forests.
- **Netravali WLS:** Located in South Goa; home to the Mainapi and Savari waterfalls.
- **Cotigao WLS:** Known for tall trees and a multi-storied forest structure; located in Canacona, South Goa.

What is the Central Empowered Committee (CEC)?

- **Origin:** Initially set up by the Supreme Court in 2002 to monitor environmental compliance.
- **Current Status:** Reconstituted as a permanent statutory body by the MoEFCC (Sept 2023) under the Environment (Protection) Act, 1986.
- **Function:** It now reports to the Ministry (Executive) rather than directly to the SC (Judiciary), replacing the earlier ad-hoc committee.

4.7. NEIGHBOURHOOD FIRST: DECODING INDIA'S RESPONSE TO CYCLONE DITWAH

Context: India has launched 'Operation Sagar Bandhu' to provide Humanitarian Assistance and Disaster Relief (HADR) to Sri Lanka, which has been battered by Cyclone Ditwah.

What is 'Sagar Bandhu'?

- Objective: To deliver essential relief supplies and assist Sri Lanka in post-cyclone recovery.
- Trigger: The operation was initiated following a formal request from Sri Lankan defence officials, specifically utilizing Indian naval assets present in the region.
- Policy Anchor: The operation aligns with India's 'Neighbourhood First' policy and the newly articulated Vision MAHASAGAR.

Naval Assets Deployed

The relief material was transported by two key Indian Naval ships which were already in Sri Lanka for an International Fleet Review (IFR):

- INS Vikrant:
- Type: Indigenous Aircraft Carrier (IAC-1).
- Significance: First aircraft carrier built in India (Cochin Shipyard). It was requested specifically for its aviation capabilities to aid relief operations.
- INS Udaygiri:
- Type: Indigenous Stealth Frigate.
- Class: Part of the Project 17A frigates (Follow-on to the Shivalik class).
- Features: Improved stealth features, advanced weapons, and sensors.

Vision MAHASAGAR

- Definition: The article defines MAHASAGAR as "Mutual And Holistic Advancement for Security and Growth Across Regions".
- Origin: Announced by Prime Minister Narendra Modi during his visit to Mauritius (March).
- Focus: It targets engagement with the Global South, reinforcing India's role as a net security provider in the Indian Ocean Region (IOR).
- Note: This builds upon the existing SAGAR (Security and Growth for All in the Region) doctrine.

ABOUT CYCLONE Ditwah

- C yclone Name: Ditwah Cyclones in the North Indian Ocean are named by a panel of 13 countries; 'Ditwah' is a name contributed by Yemen).
- Diplomac

4.8. RHINOCEROS

Context: A 2025 scientific study published in *Science* **reported that** dehorning of rhinos in African reserves led to a 75–78% decline in poaching**, making it one of the most effective and low-cost anti-poaching strategies.**

The findings have revived global discussions on evidence-based wildlife conservation**, especially in contrast to India's** community-led, enforcement-driven rhino protection model**.**

The issue is significant for India as it hosts the Greater One-Horned Rhinoceros**, a key conservation success species concentrated in** Assam**.**

About Rhinoceros

- **Rhinoceroses are among the** oldest surviving megafauna on Earth**, having evolved over** 50 million years ago **and survived multiple geological and climatic changes across Africa and Asia.**
- **They are the** second-largest land mammals after elephants**, characterised by their** large body size**,** thick dermal skin**,** strong skeletal structure**, and** adaptive feeding behaviour**.**
- **Despite their evolutionary resilience, rhinos have suffered dramatic population declines due to** intensive poaching**,** habitat fragmentation**, and** international illegal wildlife trade**.**
- **The** International Rhino Foundation (IRF) **released its** State of the Rhino Report 2024**, which confirmed that** fewer than 28,000 rhinoceroses remain globally across all five species**, underlining the species' continued vulnerability.**
- **India continues to remain central to global rhinoceros conservation because it supports** more than 80% of the world's population of the Greater One-Horned Rhinoceros**, primarily concentrated in the state of** Assam**.**

World Rhino Day

- Date of Observation: **22 September annually.**
- Purpose: **To raise global awareness about** rhino conservation**, highlight** threats **such as** poaching **and** habitat loss**, and emphasize the importance of protecting rhinos for** ecological balance, biodiversity, and cultural heritage**.**
- Initiative: **Launched by the** World Wildlife Fund (WWF) and other conservation organizations**, the day serves as a platform to recognize efforts by governments, NGOs, and local communities in rhino protection worldwide.**

Taxonomy and Species Distribution: The Five Species of Rhinocerous

There are five surviving species of rhinoceros**, divided geographically into** African and Asian groups:

Feature	Greater One-Horned (Indian)	Javan Rhino	Sumatran Rhino	White Rhino	Black Rhino

Scientific Name	***Rhinoceros unicornis***	***Rhinoceros sondaicus***	***Dicerorhinus sumatrensis***	***Ceratotherium simum***	***Diceros bicornis***
Location	**India & Nepal**	**Indonesia (Ujung Kulon)**	**Indonesia (Sumatra)**	**Africa (South, Namibia)**	**East & Southern Africa**
Horn(s)	Single Horn	**Single Horn**	Two Horns	**Two Horns**	**Two Horns**
IUCN (Red List) Status	Vulnerable	Critically Endangered	Critically Endangered	Northern White Rhinoceros: Critically Endangered (**with only** two females surviving under guarded conditions in Kenya) Southern White Rhinoceros: **Near Threatened**	Critically Endangered
WPA 1972	Schedule I	**N/A**	**N/A**	**N/A**	**N/A**

International Legal Framework

- **All rhino species are listed under** CITES Appendix I**, which strictly prohibits international commercial trade in rhinos and their derivatives.**
- **Rhino conservation is also linked to commitments under the** Convention on Biological Diversity (CBD) **and** Sustainable Development Goal 15 (Life on Land)**.**

Differences Between African and Asian Rhinoceroses

Rhinoceroses, one of the largest land mammals, exhibit notable differences in morphology, behaviour, habitat preference, and conservation status across Africa and Asia, as follows:

Feature	**African Rhino**	**Asian Rhino**
Size	**The white rhinoceros is the second-largest land mammal after the elephant.**	**The Indian rhinoceros is the largest among all Asian rhino species.**
Appearance and Behaviour	**Less-armoured body; generally more aggressive; possesses** two horns**; poor swimmers, often wallow in mud to avoid drowning; uses horns in fights; grazes close to the ground.**	**More heavily armoured body; generally less aggressive; horn count varies—**two horns in Sumatran rhinos**,** one horn in Indian and Javan rhinos**; strong swimmers; fights using lower teeth; feeds on tall grasses, shrubs, and leaves.**
Habitat	**Grasslands, savannas, shrublands, and some desert areas.**	**Tropical and subtropical grasslands, savannahs, and moist forests.**

Conservation Status (IUCN)	**White Rhino: Near Threatened** **Black Rhino: Critically Endangered**	**Indian Rhino: Vulnerable; listed under** Schedule I of the Wildlife Protection Act, 1972 **Sumatran Rhino: Critically Endangered** **Javan Rhino: Critically Endangered**

Biological Characteristics of Rhinoceros

- **Rhinoceros horns are made entirely of** keratin**, the same fibrous protein found in human hair, nails, and animal scales, and do not contain bone tissue.**
- **Horns grow continuously from a** germinal layer at the base**, allowing regrowth if damaged or trimmed.**
- **Rhinoceroses are** strictly herbivorous**; their horns are not used for hunting but for** digging soil **to access roots, tubers, and minerals.**
- **During mating, horns act as** secondary sexual characteristics**, with females preferring males with larger, well-formed horns.**
- **Rhinoceroses have** poor eyesight **but compensate with a highly developed** sense of smell and hearing**.**
- **Their** hindgut-fermentation digestive system **allows efficient processing of coarse vegetation.**

Behaviour and Ecological Role of Rhinoceros

- **Rhinoceroses are mostly** solitary**, except during mating or when females have calves.**
- **Adult males maintain** loosely defined territories**, marked by** dung heaps, urine, ground scraping, and scent**.**
- Territorial disputes **are resolved through** visual displays, vocalisations, and mock charges**.**
- **Indian rhinos are** excellent swimmers**, enabling them to traverse rivers, wetlands, and floodplains.**
- **They prefer** riverine grasslands and alluvial floodplains**, providing abundant forage and water.**
- Wallowing behaviour **regulates body temperature, protects against insects, and removes ectoparasites; wallows also form** micro-habitats **for amphibians, insects, and aquatic plants.**
- **As** mega-herbivores**, rhinoceroses shape ecosystems by** grazing tall grasses, trampling shrubs, and preventing woody encroachment**.**
- **Their** selective feeding and movement **help maintain** open grasslands**, supporting other grassland-dependent species.**
- Dung contributes to nutrient cycling**, supporting soil organisms and coprophagous insects.**
- **By regulating vegetation and creating habitats, rhinoceroses act as** keystone species and ecosystem engineers**, significantly influencing ecosystem stability and biodiversity.**

Greater One-Horned Rhinoceros: India's Conservation Icon

- **The** Greater One-Horned Rhinoceros (*Rhinoceros unicornis*) **is the** largest of all Asian rhino species **and one of the largest rhinoceroses globally.**

- **The species is characterised by a** single black horn measuring 8–25 inches **and a thick** grey-brown, armour-plated skin **with deep folds.**
- **Adult males weigh between** 2,200 and 2,800 kilograms**, while females are slightly lighter.**
- **The natural lifespan of the species ranges from** 45 to 50 years **under favourable conditions.**

Habitat and Distribution of Greater One-Horned Rhinoceros

The Greater One-Horned Rhinoceros (Rhinoceros unicornis) **predominantly inhabits** alluvial floodplain grasslands, swamps, riverine forests, and subtropical savannahs**, which provide abundant forage and water resources. The species is largely restricted to the** Terai–Brahmaputra floodplains **of the Indian subcontinent.**

- Current Distribution: **India and Nepal.**
- Historical Range: **Spanned the** Indus, Ganga, and Brahmaputra river systems**, covering present-day Pakistan, India, and Nepal.**

Key Rhino-Bearing Protected Areas in India

- Kaziranga National Park, Assam **– Supports the** largest population **of Greater One-Horned Rhinoceroses, with around** 2,613 individuals recorded in 2022**.**
- Pobitora Wildlife Sanctuary, Assam **– Holds the** highest density of rhinos in the world**, despite its small geographical area.**
- Manas National Park, Assam **– A UNESCO World Heritage Site, known for successful rhino conservation and reintroduction programs.**
- Orang National Park, Assam **– Important habitat for rhinos, with recent habitat expansions enhancing population viability.**
- Jaldapara National Park, West Bengal **– Provides critical floodplain grasslands supporting stable rhino populations.**
- Gorumara National Park, West Bengal **– Known for its riverine grasslands and role in rhino conservation.**
- Dudhwa National Park, Uttar Pradesh **– Northernmost rhino habitat, contributing to the translocation and range expansion programs.**

Key Threats to Rhinoceroses

Rhinoceroses, particularly the Greater One-Horned Rhinoceros**, face a range of threats that challenge their survival both in India and globally:**

1. **Poaching and Illegal Wildlife Trade**

- **Rhino horns, composed of** keratin**, are highly valued in** illegal wildlife trade**, particularly in parts of** China and Vietnam**, for use in traditional medicine, status symbols, and ornamental purposes, despite having** no scientifically proven medicinal value**.**
- **Between** 2012 and 2022**, the illegal rhino horn trade generated** USD 874 million to USD 1.13 billion **in illicit income.**
- **The** UNODC **reports that rhino horn trafficking accounts for** nearly 29% of global illegal wildlife trade**, generating multi-million-dollar profits.**

- **Poaching incidents in Africa, such as in the** Greater Kruger region**, have caused nearly** 6.5% population loss annually **from 2017–2023, despite significant anti-poaching investment (~$74 million).**
- **In India, although poaching has reduced drastically in recent years,** Kaziranga National Park **still faces threats, requiring constant vigilance and enforcement.**

2. **Habitat Loss and Fragmentation**

- **The** expansion of agriculture, infrastructure development, and urbanisation **has reduced available rhino habitats.**
- **Fragmented landscapes increase the vulnerability of rhinos to poaching and** limit their natural dispersal**.**
- **Recovery of rhino populations now necessitates** habitat expansion, corridor creation**, and** connectivity between protected areas **such as** Kaziranga, Pobitora, Manas, Orang, and Dudhwa National Parks**.**

3. **Human-Wildlife Conflict**

- **Increasing rhino populations encroach into** agricultural lands**, causing** crop damage and occasional human casualties**, creating negative attitudes towards conservation.**
- **Conflicts arise particularly in areas adjacent to** floodplains and riverine habitats**, requiring community-based mitigation strategies.**

4. **Climate Change**

- Altered rainfall patterns**, extended monsoon floods, and** invasion of alien plant species **threaten the** alluvial floodplain grasslands **crucial for grazing.**
- **Prolonged floods, particularly in Assam, can** displace rhinos**, increasing mortality risk and stress on smaller protected areas.**

5. **Genetic Bottlenecks and Small Populations**

- **Some smaller rhino populations in** Pobitora, Laokhowa, and Burhachapori Wildlife Sanctuaries **face** genetic isolation**, which may reduce resilience to diseases and environmental changes.**
- **This emphasizes the need for** translocations and managed breeding programs **to maintain genetic diversity.**

6. **Threats from Disease and Parasites**

- **Rhinos are susceptible to** tick infestations, fungal infections**, and other parasites.**
- **Wallowing helps mitigate this naturally, but** habitat degradation and overcrowding **can exacerbate disease spread.**

7. **Emerging Threats from Poaching Techniques**

- **Despite strict laws,** organized criminal networks **exploit loopholes, using sophisticated methods for poaching and illegal horn trade.**
- **In African reserves, innovations like** dehorning **have reduced poaching by up to 78%, highlighting the need for** preventive interventions alongside legal enforcement**.**

Dehorning as a Conservation Strategy

Definition: **Rhino dehorning is a** non-lethal conservation technique **in which** 90–93% of a rhino's horn is carefully removed**. The** germinal layer **at the base is preserved to allow** natural horn regrowth**, and the remaining stump is treated with antiseptics to** prevent infection**.**

Purpose:

- **Reduces the** incentive for poachers **by removing the primary target: the horn.**
- **Provides a** safe, proactive measure **to protect rhinos without harming them.**

Scientific Findings (Greater Kruger, South Africa):

- 75% overall reduction **in poaching**
- 78% reduction **where dehorning was implemented abruptly**
- 95% lower risk **of** poaching **for dehorned rhinos compared to horned ones**
- **Achieved using** only 1.2% of the total anti-poaching budget

India's Position on Dehorning

- **India and Nepal record** very low rhino poaching incidents**, often losing only** one or two individuals annually**.**
- **Strong patrolling, intelligence networks, and community cooperation have proven sufficient deterrents.**
- **Experts argue that** preventive conservation governance **in India reduces the need for dehorning.**

Assam's Leadership in Rhino Conservation

Assam serves as the epicentre of global Greater One-Horned Rhinoceros conservation**, hosting nearly** 80% of the world's population **of this species. Over the past six decades, Assam has witnessed a remarkable recovery in rhino numbers, increasing from approximately** 600 individuals in the 1960s **to over** 4,000 by 2024**.**

This significant population growth reflects sustained conservation efforts**, including:**

- Strong legal enforcement **through acts such as the Assam Rhino Protection Act (1954) and the Wildlife (Protection) Act (1972).**
- Dedicated forest frontlines**, including rangers and anti-poaching squads, who ensure constant monitoring and protection.**
- Active community participation**, where local communities are engaged in conservation, eco-tourism, and habitat management initiatives.**

Kaziranga National Park: A Global Model of Rhino Conservation

Kaziranga National Park, Assam, is home to around 70% of the global population **of the Greater One-Horned Rhinoceros, making it a critical conservation stronghold.**

- **The** Kaziranga Model of Conservation **integrates** scientific habitat management**,** intensive anti-poaching patrols**,** technological surveillance**, and** community engagement**.**

- **Revenue generated from** eco-tourism **is strategically** reinvested into park infrastructure, rhino habitat management, and community development**, ensuring a sustainable conservation model that balances wildlife protection with local socioeconomic benefits.**

Legal and Policy Framework for Rhinoceros Conservation in India

India has developed a robust legal and policy framework **to protect rhinoceroses, particularly the** Greater One-Horned Rhinoceros**, ensuring their survival and habitat protection:**

1. **Early Legal Protection**

- Assam Forest Protection Act, 1891**: Provided one of the earliest statutory measures to protect wildlife in Assam, including rhinoceroses, by regulating hunting and forest resource exploitation.**
- Bengal Rhinoceros Preservation Act, 1932**: Specifically targeted the protection of rhinoceroses in Bengal and Assam, prohibiting their killing, capturing, or injuring, except under license or self-defense.**

2. **Post-Independence Legislation**

- Assam Rhino Protection Act, 1954**: Reinforced earlier protections and provided state-level statutory backing for anti-poaching measures.**
- Wildlife (Protection) Act, 1972**:**
- **Rhinoceroses were placed under** Schedule I**, granting the** highest legal protection**.**
- **Hunting, capturing, or trade of rhinos is** strictly prohibited**.**
- Assam Amendment, 2009**: Introduced** enhanced penalties**, including** life imprisonment for repeat poaching offenders**, serving as a strong deterrent against illegal hunting.**

3. **Policy Initiatives and Strategic Programs**

- Project Rhino
- **Project Rhino is a** wildlife conservation initiative **launched by the Government of India in** 2005**.**
- **Its primary aim is to** protect and conserve the Great Indian Rhinoceros (Rhinoceros unicornis)**, especially in the** Assam region**.**
- **Focused on** habitat management, anti-poaching measures, and translocation of rhinos **to suitable habitats.**
- **Indian Rhino Vision 2020 (IRV 2020):**
- **Launched to achieve a** wild population of at least 3,000 Greater One-Horned Rhinoceroses **spread over** seven protected areas in Assam **by 2020.**
- **Focused on** population expansion, habitat connectivity, and translocation of rhinos **to secure areas.**
- National Rhino Conservation Strategy, 2019**:**
- **A** national-level framework **for rhino protection across India.**
- **Focuses on** habitat management, anti-poaching measures, scientific monitoring, and community engagement**.**
- New Delhi Declaration on Asian Rhinos, 2019:

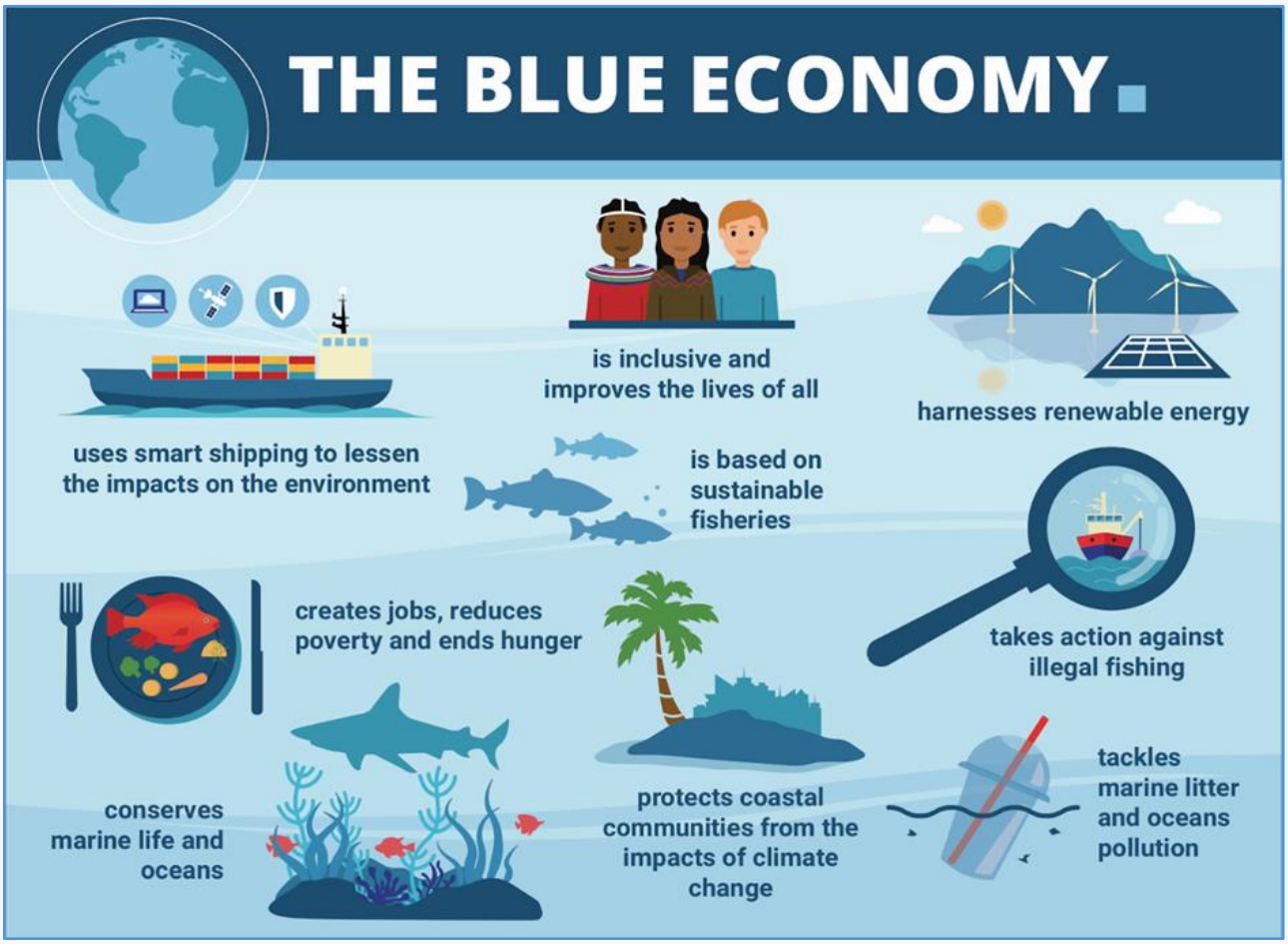
- **Signed by India, Nepal, Bhutan, Indonesia, and Malaysia.**
- **Commits to** regional cooperation, joint research, and transboundary conservation initiatives **to secure all Asian rhino species.**

4. Key Legal and Policy Outcomes

- **Strict enforcement of** anti-poaching laws **and penalties has significantly reduced rhino poaching in India.**
- **Translocation programs under IRV 2020 and linked** protected corridors **have expanded habitats and mitigated genetic bottlenecks.**
- **Integration of** community participation and eco-tourism **ensures sustainable conservation while supporting local livelihoods.**

4.9. BLUE ECONOMY VS. BLUE ECOLOGY: THE OFFSHORE MINING FRAMEWORK

Context: The Centre's proposal to auction 13 offshore mining blocks triggered protests in Kerala (by fishermen and political parties), raising concerns about marine biodiversity and fish stock depletion.



Mining Blocks & Locations

The Centre proposed auctioning blocks in three specific regions in November 2024:

1. Kerala Coast: 13 blocks for Construction-grade Sand.
2. Gujarat Coast: 3 blocks for Lime Mud.
3. Great Nicobar (Andaman & Nicobar): 7 blocks for Polymetallic Nodules and Crusts

Regulatory Safeguards & Bodies

Marine Protected Areas (MPAs)

- Definition: A clearly defined geographical space recognized and managed to achieve the long-term conservation of nature.
- Legal Framework: In India, MPAs are primarily notified as Sanctuaries or National Parks under the Wild Life (Protection) Act, 1972 (WPA).
- Status: There are 130 notified MPAs in India (e.g., Gulf of Mannar, Sundarbans).
- Restrictions: High level of protection; extractive activities like mining are generally prohibited or strictly regulated.

