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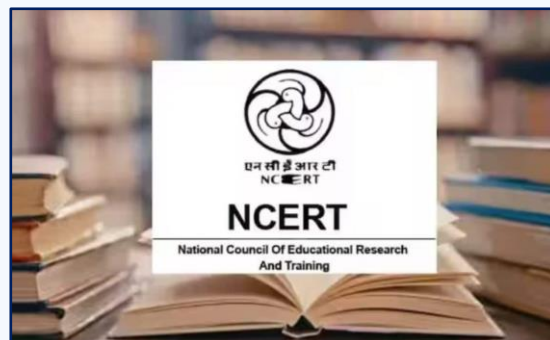
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POLITY & GOVERNANCE

1.1. NCERT GRANTED "DEEMED-TO-BE-UNIVERSITY" STATUS

Context:

The Ministry of Education has issued a formal notification declaring the **National Council for Educational Research and Training (NCERT)** as an institution **deemed to be a university**. This status follows recommendations from an expert panel approved by the **University Grants Commission (UGC)** in January.



1. Key Provisions and Implications

- **Expanded Role:** The new status transitions NCERT from a nodal school curriculum body into a **higher education and research institution**.
- **Degree-Granting Authority:** NCERT and its **six regional institutes** are now empowered to offer academic courses, design their own programmes, and **grant degrees** (undergraduate, postgraduate, and doctoral).
- **Research Focus:** The mandate specifically directs the body to begin **doctoral programmes** and expand into "innovative academic areas".
- **Global Reach:** The notification allows for the establishment of **off-campus or offshore campuses**, provided they comply with UGC norms and guidelines.

2. Mandatory Compliance and Conditions

- **UGC Norms:** All academic courses must conform to the standards prescribed by the **UGC** and other relevant statutory bodies.
- **Non-Commercial Nature:** NCERT is strictly prohibited from engaging in any activities that are "**commercial**" or "**profit-making**" in nature.
- **Accreditation:** The institution must secure accreditation from the **National Assessment and Accreditation Council (NAAC)** and obtain programme ratings from the **National Board of Accreditation**.
- **NEP 2020 Alignment:** All future expansions and academic endeavours must align with the **National Education Policy (NEP) 2020**.

3. About NCERT:

NCERT (1961) is an autonomous body under the Government of India that advises Centre and States on improving school education quality.

Key Functions:

- Conducts and promotes research in school education
- Develops textbooks, learning materials, and digital content
- Organises teacher training (pre-service & in-service)
- Promotes innovative teaching methods and practices

- Collaborates with states, universities, NGOs, and international organisations
- Acts as a nodal agency for Universalisation of Elementary Education
- Supports bilateral and international educational exchange programmes

1.2. GOVERNOR'S POWER UNDER ARTICLE 161

Context:

Recently, a Full Bench of the **Madras High Court** ruled that the Governor of a State is strictly bound by the "aid and advice" of the State Council of Ministers while exercising powers under **Article 161** of the Constitution.

The Court clarified that the Governor, regardless of personal opinion, cannot exercise independent discretion

or take a different view from the Cabinet regarding the remission and premature release of convicts.



1. Scope of Article 161

Article 161 of the Indian Constitution empowers the **Governor of a State** to grant:

- **Pardon:** Completely absolves the convict from the sentence and the conviction.
- **Reprieve:** A temporary stay on the execution of a sentence.
- **Respite:** Awarding a lesser sentence in place of one originally awarded due to special facts (e.g., pregnancy or physical disability).
- **Remission:** Reducing the period of the sentence without changing its character (e.g., reducing two years of rigorous imprisonment to one year).
- **Commutation:** Substituting one form of punishment for a lighter form (e.g., rigorous imprisonment to simple imprisonment).

2. Limitations on Article 161

- **Jurisdiction:** The power extends only to matters to which the **executive power of the State** extends (offences against State laws).
- **Death Penalty:** Unlike the President, the Governor **cannot pardon** a death sentence. However, the Governor **can** suspend, remit, or commute a death sentence.
- **Court Martial:** The Governor has no power to grant clemency in cases of punishment by a Military Court (Court Martial).

Recent Madras High Court Judgement (April 2026)

The Full Bench of the Madras High Court addressed whether the Governor has any "discretionary" power to reject a Cabinet recommendation for premature release.

Key Highlights of the Ruling:

- **Binding Nature of Advice:** The court held that the Governor is constitutionally obligated to follow the State Cabinet's recommendation. The phrase "aid and advice" under Article 163 is mandatory for the exercise of powers under Article 161.
- **No Independent Discretion:** The Bench ruled that under no circumstances can the Governor take a view different from the Council of Ministers in matters of remission.

- **Reliance on Precedents:** The High Court relied heavily on the Supreme Court's landmark judgements in **Maru Ram v. Union of India (1980)** and **AG Perarivalan v. State of Tamil Nadu (2022)**, which established that the executive power of the Governor is actually the power exercised by the State Government.

Comparative Analysis: President vs. Governor

Feature	President (Article 72)	Governor (Article 161)
Law under which offence is committed	Offences against Union Laws.	Offences against State Laws.
Death Sentence	Can grant Pardon , commute, or remit.	Cannot Pardon ; can only commute, remit, or suspend.
Court Martial	Can grant clemency for Military Courts.	No power regarding Court Martial.
Binding Advice	Bound by Union Cabinet advice.	Bound by State Cabinet advice.