Important Coastal and Marine Biodiversity Areas (ICMBAs)

- What are they? Biologically rich sites identified for conservation prioritization.
- Identified By: Wildlife Institute of India (WII).
- Count: 106 sites have been prioritized.
- Legal Status: Unlike MPAs, "ICMBA" is not a statutory category under the WPA, 1972. However, they serve as a scientific basis for declaring future MPAs or regulating activities under the Environment Protection Act (EPA).

Offshore Areas Mineral Trust (OAMT)

- Establishment: Set up under the Offshore Areas Mineral (Development and Regulation) Act, 2002 (as amended in 2023).
- Funding: It is a non-lapsable fund.
- Source: An additional levy paid by leaseholders (miners), capped at one-third of the royalty paid.
- Mandate: Funds are utilized for:
- Research and administration of offshore areas.
- Mitigation of adverse ecological impacts.
- Disaster relief in offshore areas.

Polymetallic Nodules

- Appearance: Potato-shaped porous nodules found on the deep sea floor (4,000–6,000m depth).
- Composition: Primarily Manganese and Iron, but crucially contain Nickel, Copper, Cobalt, and Lead.
- Importance: Essential for the Energy Transition (EV batteries, renewables).
- India's Rights: India has exploration contracts with the International Seabed Authority (ISA) for these nodules in the Central Indian Ocean Basin.

4.10. DEEPAVALI: INDIA'S NEWEST ENTRY ON THE GLOBAL CULTURAL MAP

Context: Deepavali, the 'Festival of Lights', has been officially inscribed on UNESCO's Representative List of the Intangible Cultural Heritage (ICH) of Humanity.

Venue: The decision was finalized during the 20th Intergovernmental Committee session held at the Red Fort, New Delhi.

Status: It becomes the 16th Indian element to join this prestigious list.

Rationale: The inscription acknowledges Deepavali as a "living tradition" that fosters social cohesion, cultural continuity, and community bonding.

Decoding UNESCO's Intangible Cultural Heritage (ICH):

- Unlike the *World Heritage List* (which focuses on physical monuments), the ICH List recognizes "living traditions."
- Categories: It encompasses oral traditions, performing arts, social practices, rituals, festive events, and traditional craftsmanship.
- Objective: To safeguard cultural diversity in the face of globalization and preserve shared human heritage (e.g., France's baguette-making).

The Selection Mechanism

- Criteria: The practice must be inclusive, representative, and deeply rooted in the community.
- Process: States submit a nomination dossier for evaluation. Currently, a country can nominate one element every two years.
- Safeguarding: The list also identifies traditions at risk (e.g., urgent safeguarding list entries like Vietnam's Chăm pottery).

INDIA'S CULTURAL INVENTORY

With the addition of Deepavali (2025), India now has 16 elements on the Representative List. A quick revision of key past entries:

Category	Element	Year
Festivals	Durga Puja in Kolkata	2021
	Kumbh Mela	2017
	Nowruz (Persian New Year)	2016
	Ramman (Garhwal Himalayas)	2009
Performing Arts	Garba of Gujarat	2023
	Sankirtana (Manipur)	2013
	Chhau Dance	2010
	Kalbelia (Rajasthan)	2010
	Mudiyettu (Kerala)	2010
	Kutiyattam (Sanskrit Theatre)	2008
	Ramlila	2008
Chanting	Buddhist Chanting of Ladakh	2012
	Vedic Chanting	2008
Crafts	Thatheras of Jandiala Guru (Punjab)	2014
Wellness	Yoga	2016

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UPSC PRELIMS PRACTICE QUESTIONS

1. With reference to Lycodon irwini, recently seen in news, consider the following statements:

1. It is a newly documented species of wolf snake found on Great Nicobar Island.
2. It has been recommended to be classified as "Endangered" under the IUCN Red List due to its restricted range.
3. It is named after an Indian herpetologist associated with Pondicherry University.

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

Ans. (a) 1 and 2 only

- **Statement 1 is correct:** Lycodon irwini is a newly documented species of wolf snake found on the east coast of Great Nicobar Island.
- **Statement 2 is correct:** Researchers have recommended classifying it as "Endangered" under the IUCN Red List due to its rarity and restricted range.
- **Statement 3 is incorrect:** It is named after the late Australian conservationist **Steve Irwin**, not an Indian herpetologist. (Though it was described by researchers from Pondicherry University and the Max Planck Institute).

2. With respect to the timing of the Solstice across hemispheres, consider the following statements:

1. The Winter Solstice occurs in the Southern Hemisphere around June 20 or 21.
2. The term 'Solstice' is derived from a Latin word meaning 'the death of the Sun'.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (a) 1 only

Statement 1 is correct: The Southern Hemisphere experiences its Winter Solstice in June, while the Northern Hemisphere experiences it in December.

Statement 2 is incorrect: The word is derived from solstitium (Sol = Sun, stitium = to stop), implying the Sun **stops** its movement, not its death (though it symbolically marks death/rebirth).

3. With reference to the 'Status of Elephants in India 2021-25' report, consider the following statements:

1. The estimation marked a shift from DNA-based methods to visual sightings for higher accuracy.
2. The Shivalik-Gangetic Plains region witnessed a sharp decline in elephant population compared to previous estimates.
3. Karnataka recorded the highest number of elephants among all states.

Which of the statements given above is/are correct?

(a) 1 and 2 only
(b) 3 only
(c) 2 and 3 only
(d) 1, 2 and 3

Ans. (b) 3 only

Statement 1 is incorrect: The shift was from visual/dung counts to DNA mark-recapture techniques.

Statement 2 is incorrect: The Shivalik-Gangetic Plains population remained nearly unchanged/stable.

Statement 3 is correct: Karnataka has the highest population (6,013).

4. With respect to the Geological Setting of the Afar Region, consider the following statements:

1. The Afar Depression represents a geological 'Triple Junction' where the Red Sea Rift, Gulf of Aden Rift, and East African Rift meet.
2. The East African Rift System is a convergent plate boundary where the Nubian and Somali plates are colliding.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (a) 1 only

Statement 1 is correct; the region is a unique meeting point of three rift systems

Statement 2 is incorrect; it is a divergent boundary where the plates are separating, not colliding.

5. With reference to the National Tiger Conservation Authority (NTCA), consider the following statements:

I. It is a non-statutory body chaired by the Prime Minister of India.
II. It has the power to approve the Tiger Conservation Plans submitted by State Governments.
III. It serves as the lead agency for the implementation of Project Cheetah in India.

Which of the statements given above is/are correct?

(a) I and II only
(b) II and III only
(c) I and III only
(d) I, II and III

Ans. (b) II and III only

Statement I Incorrect: The NTCA is a statutory body. It was not created by an executive order but by the Wildlife (Protection) Act, 1972, through the 2006 Amendment.

Statement II Correct: Under Section 38 O of the Wildlife (Protection) Act, the NTCA is legally mandated to approve the Tiger Conservation Plan (TCP).

Statement III Correct: The NTCA's mandate was expanded beyond tigers to include the reintroduction of Cheetahs (Project Cheetah).

6. With respect to the proposed Goa Tiger Reserve, consider the following statements:

1. The Central Empowered Committee (CEC) has recommended the inclusion of Netravali and Cotigao Wildlife Sanctuaries in Phase I as the Core Zone.
2. The proposed reserve is designed to establish ecological contiguity with the Kali Tiger Reserve located in Maharashtra.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (a) 1 only

Statement 1 is correct; Phase I includes Netravali and Cotigao as the Core Zone due to minimal habitation.

Statement 2 is incorrect; the Kali Tiger Reserve is located in Karnataka, not Maharashtra.

7. With respect to 'Operation Sagar Bandhu', consider the following statements:

1. The operation was launched to provide Humanitarian Assistance and Disaster Relief (HADR) to Sri Lanka following Cyclone Ditwah.
2. It deployed the indigenous aircraft carrier INS Vikrant and the stealth frigate INS Udaygiri to transport relief material.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (c) Both 1 and 2

Statement 1 is correct; the operation assisted Sri Lanka in post-cyclone recovery.

Statement 2 is correct; both ships, already present for an International Fleet Review, were utilized for the mission.

8. Consider the following statements regarding the Greater One-Horned Rhinoceros:

1. It primarily inhabits alluvial floodplains, riverine forests, swamps, and subtropical savannahs.
2. Its current distribution is limited to India and Nepal, though historically it ranged across the Indus, Ganga, and Brahmaputra river systems.
3. Adult males maintain loosely defined territories, which are marked using dung heaps, urine spraying, ground scraping, and scent marking.
4. Pobitora Wildlife Sanctuary has the largest total rhino population in the world.

Which of the statements given above is/are correct?

(a) 1 and 2 only
(b) 1, 2, and 3 only
(c) 2, 3, and 4 only
(d) 1, 2, 3, and 4

Ans. (b) 1, 2, and 3 only

Statement 1 is correct: The Greater One-Horned Rhinoceros prefers alluvial floodplains, riverine forests, swamps, and subtropical savannahs.

Statement 2 is correct: Its current distribution is limited to India and Nepal, though historically it was widespread across the Indus, Ganga, and Brahmaputra river systems.

Statement 3 is correct: Adult males are territorial and use dung heaps, urine spraying, ground scraping, and scent marking to communicate boundaries and reduce conflicts.

Statement 4 is incorrect: Pobitora has the highest rhino density, not the largest total population; Kaziranga National Park hosts the largest total population of Greater One-Horned Rhinos.

9. With respect to the regulatory framework for offshore mining and conservation in India, consider the following statements:

1. The Offshore Areas Mineral Trust (OAMT) is a non-lapsable fund financed by an additional levy on leaseholders, which is capped at one-third of the royalty paid.
2. Important Coastal and Marine Biodiversity Areas (ICMBAs) are statutory zones notified under the Wild Life (Protection) Act, 1972, carrying the same legal status as National Parks.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (a) 1 only

Statement 1 is correct; the OAMT is non-lapsable and funds research, mitigation, and relief.

Statement 2 is incorrect; ICMBAs are identified by the Wildlife Institute of India as scientific priorities but are not a statutory category under the WPA, 1972, unlike MPAs.

10. With respect to the inscription of Deepavali on UNESCO's Intangible Cultural Heritage (ICH) list, consider the following statements:

1. The decision to inscribe Deepavali was finalized during the 20th Intergovernmental Committee session held at the Red Fort, New Delhi.
2. With this inclusion, Deepavali becomes the 16th Indian element to join the Representative List of the Intangible Cultural Heritage of Humanity.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (c) Both 1 and 2

Statement 1 is correct; the session took place at the Red Fort. Statement 2 is correct; it is the 16th element, acknowledging the festival as a "living tradition" that fosters social cohesion.

Scan to attempt more questions

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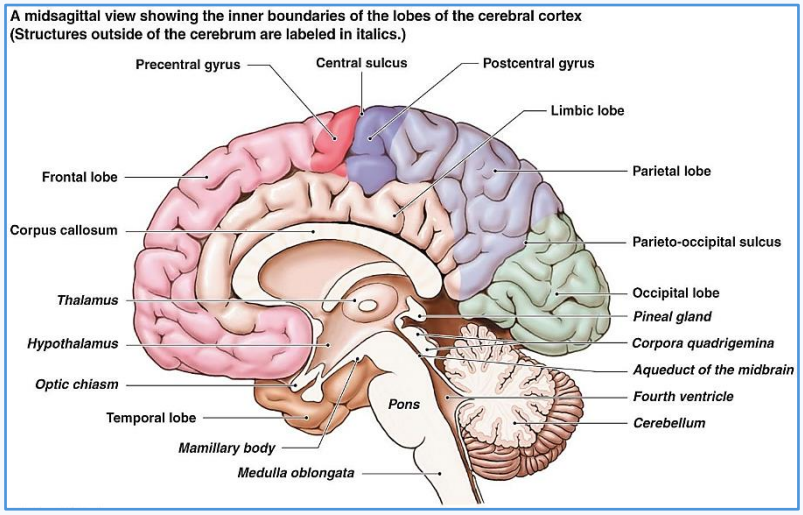
5.1. MAPPING THE NEURAL LIFESPAN



- **Source:** Researchers at the **University of Cambridge** (MRC Cognition and Brain Sciences Unit) published findings in Nature Communications.
- **Methodology:** Analysed **MRI brain-diffusion scans** of 3,802 individuals (aged 0–90 years).
- **Key Finding:** Human brain development is **non-linear**. It evolves through **five distinct phases (epochs)** separated by four specific "turning points" where significant rewiring occurs.
- **The Turning Points:** Ages **9, 32, 66, and 83**.

Epoch	Age Range	Key Structural Changes & Implications
I. Childhood	**0–9 Years**	• Rapid synapse formation and pruning. • Consolidation of neural networks. • Lays the foundation for future cognitive abilities.
II. Adolescence	**9–32 Years**	• Significant growth in connectivity and efficiency. • Supports complex reasoning, learning, and social cognition. • Biologically, adolescence extends up to age 32.
III. Early Adulthood	**32–66 Years**	• **Peak Rewiring:** Occurs around age 32. • Brain stabilizes; cognitive abilities and personality traits plateau. • Focus shifts to maintenance and efficiency.
IV. Early Ageing	**66–83 Years**	▪ Gradual decline in connectivity. • Increased vulnerability to neural health issues and degeneration.
V. Late Ageing	**83+ Years**	▪ Pronounced structural decline. ▪ Functional isolation of brain regions. • Higher risk of age-related cognitive disorders.

Why This Framework Matters?

- **Neuroplasticity:** Confirms that structural plasticity continues well into late adulthood, supporting the potential for lifelong learning and rehabilitation.
- **Policy Implications:**
  - **Education:** Tailoring curricula to match brain connectivity phases.

- **Public Health:** Developing age-specific strategies for mental health and geriatric care.

- **Cognitive Resilience:** Provides a baseline to understand how brain structure links to resilience against ageing.

Anatomy of the Human Brain

- **Cerebrum:**
  - The largest part, divided into two hemispheres connected by the **Corpus Callosum**.
  - **Function:** Controls voluntary movement, speech, intelligence, memory, and sensory processing.
- **Cerebellum:**
  - Located under the cerebrum.
  - **Function:** Regulates balance, posture, and fine motor coordination.
- **Brainstem (Midbrain, Pons, Medulla):**
  - Connects the brain to the spinal cord.
  - **Function:** Controls involuntary life-support functions like heartbeat, breathing, and digestion.
- **Limbic System:**
  - **Hippocampus:** Key for learning and long-term memory.
  - **Amygdala:** Processes emotions (fear, pleasure).
  - **Hypothalamus:** Regulates body temperature, hunger, thirst, and circadian rhythms.
- **Thalamus:**
  - Acts as a relay station for sensory and motor signals to the cerebral cortex.

5.2. NUCLEAR POWER IN SPACE: THE NEXT FRONTIER OF LUNAR EXPLORATION

Context: The USA has announced the **Lunar Fission Surface Power Project**, aiming to deploy a small nuclear reactor on the Moon by the **early 2030s**.This marks the first attempt to establish a permanent nuclear power source beyond Earth's orbit, addressing the limitations of solar energy for sustained human presence.

Why Nuclear over Solar?

While solar energy powers most current missions, it faces critical constraints on the Moon and Mars:

- **Lunar Nights:** Last for **two weeks**, leaving solar-powered equipment in darkness.
- **Shadowed Regions:** The poles (potential water ice sites) receive scarce sunlight.
- **High Energy Demand:** Industrial operations like **In-Situ Resource Utilisation (ISRU)** (converting ice to fuel/oxygen) require over **1 MW** of continuous power, which solar cannot reliably provide.

From RTGs to Fission

Technology	RTG (Radioisotope Thermoelectric Generator)	Fission Surface Power (New Focus)
Mechanism	Converts heat from the **natural radioactive decay** of Plutonium-238 into electricity.	Uses **nuclear fission** (splitting atoms) in a compact reactor (size of a shipping container).
Power Output	Low (Few hundred watts). Good for instruments.	High (Tens to Hundreds of Kilowatts). Good for habitats & industry.
Example	**Voyager spacecraft**, Curiosity Rover.	**Lunar Fission Surface Power Project**.

Future Propulsion Systems:

1. **Nuclear Thermal Propulsion (NTP):**

- **Mechanism:** A nuclear reactor heats a propellant (like hydrogen), which expands and is expelled through a nozzle to create thrust.
- **Benefit:** High thrust; could shorten travel time to Mars, reducing crew exposure to cosmic rays.
- **Project:** US **DRACO programme** plans to test this by 2026.

2. **Nuclear Electric Propulsion (NEP):**

- **Mechanism:** Reactor-generated electricity is used to **ionise** a propellant (like Xenon gas) to create thrust.
- **Benefit:** High efficiency, suitable for long-duration deep-space cargo missions.

The Legal Vacuum:

Current international laws are insufficient for the modern nuclear space age.

- **The 1992 UN Principles (UNGA Resolution 47/68):**
  - **Scope:** Applies only to RTGs and fission reactors for electricity, **not** propulsion.
  - **Nature: Non-binding** guidelines; no enforcement mechanism.
  - **Key Principles:** Principle 3 (Safety design), Principle 4 (Risk assessment), Principle 7 (Emergency notification).
- **Other Treaties:**
  - **Outer Space Treaty (1967):** Bans WMDs but is silent on peaceful nuclear propulsion.
  - **Liability Convention (1972):** Vague on liability for nuclear accidents beyond Earth orbit.
- **The Gap:** No binding technical standards for reactor design, safety zones, or end-of-life disposal, raising risks of radioactive contamination of celestial bodies.

India's Strategic Opportunity

- **Collaboration:** Potential alliance between **ISRO** and the **Department of Atomic Energy (DAE)**.
- **Applications:**
  - Powering operations in permanently shadowed lunar craters.
  - Enabling ISRU on Mars.

- **Diplomatic Role:** India can champion a new multilateral oversight mechanism (modelled on the **IAEA**) to certify designs and verify compliance, ensuring the peaceful and safe use of nuclear energy in space.

5.3. AERIAL VIGILANCE: ARMED FORCES RAMP UP HERON MK II FLEET

Context: Following **Operation Sindoor**, the Indian Armed Forces have initiated "Emergency Procurement" of additional **Heron Mk II** Unmanned Aerial Vehicles (UAVs). While the **Army** and **Air Force** already operate these drones, the **Indian Navy** is acquiring them for the first time. The Navy will transition from the older **Searcher UAVs** (also Israeli) to the more advanced Heron Mk II platform.

Heron Mk II

- **Type:** Medium Altitude Long Endurance (**MALE**) UAV.
- **Origin:** Manufactured by **Israel Aerospace Industries (IAI)**.
- **Key Upgrades:**
  - **SATCOM Enabled:** Unlike earlier versions dependent on Line-of-Sight (LOS) radio, the Mk II is **Satellite-Linked**. This allows **Beyond Line of Sight (BLOS)** operations, meaning it can fly much further while controlled from a distant base.
  - **Standoff Capability:** Can gather intelligence from deep inside enemy territory without crossing the border, using long-range sensors.
  - **Endurance:** Capable of flying for **45 hours** continuously at an altitude of **35,000 feet**.

Emergency Procurement:

- **Objective:** To bypass long bureaucratic cycles and plug critical operational gaps swiftly during heightened tensions.
- **Financial Cap:** Under these powers, the Vice Chiefs of the three services can sign contracts up to **₹300 crore** per project without going through the Defence Acquisition Council (DAC) for every approval.
- **Timeline:** Items procured under this route are typically delivered within **1 year**.

Strategic Implications & Indigenisation

- **Northern Sector Deployment:** The Army has already deployed these drones in the Northern sector (Ladakh/China border) for surveillance.
- **Make in India Push:**
  - The deal isn't just a direct purchase; it involves collaboration with Indian Defence PSUs (like HAL) and private partners.
  - **Goal:** To build capabilities for maintenance, integration, and eventual local manufacturing of MALE UAVs.

Comparison:

Feature	Searcher Mk II (Navy's Current)	Heron Mk II (Navy's Upgrade)
Role	Tactical Surveillance	Strategic Reconnaissance (MALE)
Range	Limited (Line of Sight)	Extended (Satellite Link)
Endurance	~18-20 Hours	~45 Hours
Payload	Lighter Sensors	Multi-Sensor (SAR, COMINT, ELINT)

5.4. LESSONS FROM MALARIA PARASITES

Context: Recent studies on malaria parasites (Plasmodium sporozoites) have revealed that their corkscrew-like (helical) motion is not merely a biological quirk but a sophisticated evolutionary adaptation to navigate noisy microscopic environments. This finding bridges the gap between biological observation and physics-based mathematical modelling.

Navigating the 'Noisy' Micro-World

For microscopic organisms, moving in a straight line is inefficient due to **Rotational Diffusion**—the tendency of random collisions with surrounding molecules to disorient the organism within seconds.

- **The Obstacle:** "White Noise" (random energy bursts) and internal biological fluctuations constantly push the organism off course.
- **The Necessity:** Parasites like Plasmodium must maintain a consistent trajectory for tens of seconds to locate blood vessels and capillaries.

The Evolutionary Solution: The 'Corkscrew' Strategy

To overcome this instability, malaria parasites have evolved to move in **right-handed helices**.

- **Displacement Efficiency:** In a noisy 3D environment, a helical path allows the organism to cover a larger effective distance than a straight-line swimmer moving at the same speed.
- **Averaging Fluctuations:** The rotating path helps "average out" internal engine fluctuations, keeping the overall direction stable.
- **Geometric Fit:** The helical pitch (approx. 13 micrometers) and radius (approx. 3 micrometers) align with the dimensions of small blood vessels, aiding in navigation.

'Colored Noise' vs. White Noise

The study introduces a nuanced understanding of how these parasites manage "noise."

- **Ornstein-Uhlenbeck (OU) Process:** Unlike "White Noise" (which is completely random), the parasite's internal fluctuations are described as **"Colored Noise."**
- **Significance:** This means the noise has "memory"—the current fluctuation depends on the recent past. The parasite's helical motion exploits this predictability to maintain a "straighter than straight" effective path over time.

Technological Implications: Bio-Mimicry

- **Micro-Robotics:** This biological mechanism serves as a blueprint for designing artificial **nanobots** and micro-swimmers.
- **Medical Application:** Engineers can design drug-delivery devices with controlled rotational components to navigate complex human tissues and capillaries more effectively.

About Malaria:

- **Causative Agent:** Plasmodium parasites (P. falciparum and P. vivax are the most dangerous).
- **Vector:** Infected female Anopheles mosquitoes.
- **Transmission:** Non-contagious; spread via bites, infected blood, or contaminated needles.

Symptoms & Impact

- **Incubation:** Symptoms (fever, chills, headache) typically appear 10–15 days post-infection.
- **Severity:** If untreated, it can lead to jaundice, seizures, respiratory distress, and death.

Prevention & Treatment

- **World Malaria Day:** Observed on **April 25**.
- **Theme (2025):** "Malaria Ends with Us: Reinvest, Reimagine, Reignite".
- **Therapeutics:**
  - **ACTs (Artemisinin-based Combination Therapies):** Standard for P. falciparum.
  - **Chloroquine:** Used for P. vivax (where effective).
  - **Primaquine:** Prevents relapse in P. vivax and P. ovale.

5.5. VPN REGULATIONS & DATA SOVEREIGNTY

Context: The **Ministry of Electronics and Information Technology (MeitY)** has issued a strict advisory to **Virtual Private Network (VPN)** providers, directing them to block websites that are leaking the personal data of Indian citizens.

The Current Directive

- **Issuing Body:** The **Ministry of Electronics and Information Technology (MeitY)**.
- **The Order:** Directed **Virtual Private Network (VPN)** providers to block access to websites that are leaking sensitive personal data (names, locations, mobile numbers) of Indian citizens.
- **Objective:** To curb the misuse of leaked data that allows the tracking of individuals via phone numbers or addresses.

What is a VPN?

- A **Virtual Private Network (VPN)** is a technology that establishes a secure, encrypted connection (a "tunnel") between a user's device and a remote server owned by the VPN provider.

- It masks the user's actual **Internet Protocol (IP) address**, replacing it with the IP address of the VPN server.

How does it work?

- **Encryption:** It scrambles data into unreadable code, ensuring that **Internet Service Providers (ISPs)** or third parties cannot monitor the user's browsing activity.
- **Location Spoofing:** By routing traffic through a server in a different country, it allows users to bypass **geo-restrictions** and censorship.

Why is it used?

- **Privacy:** To prevent tracking by ISPs, advertisers, and surveillance agencies.
- **Security:** To protect data when using public Wi-Fi networks.
- **Access:** To access content blocked in specific geographic regions.

Key Terms

- **Virtual Server:** A server that appears to be in one location (e.g., India) to the user, but is physically located in another country (e.g., Singapore).
- **Split Tunneling:** A feature in some VPNs allowing users to route some traffic through the VPN while letting other traffic access the internet directly.
- **Deep Packet Inspection (DPI):** A method used by ISPs/Governments to detect and block VPN traffic.

5.6. LUNARCRETE: THE FUTURE OF EXTRATERRESTRIAL INFRASTRUCTURE

Context: With major powers like the US and China accelerating their timelines for establishing long-term lunar settlements, researchers are actively developing **Lunarcrete** as a viable construction material to withstand the Moon's harsh environment.

What is Lunarcrete?

- **Definition:** An umbrella term for "Moon Concrete," a hypothetical construction material designed for extraterrestrial habitats.
- **Composition:** Unlike terrestrial concrete (which uses sand and gravel), Lunarcrete utilizes **Lunar Regolith** (loose moon soil/dust) as the primary aggregate.
- **Purpose:** To build habitats capable of protecting astronauts from:
  - **Cosmic Radiation:** The Moon lacks a protective atmosphere/magnetosphere.
  - **Extreme Temperatures:** Swings ranging from **120°C to –130°C**.

The Challenge: Binding without Water

Standard concrete relies on Portland cement and water. Since water is a scarce and precious resource on the Moon, scientists are developing **waterless binding techniques**:

- **Sulphur Lunarcrete:**
  - **Process:** Mixing lunar regolith with molten sulphur.
  - **Mechanism:** Sulphur acts as the binding agent upon cooling and solidifying.
  - **Limitation:** While water-free, it has a low melting point, making it **structurally unstable** in high-temperature lunar days.
- **Sintering (Microwave Heating):**
  - **Process:** Using concentrated sunlight or microwaves to heat regolith.
  - **Mechanism:** The heat causes the soil grains to melt and fuse (sinter) into solid bricks, eliminating the need for any external binder.

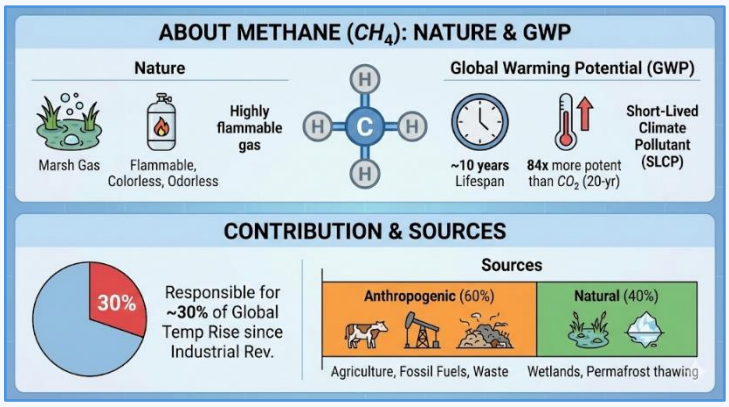
Thermal Properties & Viability

A recent simulation by Louisiana State University (LSU) highlighted the material's insulation capabilities:

- **Temperature Regulation:** A Lunarcrete dome successfully maintained an internal temperature of **22°C** despite external fluctuations between 120°C and –130°C.
- **Structural Design:** Walls constructed with **two layers of Lunarcrete** separated by a vacuum (empty space) provided the most effective thermal insulation.

5.7. METHANE EMISSIONS AND SPACE-BASED SOLUTIONS

Context: Recent satellite-based studies, including ISRO's analysis using 2023 data, have revealed that methane emissions from major Indian landfills are significantly higher than official estimates, prompting regulatory scrutiny by the National Green Tribunal and renewed focus on satellite monitoring for waste-sector climate mitigation.



About Methane (CH_4)

- **Nature:** It is a colourless, odourless, and highly flammable gas, often referred to as "Marsh Gas."
- **Global Warming Potential (GWP):** It is a Short-Lived Climate Pollutant (SLCP) with a lifespan of ~10 years. However, it is **84 times more potent** than CO_2 in trapping heat over a 20-year period.
- **Contribution:** Responsible for approximately **30%** of the global temperature rise since the Industrial Revolution.

Global Methane Emissions: Sectoral Analysis

Human-induced (anthropogenic) methane emissions are primarily concentrated in three key sectors:

- **Agriculture (~40%):** The leading source, driven principally by **enteric fermentation** in livestock and anaerobic conditions in **paddy cultivation**.
- **Fossil Fuels (~35%):** Emissions arise from fugitive leakages during **coal mining** and the extraction, processing, or transport of **oil and natural gas**.
- **Waste Management (~20%):** Methane is generated through the anaerobic decomposition of organic matter in **landfills**, open dumpsites, and **wastewater treatment** systems.

The Data Discrepancy

A major hurdle in mitigating methane is the lack of accurate data. Traditional models often underestimate emissions compared to real-time satellite monitoring.

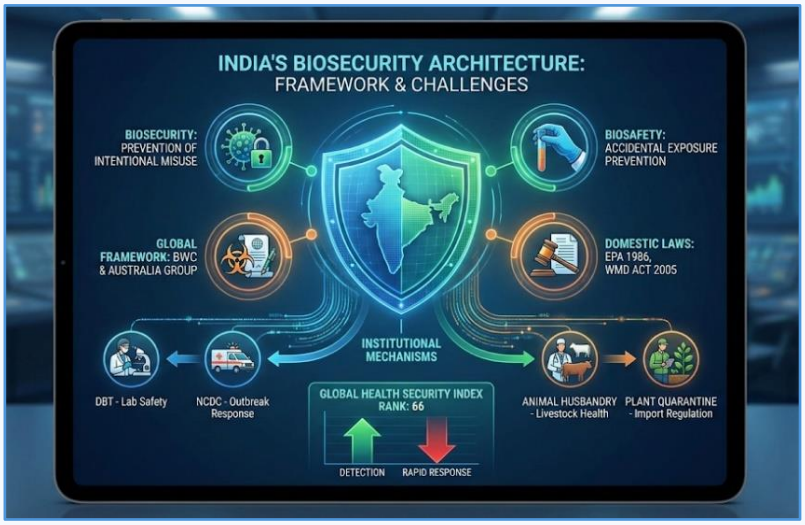
- **Traditional Models:** Rely on "inventory-based" estimates (waste volume × baseline assumptions). These are often outdated (e.g., based on 2018 estimates) and fail to capture real-time leakages.
- **Satellite Findings (ISRO & Others):** Advanced satellites (e.g., Carbon Mapper, SRON) have revealed massive discrepancies

Policy & Technological Interventions

- **The Feedback Loop Strategy:** A proposed mechanism where satellite detection (identifying hotspots) triggers immediate ground-level verification (fixing gas collection leaks or covering exposed waste).
- **Associated Schemes:**
  - **Swachh Bharat Mission:** Provides the existing framework for waste management reforms.
  - **Gobardhan Scheme:** Focuses on converting biodegradable waste into compressed biogas (Bio-CNG). Example: Indore has successfully utilized this to set up Bio-CNG plants.
- **Global Comparison:** The International Energy Agency (IEA) notes that ~70% of fossil fuel methane emissions can be mitigated using existing technologies.

5.8. INDIA'S BIOSECURITY ARCHITECTURE: FRAMEWORK & CHALLENGES

Context: With rising bio-risks (zoonosis, bioterrorism), India is pivoting towards a unified **National Biosecurity Framework** to integrate its currently fragmented response mechanisms.



Biosecurity vs. Biosafety

- **Biosecurity:** Focuses on **prevention of intentional misuse** (e.g., bioterrorism, theft of pathogens). It protects human, animal, and plant health.
- **Biosafety:** Focuses on **prevention of accidental exposure** (e.g., lab leaks, unintentional release).
- **Relationship:** Robust biosafety is a prerequisite for effective biosecurity.

Global Framework: Biological Weapons Convention (BWC)

- **Year:** Came into force in **1975**.
- **Significance:** First multilateral disarmament treaty banning the production of an entire category of weapons.
- **Mandate:** Prohibits development, production, and stockpiling of biological agents for hostile purposes.
- **Unique Feature:** It mandates the **destruction** of existing stockpiles.
- **India's Stance:** India is a signatory to the BWC

India's Domestic Legal Framework

- **Environment (Protection) Act, 1986:**
  - Governing Law for hazardous microorganisms and Genetically Modified Organisms (GMOs).
  - **Rules:** The **Biosafety Rules, 1989** were framed under this Act.
- **WMD Act, 2005:**
  - Full Name: Weapons of Mass Destruction and their Delivery Systems (Prohibition of Unlawful Activities) Act, 2005.
  - Function: Criminalizes the manufacture, transport, or transfer of biological weapons.
- **Disaster Management Act, 2005:**
  - NDMA has issued specific guidelines for the **Management of Biological Disasters**.

5.9. INDIAN ARMY COMPLETES APACHE FLEET INDUCTION

Context: The Indian Army has received the final batch of three **AH-64E Apache attack helicopters**, marking the completion of its six-unit fleet. These assets are now part of the **451 Army Aviation Squadron** based in **Jodhpur, Rajasthan**, boosting operational readiness along the western borders.

The Acquisition:

- **The Deal:** Signed in February 2020 with the **United States** (Boeing) for **$600 million**.

- **Fleet Strength:** The deal comprised **six** helicopters for the Indian Army.
  - Note: The Indian Air Force (IAF) already operates a fleet of **22** AH-64E Apaches.
- **Delivery Timeline:** Delayed due to global supply chain disruptions; originally scheduled for May 2024, completed in late 2025 following high-level defence dialogues.
- **Deployment:** Stationed at **Jodhpur** to cater specifically to operational requirements on the **Western Front**.

About AH-64E Apache (Apache Guardian)

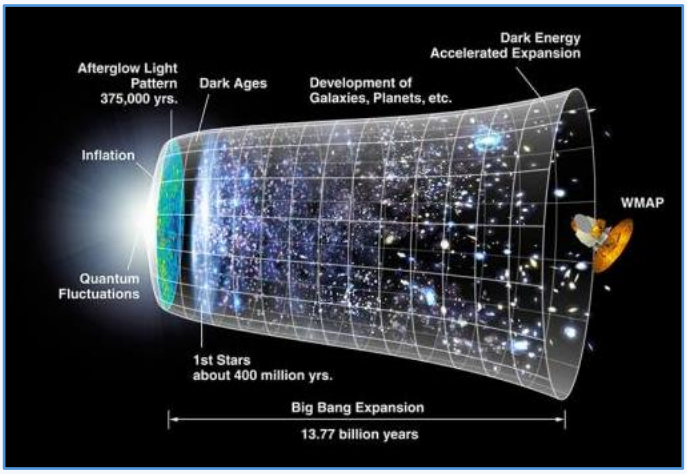
- **Origin:** United States (Manufacturer: **Boeing**).
- **Classification:** World's most advanced **multi-role combat helicopter**.
- **Key Roles:**
  - Advanced reconnaissance.
  - Precision strikes.
  - Close air support in contested environments.
  - Anti-armour operations (often called "Tank Busters").
- **Global Presence:** Used by the US Army and nations including Egypt, Israel, Japan, UK, and UAE.

Strategic Significance

- **Operational Synergy:** The induction enhances the Army's dedicated attack helicopter capability, previously reliant on the IAF for heavy attack support.
- **Modernisation:** Represents a shift towards state-of-the-art avionics and night-fighting capabilities compared to older Soviet-origin fleets.
- **Bilateral Relations:** Underscores the deepening India-US defence partnership, reinforced by recent talks between Defence Minister Rajnath Singh and US Defence Secretary Pete Hegseth.

5.10. GHOST PARTICLES OF THE GALAXY: A NEW HOPE OR A FALSE ALARM?

Context: Researchers using the **Fermi Gamma-ray Space Telescope** have detected a gamma-ray signal extending towards the centre of the Milky Way. The energy spectrum of this signal aligns with the theoretical prediction for the annihilation of Weakly Interacting Massive Particles (**WIMPs**)potentially serving as direct evidence for Dark Matter.



What is Dark Matter?

- **Definition:** A hypothetical form of matter that is entirely invisible. It does not emit, absorb, or reflect light/energy, making it undetectable by conventional electromagnetic sensors.
- **Cosmic Composition:**
  - **Dark Matter:** Constitutes approximately **27%** of the universe.

- **Visible (Baryonic) Matter:** Accounts for only **5%**. It consists of subatomic particles like protons, neutrons, and electrons.
- **Ratio:** Dark matter outweighs visible matter by a ratio of roughly six to one.

- **Interaction:** It interacts with ordinary matter primarily through **gravity**, not electromagnetic forces.
- **Detection Method:** Astronomers map it using **Gravitational Lensing**: the bending of light caused by massive objects (like dark matter halos).

The WIMP Hypothesis

- **Definition: WIMPs (Weakly Interacting Massive Particles)** are a hypothetical class of subatomic particles believed to be the primary constituent of Dark Matter.
- **Detection Logic:** While WIMPs barely interact with normal matter, theory suggests that when they collide, they annihilate each other, releasing high-energy **Gamma-rays**.

Cosmic Origins & Observational Evidence

- **Big Bang Remnants:** Primordial dark matter may have been trapped in black holes formed during the Big Bang.
- **Stellar Objects:** High concentrations may exist in stellar remnants like **White Dwarfs**, **Neutron Stars**, and **Brown Dwarfs** (failed stars lacking nuclear fusion).

Evidence of Existence:

- **Galaxy Rotation Curves:**
  - Newtonian Prediction: Stars at galaxy edges should move slower than those at the center.
  - Observation: Outer stars move faster than expected, implying unseen mass (Dark Matter) is providing extra gravitational pull.
- **Gravitational Lensing:**
  - Massive objects bend light passing near them. Observations often reveal more bending than visible mass can explain, indicating the presence of Dark Matter.
- **Galaxy Formation:** The current clustering and structure of galaxies suggest Dark Matter acted as a gravitational "glue" in the early universe.

Major Experiments & Observatories

- **Alpha Magnetic Spectrometer (AMS):** Located on the **International Space Station (ISS)**; detects excess positrons (antimatter) which may be a signature of Dark Matter.
- **XENON1T (Italy):** Aims to detect WIMPs by observing their interaction with liquid **xenon** atoms in a subterranean laboratory.
- **IceCube Neutrino Observatory (Antarctica):** Investigates **sterile neutrinos** as potential Dark Matter candidates.
- **Large Hadron Collider (CERN):** Conducts high-energy collisions to probe fundamental particles and signs of Dark Matter creation.
- **James Webb Space Telescope (JWST):** Studies early galaxy formation to understand the role Dark Matter played in cosmic evolution.

The Repulsive Force: Understanding Dark Energy

- **Definition:** A mysterious form of energy constituting **68%** of the universe.
- **Function:** It is responsible for the **accelerated expansion** of the universe.
- **Properties:**
  - **Uniform Distribution:** Spread evenly across space and time; its density does not dilute as the universe expands.
  - **Repulsive Nature:** Unlike gravity (which attracts), Dark Energy exerts a repulsive force that pushes galaxies apart.

Key Notes

- **Hubble's Law:** States that galaxies move away from Earth at speeds proportional to their distance, confirming the universe is expanding.
- **Antimatter vs. Dark Matter:**
  - **Antimatter:** Particles identical to visible matter but with **opposite electrical charges** (e.g., Positrons are anti-electrons).
  - **Distinction:** Antimatter is **not** the same as Dark Matter.

5.11. THE COSMIC REFINERY: DECODING THE SUPERKILONOVA

Context: An international team of researchers, including scientists from **IIT-Bombay** and the **Indian Institute of Astrophysics (Bengaluru)**, has identified a rare cosmic explosion known as a **Superkilonova** approximately 1.3 billion light-years away.

Distinguishing Kilonova & Superkilonova

What is a Kilonova?

- **Definition:** A high-energy astronomical event triggered by the collision of two **neutron stars** or the merger of a neutron star with a black hole.
- **Nucleosynthesis:** It functions as a cosmic factory, synthesizing heavy, radioactive elements like **Gold, Platinum, and Neodymium** via rapid neutron capture.
- **Observation:** The radioactive decay of these elements emits radiation in the optical and infrared spectrums. These events are frequently associated with **Gamma-Ray Bursts (GRBs)**.

What Defines A Superkilonova?

- **The Distinction:** A Superkilonova is a rare, enhanced variant of a merger that possesses an **additional energy source**.
- **Key Characteristics:** This extra energy renders the explosion significantly **brighter, bluer, and longer-lasting** than a standard kilonova.
- **Hybrid Fingerprint:** Observational data reveals a unique transition: the event initially exhibits the light signature of a kilonova (rapid fading) but subsequently

Understanding Neutron Stars:

How are they Formed?

- **Gravitational Collapse:** They originate when a massive star exhausts its nuclear fuel and collapses under its own gravity.
- **Core Fusion:** The immense pressure in the collapsing core crushes protons and electrons together to synthesize **neutrons**.
- **The Mass Limit:** A neutron star forms if the collapsing core is between **1 and 3 solar masses**. (Cores exceeding this limit collapse further into **Black Holes**).

What Are Their Physical Attributes?

- **Extreme Density:** They are the densest class of stellar remnants, typically measuring just **20 km** in diameter.
- **Mass:** Despite their compact size, they contain a mass between **1.18 and 1.97 times** that of the Sun.

How Do We Observe Them?

Neutron stars are categorized based on their distinct emission patterns:

- **Pulsars (Cosmic Lighthouses):** Rotating neutron stars that emit beams of radiation at highly regular intervals (ranging from milliseconds to seconds) from their magnetic poles.
- **Magnetars:** A rare subtype characterized by **ultra-high magnetic fields**, which are orders of magnitude stronger than Earth's magnetic field.
- **Rotating Radio Transients (RRATs):** Mysterious sources that emit single, irregular radio bursts (intervals of minutes to hours). Unlike pulsars, the exact mechanism behind RRATs remains unknown.

5.12. GENETICALLY MODIFIED (GM) CROPS: OVERVIEW, STATUS, AND REGULATION

Definition: Genetically Modified Organisms (GMOs) are entities (plants, bacteria, animals) with genetically altered DNA. GM crops involve inserting specific genes from a host organism into a plant's genome via genetic engineering.

- **Development Techniques:**
- Gene Gun: Bombardment of DNA-coated metal particles into plant cells.
- Agrobacterium-mediated: Use of Agrobacterium tumefaciens bacterium as a vector to transfer genes.
- Electroporation: Application of electric pulses to create pores in cell membranes for DNA entry (used in protoplasts).
- Microinjection: Direct injection of foreign DNA into cells.

Status of GM Crops in India

A. Bt Cotton (Commercialized)

- Status: The only GM crop approved for commercial cultivation in India (since 2002).
- Mechanism: Contains genes from soil bacterium Bacillus thuringiensis (B. thuringiensis).
- Function: Produces insecticidal proteins (Cryoproteins) to resist the cotton bollworm.

B. Bt Brinjal (Moratorium)

- Status: Approved by GEAC in 2009 but placed under an indefinite moratorium.
- Mechanism: Contains the cry1Ac gene from B. thuringiensis.
- Recent Developments: Biosafety field trials permitted for varieties Janak and BSS-793 in eight states.

C. GM Mustard (DMH-11)

- Developer: Centre for Genetic Manipulation of Crop Plants (Delhi University).
- Status: Not yet released for commercial cultivation.
- Parentage: Hybrid of 'Varuna' and 'Early Heera-2'.
- Objective: To enable cross-pollination in naturally self-pollinating mustard plants to improve yield.

The Barnase-Barstar System (GM Mustard Mechanism)

DMH-11 utilizes three specific transgenes derived from the soil bacterium Bacillus amyloliquefaciens to facilitate hybridization.

- Barnase (Male Sterility): Expressed in the Varuna variety. It destroys tapetum cells (nutrient layer for pollen), rendering the plant male-sterile to prevent self-pollination.
- Barstar (Fertility Restoration): Expressed in the Heera variety. It inhibits the Barnase protein. When crossed, the resulting hybrid seeds are fully fertile.
- Bar Gene (Marker): Confers resistance to the herbicide 'Basta'. Used primarily to identify and select transformed plants during development.

Regulatory Framework in India

Regulation is governed under the Environment (Protection) Act, 1986 and the Rules, 1989.

A. Statutory Bodies

Genetic Engineering Appraisal Committee (GEAC):

- Role: Apex body for approving large-scale use, release, and field trials of GMOs.
- Ministry: Ministry of Environment, Forest and Climate Change (MoEF&CC).
- Chairperson: Special/Additional Secretary, MoEF&CC.
- Power: Can take punitive action under the EPA, 1986.
- Review Committee on Genetic Manipulation (RCGM): Monitors safety in ongoing research and small-scale trials (under Dept. of Biotechnology).

B. Institutional & Monitoring Bodies

- Institutional Biosafety Committee (IBSC): Ensures biosafety compliance at the research institute level.

- State Biotechnology Coordination Committee (SBCC): Enforces regulations at the state level.
- District Level Committee (DLC): Monitors safety compliance at the local/district level.
- Recombinant DNA Advisory Committee (RDAC): Recommends policy and safety regulations.

Associated Concerns:

Ecological Risks:

- Genetic Contamination: Gene flow to wild relatives.
- Biodiversity Loss: Potential toxicity to benign soil flora/fauna and non-target insects (e.g., Monarch butterflies).
- Pest Resistance: Evolution of "super-pests" (e.g., Pink Bollworm resistance in India).

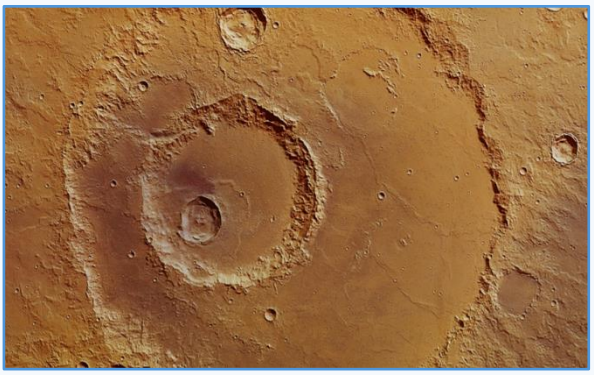
Agrarian & Economic Issues:

- Yield Stagnation: Debate over actual yield benefits of Bt Cotton long-term.
- Input Costs: Increased reliance on herbicides (e.g., Glyphosate) and corporate monopoly over seeds (IPR issues).

Health & Ethics:

- Potential allergenicity in humans.
- Ethical concerns regarding the manipulation of natural biological order.

5.13. INDIA'S IMPRINT ON MARS: NEW CRATERS NAMED AFTER KERALA & M.S. KRISHNAN



Context: The International Astronomical Union (IAU) has officially approved the naming of a 3.5 billion-year-old crater on Mars after M.S. Krishnan, a pioneering Indian geologist. Additionally, several smaller Martian landforms have been named after significant locations in Kerala.