1.3. PM SURYA GHAR: MUFT BIJLI YOJANA

Context:

Recently, the Ministry of New and Renewable Energy (MNRE) has proposed a new incentive scheme for States to accelerate the adoption of the "Utility-Led Aggregation (ULA)" model under the PM Surya Ghar: Muft Bijli Yojana. To achieve the national target of one crore rooftop solar households by March 2027, the government is encouraging State Power Distribution Companies (DISCOMs) to lead the installation process, particularly for households that face financial or infrastructural barriers.



1. Overview and Objectives

- **Launch:** Launched in February 2024 by the Prime Minister.
- **Nodal Ministry:** Ministry of New and Renewable Energy (MNRE).
- **Primary Goal:** To provide up to **300 units of free electricity** every month to one crore households across India.
- **Target Capacity:** Aiming to reach 30 GW of solar capacity through residential rooftop systems.
- **Financial Outlay:** A total central investment of over **₹75,021 crore**.

2. Implementation Models

The scheme moves beyond individual applications by introducing systemic models to ensure scalability:

- **Utility-Led Aggregation (ULA) Model:** DISCOMs or designated state agencies act as aggregators. They float bulk tenders to install systems across multiple households, lowering costs through economies of scale.
- **RESCO (Renewable Energy Service Company) Model:** A third-party developer (RESCO) installs, owns, and operates the solar plant on the consumer's roof. The consumer only pays for the electricity generated, often at a rate lower than the grid tariff.

3. Central Financial Assistance (CFA) & Subsidy Structure

The subsidy is directly credited to the consumer's bank account following installation and inspection.

- **For 1–2 kW systems:** Up to 60% of the benchmark cost.
- **For 2–3 kW systems:** 40% of the additional cost for the capacity beyond 2 kW.
- **Upper Limit:** The total subsidy is capped at a maximum of 3 kW capacity (approx. ₹78,000).
- **Low-Interest Loans:** Collateral-free, low-interest (around 7%) loan options are available through banks for systems up to 3 kW.

4. Special Components

- **Model Solar Village:** The scheme aims to develop one "Model Solar Village" in every district of India to act as a demonstration hub for solar adoption.
- **Local Body Incentives:** Urban Local Bodies (ULBs) and Panchayati Raj Institutions (PRIs) are provided financial incentives to promote and facilitate rooftop solar in their respective areas.
- **National Portal:** A dedicated digital platform handles the end-to-end process from registration to subsidy release, ensuring transparency.

1.4. RIGHT TO VOTE IN INDIA

Context:

Recently, the Supreme Court of India, underscored the significance of the right to vote by describing it as a "sentimentally vital" entitlement for citizens. This observation came during a directive to the Election Commission of India (ECI) regarding the large-scale removal of voters from electoral rolls in West Bengal due to "logical discrepancies." With nearly 34 lakh appeals pending before Appellate Tribunals just ahead of the 2026 Assembly elections, the Court emphasized that ensuring the integrity of electoral rolls is essential for protecting the democratic right of every eligible citizen to participate in the governing process.



1. The Nature of the Right

There is often a debate on whether the right to vote is a Fundamental, Constitutional, or Statutory right. For the UPSC Prelims, the following distinctions are vital:

- **Constitutional Right:** It is a right granted by the Constitution (Article 326) but is located outside Part III (Fundamental Rights).
- **Statutory Right:** It is also a statutory right because it is regulated and operationalized by the **Representation of the People Act, 1951**.
- **Supreme Court's Stance:** In the *Anoop Baranwal case (2023)* and *Kuldip Nayar case (2006)*, the Court maintained it is a statutory right. However, in *PUCL vs. Union of India*, it was observed that voting is a "facet of freedom of expression" under **Article 19(1)(a)**.

2. Constitutional Provisions

- **Article 326:** This article defines **Universal Adult Suffrage**. It states that elections to the Lok Sabha and State Legislative Assemblies shall be on the basis of adult suffrage; every citizen not less than 18 years of age (and not otherwise disqualified) is entitled to be registered as a voter.

- **61st Constitutional Amendment Act, 1988:** This amendment reduced the voting age from **21 to 18 years**, which became effective in 1989.

3. Legal Framework

The right to vote is governed by two major statutes:

- **Representation of the People Act (RPA), 1950:** Focuses on the preparation of electoral rolls, qualification of voters, and delimitation of constituencies.
- **Representation of the People Act (RPA), 1951:** Focuses on the actual conduct of elections and defines the "Right to Vote" under **Section 62**.

4. Key Disqualifications and Limitations

The right to vote is not absolute and can be restricted on grounds of:

- Non-residence.
- Unsoundness of mind.
- Crime or corrupt/illegal practices.
- **Prisoners' Rights:** Under **Section 62(5)** of the RPA 1951, no person shall vote if they are confined in a prison or in the lawful custody of the police (this does not apply to persons under preventive detention).
- **NRI Voting:** Non-Resident Indians can vote but currently must be **physically present** in their respective constituencies (Section 20A of RPA 1950).

1.5. WHIP IN INDIA

Context:

Recently, the Indian National Congress and the Bharatiya Janata Party (BJP) issued rigorous whips to their respective Members of Parliament in the Lok Sabha. These directives were issued to ensure the mandatory presence of all legislators for a special three-day sitting of Parliament scheduled from April 16 to 18, 2026.



The primary objective of these whips is to secure maximum attendance and unified party support for critical amendments to the Women's Reservation Act and other "most important" legislative businesses slated for discussion and voting.

1. Definition and Origin

- The **Whip** is an official of a political party who acts as an "assistant floor leader" within the legislature.
- The concept is inherited from the **British Parliamentary system**, where "whipping-in" was used to ensure members followed the party line.
- Every major political party, whether in power or in opposition, appoints its own whips in both the Lok Sabha and the Rajya Sabha.

2. Status of the Office

- **Not in the Constitution:** The office of the whip is **not mentioned** in the Constitution of India.
- **Not in House Rules:** It is also not mentioned in the **Rules of the House** or any specific **Parliamentary Statute**.

- **Based on Convention:** The institution of the whip is entirely based on the **conventions** of the parliamentary form of government.

3. Types of Whips

Political parties generally issue three categories of whips depending on the importance of the issue:

- **One-line Whip:** This is issued to inform members about a vote; it allows a member to abstain if they do not wish to follow the party line.
- **Two-line Whip:** This directs members to be **present** in the House during the time of voting, but does not provide specific instructions on how to vote.
- **Three-line Whip:** This is the most stringent directive, mandating that members be present and **vote strictly according to the party's position**.

4. Functions and Enforcement

- **Attendance & Discipline:** The primary role is to ensure the presence of party members and regulate their behavior on the floor.
- **Communication:** The whip serves as a bridge between the party leadership and the individual legislators.
- **The Tenth Schedule Link:** If a member violates a three-line whip (votes or abstains contrary to party directions), they face disqualification from the House under the **Anti-Defection Law (1985)**, unless the act is condoned by the party within 15 days.

5. Key Limitations

The authority of the whip is not absolute and does not apply in the following scenarios:

- **Presidential Elections:** Members of Parliament and State Assemblies cannot be directed by a whip to vote for a particular candidate.
- **Vice-Presidential Elections:** Similarly, no whip can be issued for the election of the Vice-President.
- **Rajya Sabha Elections:** Following the Supreme Court's observations, the whip system does not strictly apply to the election of members to the Rajya Sabha.

1.6. CONSTITUTION (ONE HUNDRED AND THIRTY-FIRST AMENDMENT) BILL, 2026

Context:

Recently, the Union Government introduced the **Constitution (One Hundred and Thirty-First Amendment) Bill, 2026** in the Lok Sabha. The Bill aims to overhaul the electoral map of India by expanding the strength of the Lower House to **850 members** and enabling the immediate rollout of 33% reservation for women by decoupling it from the requirement of a post-2026 Census.



Key Provisions of the 131st Amendment Bill, 2026

1. Expansion of Lok Sabha Strength

The Bill proposes a significant increase in the membership of the Lok Sabha to accommodate India's growing population.

- **Total Seats:** Increased from 543 to **850**.
- **State Representation:** Maximum seats for States capped at **815**.
- **UT Representation:** Maximum seats for Union Territories capped at **35**.
- **Rationale:** To improve the representative-to-population ratio, which has remained stagnant based on the 1971 Census data.

2. Amendment to Article 81 and 82 (Removing the Freeze)

- **Article 82:** Currently, this article mandates that delimitation can only happen after the first Census conducted after the year 2026. The 131st Amendment seeks to **delete this proviso**.
- **Data Baseline:** It allows the government to use the **2011 Census** (or any "last preceding published census" as determined by Parliament) to redraw constituencies immediately, rather than waiting for the final results of the 2027 Census.

3. Accelerated Women's Reservation (Article 334A)

- The **106th Amendment Act (2023)** had stipulated that women's reservation would only take effect after a census and subsequent delimitation.
- The 131st Amendment modifies **Article 334A** to allow the 1/3rd reservation to be implemented for the **2029 General Elections** by linking it to the expedited delimitation process proposed in this Bill.

4. Role of the Delimitation Commission 2026

- The Bill is accompanied by a new **Delimitation Bill, 2026**.
- The Commission will be chaired by a **retired or serving Supreme Court Judge**.
- It will include the Chief Election Commissioner and respective State Election Commissioners.
- **Judicial Immunity:** As per standard practice, the orders of the Delimitation Commission, once published in the Gazette, cannot be called into question in any court of law.

5. Federal Challenges and Concerns

- **North-South Divide:** Southern states (like Tamil Nadu and Kerala) fear a loss of political weight because they successfully implemented population control, whereas Northern states (like Uttar Pradesh and Bihar) will see a massive surge in seats due to higher population growth.
- **Constitutional Default:** By removing the 1971 freeze, the Bill reverts to the default of **Article 81(2)(a)**, which requires seats to be proportional to population, potentially penalizing states with better demographic management.

1.7. PETROLEUM AND NATURAL GAS REGULATORY BOARD (PNGRB)

Context:

Recently, the Petroleum and Natural Gas Regulatory Board (PNGRB) has moved toward the final stages of awarding bids for four major LPG pipelines spanning approximately 2,500 km, an initiative aimed at eliminating road-based bulk LPG transportation by 2030.

Furthermore, the board has been in the news for implementing the **Unified Tariff Regime (effective January 2026)**, which operationalizes the "One Nation, One Grid, One Tariff" model to make natural gas more affordable for distant consumers and industrial hubs across India.



1. Origin and Legal Status

The PNGRB is a **statutory body** established under the **Petroleum and Natural Gas Regulatory Board Act, 2006**. It operates under the aegis of the Ministry of Petroleum and Natural Gas (MoPNG).

2. Composition of the Board

- The Board consists of a **Chairperson**, a **Member (Legal)**, and three other members.
- All members are appointed by the Central Government based on the recommendations of a Search Committee.