Key Martian Features & Their Indian Counterparts

The proposal was submitted by researchers from the Indian Institute of Space Science and Technology (IIST) and Government College, Kasaragod.

Martian Name	Feature Type	Named After / Significance
Krishnan Crater	**Large Crater**	M.S. Krishnan **(Pioneering Geologist).**
Krishnan Palus	**Plain (inside the crater)**	**Latin for 'swamp' or 'marsh', used for small plains.**
Periyar Vallis	**Valley/Channel**	Periyar River **(Kerala's longest river).**
Thumba	**Small Crater**	**Site of** TERLS **(India's first rocket launch station).**

Valiamala	**Small Crater**	**Location of** IIST **and LPSC (ISRO unit) in Trivandrum.**
Bekal	**Small Crater**	Bekal Fort **(Largest fort in Kerala).**
Varkala	**Small Crater**	Varkala Cliff **(A declared National Geological Monument).**

Person in Focus: Dr. M.S. Krishnan (1898–1970)

- Role: **He was the** first Indian **to serve as the** Director of the Geological Survey of India (GSI) **(appointed in 1951).**
- Key Contributions:
- **Authored the seminal book *"Geology of India and Burma"*.**
- **Instrumental in the formation of the** Geological Society of India**.**
- **Worked on the stratigraphy of Gangpur (Odisha) and mineral resources of Madras Presidency.**
- **Awarded the** Padma Bhushan **in 1970.**

The Science Behind the Naming (IAU Guidelines) **The** International Astronomical Union (IAU) **is the globally recognized authority for naming celestial bodies and their surface features.**

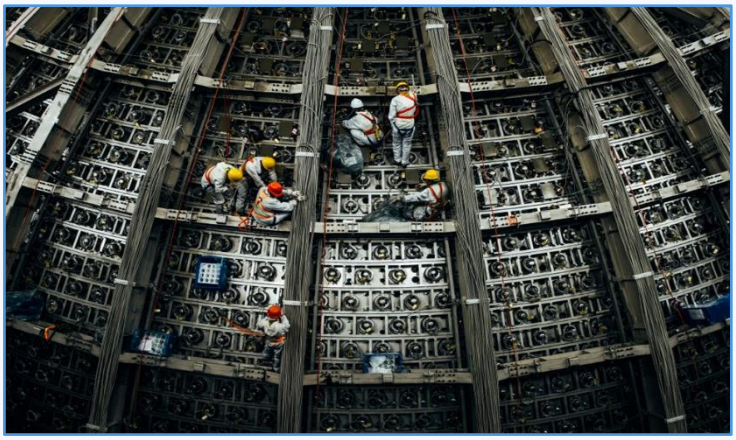
- Large Craters (>60 km): **Named after deceased scientists or writers who have contributed to the study of Mars.**
- Small Craters (<60 km): **Named after towns and villages of the world with a population of** less than 100,000**.**
- Vallis (Valleys): **Named after the word for "Mars" in various languages or names of rivers on Earth.**

Prelims Takeaways:

- Geological Survey of India (GSI): **Established in** 1851**, it is the second-oldest survey institution in India (after Survey of India). It operates under the** Ministry of Mines**.**
- Varkala Cliff: **It is the only place in southern Kerala where** Cenozoic sedimentary formations **are visible on the coast. It is a designated** Geo-heritage site**.**
- Other Indian Names on Mars: **Craters have previously been named after** Devendra Lal **(Physicist), and towns like** Mursan **(UP),** Hilsa **(Bihar),** Poona**, and** Kakori**.**

5.14. THE RACE FOR "GHOST PARTICLES": CHINA'S JUNO VS. INDIA'S INO

Context: China has officially completed the construction of the Jiangmen Underground Neutrino Observatory (JUNO)**. This development highlights the widening gap in "Big Science" capabilities between China and India, as the** India-based Neutrino Observatory (INO) **remains stalled due to regulatory and social hurdles.**



What are Neutrinos?

- Nature: **Lightest subatomic particles with mass; electrically neutral.**
- Interaction: **Known as** "Ghost Particles" **due to extremely weak interactions with matter; they interact solely via the** Weak Nuclear Force **and** Gravity**.**
- **Abundance:**
- **Most abundant particles in the universe** possessing mass**.**
- **Second most abundant particles overall (after Photons/Light).**
- Permeability: **Trillions pass through the human body every second without interaction.**

Classification & Sources

- 3 known types of Neutrinos: Electron neutrino, Muon neutrino, and Tau neutrino.
- Primary Sources: **Solar fusion (Solar neutrinos), Cosmic rays, Supernovae, Nuclear reactors, and the Early Universe (Relic neutrinos).**

ABOUT JIANGMEN UNDERGROUND NEUTRINO OBSERVATORY (JUNO)

1. **Operational Context**

- Location: **700 meters underground near** Jiangmen (Guangdong Province)**, Southern China.**
- Infrastructure: **Features a** 600-tonne spherical detector **with light-detecting tubes, submerged in a 12-storey cylindrical water pool to shield against interference.**

2. **Core Objectives**

- Mass Hierarchy: **To determine the ordering of neutrino masses (identifying the lightest and heaviest types).**
- Multi-Spectrum Study: **Observation of reactor neutrinos, supernova bursts, solar/atmospheric neutrinos, and** Geo-neutrinos **(from Earth's interior).**
- Collaboration: **A multi-nation project involving France, Germany, Italy, Russia, the U.S., and Taiwan.**

GLOBAL NEUTRINO OBSERVATORIES

1. **International Facilities**

- IceCube (Antarctica): **The largest neutrino telescope; uses Antarctic ice to detect high-energy astrophysical neutrinos.**
- Super-Kamiokande (Japan): **Underground water Cherenkov detector; famous for confirming** neutrino oscillations**.**
- DUNE (USA): **Deep Underground Neutrino Experiment; uses liquid argon to probe** CP violation **and mass hierarchy.**
- KM3NeT (Mediterranean Sea): **Located underwater; focuses on high-energy cosmic sources.**

2. The Indian Context

- India-based Neutrino Observatory (INO):
- Proposed Location: **Bodi West Hills,** Theni District**, Tamil Nadu.**
- Focus: **Study of** Atmospheric Neutrinos **using a Magnetized Iron Calorimeter (ICAL).**
- Status: **Currently stalled due to environmental and clearance issues**

5.15. VIKRAM-I: A LEAP FOR INDIA'S PRIVATE SPACE SECTOR

Unveiling the Milestone:

- Launch: Unveiled recently by the Prime Minister of India.
- Developer: Built by Skyroot Aerospace, marking a significant stride in India's private space industry.
- Classification: An orbital-class launch vehicle named in honor of Dr. Vikram Sarabhai, the father of the Indian space program.

How is it Designed?

- Material Composition: Features an all-carbon composite structure, ensuring a high strength-to-weight ratio.
- Thrust Profile: Capable of generating a peak thrust of 1,200 kN.
- Rapid Deployment: Designed for simplicity and speed, possessing the capability to launch within 24 hours from any location.

Propulsion Dynamics:

- Staging Architecture: A four-stage vehicle comprising a mix of solid and liquid propulsion.
- Initial Boost (Stages 1-3): Powered by solid fuel to provide robust thrust during the initial atmospheric ascent.
- Precision Injection (Stage 4): A liquid-fuelled upper stage utilizing hypergolic propellants (MMH fuel and NTO oxidiser) for precise orbital adjustments.
- Engine Technology: The final stage employs a cluster of four Raman engines, which ignite instantly upon chemical contact.

Mission Capabilities: What Can It Carry?

- Target Segment: specifically optimised for the small-satellite market, with the ability to deploy multiple satellites in a single mission.
- Payload to LEO: Capable of lifting 350 kg to Low Earth Orbit (500 km inclination).
- Payload to SSO: Capable of lifting 260 kg to Sun-Synchronous Orbit.

Technological Edge:

- Manufacturing: Utilizes 3D-printed engines to reduce manufacturing time and cost.
- Separation Systems: Deploys ultra-low-shock pneumatic systems for smooth stage separation.

- Guidance: Equipped with advanced avionics for real-time trajectory correction.

5.16. THE MENACE OF AURAMINE O IN INDIAN FOOD

Context: Recent inspections by State food safety departments have flagged the persistent use of Auramine O, a banned industrial dye, in food items (sweets, street food) to mimic the color of saffron or turmeric.

What is Auramine O?

- Chemical Nature: It is a synthetic yellow dye derived from compounds like dimethylaniline and formaldehyde.
- Physical Properties: It appears as yellow flakes or powder and is highly soluble in water and solvents.
- Primary Application: It is strictly an industrial dye used in:
- Textile and leather processing.
- Manufacturing of printing inks and paper.
- Microbiological staining procedures.

The Health Verdict: Why is it Dangerous?

- Toxicity: Long-term ingestion can lead to Liver and Kidney damage and enlargement of the spleen.
- Genetic Impact: It has mutagenic effects, meaning it can alter genetic material (DNA).
- Cancer Risk: The International Agency for Research on Cancer (IARC) classifies Auramine O as "possibly carcinogenic to humans" (Group 2B).

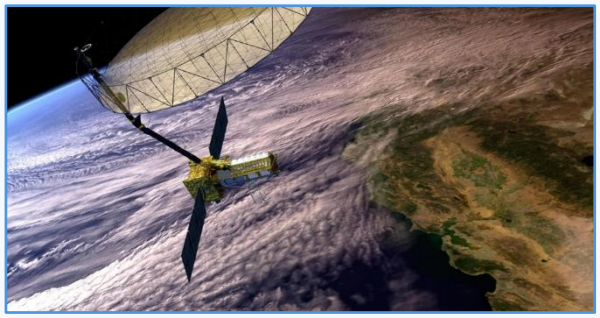
Regulatory & Legal Status

- In India: It is prohibited/banned for use as a food additive/colorant under the Food Safety and Standards Act, 2006.
- Global Stand: It is banned in the European Union (EU) and the United States (USA) for use in consumables.
- Reason for Illegal Use: Despite the ban, it is used by small-scale vendors due to its low cost, easy availability, and ability to provide a bright yellow color indistinguishable from natural agents like turmeric.

Institutional Mechanism

- Nodal Agency: Food Safety and Standards Authority of India (FSSAI) is responsible for surveillance, sampling, and enforcement.
- Current Challenges: Lack of rapid testing kits at the point of sale and uneven laboratory infrastructure across states.

5.17. NISAR ENTERS OPERATIONAL SCIENCE PHASE



Context: The NASA-ISRO Synthetic Aperture Radar (NISAR) satellite, launched on **July 30,** has officially transitioned from the commissioning phase to the **Science Phase,** marking the beginning of its data collection operations.

Mission Overview:

- Agencies Involved: **A joint flagship mission between** NASA **(USA) and** ISRO **(India).**
- Launch Vehicle: **Launched onboard India's** GSLV Mk-II **rocket from Sriharikota.**
- Mission Life: **5 Years.**
- Orbit: **Placed in a** Sun-Synchronous Polar Orbit **at an altitude of** 747 km**.**
- Current Status: **The 12-meter antenna reflector is deployed, and the satellite has begun routine "science orbit" manoeuvres for calibration and data validation.**

What makes NISAR unique?

NISAR is the first satellite **to use** Dual-Frequency Synthetic Aperture Radar (SAR)**. It operates on two distinct radio distinct bands to ensure all-weather, day-and-night imaging (penetrating clouds, smoke, and canopy).**

- L-Band SAR (Provided by NASA):
- Frequency: **1.257 GHz (Longer Wavelength).**
- Function: **Penetrates dense forest canopies and soil layers.**
- Usage: **Detecting ground deformation, sub-surface movements, and woody biomass.**
- S-Band SAR (Provided by ISRO):
- Frequency: **3.2 GHz (Shorter Wavelength).**
- Function: **Optimised for surface-level observation.**
- Usage: **Monitoring crop growth, soil moisture, and water levels.**

Operational Mechanics: How does it scan the Earth?

- SweepSAR Technology: **The mission utilizes a "SweepSAR" technique that allows for a wide swath (coverage area) of** 240 km **while maintaining high resolution.**
- Resolution: **Offers spatial resolution between** 3 to 10 metres**.**
- Revisit Time: **It will image the entire Earth's land and ice masses every** 12 days**.**
- Deformation Accuracy: **Capable of detecting vertical land movements (subsidence/uplift) down to a** centimetre**.**

Strategic Applications:

The data will be used for six broad themes:

- Cryosphere: **Monitoring glacial melt, ice sheets, and sea-level rise implications.**
- Disaster Management: **Creating "Damage Proxy Maps" within** 5 hours **of natural disasters (floods, cyclones, earthquakes) to aid relief.**

- Agriculture: **precise estimation of crop acreage and soil moisture (critical for Rabi/Kharif planning).**
- Ecosystems: **Carbon stock estimation by measuring forest biomass.**

Data Policy & Infrastructure

- Open Data Policy: **All data generated will be freely available globally within hours of acquisition.**
- Ground Stations:
- Global: **NASA's Near Earth Network (Alaska, Norway, Chile).**
- India: **ISRO's stations in Shadnagar (Telangana) and Antarctica.**

5.18. MISSION SUDARSHAN CHAKRA: INTEGRATING S-500 INTO INDIA'S STRATEGIC GRID

Context: Defence Minister Rajnath Singh is scheduled to discuss the potential acquisition of the S-500 'Prometheus' air defence system with his Russian counterpart on December 4.

S-500 'Prometheus'

The S-500 (Russian: *Prometey*), also known as 55R6M "Triumfator-M", is a next-generation surface-to-air missile/anti-ballistic missile system designed to supplement the S-400.

- Primary Capabilities:
- Operational Range: Capable of intercepting ballistic missiles up to 600 km and airborne targets (aircraft/AWACS) up to 500 km.
- Altitude: Can engage targets at altitudes of 180–200 km (Near Space).
- Hypersonic Interception: Specifically designed to destroy hypersonic cruise missiles and other aerial threats flying at speeds exceeding Mach 5.
- Space Warfare: Unlike its predecessors, the S-500 can target Low Earth Orbit (LEO) satellites and space weapons.
- Technical Superiority over S-400:
- Response Time: The S-500 has a response time of 3-4 seconds, significantly faster than the S-400's 9-10 seconds.
- Simultaneous Engagement: Capable of detecting and simultaneously engaging up to 10 ballistic hypersonic targets flying at speeds of 7 km/s.
- Radar: Utilizes the 'Yenisei' radar system, which offers superior detection against stealth aircraft (like F-22 and F-35) and electronic interference.

Current Arsenal: S-400 'Triumf' Status

- Indian Service Name: Officially designated as 'Sudarshan Chakra'.

- Status: 3 squadrons delivered; deployed during 'Operation Sindoor' (a recent air defence operation). Remaining 2 squadrons expected by 2026-27.
- Indigenisation: An Indian firm has been selected to establish a Maintenance, Repair, and Overhaul (MRO) facility for the S-400 domestically.

'Mission Sudarshan Chakra'

- Distinction: It is vital to distinguish between the weapon system (S-400 is named 'Sudarshan Chakra') and the strategic mission.
- Mission Definition: announced by the Prime Minister, 'Mission Sudarshan Chakra' is a broader, decade-long national security initiative.
- Objective: To establish an impenetrable "protective wall" integrating air defence, offensive capabilities, and surveillance around key national assets and industrial hubs by 2035.

5.19. NAVAL DETERRENCE: OPERATIONALISING THE SEAHAWK AMID GEOPOLITICAL FLUX

Context: The Ministry of Defence (MoD) has executed Letters of Offer and Acceptance (LOAs) worth ₹7,995 crore with the United States Government under the Foreign Military Sales (FMS) route. This agreement enables a "Follow-on Support" framework for the Indian Navy's MH-60R Seahawk fleet.

- Scope: The deal covers a comprehensive sustainment package for the Indian Navy's fleet of 24 MH-60R Seahawk helicopters for a period of five years.
- Components Included:
- Provisioning of spares and support equipment.
- Repair and replenishment of components.
- Training and technical support.
- Product support to ensure high availability of the fleet.
- Significance: This ensures the "operational readiness" of India's primary anti-submarine warfare assets in the Indian Ocean Region (IOR).

The Asset: MH-60R 'Romeo' Seahawk

- Type: Multi-role helicopter.
- Manufacturer: Lockheed Martin (Sikorsky), United States.
- Primary Roles:
- Anti-Submarine Warfare (ASW): Detecting and destroying enemy submarines.
- Anti-Surface Warfare (ASuW): Targeting enemy ships.
- Secondary Roles: Search and Rescue (SAR), vertical replenishment, and medical evacuation.
- Strategic Capability: These helicopters are equipped with Hellfire missiles, torpedoes, and precision-kill rockets, significantly boosting the Indian Navy's lethality.

Geopolitical Dynamics:

- De-hyphenation of Ties: The signing of this deal amidst a "trade war" (50% tariffs on Indian goods) indicates that India-U.S. Defence Partnership is resilient and distinct from trade disputes.
- Foreign Military Sales (FMS): The deal follows the FMS route, which is a government-to-government method for selling U.S. defence equipment, ensuring faster clearance and reliability.
- Interoperability: The MH-60R is a platform shared by the U.S. Navy, Australian Navy, and others in the QUAD, enhancing interoperability during joint exercises like Malabar.

5.20. MISSION SAMUDRAYAAN & MATSYA 6000

Context: The timeline for the critical 500-metre test dive of **Samudrayaan** (India's first manned ocean mission) has been pushed due to delays in procuring Syntactic Foam from France.

What is Mission Samudrayaan?

- Objective: **To send** three humans **to a depth of** 6,000 metres **in the central Indian Ocean.**
- Purpose:
- **Exploration of deep-sea resources (Polymetallic Nodules/Manganese crusts).**
- **Biodiversity assessment without disturbing the ecosystem.**
- Nodal Ministry: **Ministry of Earth Sciences (MoES).**
- Implementing Agency: **National Institute of Ocean Technology (NIOT), Chennai.**
- Global League: **Successful completion will make India the** 6th country **to have a piloted under-sea expedition beyond 5,000 metres (joining the** US, Russia, Japan, France, and China**).**

MATSYA 6000:

- Type: Self-propelled manned submersible.
- Design Capabilities:
- Operational Depth: 6,000 metres.
- Endurance: 12 hours (normal operation) and **96 hours** (in case of emergency).
- Construction Material:
- Titanium Hull: The main sphere (for the 6,000m dive) is made of Titanium to withstand immense pressure (approx. 600 bar).
- Partner: The Titanium hulls are manufactured by **ISRO.**

Why is 'Syntactic Foam' Critical?

The current delay is attributed to the procurement of Syntactic Foam **from France.**

- Function: **It provides** buoyancy **to the submersible.**
- Property: **Unlike standard hollow floats which can be crushed under deep-sea pressure, syntactic foam is a composite material made of hollow glass or ceramic microspheres filled**

with resin. It resists compression while maintaining low density, allowing the vehicle to float back up.

The Umbrella: Deep Ocean Mission (DOM)

- Nature: Central Sector Scheme **(100% funded by the Union Government).**
- Budget: **₹4,077 crore (5-year period: 2021-2026).**
- Vision: **Supports the** 'Blue Economy' **policy.**
- Six Pillars of DOM:
- Technologies for Deep Sea Mining & Manned Submersibles.
- Ocean Climate Change Advisory Services.
- Deep-sea Biodiversity exploration.
- Deep Ocean Survey.
- Energy and Freshwater from the Ocean (Offshore Thermal Energy Conversion).
- Advanced Marine Station for Ocean Biology.

5.21. REVITALISING SCL MOHALI & THE SEMICONDUCTOR BLUEPRINT

Context: The Union Government has announced a ₹4,500 crore modernization plan for the Semiconductor Laboratory (SCL) in Mohali to upgrade its strategic capabilities, reaffirming that the facility will remain government-owned.

Modernisation of SCL Mohali

- Investment: ₹4,500 crore allocated over three years (part of the larger India Semiconductor Mission corpus).
- Strategic Status:
- No Privatisation: The facility will remain under government control.
- Role: It produces 'Legacy Node' chips (older technology nodes, e.g., 180nm) vital for strategic sectors like Space (ISRO), Military, and Railways.
- Key Function: Currently engaged in "Taping Out" chips designed by students under the Chips 2 Startups (C2S) programme.
- History: Once a leading facility, it lost its edge after a fire in 1989. The current upgrade seeks a "hundredfold" increase in production.

The Umbrella: India Semiconductor Mission (ISM)

- Nodal Ministry: Ministry of Electronics and Information Technology (MeitY).
- Launch: 2021.
- Core Objective: To build a vibrant semiconductor and display ecosystem to reduce import dependency and integrate India into the global value chain (GVC).

- The Four Key Schemes:
- Semiconductor Fabs: Fiscal support of up to 50% of project cost for setting up Silicon Fabrication units.
- Display Fabs: Fiscal support of up to 50% for TFT LCD / AMOLED display fabrication units.
- Compound Semiconductors / Sensors / ATMP: Fiscal support of up to 50% of capital expenditure for Compound Semiconductors, Silicon Photonics, Sensors, and ATMP/OSAT (Assembly, Testing, Marking, and Packaging) facilities.
- Design Linked Incentive (DLI) Scheme: Targeted at startups and MSMEs. Offers financial incentives (up to ₹15 crore) and design infrastructure support for Integrated Circuits (ICs), Chipsets, etc.

Supporting Initiatives

- SPECS: Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors (provides Capex incentive).
- EMC 2.0: Electronics Manufacturing Clusters to provide world-class infrastructure.
- FDI Policy: 100% FDI is allowed in the electronics manufacturing sector under the automatic route.
- Chips to Startups (C2S): Aims to train 85,000 highly qualified engineers in Very Large Scale Integration (VLSI) and Embedded System Design.

Static Concepts

- Wafer: A thin slice of semiconductor substance, such as crystalline silicon, used in electronics for the fabrication of integrated circuits.
- Fab (Fabrication Plant): A factory dedicated to manufacturing integrated circuits.
- Fabless: Companies that design chips but outsource the manufacturing to a foundry (Fab).
- ATMP/OSAT: Post-fabrication services. They do not "make" the chip but package, test, and assemble the silicon wafer into a usable product.
- Taping Out: The final result of the chip design cycle/process before the design is sent to the foundry for manufacturing.

5.22. WINTER FORECAST 2025: DECODING THE 'COLD WAVE' PHENOMENON

Context: The India Meteorological Department (IMD) has predicted "more than usual" cold wave days for the winter season (December to February).

Affected Regions: The cold spell will primarily impact Northwest India (Delhi, Punjab, Haryana), Eastern UP, Northern MP, and parts of Maharashtra.

Why is North India Freezing? (The Causal Factors)

The India Meteorological Department (IMD) identifies specific meteorological conditions responsible for severe cold spells:

- The Fog Factor:
- Radiation Balance: Large-scale fog cover persists for extended durations, blocking sunlight during the day (preventing surface heating).
- Cooling Effect: While cloudy nights are typically warmer, persistent fog for 2–3 days leads to cumulative cooling even at night.
- Formation: Light winds combined with high moisture near the surface create a dense blanket of fog over the Indo-Gangetic plains.
- The Wind Pattern:
- Northwesterly Winds: In the absence of active Western Disturbances, cold winds from the northwest penetrate the plains.
- Wind Speed: Afternoon winds of 5–10 kmph exacerbate the chill.
- La Niña Influence:
- Pacific Connection: La Niña (abnormal cooling of the equatorial Pacific) historically favors intense cold waves in India.
- Impact: Increases the frequency and severity of cold spells across a larger geographical area.
- Subsidence: The downward movement of cold, dry air from the upper atmosphere closer to the surface traps the cold.

IMD Criteria for 'Cold Wave':

A cold wave is defined as a rapid fall in temperature within 24 hours requiring protective measures.