3. Regulatory Mandate and Scope

The PNGRB's jurisdiction is primarily focused on the **downstream and midstream** sectors.

- **What it Regulates:** Refining, processing, storage, transportation, distribution, marketing, and sale of petroleum, petroleum products, and natural gas.
- **What it DOES NOT Regulate:** The **production (upstream)** of crude oil and natural gas is outside the purview of the PNGRB.
- **Key Responsibilities:** Registering entities to market notified petroleum products and operate LNG terminals.
 - Authorizing the laying of pipelines (Common Carriers) and City Gas Distribution (CGD) networks.
 - Ensuring competitive markets and preventing restrictive trade practices.
 - Setting technical standards and safety specifications for the sector.

4. Quasi-Judicial Powers and Appeal Mechanism

The PNGRB functions as a **quasi-judicial body** with powers equivalent to a **Civil Court** for the purpose of adjudicating disputes.

- **Dispute Resolution:** It can decide on matters between entities or between an entity and any other person regarding the transport or marketing of gas.
- **Appeals:** Any person aggrieved by an order or decision of the Board can file an appeal with the **Appellate Tribunal for Electricity (APTEL)**, established under the Electricity Act, 2003.

5. Recent Policy Initiatives (2025–2026)

- **Unified Tariff Regime:** PNGRB replaced the multiple-layered tariff system with a unified structure. This ensures that customers located far from gas sources do not pay prohibitively high transportation costs.
- **Compressed Bio-Gas (CBG) Integration:** Mandatory blending obligations for CBG in CNG and PNG segments commenced from **FY 2025-26** to support the SATAT initiative.
- **LPG Interoperability:** The Board is facilitating digital and physical infrastructure to allow consumers more flexibility in choosing LPG service providers.

1.8. DELIMITATION IN INDIA

Context:

Recently, the Union Government convened a special session of Parliament to introduce a landmark suite of legislations: the **Constitution (131st Amendment) Bill, 2026**, the **Delimitation Bill, 2026**, and the **Union Territories Laws (Amendment) Bill, 2026**. This move follows the mandate of the **Nari Shakti Vandan Adhiniyam (106th Amendment)**,



which tied the implementation of 33% women's reservation to the completion of a fresh delimitation exercise. In light of the delayed 2021 Census, these bills propose to utilize the **2011 Census** data to increase the Lok Sabha strength to **850 seats**, aiming to resolve the long-standing freeze on parliamentary seats while ensuring electoral parity across the nation.

1. Definition and Objective

- **Definition:** Delimitation is the act of redrawing boundaries of Lok Sabha and State Assembly seats to reflect changes in population.
- **Primary Objective:** To provide equal representation to equal segments of the population, ensuring "One Vote, One Value."

2. Constitutional Framework

- **Article 81:** Specifies the composition of the Lok Sabha. It mandates that the ratio between the number of seats allotted to each State and the population of the State is, so far as practicable, the same for all States.
- **Article 82:** The Parliament enacts a **Delimitation Act** after every Census. Once the Act is in force, the President appoints a Delimitation Commission.
- **Article 170:** Similar to Article 82, but applies to the readjustment of constituencies for **State Legislative Assemblies**.
- **Article 327:** Empowers Parliament to make provisions with respect to all matters relating to elections, including delimitation.
- **Article 329(a):** Bars the judiciary from interfering in the delimitation of constituencies.

3. The Delimitation Commission (The Boundary Commission)

- **Nature:** A high-power body whose orders have the force of law.
- **Composition:**
 - **Chairman:** A serving or retired Judge of the **Supreme Court**.
 - **Ex-officio:** The Chief Election Commissioner (or an EC nominated by them) and the State Election Commissioner of the concerned State.
 - **Associate Members:** 10 members (5 Lok Sabha MPs and 5 State MLAs) are appointed for each state. **Note:** They have no right to vote or sign the final report.
- **Finality of Orders:** Orders are laid before the Lok Sabha/Assembly. However, these houses **cannot** make any modifications to the orders.

4. The History of the "Freeze"

- **1952, 1963, 1973, 2002:** The years Delimitation Commissions were constituted.

- **42nd Amendment (1976):** Froze the allocation of seats based on the 1971 Census until the 2001 Census to ensure states' family planning efforts didn't reduce their political clout.
- **84th Amendment (2001):** Extended the freeze on the **number of seats** until the first census after **2026** (originally intended to be the 2031 census). However, it allowed the redrawing of **internal boundaries** within states based on the 1991 (later 2001) census.
- **87th Amendment (2003):** Provided for delimitation on the basis of the **2001 Census** without changing the total number of seats.

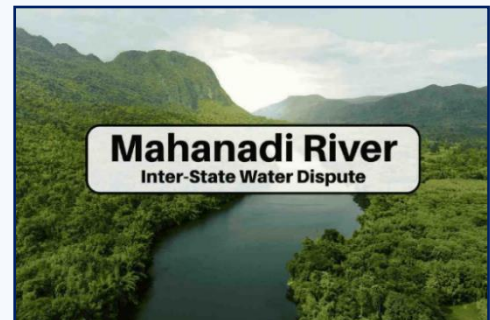
5. Current 2026 Proposal & The Federal Crisis

- **The 850-Seat Plan:** The 2026 Bills propose increasing seats to **850** to ensure that no state loses its current number of seats, even as northern states gain more due to higher population growth.
- **The Population Paradox:** Southern states (Kerala, Tamil Nadu, etc.) argue that delimitation based purely on population penalizes them for succeeding in national population control goals.
- **New Criteria:** Experts and the NITI Aayog have suggested that the new Commission may consider "additional markers" alongside population, such as economic contribution or social indicators, to maintain federal balance.

1.9. INTER-STATE RIVER WATER DISPUTES: THE MAHANADI CRISIS

Context:

The Mahanadi Water Disputes Tribunal (MWDT) has issued a final ultimatum to the states of Odisha and Chhattisgarh to present a mutual water-sharing settlement by May 2. Failing this, the tribunal has stated it will proceed to deliver a judgment on the merits of the case.



1. The Mahanadi River System

- **Nomenclature:** Derived from Sanskrit words "Maha" (great) and "Nadi" (river).
- **Characteristics:** A major east-flowing peninsular river recognized for its high silt load, historical flood cycles, and immense agricultural importance.
- **Origin:** Nagri Sihawa Hills near Pharsiya village, Dhamtari district, Chhattisgarh (altitude: ~442m).
- **Length & Outflow:** Travels approximately 900 km (560 miles), emptying into the Bay of Bengal via distributaries near Paradip, Odisha.
- **Catchment Area:** Spans roughly 1.32 lakh sq. km.
- **Basin States:** Primary flow through Chhattisgarh (upper and middle basin) and Odisha (lower basin and delta), with minor catchments in Jharkhand, Maharashtra, and Madhya Pradesh.
- **Left Bank Tributaries:** Seonath (Shivnath), Hasdeo, Mand, and Ib.
- **Right Bank Tributaries:** Ong, Tel, and Jonk

2. Key feature

- **Hirakud Dam:** Situated in Odisha, it is the world's longest earthen dam, functioning for flood control, irrigation, and hydropower generation.
- **Satkosia Gorge:** An ecologically sensitive and scenic geographical formation cutting through the Eastern Ghats.

- **Delta Region:** One of India's largest delta systems, shared with the Brahmani River, acting as a crucial base for agriculture, fisheries, and port operations.
- **Biodiversity:** The ecosystem sustains over 130 avian species, diverse fish populations, and key tiger reserve zones.

The Mahanadi River Water Dispute

The conflict between Odisha and Chhattisgarh centers on the equitable sharing of the Mahanadi River's water resources.

Odisha's Grievances

- Reports a severe reduction in river flow entering its territory, resulting in harm to its population and environment.
- Attributes this decline to Chhattisgarh's construction of upstream dams and barrages, alongside its increased water consumption.
- Cites severe downstream impacts on state irrigation, drinking water supply, and coastal ecology.

Chhattisgarh's Defense

- Asserts its right to utilize the river water to meet state requirements based on its geographical share.
- Constitutes 52.9% of the river's total basin catchment area.
- Encompasses nearly 90% of the river's catchment area situated upstream of the Hirakud Dam.

Tribunal Intervention

- In 2018, following a petition filed by Odisha, the Supreme Court directed the Central Government to intervene.
- The Mahanadi Water Disputes Tribunal (MWDT) was formally constituted on March 12, 2018.
- The MWDT was established under the provisions of the Inter-State River Water Disputes Act, 1956.

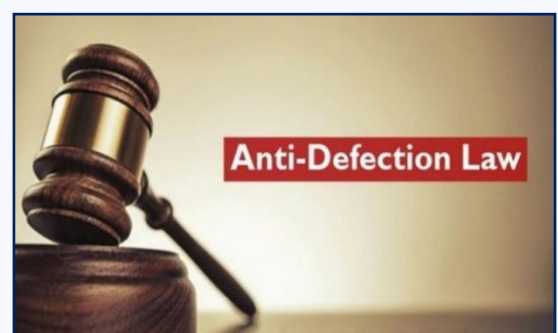
Inter-State Water Disputes in India

- **Nature of Conflicts:** Disputes arise between neighboring states over the sharing of inter-state river waters, directly impacting basic water needs, agriculture, and public livelihoods.
- **Constitutional Authority:** Article 262 of the Constitution empowers Parliament to legislate the adjudication of any dispute or complaint regarding the use, distribution, or control of inter-state river or river valley waters.
- **Statutory Mechanism:** To formally settle these conflicts, Parliament enacted the Inter-State River Water Disputes Act, 1956, pursuant to the powers granted under Article 262.

1.10. ANTI-DEFECTION LAW

Context:

Recently, the Anti-Defection Law has regained national prominence following the resignation of several high-profile legislators from the Aam Aadmi Party (AAP) in Delhi and Punjab to join the Bharatiya Janata Party (BJP). These political shifts, have triggered fresh legal debates regarding the potential disqualification of Rajya Sabha members and State MLAs under the **Tenth Schedule**.



Furthermore, the Supreme Court has recently intensified its scrutiny of the "time-bound" disposal of disqualification petitions, emphasizing that Speakers cannot indefinitely delay decisions to favor a particular political faction.

1. Introduction and Constitutional Basis

The Anti-Defection Law was introduced to curb the "Aya Ram, Gaya Ram" culture of frequent floor-crossing which destabilized governments.

- **52nd Amendment Act, 1985:** This amendment inserted the **Tenth Schedule** into the Constitution.
- **Articles Affected:** It amended Articles 102(2) and 191(2), which deal with the disqualification of Members of Parliament and State Legislatures, respectively.