- For Plains:
- Standard Criterion: When the Minimum Temperature is ≤ 10°C AND is 4.5°C to 6.4°C below normal for two consecutive days.
- Severe Cold Wave: When the Minimum Temperature is ≥ 6.5°C below normal.
- For Coastal Stations:
- The threshold of 10°C is rarely met.
- Wind Chill Factor: The "feels like" temperature is lower due to wind speed, causing discomfort despite higher ambient temperatures.
- Core Cold Wave Zone:
- Extends across Punjab, Himachal Pradesh, Uttarakhand, Delhi, Haryana, Rajasthan, UP, Gujarat, MP, Chhattisgarh, Bihar, Jharkhand, West Bengal, Odisha, and Telangana.

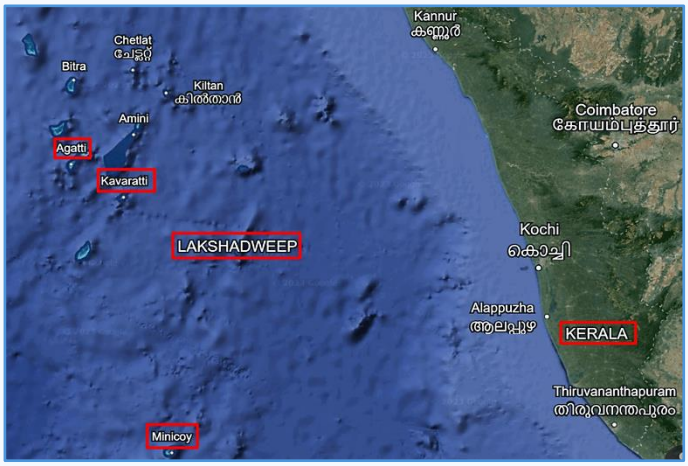
The Role of Western Disturbances (WD)

- Dual Impact:
- Warming Phase: Usually, approaching WDs bring cloud cover that traps heat (Greenhouse effect), keeping nights warmer.
- Cooling Phase: Once a WD passes, it leaves behind clear skies and cold northerly winds, often triggering a cold wave.
- *Note:* The absence of cloud cover allows infrared radiation to escape back into space, cooling the ground rapidly.

Institutional Framework: India Meteorological Department (IMD)

- Establishment: Founded in 1875.
- Parent Ministry: Ministry of Earth Sciences (Government of India).
- Mandate: The principal agency for meteorological observations, weather forecasting, and seismology

5.23. MILITARY EXPANSION IN THE LAKSHADWEEP ARCHIPELAGO



Context: The Indian armed forces are ramping up their presence in the strategically vital Lakshadweep archipelago. The Southern Naval Command (SNC) has confirmed that a new Naval detachment on Bitra Island will be fully operational by next year, while the Indian Air Force (IAF) is expanding facilities on Agatti and constructing a new air base on Minicoy.

Why the Strategic Push?

- Maritime Security: To counter increasing Chinese presence in the Indian Ocean Region (IOR).
- Anti-Piracy: To mitigate threats of piracy in the Arabian Sea.
- Shipping Lanes: To secure heavy international shipping traffic passing through the Nine Degree Channel.

Geographical Profile

- Origin: Lakshadweep consists of 36 islands of coral origin (atolls).
- Concept Check: An atoll is a ring-shaped coral reef usually formed on the rim of a submerged volcano. Corals are skeletons of marine polyps.
- Divisions:
- Amindivi Islands: The northernmost group.
- Minicoy Islands: The southernmost and largest group.
- Topography: Flat terrain with low elevation (< 5 meters); devoid of hills, streams, or valleys.
- Administrative:
- Capital: Kavaratti.
- Jurisdiction: Under the Kerala High Court.

Historical Evolution

- Discovery Myth: Linked to Cheraman Perumal, the last Chera ruler of Kerala. Myths suggest a search party sent by the Raja of Kolattunad discovered the islands after a storm.
- Early Settlers: Malabari sailors, followed by Hindus (Nambudiris, Nairs) and Mukkuvans.
- Political Control:
- Ruled by the Arakkal Kingdom of Kannur (Kerala's only Muslim dynasty) from the 16th century until 1908.

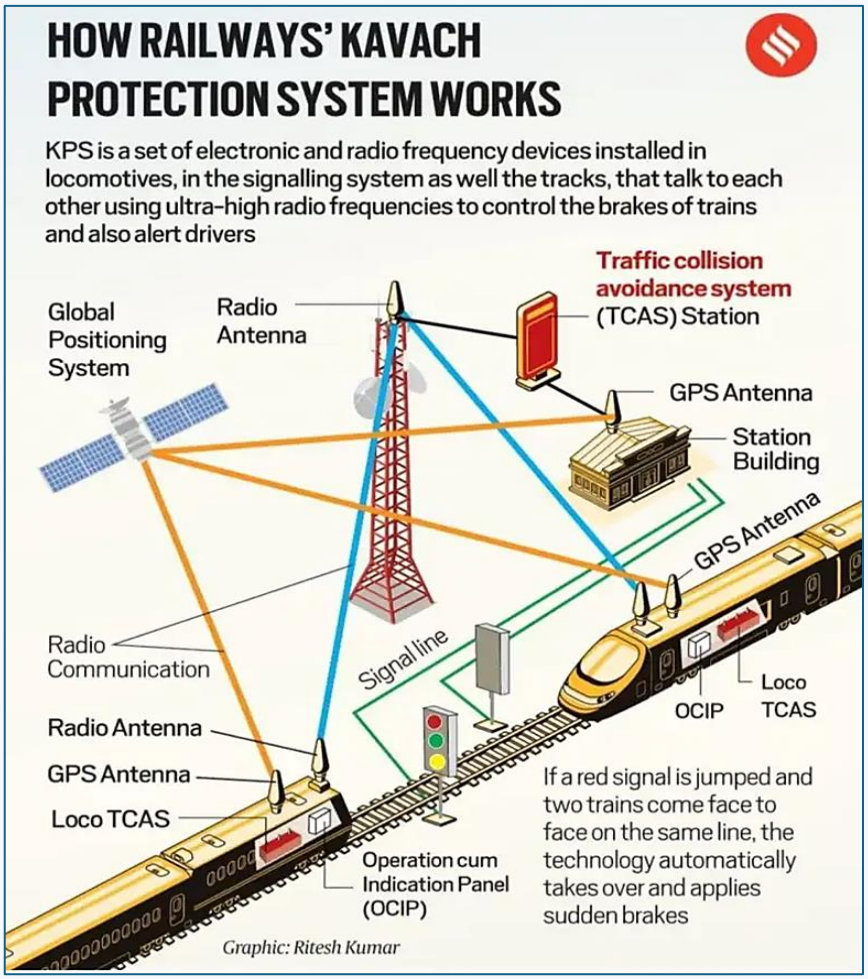
- Part of the Malabar district under the British.
- Became a Union Territory in 1956 following the States Reorganisation Act.

Unique Socio-Cultural Fabric

- Religion & Society: Predominantly Muslim but follows a unique Islamic Matrilineal system (Marumakkathayam), reflecting strong pre-Islamic Hindu influences.
- Caste System: Retains a caste structure unlike standard Islamic practice.
- Cultural Markers:
- Use of the ancient Vattelutu script (old Malayalam).
- Traditional songs alluding to Hindu deities (Ram) and snake worship.
- Languages:
- Malayalam: Official language.
- Mahl: Spoken in Minicoy (similar to Dhivehi of Maldives).
- Jazari: A dialect spoken in the islands.

5.24. DECODING KAVACH AND RAILWAY MODERATION

Context: The Union Minister of Railways recently informed the Lok Sabha that the Kavach system has been fully commissioned on over 2,000 km of the rail network. The Railways have laid over 7,129 km of Optical Fibre Cable (OFC) and installed 860 telecom towers to support this complex system.



Deciphering 'Kavach': The Indigenous Shield:

- What is it? : An indigenous Automatic Train Protection (ATP) system, technically known as the Train Collision Avoidance System (TCAS).
- Objective: To achieve "Zero Accidents" by preventing collisions due to human error (Signal Passing at Danger – SPAD) or over-speeding.
- Technology Stack:
- RFID (Radio Frequency Identification): Tags placed on tracks to identify precise train location.

- GPS (Global Positioning System): For synchronization and timing.
- OFC & Towers: For ultra-low latency communication between stations and locomotives.
- Key Functionalities:
- Collision Avoidance: Direct Loco-to-Loco communication assesses collision risk and applies automatic brakes.
- Fog Safety: Cab Signalling provides visibility of signals inside the cabin, crucial during foggy weather.
- SOS Feature: Allows loco pilots to broadcast emergency messages to control trains in the vicinity.

Beyond Kavach: Institutional Safety Frameworks

- Rashtriya Rail Sanraksha Kosh (RRSK):
- Launch: 2017-18.
- Corpus: ₹1 Lakh Crore over 5 years.
- Purpose: Dedicated fund for critical safety infrastructure upgrades (track renewal, bridge rehabilitation).
- SIMS (Safety Information Management System):
- A web-based application developed in 2016 for real-time accident reporting and data analysis between Zonal Railways and the Railway Board.
- Elimination of Unmanned Crossings:
- All Unmanned Level Crossings (UMLCs) on Broad Gauge (BG) routes were eliminated by January 2019.

Amrit Bharat Station Scheme

- Launch: Introduced by the Ministry of Railways in December 2022.
- Objective: To transform 1,309 railway stations across India into modern, integrated transport hubs.
- Key Focus: Prioritises the integration of regional architecture, enhancement of world-class passenger amenities, promotion of inclusivity (Divyangjan-friendly), and support for holistic urban development.

5.25. AGNIPATH SCHEME

Context: The Agnipath Scheme, launched in June 2022, represents a transformative reform in the recruitment policy of the Indian Armed Forces.

Core Institutional Framework

- Definition: A pan-India merit-based recruitment scheme for enrolling soldiers, airmen, and sailors into the three services (Army, Navy, and Air Force).
- Rank: Agniveers form a distinct rank in the Armed Forces, different from any other existing ranks.

- Tenure: Enrolled for a fixed period of four years, including a training period of approximately six months.
- Post-Tenure Selection: After four years, based on merit and organizational requirements, up to 25% of each specific batch will be enrolled in the regular cadre of the Armed Forces for an additional 15 years of service.

Eligibility and Enrollment

- Age Limit: Candidates must be between 17.5 to 21 years of age. (Note: A one-time relaxation to 23 years was given in the inaugural year 2022).
- Gender: Open to both men and women (subject to service requirements). The Navy and Air Force have already inducted women under this scheme.
- Educational Qualification: Varies by category (e.g., Class 10th for General Duty, Class 12th for Technical roles).

Financial Package: The "Seva Nidhi" Strategy

The financial structure is designed to provide "financial liquidly" to Agniveers at the end of their tenure.

- Monthly Package: Fixed at ₹30,000 in the 1st year, rising to ₹40,000 in the 4th year.
- Seva Nidhi Fund: 30% of the monthly salary is contributed by the Agniveer.
- An equal amount (matching contribution) is provided by the Government.
- Total Corpus: Upon completion of four years, Agniveers receive a one-time package of approximately ₹11.71 Lakh (plus interest), which is exempt from Income Tax.
- Insurance: A non-contributory Life Insurance Cover of ₹48 Lakh is provided during the service period.

Post-Service Rehabilitation & Incentives

To ensure a smooth transition into civil life, the government and various states have announced several measures:

- Education: Provision for a "Certificate of Service" and a bridge course (via NIOS/IGNOU) to provide educational credits equivalent to higher secondary or graduation.
- Job Reservations:10% Reservation in the Central Armed Police Forces (CAPFs) and Assam Rifles.
- 10% Reservation in the Coast Guard, Defence Public Sector Undertakings (DPSUs), and Ministry of Defence civil posts.
- Several states (e.g., UP, Haryana, Madhya Pradesh) have announced preference for Agniveers in state police recruitment.
- Financial Support: Banks have introduced specialized Agniveer Personal Loans for those wishing to start businesses with their Seva Nidhi corpus.

Strategic Significance for India

- Youthful Profile: Aimed at bringing down the average age of the Indian Armed Forces from 32 to 26 years.
- Techno-Savvy Force: Taps into the digital-native youth to handle modern, technology-intensive warfare.

- Financial Sustainability: Aims to reduce the burgeoning Pension Bill, allowing more funds to be diverted toward "Capital Modernization" of the military.

5.26. IN-SPACe

Established: June 2020 (Operationalized 2021)

Status: Autonomous, Single-Window, Nodal Agency under the Department of Space (DoS).

Mandate: To promote, authorize, and supervise space activities of **Non-Governmental Entities (NGEs).**

Governance: Headed by a Chairman (currently Dr. Pawan Goenka). It has its own directorates for Technical, Legal, Safety, and Monitoring.

Key Functions:

1. **The Single-Window Regulator**

- Authorization: It is the "Traffic Controller" for private players. No private rocket can launch or satellite can be deployed without IN-SPACe authorization.
- Supervision: It ensures that private space activities comply with international treaties (like the Outer Space Treaty) and national safety standards.

2. **Bridge between ISRO and Industry**

- Infrastructure Sharing: It facilitates the sharing of ISRO's world-class facilities (launch pads, tracking centers, and test labs) with private startups like Skyroot Aerospace and Agnikul Cosmos on a nominal "user charge" basis.
- Technology Transfer: It acts as the nodal agency to transfer ISRO-developed mature technologies to the private sector.

3. **Promotion & Hand-holding**

- Space Ecosystem: It manages the ₹1,000 Crore Venture Capital (VC) Fund (approved in 2024-25) to accelerate space-tech startups.
- Educational Support: Promotes space tourism and student-led satellite projects (e.g., AzaadiSAT).

Strategic Distinction: IN-SPACe vs. ISRO vs. NSIL

1. ISRO (The R&D Hub): Focuses on "cutting-edge" research, deep-space exploration (Gaganyaan, Chandrayaan), and national missions.
2. IN-SPACe (The Regulator): The "interface" that opens the door for private players to enter the sector.
3. NSIL (The Commercial Arm): A PSU that handles the commercial side of ISRO—selling launch services and building satellites on a "Demand-Driven" model.

Latest Developments

- Indian Space Policy 2023: This foundational document formally recognized IN-SPACe as the primary agency to create a level playing field for NGEs.

- FDI Reforms (2024): * 100% FDI allowed in manufacturing satellite components.
- 74% FDI (Automatic) for Satellite Manufacturing & Operations.
- 49% FDI (Automatic) for Launch Vehicles and Spaceports.
- Dec 2025 Milestone: IN-SPACe successfully authorized the first private commercial satellite launch from the new SSLV Launch Complex in Kulasekarapattinam.
- Space Vision 2047: IN-SPACe is tasked with growing India's share in the global space economy from 2% to 10% by 2030.

5.27. ANJADIP – ANTI-SUBMARINE WARFARE SHALLOW WATER CRAFT (ASW SWC)

Context: In December 2025**, the** Indian Navy inducted 'Anjadip'**, the** third of eight Anti-Submarine Warfare Shallow Water Crafts (ASW SWCs)**, at** Chennai**.**

The induction strengthens India's coastal anti-submarine warfare capability **and advances the** Aatmanirbhar Bharat **initiative in defence shipbuilding.**

About Anjadip Ship

- Anjadip **is an** indigenously designed and constructed **ASW Shallow Water Craft.**
- **It has been built by** Garden Reach Shipbuilders and Engineers (GRSE), Kolkata**, in collaboration with** L&T Shipyard, Kattupalli**, under a** Public–Private Partnership (PPP) **model.**
- **The ship is named after** Anjadip Island**, located off the** Karwar coast in Karnataka**.**
- **It represents the** modern reincarnation of INS Anjadip**, a** Petya-class corvette **that was decommissioned in** 2003**.**
- **The vessel has been designed and constructed in accordance with the** classification standards of the Indian Register of Shipping (IRS)**.**

Key Features and Technical Specifications

- Length: **Approximately** 77 metres**.**
- Displacement: **Approximately** 900 tonnes**.**
- Maximum Speed: **Around** 25 knots**.**
- Operational Endurance: **Nearly** 1,800 nautical miles**.**
- Propulsion: **It is the** largest Indian Naval warship powered by waterjet propulsion**, enhancing manoeuvrability in shallow waters.**

Weapons and Sensors

- **Equipped with** state-of-the-art Lightweight Torpedoes**.**
- **Fitted with** indigenously developed Anti-Submarine Rockets**.**

- **Integrated with** shallow-water SONAR systems **for effective detection and tracking of underwater threats.**
- **Armed with an** indigenous 30 mm Naval Surface Gun**.**
- **The ship has** over 80% indigenous content**.**

Operational Capabilities

- **Designed primarily for** Anti-Submarine Warfare (ASW) **operations in** coastal and shallow water regions**.**
- **Enhances the Navy's ability in:**
- Coastal surveillance
- Subsurface threat detection
- Mine-laying operations
- **Particularly effective in** littoral zones**, where larger warships face operational constraints.**

Strategic and Defence Significance

- **Strengthens India's** coastal defence architecture **against submarine threats.**
- **Demonstrates progress under** Aatmanirbhar Bharat **by boosting** indigenous naval shipbuilding**.**
- **Reduces dependence on** foreign defence imports**.**
- **Reflects the growing maturity of India's** domestic defence manufacturing ecosystem **and** PPP-based shipbuilding model**.**

Anti-Submarine Warfare Shallow Water Crafts (ASW SWCs)

- Overview**: ASW SWCs are a class of indigenously designed and built corvettes for the** Indian Navy**, primarily to replace the ageing** Abhay-class corvettes**.**
- Project Details**: 16 vessels under construction (8 by** Cochin Shipyard Limited (CSL) **– Mahe-class; 8 by** Garden Reach Shipbuilders & Engineers (GRSE) **– Arnala-class); contracts signed in 2019; over** 80-88% indigenous content **under** Aatmanirbhar Bharat **initiative.**
- Primary Role**: Anti-Submarine Warfare (ASW) in coastal/shallow waters – detection, tracking, and neutralization of submarines (especially midget submarines).**

GRSE – Notable Achievement

- **With the delivery of** Anjadip**,** GRSE delivered five naval vessels in a single year**, a rare feat.**
- Anjadip **is:**
- **The** 115th warship built **by GRSE.**
- **The** 77th warship delivered **to the Indian Navy.**
- Other vessels delivered by GRSE in 2025 include:
- Advanced Guided Missile Frigate Himgiri
- ASW SWCs Arnala and Androth
- Survey Vessel (Large) Ikshak

5.28. THE DIABETES DILEMMA: GLP-1 AGONISTS VS. LIFESTYLE INTERVENTIONS

Context: Amidst the global surge of "weight loss drugs" (GLP-1 agonists), the International Diabetes Federation (IDF) has emphasized the indispensability of lifestyle modifications over pharmaceutical dependency, citing sustainability and equity concerns.

Pharmacotherapy vs. Lifestyle

The Cost & Equity Barrier: While acknowledging the efficacy of new drug molecules, the IDF highlights that reliance on expensive therapies makes diabetes care unsustainable for public health systems, potentially increasing costs by 22 times in some nations.

The "Old Faithful" Approach:

- Physical Activity: A new consensus group (IDF Global Physical Activity Consensus) has been launched to create guidelines for "culturally acceptable" physical activity.
- Fasting Protocols: The IDF plans to release guidelines on 19 different fasting styles by 2027 for diabetes prevention and therapy.
- WHO Stance: Even recent WHO guidelines maintain that diet and exercise remain paramount; drugs are an escalation, not a replacement.
- Science of the "Wonder Drugs": GLP-1 Agonists The current boom in weight loss medication centers around Glucagon-Like Peptide-1 (GLP-1) Receptor Agonists (e.g., Semaglutide, Tirzepatide).
- Mechanism of Action: These drugs mimic Incretins, which are gut hormones released after eating.
- Insulin Regulation: They enhance insulin secretion from the pancreas, aiding glucose utilization.
- Glucagon Suppression: They inhibit glucagon release, preventing the liver from releasing stored glucose into the blood.
- Gastric Emptying: They slow down stomach emptying, preventing sharp blood sugar spikes.
- Satiety Signaling: They signal "fullness" to the brain, suppressing appetite.

Evolution of the Molecules:

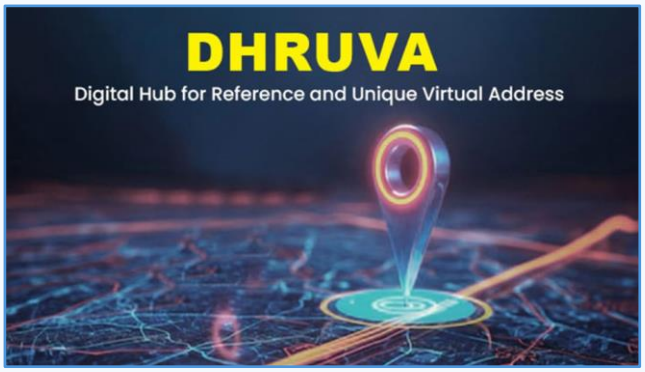
- Semaglutide: A GLP-1 mono-agonist.
- Tirzepatide: A dual agonist mimicking both GLP-1 and GIP (Glucose-dependent Insulinotropic Polypeptide).
- Future Trends: Triple and quadruple analogs are in trials, showing weight loss potential comparable to bariatric surgery (up to 20% body weight).
- Therapeutic Benefits & Future Potential
  Beyond diabetes management, these molecules have shown significant collateral health benefits:
- Cardiovascular Health: Reduction in major cardiovascular events (approx. 20%) and all-cause mortality.
- Hepatic Health: Significant resolution of fatty liver and improvement in liver fibrosis.

- Neurological Potential: Emerging evidence suggests potential benefits in reducing Alzheimer's risk and aiding addiction recovery.

Key Terminology

- Incretins: Hormones that stimulate a decrease in blood glucose levels.
- HbA1c: A blood test that measures average blood sugar levels over the past 3 months (Hemoglobin A1c).
- NCDs: Non-Communicable Diseases (Diabetes, Hypertension, etc.), often linked to lifestyle.

5.29. DECODING DHRUVA AND DIGIPIN



Context: The Department of Posts (DoP) has proposed the DHRUVA (Digital Hub for Reference and Unique Virtual Address) framework. To facilitate this, a draft amendment to the Post Office Act, 2023 has been introduced. This initiative aims to establish a Digital Public Infrastructure (DPI) for address management, similar to Aadhaar for identity and UPI for payments.

What is DHRUVA?

DHRUVA acts as a foundational Digital Public Infrastructure (DPI) designed to standardize and share physical addresses digitally.

- Tokenisation of Addresses: Similar to how UPI aliases replace bank account details, DHRUVA replaces physical addresses with "labels"
- Functionality: It creates a bridge between a user's Descriptive Address (traditional text) and a Geo-coded Address (DIGIPIN).
- Consent Architecture: It operates on a consent-based model where users authorize who accesses their address and for how long.

Understanding DIGIPIN

DIGIPIN is the underlying location system developed in-house by India Post.

- Structure: It is a 10-digit alphanumeric code.
- Basis: Unlike traditional PIN codes based on postal zones, DIGIPIN is based on Geo-coordinates (Latitude and Longitude).
- Granularity: The system divides India into specific grids (approximately 4m x 4m or related blocks), assigning a unique code to every location.
- Nature: It is an open-sourced system, ensuring interoperability across logistics and gig platforms (e.g., Amazon, Uber).

Operational Mechanism

The framework mirrors the financial ecosystem (like NPCI) and involves multiple stakeholders:

- Address Service Providers: Generate proxy addresses/labels.

- Address Validation Agencies: Authenticate the validity of addresses.
- Governance Entity: An independent body to oversee the framework (similar to NPCI).

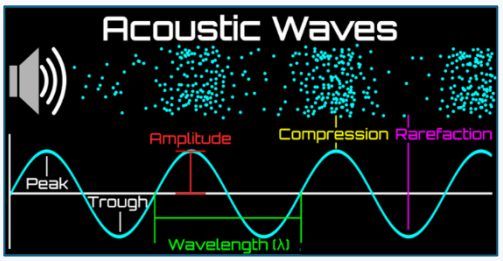
Strategic Significance & Challenges

- Service Delivery: Enables precise delivery in rural areas where descriptive addresses are unstructured.
- Portability: Allows seamless address updates across all service providers when a user relocates.

The Urban Governance Dilemma:

- Limitation: The system links addresses to *people* (via consent) rather than *structures*.
- Impact: If citizens opt out of data sharing, it creates data gaps, potentially hindering urban planning and structural mapping.

5.30. THE PHYSICS OF ACOUSTICS: PRINCIPLES AND APPLICATIONS



Context: The diverse auditory environment of the Allen Forest Zoo (Kanpur) serves as a practical example to understand the fundamental concepts of acoustics (sound generation), frequency dynamics, and the application of electromagnetism in audio devices.

Mechanics of Sound Propagation

- Nature of Waves: Sound travels as longitudinal waves created by mechanical disturbances.
- Propagation Mechanism: It requires a material medium (solid, liquid, or gas). The source vibrates, causing periodic compression (high pressure) and rarefaction (low pressure) of air molecules to transmit energy.
- Human Auditory Spectrum: The human ear perceives frequencies between 20 Hz and 20,000 Hz (20 kHz).
- Infrasonic: Frequencies below 20 Hz (e.g., Elephant communication, earthquakes).
- Ultrasonic: Frequencies above 20 kHz (e.g., Bats, medical imaging).

Frequency Dynamics and Pitch

- Concept:Pitch is the perceptual characteristic of sound determined by its frequency (measured in Hertz).
- High Frequency = High Pitch (Sharp sound, e.g., a spoon dropping ~8 kHz).
- Low Frequency = Low Pitch (Deep sound, e.g., a hum ~200 Hz).
- Inverse Relationship Principle: In both string and wind instruments, the frequency is inversely proportional to the length of the vibrating element.
- String Instruments (Guitar): Shortening the vibrating string (by pressing a fret) increases the frequency (sharper note).
- Wind Instruments (Flute): Shortening the air column increases the frequency.

- *Practical Example:* As a water bottle fills, the air column shortens, causing the sound of the water to become progressively sharper (higher pitch).

Application of Electromagnetism: The Loudspeaker

- Transduction: Loudspeakers function as transducers, converting electrical energy into mechanical energy (sound).
- Core Components: A permanent magnet and a copper coil (electromagnet) attached to a diaphragm.

Operational Principle:

- Electromagnetism: When electric current flows through the copper coil, it generates a magnetic field.
- Alternating Current (AC): As the audio signal (AC) changes direction, the polarity of the electromagnet flips rapidly.
- Interaction: The varying magnetic field of the coil interacts with the static field of the permanent magnet (attraction and repulsion).
- Sound Generation: This rapid push-and-pull vibrates the diaphragm, creating sound waves in the air.

5.31. THE VECTOR PARADOX: FROM EVOLUTIONARY ORIGINS TO GENETIC CONTROL

Context: A recent study in *PNAS* (Proceedings of the National Academy of Sciences) challenges the traditional consensus on mosquito evolution.

- The Timeline Controversy:
- Traditional View (Triassic Origin): Suggests mosquitoes appeared ~220 million years ago. Supported by older molecular clock studies.
- Revised Hypothesis (Cretaceous Origin): The new study posits a younger origin ~106 million years ago.

Scientific Basis for Revision:

- Branch Attraction Bias: A statistical error in previous studies where unrelated species appeared closely related due to high mutation rates.
- Genomic Shift: The genus *Anopheles* underwent a DNA composition shift (from G-C rich to A-T rich), which earlier studies misinterpreted as deep evolutionary divergence.
- The Co-Evolution Theory:
- Mosquitoes likely co-evolved with Plasmodium (Malaria parasite) ~43-46 million years ago.
- Culex Lineage: Historically associated with transmitting malaria to birds and reptiles.
- Anopheles Lineage: Evolved to transmit malaria to mammals.

Bio-Engineering the Vector:

With urbanization and climate change expanding vector territories, traditional controls (nets, insecticides) are failing. Genetic engineering offers precise, non-chemical solutions.

Genomic Sequencing:

- Institutes in Bengaluru and the USA have sequenced the genome of *Anopheles stephensi* (a major urban malaria vector), enabling targeted gene editing.

Gene Drive Technology:

- Concept: Proposed by Austin Burt (2003), it bypasses Mendelian laws of inheritance.
- Mechanism: Uses protein-based tools (like CRISPR) to force a specific trait (e.g., infertility) to be inherited by nearly 100% of offspring, rapidly spreading through wild populations.

The OX5034 Mosquito (Self-Limiting):

- Developer: Oxitec (Released in Florida/Texas, 2020).
- Mechanism: Genetically Modified (GM) males carry a "self-limiting gene."
- Outcome: When GM males mate with wild females, female offspring (the biters) die before adulthood; male offspring survive to continue the cycle.

5.32. GRAIN GEOPOLITICS: THE US-INDIA RICE TRADE EQUATION

Context: The U.S. administration has hinted at imposing tariffs on Indian rice, citing "dumping" concerns to protect American farmers. Trade data suggests such tariffs would disproportionately impact the U.S.

- India's Exposure: Only 3% of India's total rice exports go to the U.S.
- U.S. Dependency: Indian rice constitutes over 25% of total rice imports into the U.S.
- Upcoming Talks: Negotiations regarding tariffsA are scheduled between U.S. and Indian delegations.

Geographical Prerequisites for Rice?

- Cropping Season: Primarily a Kharif crop (June-November). Also grown in Rabi season in irrigated areas (e.g., Tamil Nadu, Coastal Andhra Pradesh).
- Temperature:
- Average: 21°C to 37°C.
- Germination: ~21°C.
- Growth: >25°C.
- Rainfall: High water requirement (150-300 cm).
- Soil Type: Deep, fertile clayey or loamy soils with high water retention capacity. Alluvial soils in river basins/coastal areas are ideal.

How Significant is India in the Global Rice Map?

- Global Standing:

- Production: 2nd largest globally (after China). India and China together account for >50% of world production.
- Exports: Largest exporter globally.
- Market Share:
- In 2023, India accounted for 33% of global rice exports.
- Pre-ban (2022), India contributed ~40% of global exports.
- Major Production Hubs: Coastal strips (East/West), Assam plains, and Himalayan foothills.

India's Export Basket?

- Varieties:
- Basmati: ~1/3rd of total exports.
- Non-Basmati: Includes Parboiled, Brown, Broken, and White rice.
- Top Destinations:
- Basmati: Saudi Arabia (Top importer by value), Iran, Iraq.
- Non-Basmati: Kenya, Benin, Mozambique, Vietnam.
- Global Competitors: Thailand and Vietnam (their combined exports roughly equal India's exports).

Recent Policy Shift?

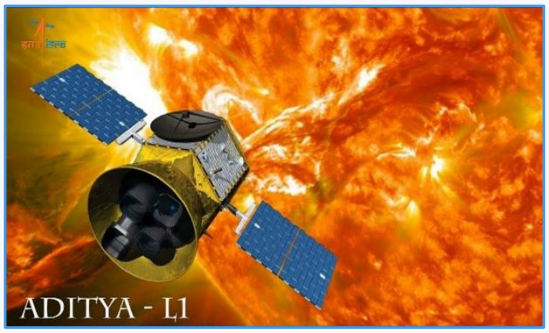
- Ban Lifted: The Centre has lifted the export ban on Non-Basmati White Rice.
- Condition: A Minimum Export Price (MEP) of $490 per tonne has been imposed.

Rationale for Relaxation:

- Surplus Stocks: FCI stocks (323 LMT) far exceeded buffer norms.
- Good Monsoons: Increase in paddy sowing area (approx. 413.5 lakh hectares).
- Price Stability: Declining wholesale prices domestically.

5.33. ADITYA-L1: UNVEILING THE MECHANICS OF SOLAR SUPER-STORMS

Context: India's Aditya-L1, in collaboration with six U.S. satellites (including NASA's Parker and Wind), has decoded the unusual behavior of the May 2024 Solar Storm (Gannon's Storm).



The Phenomenon: The mission observed a rare event where two Coronal Mass Ejections (CMEs) collided, triggering a process known as Magnetic Reconnection.

What did the Mission Reveal about Solar Storms?

- Magnetic Reconnection: Typically, CMEs carry twisted "magnetic ropes." During this event, two CMEs collided, compressing the magnetic field lines until they snapped and rejoined.
- Scale of Event: The reconnection region was approximately 1.3 million km wide (nearly 100 times the size of Earth).

- Impact: This process caused a sudden reversal of magnetic fields, significantly intensifying the storm's impact on Earth's magnetic shield.
- Significance: This is the first recorded instance of such a massive magnetic breakup and rejoining observed *inside* a CME.

Key Features of the Aditya-L1 Mission?

- Objective: To study the Sun's outermost layers: the Photosphere, Chromosphere, and Corona.
- Placement: Positioned in a Halo Orbit around the Lagrange Point 1 (L1), approx. 1.5 million km from Earth.
- Strategic Advantage: The L1 point allows for a continuous, uninterrupted view of the Sun without any occultation or eclipse.
- Payloads: It carries seven payloads to observe the Sun across various wavelengths (Visible, UV, X-ray) and measure particle flux/magnetic fields in situ.

How does Aditya-L1 compare to Global Missions?

- Parker Solar Probe (NASA): Closest mission to the Sun; studies the outer corona and solar wind.
- Solar Orbiter (ESA/NASA): Focuses on the Sun's poles and the 11-year solar cycle.
- SOHO (NASA/ESA): Provides real-time data on space weather.
- ASO-S / Kuafu-1 (China): Studies solar flares and magnetic fields to understand Earth's environmental impact.

5.34. TACTICAL BROTHERHOOD: INDIA-NEPAL JOINT MILITARY DRILL

Context: The 19th edition of the India-Nepal joint military exercise, SURYAKIRAN-XIX, recently concluded.The exercise was held at the Foreign Training Node in Pithoragarh, Uttarakhand. The event culminated in a validation phase witnessed by the Directors-General of Military Operations (DGMOs) of both nations.

Why is this Exercise Significant?

- Interoperability: It enhanced the seamless interoperability and coordination between the two armies at battalion and company levels.
- Regional Security: The drill underscored the importance of shared security and humanitarian preparedness in the Himalayan region.
- Diplomatic Gesture: As a symbol of enduring partnership, the DGMOs jointly planted a "Tree of Friendship," reaffirming the strategic cooperation between New Delhi and Kathmandu.

Major Military Exercises of India (2025)

Exercise Name	Partner Country	Service	Focus / Domain
Austra Hind	Australia	Army	Multi-domain operations; Peacekeeping
AUSTRAINDEX	Australia	Navy	Maritime security & interoperability

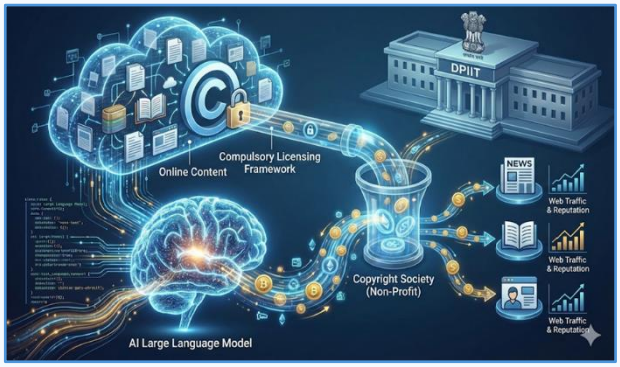
Sampriti	Bangladesh	Army	Counter-terrorism; Disaster management
Bongosagar	Bangladesh	Navy	Maritime patrolling; Interoperability
Hand-in-Hand	China	Army	Counter-terrorism (Currently suspended)
Cyclone	Egypt	Army	Desert warfare; Special Forces ops
Shakti	France	Army	Counter-terrorism in semi-urban terrain
Varuna	France	Navy	High-end naval warfare; Subsurface combat
Garuda	France	Air Force	Air defence; Interoperability
Garuda Shakti	Indonesia	Army	Counter-insurgency; Jungle warfare
Samudra Shakti	Indonesia	Navy	Maritime security
Dharma Guardian	Japan	Army	Jungle warfare; Urban counter-terrorism
JIMEX	Japan	Navy	Naval warfare; Maritime security
Veer Guardian	Japan	Air Force	Air combat manoeuvring
Kazind	Kazakhstan	Army	Counter-terrorism in mountainous terrain
Khanjar	Kyrgyzstan	Army	High-altitude warfare; Special Forces
Harimau Shakti	Malaysia	Army	Jungle warfare planning & execution
Ekuverin	Maldives	Army	Amphibious ops; Counter-terrorism
Ekatha	Maldives	Navy	Diving & Special Operations
Nomadic Elephant	Mongolia	Army	Counter-terrorism; Peacekeeping
Imbax	Myanmar	Army	Peacekeeping operations
Suryakiran	Nepal	Army	Mountain warfare; HADR; Counter-terror
Al Najah	Oman	Army	Counter-terrorism
Naseem-Al-Bahr	Oman	Navy	Naval cooperation
Eastern Bridge	Oman	Air Force	Air operations interoperability
Indra	Russia	Tri-Service	Joint operations across land, sea, air
Avia Indra	Russia	Air Force	Anti-terror air operations
Lamitiye	Seychelles	Army	Semi-urban warfare; Security ops
Agni Warrior	Singapore	Army	Artillery firepower & technology
Bold Kurukshetra	Singapore	Army	Mechanized warfare
SIMBEX	Singapore	Navy	Maritime combat; Anti-submarine warfare
Mitra Shakti	Sri Lanka	Army	Counter-insurgency; Terrorism
SLINEX	Sri Lanka	Navy	Naval maneuvers; Surveillance
Maitree	Thailand	Army	Jungle warfare; Counter-terrorism
Siam Bharat	Thailand	Air Force	Humanitarian assistance; Air ops
Zayed Talwar	UAE	Navy	Maritime security; Interoperability
Desert Flag	UAE	Air Force	Large force employment warfare

Ajeya Warrior	United Kingdom	Army	Counter-terrorism; Urban warfare
Konkan	United Kingdom	Navy	Maritime interdiction; Air defence
Indradhanush	United Kingdom	Air Force	Air defence operations
Yudh Abhyas	USA	Army	High-altitude; Cold weather ops
Vajra Prahar	USA	Army (SF)	Special Forces; Counter-terrorism
Tiger Triumph	USA	Tri-Service	HADR (Humanitarian Assistance)
Cope India	USA	Air Force	Air combat tactics; Mobility
Dustlik	Uzbekistan	Army	Counter-terrorism in urban terrain
VINBAX	Vietnam	Army	UN Peacekeeping operations

5.35. THE AI ROYALTY REGIME: DPIIT'S COMPULSORY LICENSING PROPOSAL

Context: A working paper by the Department for Promotion of Industry and Internal Trade (DPIIT) proposes a new framework to regulate how AI Large Language Models (LLMs) access online content.

- Objective: To balance the interests of Copyright Holders (publishers) and AI Developers (data consumers).



What is the Proposed Framework?

- Default Access: AI models should have default access to all freely available online content for training.
- No Opt-Out: Publishers/Creators should not have the right to block AI access (no opt-out mechanism).
- *Reasoning:* Small creators lack resources to enforce opt-outs effectively.
- Monetization Model: Implementation of a "Compulsory Licensing" style system.
- AI firms pay a statutory fee to access data.
- This eliminates the need for individual negotiations with every publisher.

How will Administration Work?

- Copyright Society: A non-profit body (similar to those for music rights) will be established or designated.
- Function:
- Collect royalties from AI companies.
- Distribute funds to content creators (both members and non-members).
- Distribution Criteria: Royalties to be based on metrics like web traffic and social reputation of the publisher.

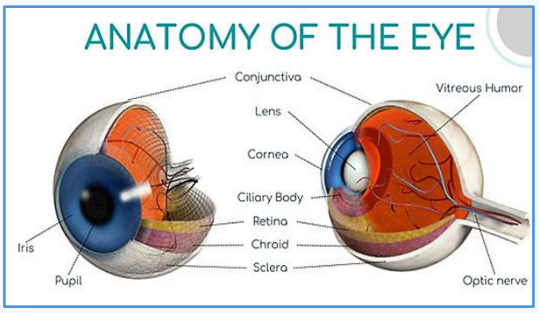
Key Terminology

- Compulsory Licensing: A mechanism under the Copyright Act, 1957, where the government allows the use of copyrighted material without the owner's specific consent, provided a fixed royalty is paid (e.g., Radio stations playing music).
- DPIIT: The nodal department under the Ministry of Commerce and Industry responsible for IPR policy (Copyrights, Patents, Trademarks, GI).

Counter-Argument?

- Nasscom's Dissent: The industry body argued against forced royalties, terming it a "Tax on Innovation."
- Demands: They advocate that mining freely available (non-paywalled) data should be free, with an option for creators to "reserve" rights if they choose.

5.36. THE PHYSIOLOGY OF OPTICS: MECHANISMS OF DARK ADAPTATION



- Dark Adaptation: The physiological process by which the human eye increases its sensitivity to light when transitioning from a high-illumination environment (bright sunlight) to a low-illumination environment (dark room).
- The Latency Period: The temporary visual impairment experienced during this transition is caused by the time lag in the eye's mechanical and chemical adjustments.

How does the Eye Mechanically Adjust? (The Pupillary Reflex)

- Role of the Pupil: The pupil functions as a variable aperture, regulating the quantum of light entering the eye.
- In High Illumination: The pupil constricts (shrinks) to minimize light entry and protect the retina from photic damage.
- In Low Illumination: The pupil dilates (widens) to maximize light capture.
- The Constraint: When moving into darkness, the pupil is initially constricted. It requires time to dilate fully, contributing to temporary blindness.

How does the Eye Chemically Adjust? (The Rhodopsin Cycle)

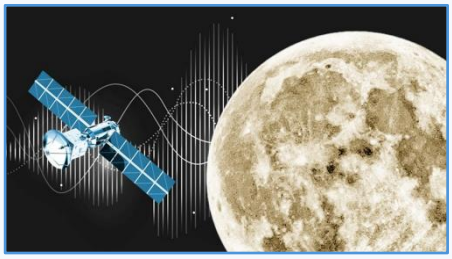
The primary driver of dark adaptation occurs at the molecular level within the Retina.

- Photoreceptors: The retina contains two distinct types of light-sensitive cells:
- Cones: Active in bright light (Photopic vision); responsible for color perception and high visual acuity.
- Rods: Active in dim light (Scotopic vision); responsible for contrast and motion detection.
- The Rhodopsin Mechanism:
- Rod cells contain a photosensitive pigment called Rhodopsin (or Visual Purple).
- Photobleaching: Exposure to bright light causes Rhodopsin to decompose (break down) rapidly, rendering rod cells inactive.

- Regeneration: In darkness, Rhodopsin must normally resynthesize (regenerate) to restore light sensitivity. This regeneration is a slow biochemical process, causing the delay in vision recovery.
- Vitamin A (Retinol) is a critical precursor for the synthesis of Rhodopsin. Deficiency leads to 'Night Blindness' (Nyctalopia).

5.37. BEYOND THE BLUE: THE RACE FOR ORBITAL SPECTRUM & LUNAR SOIL

Context: While nations race to the Moon, a parallel competition is intensifying in Low Earth Orbit (LEO) for two limited resources: Radio Frequency (Spectrum) and Orbital Slots. This is driven by Megaconstellations (fleets of thousands of satellites like Starlink & OneWeb).



The Resources at Stake:

- Radio Frequency (Spectrum): The "oxygen" of space; essential for data transmission.
- Orbital Slots: Specific physical coordinates required to beam signals without interference.

Which Frequency Bands Matter?

- L-Band (1–2 GHz): Primarily used for GPS/Navigation (penetrates clouds/rain well).
- Ku-Band (12–18 GHz): The workhorse for Satellite TV and Internet.
- Ka-Band (26–40 GHz): High-frequency band for High-Speed Data/Broadband.
- Key Constraint: Spectrum is a limited natural resource; signals must be coordinated to avoid "jamming."

How is Space Governed? (The Role of ITU)

- The Body: International Telecommunication Union (ITU) (UN Specialized Agency).
- Function: Sole global coordinator for satellite spectrum and orbital slots.
- Allocation Principle: Historically "First-come, first-served."
- *Issue:* Favors early movers (developed nations) and encourages "warehousing" (claiming slots without using them).
- Recent Reform (WRC-23 Resolution 8): To prevent hoarding, operators must now meet strict deployment milestones:
- 10% of satellites deployed within 2 years.
- 50% within 5 years.
- 100% within 7 years.

Feature	Geostationary Orbit (GEO)	Low Earth Orbit (LEO)
Altitude	~36,000 km	150 – 2,000 km
Latency	High (~600ms)	Low (20–40ms)
Use Case	Broadcast TV, Weather	Real-time Internet, Telemedicine
Coverage	Fixed spot over Earth	Requires "Constellations" to cover Earth

Where Does India Stand?

- Strategic Assets:
- GSAT-N2: ISRO's high-throughput satellite serving the Northeast & Andaman.
- OneWeb: India has a strategic stake via Bharti Enterprises.
- Policy Stance (TRAI):
- The Telecom Regulatory Authority of India (TRAI) has recommended Administrative Allocation of satellite spectrum.
- Why? Unlike terrestrial spectrum (mobile), satellite spectrum is a shared resource (non-exclusive); auctions could artificially inflate costs and hinder universal coverage.

The Sustainability Threat

- Debris: Projections show 50,000+ satellites by 2030.
- ITU-R 74: Mandates satellites to be de-orbited within 25 years of mission end. (Compliance is currently low: <70%).

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UPSC PRELIMS PRACTICE QUESTIONS

1. With respect to the anatomical functions of the brain, consider the following statements:

1. The Cerebellum is primarily responsible for controlling involuntary life-support functions such as heartbeat, breathing, and digestion.
2. The Cerebrum, which is the largest part of the brain, controls voluntary movements, speech, intelligence, and sensory processing.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (b) 2 only

Explanation:

Statement 1 is incorrect; involuntary life-support functions are controlled by the **Brainstem** (Midbrain, Pons, Medulla), while the Cerebellum regulates balance and coordination.

Statement 2 is correct regarding the functions of the Cerebrum.

2. With respect to the International Legal Framework governing nuclear power in space, consider the following statements:

1. The UN Principles of 1992 regarding the use of nuclear power sources in outer space are legally binding guidelines with a strict enforcement mechanism.
2. The Outer Space Treaty (1967) explicitly bans Weapons of Mass Destruction (WMDs) but remains silent on the use of peaceful nuclear propulsion.
3. There is currently a legal vacuum regarding binding technical standards for the safety design and end-of-life disposal of nuclear reactors in space.

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

Ans. (b) 2 and 3 only

Explanation:

- **Statement 1 is incorrect:** The **Principles Relevant to the Use of Nuclear Power Sources in Outer Space (1992)** adopted by the UN General Assembly are **non-binding guidelines** ("soft law"). They do not constitute a legally binding treaty and lack a strict enforcement mechanism.
- **Statement 2 is correct:** The **Outer Space Treaty (1967)** explicitly prohibits placing nuclear weapons or other Weapons of Mass Destruction (WMDs) in orbit. However, it remains **silent** on the use of nuclear energy for peaceful purposes, such as nuclear propulsion or power generation, thereby implicitly allowing them under the "peaceful use" clause.
- **Statement 3 is correct:** There is currently a **legal vacuum** regarding binding international technical standards for the safety design, operation, and end-of-life disposal of nuclear reactors in space. The existing frameworks (like the 1992 Principles) are voluntary and limited in scope, leaving a gap in enforceable regulations.