2. Grounds for Disqualification

The law specifies three categories of members who can be disqualified:

1. Members of Political Parties:

- a. If they **voluntarily give up** the membership of their political party. (Note: Resignation is not mandatory; "conduct" can also imply giving up membership).
- b. If they vote or abstain from voting in the House **contrary to the direction (whip)** issued by the party without prior permission, and the act is not condoned by the party within **15 days**.

2. Independent Members:

- a. If an independent candidate joins **any** political party after the election.

3. Nominated Members:

- a. If they join a political party **after the expiry of six months** from the date they take their seat. (They can join a party within the first six months without penalty).

3. Key Exceptions

Legislators are protected from disqualification in the following scenarios:

- **Merger (2/3rd Rule):** If at least **two-thirds** of the members of a party's legislative wing agree to a merger with another party.
- **Presiding Officers:** If a member is elected as the Speaker or Chairman, they may resign from their party and rejoin it after they demit office without being disqualified.

4. The 91st Amendment Act, 2003

This amendment significantly strengthened the law by:

- **Removing the "Split" Provision:** Earlier, a "split" by one-third of the members protected them from disqualification; this was abolished to prevent frequent breaks in parties.
- **Limiting the Cabinet Size:** The total number of ministers, including the PM/CM, cannot exceed **15%** of the total strength of the Lok Sabha/Legislative Assembly (State minimum is 12).
- **De-barring from Office:** Any member disqualified for defection is also disqualified from being appointed as a **Minister** or holding any **remunerative political post** until the end of their term or until they are re-elected.

5. The Deciding Authority and Judicial Review

- **The Presiding Officer:** The Speaker or Chairman of the House has the final authority to decide on disqualification.

- **Kihoto Hollohan Case (1992):** The Supreme Court ruled that while the Speaker decides, the decision is subject to **Judicial Review**. The Speaker acts as a "Tribunal" in such cases.
- **Timeline:** While the law does not specify a timeline, the SC in the **Keisham Meghachandra Singh Case (2020)** suggested that disqualification petitions should ideally be decided within **three months**.

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UPSC PRELIMS PRACTICE QUESTIONS

Q. With reference to the Jan Vishwas (Amendment of Provisions) Bill, 2026, consider the following statements:

1. The Bill mandates a 10% annual increase in the minimum amount of fines and penalties across all amended Acts.
2. It introduces a mechanism where Adjudicating Officers, instead of traditional courts, will determine penalties for certain minor offences.
3. The Bill proposes to decriminalize provisions in over 70 Central Acts to promote trust-based governance.

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)

Explanation:

- **STATEMENT 1 IS INCORRECT:** While the Bill does provide a 10% increase in fines and penalties, this revision is scheduled to occur every **three years**, not annually.
- **STATEMENT 2 IS CORRECT:** One of the core features of the Bill is the appointment of **Adjudicating Officers** to handle minor defaults administratively, thereby reducing the burden on the Indian court system.
- **STATEMENT 3 IS CORRECT:** The 2026 version of the Bill is an expansive reform that targets **79 Central Acts** (more than 70) to streamline the regulatory environment and decriminalize hundreds of provisions.

Q. With reference to the recent notification regarding NCERT, consider the following statements:

1. NCERT has been granted the status of a “deemed-to-be-university”.

2. It can now award undergraduate, postgraduate, and doctoral degrees.
3. It is now completely independent of UGC regulations.

Which of the statements given above is/are correct?

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

Ans. (a)

Explanation:

- **Statement 1 is Correct:** The Ministry of Education has officially notified the National Council for Educational Research and Training (NCERT) as an institution **deemed to be a university**. This status was granted based on the recommendations of an expert panel from the University Grants Commission (UGC).
- **Statement 2 is Correct:** This new status transforms NCERT from a curriculum body into a higher education and research institution. It is now authorized to offer academic programs and **grant degrees** at the undergraduate, postgraduate, and doctoral levels.
- **Statement 3 is Incorrect:** NCERT is **not independent** of UGC regulations. The notification explicitly states that all academic courses and programs must conform to the **norms and standards prescribed by the UGC** and other relevant statutory bodies. Additionally, it must comply with UGC guidelines regarding the establishment of new or offshore campuses.

Q. Which of the following statements is/are correct regarding CAPFs in India?

1. CAPFs operate under the Ministry of Defence.

2. CAPFs include both border guarding and internal security forces.
3. Assam Rifles guards the Indo-Myanmar border.

Select the correct answer:

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

Ans. (a)

Explanation:

- **Statement 1 is Incorrect:** All Central Armed Police Forces (CAPFs) actually fall under the **Ministry of Home Affairs (MHA)**, not the Ministry of Defence. The Ministry of Defence only manages the Army, Navy, and Air Force.
- **Statement 2 is Correct:** These forces have a double role. Some, like the BSF, guard our **borders**, while others, like the CRPF, handle **internal security** issues like riots or elections.
- **Statement 3 is Correct:** The **Assam Rifles** is specifically tasked with guarding the border between India and **Myanmar**.

Q. Consider the following statements regarding the Pardoning Power of the Governor in India:

Statement-I: The Governor of a State has the power to pardon a death sentence if the offence is against a law to which the executive power of the State extends.

Statement-II: The Madras High Court recently ruled that the Governor is bound by the aid and advice of the Council of Ministers while exercising powers under Article 161.

Which one of the following is correct in respect of the above statements?