3. With respect to the Heron Mk II Unmanned Aerial Vehicle (UAV), consider the following statements:

1. It is a Medium Altitude Long Endurance (MALE) UAV manufactured by Israel Aerospace Industries (IAI).
2. Unlike earlier versions that depended on Line-of-Sight (LOS) radio, the Mk II is Satellite-Linked, enabling Beyond Line of Sight (BLOS) operations.
3. The Indian Navy has been operating the Heron Mk II for over a decade and is now upgrading to the Searcher platform.

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

Ans. (a) 1 and 2 only

- **Statement 1 is correct:** The Heron Mk II is a Medium Altitude Long Endurance (MALE) UAV manufactured by Israel Aerospace Industries (IAI).
- **Statement 2 is correct:** The Heron Mk II is Satellite-Linked (SATCOM enabled), which allows for Beyond Line of Sight (BLOS) operations, a significant upgrade over earlier Line-of-Sight (LOS) dependent versions.
- **Statement 3 is incorrect:** The Indian Navy is acquiring the Heron Mk II **for the first time**. The transition is happening **from** the older Searcher UAVs **to** the advanced Heron Mk II, not the reverse.

4. With respect to micro-navigation and bio-mimicry applications, consider the following statements:

1. Rotational Diffusion refers to the tendency of random collisions with surrounding molecules to disorient microscopic organisms moving in a straight line.
2. The helical motion mechanism of parasites is being used as a blueprint for designing artificial nanobots and drug-delivery devices.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (c) Both 1 and 2

- **Statement 1 is correct:** Rotational Diffusion describes the phenomenon in microscopic environments where random collisions with surrounding fluid molecules (Brownian motion) cause an organism to lose its orientation rapidly, making straight-line navigation inefficient.
- **Statement 2 is correct:** The helical (corkscrew) motion is an evolutionary adaptation that ensures stability in "noisy" environments. This mechanism is actively being used as a blueprint in bio-mimicry to design artificial nanobots and micro-swimmers for applications such as targeted drug delivery in complex human tissues.

5. With respect to the technical components of Virtual Private Networks (VPNs) mentioned in the article, consider the following statements:

1. Split Tunneling allows a user to simultaneously route some internet traffic through an encrypted VPN connection while other traffic accesses the internet directly.
2. A Virtual Server must be physically located within the same geographic jurisdiction that its IP address represents to the user.

3. Deep Packet Inspection (DPI) is a tool primarily used by VPN providers to enhance the encryption standards of their tunnels.

How many of the statements given above are correct?

(a) Only one
(b) Only two
(c) All three
(d) None

Ans. (a) Only one

Statement 1 is correct: Split Tunneling is a feature that allows users to choose which traffic goes through the VPN and which uses the direct internet connection.

Statement 2 is incorrect: According to the article, a Virtual Server can appear to be in one location (e.g., India) while being physically located in another country (e.g., Singapore).

Statement 3 is incorrect: Deep Packet Inspection (DPI) is a method used by ISPs or governments to detect and block VPN traffic, rather than a tool used by VPN providers to improve encryption.

6. Lunarcrete, which was recently in the news, refers to which of the following?

(a) A method of extracting oxygen and hydrogen from lunar ice deposits.
(b) A building material using lunar regolith as aggregate and sulphur or heat fusion as a binder.
(c) A specialized fabric designed to protect astronauts from lunar dust and radiation.
(d) A water-intensive cement mixture imported from Earth for lunar construction.

Ans. (b) A building material using lunar regolith as aggregate and sulphur or heat fusion as a binder.

Lunarcrete (often called Moon Concrete) is a hypothetical construction material designed for building habitats on the Moon. It distinguishes itself from terrestrial concrete by using **Lunar Regolith** (Moon soil/dust) as the primary aggregate instead of sand or gravel.

To address the scarcity of water on the Moon, it utilizes alternative binding methods such as **Sulphur** (which melts and re-solidifies) or **Sintering** (using microwaves/sunlight to fuse soil grains), rather than water-intensive Portland cement. Therefore, **option B is the correct answer.**

7. With reference to the nature and impact of Methane (CH_4), consider the following statements:

1. It is a long-lived climate pollutant that persists in the atmosphere for over a century.
2. It is approximately 84 times more potent than Carbon Dioxide in trapping heat over a 20-year period.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (b) 2 only

Statement 1 is incorrect: Methane is classified as a **Short-Lived Climate Pollutant (SLCP)** with an atmospheric lifespan of approximately **10 years**, unlike Carbon Dioxide which can persist for centuries.

Statement 2 is correct: Despite its short lifespan, Methane is significantly more potent, with a warming potential roughly **84 times higher** than CO_2 over a 20-year timeframe.

8. With respect to the Biological Weapons Convention (BWC), consider the following statements:

1. It is the first international treaty to ban the entire category of biological weapons of mass destruction.
2. It mandates the destruction of existing stockpiles of biological weapons by the signatory nations.
3. India is a signatory to the Biological Weapons Convention.

Which of the statements given above is/are correct?

(a) 1 only
(b) 1 and 2 only
(c) 2 and 3 only
(d) 1, 2 and 3

Ans. (d) 1, 2 and 3

Statement 1 is Correct: The Biological Weapons Convention (BWC) is the **first** multilateral disarmament treaty to ban an entire category of Weapons of Mass Destruction (WMD). It opened for signature in 1972 and entered into force in 1975.

Statement 2 is Correct: The full title of the treaty is "The Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and **on their Destruction**." Under **Article II** of the Convention, each State Party undertakes to destroy, or to divert to peaceful purposes, all agents, toxins, weapons, equipment, and means of delivery as soon as possible (no later than nine months after entry into force).

Statement 3 is Correct: India is a key signatory and party to the convention. India **signed and ratified** the BWC in **1974** and has been a strong proponent of its implementation.

9. With reference to the 'AH-64E Apache' helicopters, consider the following statements:

1. The AH-64E is a single-role reconnaissance helicopter designed primarily for high-altitude surveillance.
2. India is the only nation in Asia to operate the Apache Guardian variant.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (d) Neither 1 nor 2

Statement 1 is incorrect: The AH-64E Apache is a **multi-role** combat helicopter, not a single-role reconnaissance platform. It performs various roles including precision strikes, close air support, anti-armour operations, and reconnaissance.

Statement 2 is incorrect: India is **not** the only nation in Asia to operate the Apache Guardian. Other Asian nations, such as **Japan, Indonesia, Israel, South Korea, and Singapore**, also operate this platform.

10. With respect to Dark Matter, consider the following statements:

1. It is composed of non-baryonic matter that does not emit, absorb, or reflect electromagnetic radiation.
2. The phenomenon of gravitational lensing is utilized to infer the presence and distribution of dark matter.
3. Dark matter is the primary force responsible for the accelerated expansion of the universe.

Which of the statements given above is/are correct?

(a) 1 only
(b) 1 and 2 only
(c) 2 and 3 only
(d) 1, 2 and 3

Ans. (b) 1 and 2 only

Statement 1 is Correct: Dark matter is hypothetical **non-baryonic matter**. Unlike normal (baryonic) matter, it does not interact with the electromagnetic force. This means it does not absorb, reflect, or emit light, making it invisible to current telescopic instruments.

Statement 2 is Correct: Because dark matter has mass, it exerts a gravitational pull. Astronomers infer its presence through **gravitational lensing**—a phenomenon where the gravity of dark matter bends the light coming from distant galaxies, distorting their appearance.

Statement 3 is Incorrect: This statement describes **Dark Energy**, not Dark Matter.

- **Dark Matter** acts as a "cosmic glue," exerting attractive gravity that holds galaxies and clusters together.
- **Dark Energy** is a repulsive force that is driving the accelerated expansion of the universe.

11. With respect to the formation of Neutron Stars, consider the following statements:

1. They are formed when a massive star collapses, crushing protons and electrons into neutrons.
2. If the core of a collapsing star is more than 3 solar masses, it stabilizes as a neutron star.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (a) 1 only

Statement 1 is correct: Neutron stars are formed when the core of a massive star collapses, crushing together every proton and electron into a neutron.

Statement 2 is incorrect: If the core is between about 1 and 3 solar masses, it becomes a neutron star. Stars with higher masses (above 3 solar masses) will continue to collapse into **stellar-mass black holes**.

12. With respect to GM Mustard (DMH-11), consider the following statements:

1. It is a hybrid of 'Varuna' and 'Early Heera-2' varieties developed by the Centre for Genetic Manipulation of Crop Plants.
2. The Barnase gene is responsible for restoring fertility in the hybrid plant.
3. The system utilizes transgenes derived from the soil bacterium Bacillus amyloliquefaciens.

Which of the statements given above is/are correct?

(a) 1 only
(b) 1 and 3 only
(c) 2 and 3 only
(d) 1, 2 and 3

Ans. (b) 1 and 3 only

Statement 1 is correct; DMH-11 is a hybrid of 'Varuna' and 'Early Heera-2'.

Statement 2 is incorrect; Barnase induces male sterility, while Barstar restores fertility.

Statement 3 is correct; the transgenes are derived from Bacillus amyloliquefaciens.

13. With respect to Geological Heritage and Institutions, consider the following statements:

1. The Geological Survey of India (GSI) operates under the administrative control of the Ministry of Earth Sciences.
2. Varkala Cliff is a designated Geo-heritage site known for exposing Cenozoic sedimentary formations on the coast.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (b) 2 only

Statement 1 is incorrect; the GSI operates under the Ministry of Mines.

Statement 2 is correct; it is a unique geological site in southern Kerala showcasing these specific formations.

14. With respect to the properties of Neutrinos, consider the following statements:

1. Neutrinos are the second most abundant particles in the universe after photons.
2. They interact with matter solely through the Weak Nuclear Force and Gravity.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (c) Both 1 and 2

Statement 1 is correct; they are the most abundant particles possessing mass, second overall to photons.

Statement 2 is correct; their lack of electric charge limits their interaction to these two forces

15. With respect to the design and development of the Vikram launch vehicle, consider the following statements:

1. It is an orbital-class launch vehicle developed by the private entity Skyroot Aerospace.
2. The vehicle features an all-carbon composite structure to ensure a high strength-to-weight ratio.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (c) Both 1 and 2

Statement 1 is correct; it is India's privately developed orbital-class vehicle by Skyroot. Statement 2 is correct; the carbon composite structure is a key design feature for efficiency.

16. With respect to the chemical properties and application of Auramine O, consider the following statements:

1. It is a synthetic yellow dye derived from compounds such as dimethylaniline and formaldehyde.
2. It is a permitted food additive used to enhance the color of dairy-based sweets in India.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (a) 1 only

Statement 1 is correct; it is strictly an industrial dye used in textiles and printing inks. Statement 2 is incorrect; its use in food items is strictly prohibited due to toxicity.

17. With respect to the NISAR (NASA-ISRO Synthetic Aperture Radar) Mission, consider the following statements:

1. It is the first satellite mission to use two different radar frequencies (L-band and S-band) to measure changes in our planet's surface less than a centimeter across.
2. ISRO has provided the L-band Synthetic Aperture Radar (SAR), while NASA has contributed the S-band SAR.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (a) 1 only

Statement 1 is correct; NISAR is a dual-frequency L-band and S-band SAR mission capable of observing minute surface changes.

Statement 2 is incorrect; the roles are reversed—NASA provided the L-band SAR, and ISRO provided the S-band SAR.

18. With reference to the capabilities of the S-500 'Prometheus' air defence system, consider the following statements:

1. It is designed to intercept hypersonic cruise missiles flying at speeds exceeding Mach 5.
2. Unlike the S-400, the S-500 is capable of targeting Low Earth Orbit (LEO) satellites and space weapons.
3. It utilizes the 'Yenisei' radar system, which offers superior detection against stealth aircraft.

Which of the statements given above are correct?

(a) 1 and 2 only

(b) 2 and 3 only

(c) 1 and 3 only

(d) 1, 2, and 3

Ans. (d) 1, 2, and 3

All statements are correct: The S-500 is designed for hypersonic interception (>Mach 5), can engage targets in Near Space (including LEO satellites), and uses the advanced 'Yenisei' radar for anti-stealth capabilities

19. With respect to the MH-60R 'Romeo' Seahawk helicopters, consider the following statements:

1. These multi-role helicopters are manufactured by Lockheed Martin (Sikorsky).
2. Their primary operational roles are Anti-Submarine Warfare (ASW) and Anti-Surface Warfare (ASuW).

Which of the statements given above is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

Ans. (c) Both 1 and 2

Statement 1 is correct; the manufacturer is Lockheed Martin. Statement 2 is correct; ASW and ASuW are its primary capabilities, equipped with torpedoes and Hellfire missiles.

20. With respect to the Deep Ocean Mission (DOM), consider the following statements:

1. It is a Central Sector Scheme, fully funded by the Union Government, aimed at supporting the 'Blue Economy'.
2. One of the six pillars of the mission focuses on Ocean Climate Change Advisory Services and deep-sea biodiversity exploration.

Which of the statements given above is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

Ans. (c) Both 1 and 2

Statement 1 is correct; DOM is a Central Sector Scheme with 100% Union funding. Statement 2 is correct; the mission pillars include climate advisory services and biodiversity exploration.

21. With respect to the India Semiconductor Mission (ISM) schemes, consider the following statements:

1. The scheme offers fiscal support of up to 50% of the project cost for setting up Silicon Fabrication units.
2. The Design Linked Incentive (DLI) Scheme is primarily targeted at large multinational corporations to set up manufacturing plants.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (a) 1 only

Statement 1 is correct; the fiscal support is up to 50% for fabs.

Statement 2 is incorrect; the DLI scheme is targeted at startups and MSMEs for design infrastructure support.

22. With respect to the criteria for declaring a Cold Wave in India, consider the following statements:

1. In the plains, a cold wave is declared if the minimum temperature is 10°C or lower and the departure from normal is between 4.5°C to 6.4°C.
2. Regardless of the normal temperature, a cold wave is declared in the plains if the minimum temperature falls to 4°C or lower.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (c) Both 1 and 2

Statement 1 is correct; this is the standard deviation criterion used by the IMD.

Statement 2 is correct; an absolute minimum temperature of 4°C or lower automatically qualifies as a cold wave in the plains.

23. With respect to the historical and administrative evolution of Lakshadweep, consider the following statements:

1. The islands were under the rule of the Arakkal Kingdom of Kannur from the 16th century until 1908.
2. The Union Territory falls under the judicial jurisdiction of the Karnataka High Court.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (a) 1 only

Statement 1 is correct; the Arakkal dynasty ruled until the British took over in 1908. Statement 2 is incorrect; the islands fall under the jurisdiction of the **Kerala High Court**

24. With respect to the technical architecture of the 'Kavach' system, consider the following statements:

1. The system primarily utilises Global Positioning System (GPS) data to identify the precise location of trains on the track.
2. The deployment of the system requires the continuous laying of Optical Fibre Cable (OFC) to facilitate ultra-low latency communication between stations and locomotives.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (c) Both 1 and 2

Statement 1 is incorrect: The Kavach system utilises Radio Frequency Identification (RFID) tags installed on the tracks to determine the precise location of trains, whereas the Global Positioning System (GPS) is employed primarily for time synchronization.

Statement 2 is correct: As the system's architecture necessitates the continuous laying of Optical Fibre Cables (OFC) along tracks to establish a robust, ultra-low latency communication backbone between stationary units and locomotives.

25. With reference to the 'Agnipath' scheme, consider the following statements:

I. Agniveers are entitled to receive a monthly pension after the completion of their four-year tenure.
II. The Seva Nidhi package received by Agniveers at the end of their service is fully exempt from Income Tax.
III. Up to 50% of each batch of Agniveers is eligible for permanent enrollment in the regular cadre of the Armed Forces.

Which of the statements given above is/are correct?

(a) II only
(b) I and II only
(c) II and III only
(d) I, II and III

Ans. (a) II only

Statement I is incorrect as the Agnipath scheme is specifically designed as a "non-pensionary" service to reduce the long-term defense pension bill; instead, it provides a one-time "Seva Nidhi" severance package.

Statement II is correct as the Union Budget (under Section 10(12C) of the Income Tax Act) explicitly grants tax-free status to the entire Seva Nidhi corpus, including the interest and the government's matching contribution.

Statement III is incorrect because the current policy cap for permanent absorption into the regular cadre is 25% of each batch, based on merit and organizational requirements during their 4-year tenure.

26. With reference to the Indian National Space Promotion and Authorization Centre (IN-SPACe), consider the following statements:

I. It is a statutory body established under the Space Act of 2020.
II. It serves as a single-window nodal agency for the participation of private entities in the space sector.
III. It is responsible for the commercial exploitation of products and services emanating from the Indian space programme.

How many of the above statements are correct?

(a) Only one
(b) Only two
(c) All three
(d) None

Ans. (a) Only one

Statement I is Incorrect because IN-SPACe is an executive body (Autonomous agency under DoS), not statutory.

Statement II is Correct.

Statement III is Incorrect because that is the primary mandate of NSIL (NewSpace India Limited), not IN-SPACe.

27. Which of the following best explains the strategic role of ASW Shallow Water Crafts like Anjadip?

(a) Blue-water naval dominance in deep oceans
(b) Long-range missile deterrence
(c) Coastal anti-submarine warfare and mine-laying operations
(d) Amphibious troop deployment

Ans. (c)

Explanation: ASW SWCs are optimised for littoral and shallow-water environments, focusing on submarine detection, coastal surveillance, and mine-laying, rather than blue-water or amphibious roles.

28. With respect to the mechanism and evolution of GLP-1 Agonists, consider the following statements:

1. These drugs function by enhancing glucagon secretion from the pancreas while simultaneously accelerating gastric emptying.
2. Tirzepatide is a dual agonist that mimics the action of both GLP-1 and Glucose-dependent Insulinotropic Polypeptide (GIP).

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (b) 2 only

Statement 1 is incorrect; these drugs **inhibit** (suppress) glucagon release and **slow down** gastric emptying.

Statement 2 is correct; unlike Semaglutide (mono-agonist), Tirzepatide is a dual agonist.

29. With respect to the 'DigiPin' initiative by the Department of Posts, consider the following statements:

1. It is a digital addressing system that divides the geographical territory of India into 4-meter by 4-meter grids to assign a unique address to every location.
2. DigiPin is an alphanumeric code that permanently replaces the existing 6-digit PIN code system for all postal communications.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (a) 1 only

Statement 1 is correct; DigiPin (Digital Postal Index Number) creates a National Addressing Grid using 4m x 4m cells.

Statement 2 is incorrect; it is designed to act as a **supplementary** geo-coded layer to improve accuracy, not to immediately abolish or replace the existing 6-digit PIN code system, which serves strictly for routing to post offices.

30. Which of the following statements accurately describes the nature of sound waves?

(a) They are transverse waves that can propagate through a vacuum.
(b) They are electromagnetic waves that require a solid medium to travel.
(c) They are longitudinal waves that require a material medium (solid, liquid, or gas) for propagation.
(d) They are mechanical waves that travel by creating constant low pressure without compression.

Ans. (c)

Explanation: Sound travels as longitudinal waves created by mechanical disturbances (compression and rarefaction) and requires a material medium to propagate; it cannot travel through a vacuum.

31. With respect to the bio-engineering of vectors and Gene Drive Technology, consider the following statements:

1. Gene Drive technology utilizes tools like CRISPR to bypass Mendelian laws of inheritance, ensuring a specific trait is passed to nearly 100% of offspring.

2. In the genetically modified OX5034 mosquito strain, the self-limiting gene ensures that male offspring die before adulthood while females survive to reproduce.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (a) 1 only

Statement 1 is correct; it forces inheritance beyond the standard 50% Mendelian chance. Statement 2 is incorrect; in the OX5034 strain, the **female** offspring (the biters) die before adulthood, while the **male** offspring survive to continue the cycle.

32. With respect to the geographical prerequisites for rice cultivation in India, consider the following statements:

1. Rice is primarily a Kharif crop requiring high temperatures above 25°C during the growth phase.
2. It requires deep, fertile clayey or loamy soils with high water retention capacity and rainfall between 150-300 cm.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (c) Both 1 and 2

Statement 1 is correct; rice is a Kharif crop requiring temperatures >25°C for growth. Statement 2 is correct; it thrives in clayey/loamy soils with high water retention and heavy rainfall.

33. With respect to the findings of the Aditya-L1 mission regarding the May 2024 Solar Storm, consider the following statements:

1. The mission observed a rare "Magnetic Reconnection" event where two Coronal Mass Ejections (CMEs) collided and their magnetic field lines snapped and rejoined.
2. The reconnection region observed was approximately 1.3 million km wide, nearly 100 times the size of Earth.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (c) Both 1 and 2

Statement 1 is correct; the mission decoded this unusual behavior involving the collision of two CMEs. Statement 2 is correct; the scale of the reconnection region was massive, significantly intensifying the storm's impact.

34. With respect to India's joint military exercises consider the following statements:

1. 'Dharma Guardian' is a joint army exercise between India and Japan aimed at jungle warfare and urban counter-terrorism.
2. 'Varuna' is a bilateral air force exercise between India and France focused on air combat maneuvering.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (a) 1 only

Statement 1 is correct; Dharma Guardian is an army exercise with Japan.

Statement 2 is incorrect; 'Varuna' is a **Naval** exercise (high-end naval warfare), whereas 'Garuda' is the Air Force exercise with France.

35. With respect to the physiological mechanisms of Dark Adaptation, consider the following statements:

1. The mechanical adjustment of the eye involves the constriction of the pupil to maximize the quantum of light entering the retina.
2. The chemical adjustment is primarily driven by the regeneration of the photosensitive pigment Rhodopsin within the rod cells.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (b) 2 only

Statement 1 is incorrect; in low illumination, the pupil **dilates** (widens), not constricts, to maximize light capture. Constriction occurs in high illumination. Statement 2 is correct; the regeneration (resynthesis) of Rhodopsin in darkness is the primary chemical driver of dark adaptation.

36. With respect to the governance of space resources and the International Telecommunication Union (ITU), consider the following statements:

1. The ITU functions as the sole global coordinator for the allocation of satellite spectrum and orbital slots.
2. The recent WRC-23 Resolution 8 encourages the "warehousing" of orbital slots by removing deployment milestones for satellite operators.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (a) 1 only

Statement 1 is correct; the ITU manages global spectrum and orbital slots. Statement 2 is incorrect; Resolution 8 aims to prevent hoarding/warehousing by imposing strict milestones (e.g., 10% deployment within 2 years).

37. With respect to the proposed 'Compulsory Licensing' framework for AI models, consider the following statements:

1. The framework mandates that AI developers must negotiate individual licensing agreements with every publisher to access their content.
2. Publishers are granted the statutory right to 'opt-out' of the data scraping process if they do not wish their content to be used for AI training.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (d) Neither 1 nor 2

Statement 1 is incorrect; the framework proposes a statutory fee model to *eliminate* the need for individual negotiations. Statement 2 is incorrect; the proposal explicitly suggests *no opt-out mechanism*, reasoning that small creators lack the resources to enforce it.

Scan to attempt more questions


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6.1. BRIDGING CIVILIZATIONS: KASHI TAMIL SANGAMAM

Context: The **4th Edition of Kashi Tamil Sangamam (KTS 4.0)** is set to commence on **December 2, 2025**, at Namo Ghat, Varanasi.

- **Theme: "Tamil Karkalam"** (Learn Tamil).
- **Context:** In his Mann Ki Baat address, the Prime Minister highlighted the event as a key pillar of the Ek Bharat Shreshtha Bharat initiative, emphasizing that "Tamil is the pride of India."