- (a) Both Statement-I and Statement-II are correct and Statement-II is the correct explanation for Statement-I.
- (b) Both Statement-I and Statement-II are correct and Statement-II is not the correct explanation for Statement-I.
- (c) Statement-I is correct but Statement-II is incorrect.
- (d) Statement-I is incorrect but Statement-II is correct.

Ans. (d)

Explanation:

- **STATEMENT-I IS INCORRECT:** According to the Constitution and clarified by various Supreme Court judgements, the Governor **cannot** pardon a death sentence. Only the President of India has the power to pardon a death sentence under Article 72. The Governor can only suspend, remit, or commute a death sentence.
- **STATEMENT-II IS CORRECT:** The Madras High Court Full Bench in April 2026 reaffirmed that the Governor must act strictly according to the Cabinet's advice under Article 161 and has no independent discretionary power in these matters.



Scan to attempt more questions

INTERNATIONAL RELATIONS

2.1. INDIA EXPRESSES 'DEEP CONCERN' OVER MASS CIVILIAN DEATHS IN LEBANON

Context:

India formally expressed **"deep concern"** over the growing loss of civilian lives in Lebanon following **Israeli airstrikes** on **Beirut**, the Lebanese capital. Speaking at a press briefing at the **National Media Centre, New Delhi**, the Official Spokesperson of the **Ministry of External Affairs (MEA), Randhir Jaiswal**, reiterated India's respect for **"sovereignty and territorial integrity"** of all states as **"essential"**. The **Lebanese Health Ministry** reported the death toll rising to **1,223 people** — with over **357 injured** —



within a single week. Israel struck targets in Beirut, claiming they were **command centres of Hezbollah**.

1. India's Official Position on the Lebanon Conflict

- **Deep Concern:** India expressed serious concern over the large number of civilian casualties in Lebanon.
- **Sovereignty & Territorial Integrity:** India emphasised that respect for these principles within the international state system is essential — a consistent cornerstone of India's foreign policy.
- **Protection of Civilians:** India has always prioritised civilian protection as the foremost concern in conflict situations.
- **Indian Embassy in Beirut:** The MEA confirmed it remains in close contact with the Indian community in Lebanon.
- **Notable omission:** India stopped short of directly mentioning Israel by name in its statement.

2. About Lebanon

2.1 Geographic Profile

Parameter	Details
Location	Eastern Mediterranean coast; West Asia (Middle East)
Borders	Syria (north & east), Israel (south), Mediterranean Sea (west)
Capital	Beirut
Area	~10,452 sq km (one of the smallest countries in West Asia)
Official Language	Arabic (French also widely used)

Currency	Lebanese Pound (LBP)
UN Membership	Founding member of the United Nations (1945)

2.2 Political System — Confessionalism

Lebanon follows a unique political system called **confessionalism**, where state power is formally distributed along religious/sectarian lines:

- There are **18 officially recognised religious communities** in Lebanon.
- The **Taif Agreement (1989)** ended the Lebanese Civil War (1975–1990) and rebalanced power between Christians and Muslims.

2.3 Hezbollah

- **Hezbollah** ("Party of God") is a **Shia political party and militant organisation** founded in **1982** with **Iranian backing** following Israel's invasion of Lebanon.
- It operates a **state-within-a-state** in southern Lebanon and parts of Beirut — with its own army, hospitals, schools, and social services.
- Designated a **terrorist organisation** by the **USA, EU, Gulf Cooperation Council (GCC)**, and several Arab states.
- Lebanon's government has **not** designated Hezbollah as a terrorist organisation.
- Hezbollah has representation in the Lebanese Parliament and Cabinet.
- It fought a major war with Israel in **2006 (Second Lebanon War)**.
- Its long-time Secretary-General, **Hassan Nasrallah**, was killed by an Israeli airstrike in **2024**.

2.2. INDIA-ZAMBIA BILATERAL RELATIONS & CRITICAL MINERALS

Context:

India's diplomatic and economic efforts to secure a supply chain for critical minerals have hit a roadblock. Talks with Zambia have stalled due to a lack of specific assurances regarding long-term mining rights.



1. Key Minerals in Focus

- **Cobalt: Significance:** A vital component for lithium-ion batteries used in Electric Vehicles (EVs) and mobile phones.
 - **Global Context:** Zambia is one of the world's largest producers of cobalt (often as a byproduct of copper mining).
- **Copper: Significance:** Essential for power generation, electronics, renewable energy infrastructure, and construction.
 - **Strategic Need:** As India pushes for "Green Energy" and infrastructure growth, copper demand is surging.

2. Current Status of the Agreement

- **Land Allocation:** India was previously allocated **9,000 square kilometers** in Zambia for mineral exploration.
- **Exploration Progress:** A team of Indian geologists has already visited the site and collected mineral samples for analysis.
- **Timeline:** The exploration phase was intended to span **three years**.
- **Private Sector Involvement:** New Delhi intends to invite private Indian companies to participate in extraction once the exploration phase is successful and mining rights are legally secured.

3. The Stumbling Block: Mining Rights

- **Issue:** The primary reason for the "stall" in talks is the lack of clear assurances from the Zambian government (Lusaka) regarding **Mining Rights**.
- **Legal Security:** Without guaranteed rights to extract the minerals they find, India is hesitant to commit further investment or involve private players, as exploration is capital-intensive and risky.