About Kashi Tamil Sangamam (KTS)

- **Nodal Ministry:** Ministry of Education (in collaboration with the UP Government and other ministries).
- **Objective:** To celebrate the ancient civilizational links between **Kashi (Varanasi)** and **Tamil Nadu**, two of India's oldest seats of knowledge.
- **Significance:** It aligns with the **National Education Policy (NEP) 2020**, focusing on integrating the **Indian Knowledge System (IKS)** with modern education.

Historical & Cultural Connect

A. The Legend of King Parakrama Pandya (15th Century)

- **The Story:** King Parakrama Pandya of Madurai traveled to Kashi to bring a Shiva Lingam back to the South.
- **Sivakasi:** On his return, the cow carrying the Lingam refused to move at a specific spot. Taking it as divine will, he installed the Lingam there, now known as **Sivakasi** (Tamil Nadu).
- **Tenkasi:** The Pandyas also built the **Kasi Viswanathar Temple** in **Tenkasi** (South Kashi) for devotees unable to travel to Uttar Pradesh.

B. Sage Agastya: The Cultural Bridge

- **Status:** A revered Saptarishi (Vedic Sage) and the **father of the Tamil language**.
- **Contributions:**
  - **Grammar:** Authored **Agattiyam**, the first Tamil grammar text.
  - **Medicine:** Considered the father of **Siddha Medicine**.
  - **Literature:** Associated with Agastya Samhita and Naadi Shastra.
  - **Geography:** His hermitage is mentioned in the Ramayana on the banks of the **Godavari**. He is credited with "Aryanizing" the South (cultural assimilation) and spreading Vedic culture to **Java and Sumatra** (Indonesia).

6.2. ANGKOR WAT TEMPLE COMPLEX

Historical Genesis:

- **Patron:** Built by the **Khmer King Suryavarman II**.
- **Timeline:** Constructed in the **first half of the 12th Century** (approx. 1110–1150 AD).
- **Religious Transition:** Originally dedicated to **Lord Vishnu** (Hinduism), it gradually transformed into a **Buddhist temple** towards the end of the 12th century.

Location & Geography

- **Site:** Located in **Siem Reap province, Cambodia**.
- **Significance:** It served as the capital of the **Khmer Empire** (9th–15th Centuries).
- **Complex:** The greater Angkor area includes other major temples like **Angkor Thom**, **Bayon Temple**, and **Ta Prohm**.

Key Features

- **Style:** Represents the zenith of **high classical Khmer architecture**.
- **Material:** Constructed primarily using **Sandstone blocks**.
- **Engineering Marvel:** Stones were fitted without mortar; the precise binding agent (wooden paste vs. lime plaster) remains a subject of study.
- **Defensive Structure:** Protected by a massive **15-foot high wall** and a **wide moat**. Access is restricted to small bridges on the East and West.

Symbolism & Art

- **Mount Meru:** The temple's five central towers symbolize the peaks of **Mount Meru**, considered the abode of gods in Hindu-Buddhist cosmology.
- **Bas-Reliefs:** Extensive carvings depict Hindu epics (Ramayana, Mahabharata), deities, and Khmer history.

Global Recognition

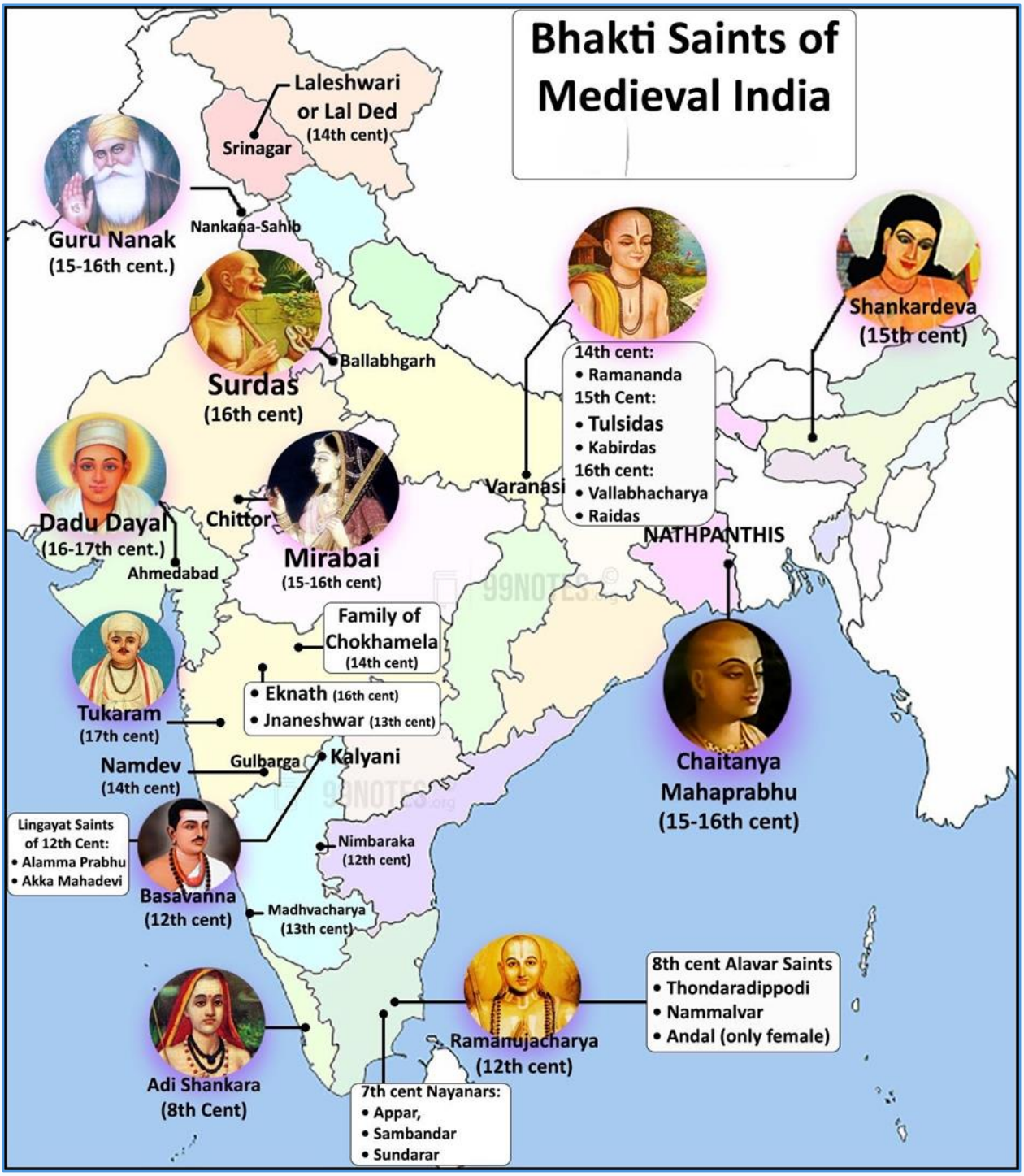
- **Status:** Designated as a **UNESCO World Heritage Site** in **1992**.
- **Scale:** It holds the distinction of being the **largest religious monument in the world** (covering ~200 acres).

6.3. THE MYSTIC WEAVER: SANT KABIR DAS

Who was Sant Kabir?

- Timeline: A prominent 15th-century Indian mystic poet and saint.
- Background: Born in Varanasi, Uttar Pradesh, to a Hindu family but raised by a Muslim weaver couple, embodying a syncretic heritage.

- Followers: Revered by both Hindus and Muslims; his distinct sect of followers is known as "Kabir Panthis."



What was his role in the Bhakti Movement?

- The Movement: A pivotal figure in the Bhakti Movement, which emphasised personal devotion and love for the divine.
- Evolution: While the movement originated in South India (7th Century), Kabir was instrumental in its propagation across North India during the 14th and 15th centuries.
- Approach: Along with contemporaries like Ramananda, he democratised religion by composing devotional songs in vernacular languages rather than Sanskrit.

Who shaped his Philosophy?

- Mentorship: Sought spiritual guidance from diverse teachers, including the Vaishnava saint Ramananda and the Sufi Pir Sheikh Taqi.
- Philosophy: This dual influence shaped his unique philosophy that rejected rigid orthodoxy and caste distinctions.

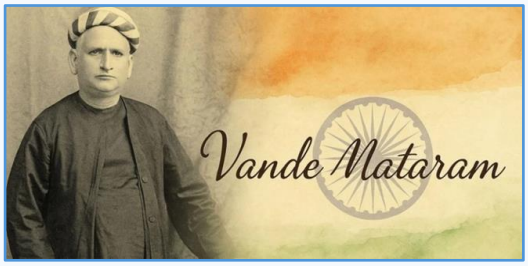
What are his Major Works?

- Key Texts: His profound philosophical insights are compiled in:
- Kabir Bijak: A collection of poems and verses.
- Kabir Parachai and Sakhi Granth.
- Kabir Granthawali: Popular in the Rajasthan tradition.
- Sikhism Connection: A significant portion of his verses is incorporated into the Adi Granth (Guru Granth Sahib), the holy scripture of Sikhism.

Linguistic Contribution:

- Dialects: composed primarily in Brajbhasha and Awadhi.
- Legacy: His works significantly influenced the evolution of the Hindi language and the broader landscape of Indian literature.

6.4. NATIONAL SONG OF INDIA-VANDE MATARAM



Context: The 150th anniversary of Vande Mataram **was marked by discussions in Parliament in December 2025.**

Debates focused on whether the song should be sung in its entirety or in part, touching on secularism, minority sensitivities, and historical interpretations**.**

Lawmakers cited historical scholarship, notably Sabyasachi Bhattacharya's "Vande Mataram: The Biography of a Song"**, highlighting the cultural and political history of the song.**

National Song – Definition and Significance

- Definition: **A** National Song **is a patriotic song that reflects the** cultural identity, unity, and historical struggles **of a nation but is distinct from the National Anthem.**
- India's National Song: Vande Mataram
- Official Adoption:
- 1937: **First two stanzas adopted by the** Congress Working Committee**.**
- 24th January 1950: President Rajendra Prasad **declared it to be honoured equally with the** National Anthem ("Jana Gana Mana")**.**
- Constitutional Reference: **The Constitution does not explicitly mention a National Song; however,** Article 51A(a) **encourages citizens to respect national symbols, including the anthem.**

- Significance: **The song celebrates** Mother India as a life-giving and nurturing motherland**, invoking devotion, pride, and reverence.**
- Flexibility: **Unlike the anthem, it can be sung in** different languages **or** tunes **and is** not mandatory **at official events.**

Meaning of Vande Mataram – National song

- Original Lines:
- **"Vande Mataram, sujalam suphalam, malayaja shitalam, Shasyashyamalam, Mataram"**
- Translation/Meaning:
- **"I bow to thee, Mother, rich in water, rich in fruits, cool with the winds of the south, fragrant with the crops of the field, dark with the crops of the harvest."**

Historical Background of National Song

- Author: **Bankim Chandra Chatterjee (1838–1894), a leading 19th-century Bengali writer and nationalist thinker.**
- Composition Date: **Believed to be written on** Akshaya Navami, 7th November 1875**.**
- Publication: **First appeared in the** literary journal Bangadarshan (1875) **and later incorporated in the novel** Anandamath (1882)**.**
- Musical Setting: **Set to music by** Rabindranath Tagore**, enhancing its appeal as a patriotic hymn.**
- Role in Nationalism: **Served as a** battle cry during the Swadeshi movement**, inspiring protests against colonial rule.**

Key Milestones

- First Public Rendition (1896): **Sung at the Kolkata session of the Indian National Congress, gaining popularity as a patriotic song.**
- Swadeshi Movement (1905): **Became a rallying point during** anti-partition agitation in Bengal**.**
- Student Movements: **Used in protests in** Hyderabad–Karnataka region**, e.g.,** Osmania University, Gulbarga University**, despite British bans.**
- Influence Abroad: **Indian revolutionaries used it as a** symbol of resistance**, e.g.,** Bhikaji Cama in Stuttgart (1907)**,** Madan Lal Dhingra in England (1909)**.**

Bankim Chandra Chatterjee

- Life Span: **1838–1894.**
- Major Works: **Anandamath, Durgeshnandini, Kapalkundala, Devi Chaudhurani.**
- Contribution: **Shaped** modern Bengali prose **and** early Indian nationalist thought**.**
- Philosophy: **Opposed idolatry, promoted rationality and devotion to the motherland rather than religious ritualism.**

Difference Between National Anthem and National Song

The **National Anthem,** ***Jana Gana*** *Mana*, has a fixed tune and is a Fundamental Duty under the Constitution, while the **National Song**, ***Vande Mataram*****,** inspires patriotism and devotion, is flexible in rendition, and holds equal reverence without being mandatory.

Aspect	National Anthem	National Song
Purpose	Reflects history and culture of the country	Evokes patriotism and emotional connect among citizens
Usage	Fixed tune, pronunciation, and timing; mandatory on select occasions	Flexible in tune and language; not mandatory
Composition	**"**Jana Gana Mana" **by Rabindranath Tagore (1911)**	"Vande Mataram" **by Bankim Chandra Chatterjee (1875)**
Constitutional Status	Article 51A**: Honour listed as a** Fundamental Duty	No explicit mention in the Constitution; honoured equally with anthem
Adoption	**Made official National Anthem**	Adopted as National Song by Congress (1937)

***

UPSC PRELIMS PRACTICE QUESTIONS

1. With respect to the Kashi Tamil Sangamam (KTS) initiative, consider the following statements:

1. The Ministry of Culture acts as the nodal ministry for organizing the event to celebrate civilizational links between Varanasi and Tamil Nadu.
2. The initiative aligns with the National Education Policy (NEP) 2020 by focusing on integrating the Indian Knowledge System (IKS) with modern education.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (b) 2 only

Explanation: Statement 1 is incorrect because the Ministry of Education is the nodal ministry, not the Ministry of Culture. Statement 2 is correct as the event promotes the integration of the Indian Knowledge System as envisaged in NEP 2020.

2. With respect to the historical genesis of the temple consider the following statement:

1. It was constructed by Khmer King Suryavarman II in the first half of the 12th Century.
2. Originally built as a Buddhist temple, it gradually transformed into a shrine dedicated to Lord Vishnu.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (a) 1 Only

Statement 1 is Correct: The temple (Angkor Wat) was indeed built by King Suryavarman II in the first half of the 12th Century.

Statement 2 is Incorrect: The religious transition was the reverse of what is stated. It was **originally dedicated to Lord Vishnu** (Hinduism) and later transformed into a Buddhist temple.

3. With respect to the Bhakti Movement and Sant Kabir's role, consider the following statements:

1. The Bhakti Movement originated in North India in the 15th century with the advent of Sant Kabir.
2. Sant Kabir democratised religion by composing devotional songs in vernacular languages like Brajbhasha and Awadhi instead of Sanskrit.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (b) 2 only

Statement 1 is incorrect; the Bhakti Movement originated in South India in the 7th Century and was later propagated in North India by figures like Kabir. Statement 2 is correct; he used vernacular dialects to make spiritual wisdom accessible to the common people.

4. With reference to India's National Song, consider the following statements:

1. Vande Mataram was composed by Bankim Chandra Chatterjee and first published in his novel Anandamath.
2. The entire song was adopted as the National Song of India in 1937 by the Congress Working Committee.

3. The song is explicitly mentioned in the Constitution of India.

Which of the statements given above is/are correct?

(a) 1 only
(b) 1 and 2 only
(c) 2 and 3 only
(d) 1, 2, and 3

Ans. (a) 1 only

Statement 1 is correct: Bankim Chandra Chatterjee composed Vande Mataram, and it was first published in Bangadarshan and later included in Anandamath (1882).

Statement 2 is incorrect: Only the first two stanzas were adopted as the National Song in 1937, not the entire song.

Statement 3 is incorrect: The Constitution does not explicitly mention a National Song, though Article 51A(a) asks citizens to respect national symbols.

Scan to attempt more questions

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MISCELLANEOUS

7.1. DONBAS REGION

Context: The Donbas region remains the focal point of the ongoing Russia-Ukraine conflict, frequently appearing in international headlines.

Political Map: Strategic Location

- **Location:** A historical, cultural, and economic region in **Eastern Ukraine**.
- **Composition:** Primarily encompasses two administrative regions (oblasts):
  - **Donetsk** (South)
  - **Luhansk** (North)
- **Borders:**
  - **East:** Bordered by the **Russian Federation**.
  - **South:** Reaches close to the **Sea of Azov** (Strategic maritime access).

Physical & Economic Geography

- **Name Origin:** An abbreviation of "Donets Basin" (named after the **Donets River**, a tributary of the Don River).
- **River System:** The **Siverskyi Donets** flows through the region, serving as a critical water source and natural barrier.
- **Resource Wealth:**
  - **Coal:** One of the largest **coal-mining** regions in Europe (Donets Coal Basin).
  - **Industry:** Historically the industrial heartland of Ukraine (Steel, Heavy Machinery).

Key Cities in Conflict

- **Donetsk City:** The largest industrial hub.
- **Mariupol:** A key port city on the **Sea of Azov** (located in Donetsk Oblast).
- **Severodonetsk & Lysychansk:** Strategic twin cities in the Luhansk Oblast.

7.2. MH-60R SQUADRON INDUCTED AT INS HANSA

Context: The Indian Navy has commissioned its second **MH-60R helicopter** squadron, **INAS 335** (Indian Naval Air Squadron), known as the "**Ospreys**."

Location: The ceremony took place at **INS Hansa**, Goa.

MH-60R Multi-Role Helicopters

- **Role:** The MH-60R (Romeo) is an all-weather helicopter designed for:
  - **Anti-Submarine Warfare (ASW)**

- **Anti-Surface Warfare (ASuW)**
- Search and Rescue (SAR)
- Naval surveillance.

- **Deployment:** INAS 335 is the **second** squadron to operate these helicopters. The first squadron was commissioned at **Kochi** (INS Garuda) in March 2024.

Origin & Acquisition

- **Manufactured By:** Lockheed Martin (Sikorsky), **USA**.
- **Deal:** Procured under the **Foreign Military Sales (FMS)** route (Govt-to-Govt deal signed in 2020 for 24 choppers).
- **Context:** It replaces the aging British-origin **Sea King** fleet to modernize the Indian Navy.

Advanced Weaponry

- It is equipped with **Hellfire Missiles** (precision-strike air-to-ground).
- Carries **MK-54 Torpedoes** (lightweight anti-submarine torpedoes).
- Features advanced **Advanced Precision Kill Weapons System (APKWS)** rockets.

Strategic Base: INS Hansa

- **Location:** Situated near **Dabolim, Goa**.
- **Status:** It is India's **largest naval airbase** and houses the Navy's premier air squadrons.
- **Dual Use:** The base features a civil enclave that functions as **Dabolim Airport**, handling 24/7 domestic and international civilian flights.

Historical Timeline:

- **1961:** Originally commissioned at **Sulur** (near Coimbatore, Tamil Nadu) on September 5, 1961.
- **1962:** Following the **Liberation of Goa** (Operation Vijay), the Navy took over the Dabolim airfield.
- **1964:** INS Hansa was formally relocated to Dabolim.

7.3. INDIA-RUSSIA STRATEGIC PARTNERSHIP: FROM THE ARCTIC TO THE ATOM

Context: The recent India-Russia Summit has broadened the scope of the "Special and Privileged Strategic Partnership," moving beyond traditional defense ties to focus on the Arctic region, nuclear energy security, and outer space collaboration.

Why is the Arctic Focus Significant?

- Northern Sea Route (NSR): Both nations have committed to progress on the Northern Sea Route. For India, this is a strategic alternative trade corridor connecting Europe and Asia, offering shorter transit times compared to the Suez Canal.

- Bilateral Consultations: A mechanism for "regular bilateral consultations" on Arctic-related issues has been established to streamline cooperation.
- Historical Context (Svalbard Treaty): India's engagement with the Arctic dates back to the British Raj era.
- The Treaty: The Svalbard Treaty of 1920 granted Norway sovereignty over the Svalbard archipelago.
- India's Rights: As a signatory (originally through the British Empire), India possesses equal rights to conduct non-military commercial and scientific activities, such as mining and fishing, in the region.

How is Nuclear Cooperation Evolving?

- Kudankulam Nuclear Power Project (KKNPP):
- Fuel Supply: The nuclear fuel division of Rosatom has commenced the delivery of advanced nuclear fuel for Unit 3 of the KKNPP in Tamil Nadu.
- Lifecycle Support: A critical pact signed in 2024 ensures fuel supply for Units 3 and 4 for their entire service life, starting from the initial loading.
- Technology Transfer: Discussions are being accelerated regarding VVER (Vodo-Vodyanoi Energetichesky Reaktor) technology. These are pressurized water reactors used in Russian designs for joint development and research.
- Future Expansion: India has committed to "strive to" allot a second site for a new Russian-assisted nuclear power plant, reinforcing the expansion of civil nuclear cooperation beyond Kudankulam.

India–Russia Far East Cooperation Programme (2024–29)

- Mandate: An institutional mechanism to operationalize India's 'Act Far East' policy, enhancing trade and investment in the resource-rich Russian Far East and Arctic zone.
- Key Pillars: Focuses on critical sectors like energy (coking coal, oil), connectivity (Chennai-Vladivostok Maritime Corridor), and a new 'Skilled Migration Corridor' for Indian workforce mobility.
- Strategic Goal: Aims to diversify engagement beyond defense, addressing the trade deficit to achieve the $100 billion bilateral trade target by 2030.

What are the Developments in Space?

- ISRO-Roscosmos Partnership: The summit welcomed the "enhanced partnership" between the Indian Space Research Organisation (ISRO) and Roscosmos (Russian State Space Corporation).
- Objective: The collaboration focuses strictly on the use of outer space for peaceful purposes, potentially including satellite navigation and human spaceflight programs (Gaganyaan).

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UPSC PRELIMS PRACTICE QUESTIONS

1. With respect to the economic significance of the Donbas region, consider the following statements:

1. It is one of the largest coal-mining regions in Europe.
2. Historically, it is known as the agricultural heartland of Ukraine.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (a) 1 only

Statement 1 is Correct: The Donbas region (Donets Basin) is historically one of the largest coal-mining regions in Europe, rich in natural resources.

Statement 2 is Incorrect: The region is known as the **industrial heartland** of Ukraine, famous for heavy machinery, steel production, and mining, rather than being the "agricultural heartland."

2. With reference to the MH-60R helicopter squadrons of the Indian Navy, consider the following statements:

1. INAS 335 (Ospreys) is the second Indian Naval Air Squadron inducted with MH-60R helicopters.
2. The first MH-60R squadron of the Indian Navy was commissioned at INS Garuda, Kochi.
3. MH-60R helicopters are designed exclusively for Anti-Submarine Warfare operations.

Which of the statements given above is/are correct?

(a) 1 and 2 only
(b) 2 only
(c) 1 and 3 only
(d) 1, 2 and 3

Ans. (a) 1 and 2 only

Statement 1 is correct: INAS 335 is explicitly mentioned as the second MH-60R squadron.

Statement 2 is correct: The first MH-60R squadron was commissioned at Kochi (INS Garuda) in March 2024.

Statement 3 is incorrect: MH-60R helicopters are multi-role platforms, designed for ASW, ASuW, SAR, and naval surveillance—not exclusively ASW.

3. With respect to India-Russia cooperation in the Arctic and Far East, consider the following statements:

1. Under the Svalbard Treaty of 1920, India possesses equal rights to conduct non-military commercial and scientific activities in the Svalbard archipelago.
2. The India–Russia Far East Cooperation Programme (2024–29) aims to achieve a bilateral trade target of $100 billion by 2030.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans. (c) Both 1 and 2

Statement 1 is correct; as a signatory to the treaty, India has rights for mining and research. Statement 2 is correct; the programme operationalizes the 'Act Far East' policy with a $100 billion trade target by 2030

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