4. Key Important Minerals

Mineral	Key Uses	Major Global Producers
Cobalt	EV batteries (Li-ion cathode), mobile phones, aerospace alloys	DRC (~70%), Zambia, Russia
Lithium	EV batteries, grid storage, ceramics	Australia, Chile, Argentina ("Lithium Triangle")
Copper	Power generation, electronics, construction, EVs	Chile, Peru, DRC, Zambia
Graphite	EV battery anodes, lubricants, nuclear reactors	China (~95% of processing)
Rare Earth Elements	Wind turbines, EV motors, defence electronics, magnets	China (~90% of processing)
Nickel	Stainless steel, EV batteries (NMC cathode), plating	Indonesia, Philippines, Russia
Platinum Group (PGE)	Catalytic converters, hydrogen fuel cells, jewellery	South Africa, Russia, Zimbabwe
Silicon	Solar PV cells, semiconductors, electronics	China, Russia, Brazil
Titanium	Aerospace, defence, medical implants, white pigment	China, Russia, Japan
Tungsten	Hard metal tools, armour-piercing ammunition, filaments	China (~80% of global supply)

5. About Zambia

- **Location:** Southern Africa, bordered by eight nations (Angola, DRC, Tanzania, Malawi, Mozambique, Zimbabwe, Botswana, Namibia).
- **Capital:** Lusaka.

- **Part of the Copperbelt region** — one of world's richest copper/cobalt zones (shared with DRC)
- **Global significance:** 2nd largest cobalt producer globally (after DRC)
- **Major copper exporter** — key to India's energy transition supply chain
- **Member of African Union.**
- **Key Landmarks:** Victoria Falls (border with Zimbabwe), Lake Kariba, and the Zambezi River.

2.3. ROHINGYA MARITIME CRISIS

Context:

Recently, the **United Nations High Commissioner for Refugees (UNHCR)** highlighted that **2025** was the deadliest year on record for Rohingya refugees. Nearly **900 individuals** died or went missing in the **Bay of Bengal** and **Andaman Sea**. This crisis underscores the



desperate humanitarian situation in Myanmar's Rakhine State and the overcrowded camps in Cox's Bazar, Bangladesh.

I. Key Geographic & Conflict Zones

- **Source Points:** Most maritime movements originate from **Cox's Bazar** (Bangladesh) and **Rakhine State** (Myanmar).
- **Transit Routes:** The journeys cross the **Bay of Bengal** and the **Andaman Sea**.
- **Destination Points:** Refugees primarily aim for **Malaysia** and **Indonesia** seeking better livelihood opportunities.
- **Geographic Risk:** The maritime route is described as an "unmarked graveyard," with over **5,000 deaths** recorded in the last decade.

II. Drivers of Migration (The "Push" Factors)

- **Funding Shortfalls:** Reduced international aid in Bangladesh has led to food and security crises in camps.
- **Lack of Prospects:** Limited access to education and legal employment in refugee camps.
- **Statelessness:** The Rohingya remain the world's largest stateless population, denied citizenship by Myanmar's **1982 Citizenship Law**.
- **Vulnerable Demographics:** Over **50%** of those on boats are women and children, making them prime targets for **human trafficking** and exploitation.

III. About the UNHCR (UN Refugee Agency)

1. Evolution and Mandate

- **Established:** 1950, by the UN General Assembly to help millions of Europeans who had fled or lost their homes during **World War II**.
- **HQ:** Geneva, Switzerland.

- **Mandate:** To lead and coordinate international action to protect refugees and resolve refugee problems worldwide. It also has a mandate for **Stateless Persons** (under the 1954 and 1961 Conventions).
- **Governance:** Reports to the **UN General Assembly (UNGA)** and the **Economic and Social Council (ECOSOC)**.
- **Awards:** Won the Nobel Peace Prize twice (1954, 1981).

2. Key Legal Pillars

- **1951 Refugee Convention:** Defines who a refugee is and sets out the rights of individuals and the legal obligations of states.
- **Principle of Non-Refoulement:** A core tenet of international law (and Article 33 of the 1951 Convention) which prohibits states from returning a refugee to a territory where their life or freedom is threatened.

3. India's Standing with UNHCR

- **Non-Signatory:** India is **not** a signatory to the 1951 Refugee Convention or the 1967 Protocol.
- **Administrative Relationship:** Despite not being a signatory, India works closely with the UNHCR. The agency handles "mandate" refugees (like Afghans and Myanmarese) in urban areas, while the Government of India directly manages other groups (like Sri Lankan Tamils and Tibetans).
- **Legal Framework in India:** In the absence of a specific refugee law, refugees are governed under the **Foreigners Act, 1946**, the **Registration of Foreigners Act, 1939**, and the **Passport Act, 1967**.

2.4. INDIA-AFRICA FORUM SUMMIT (IAFS)

Context:

Recently, External Affairs Minister S. Jaishankar launched the official logo, theme, and website for the upcoming **4th India-Africa Forum Summit (IAFS-IV)**, scheduled to be held in New Delhi from May 28 to 31, 2026. This summit returns after a decade-long hiatus since the third edition in 2015, signaling a renewed strategic push to solidify India's role as a reliable partner for the Global South amidst global energy crises and geopolitical shifts.



1. Evolution of the Summit

- **IAFS-I (2008):** Held in New Delhi; adopted the **Delhi Declaration** and the Africa-India Framework for Cooperation.
- **IAFS-II (2011):** Held in **Addis Ababa, Ethiopia**; focused on the "Enhanced Partnership" model.
- **IAFS-III (2015):** Held in New Delhi; saw the largest-ever participation with all 54 African nations invited.
- **IAFS-IV (2026):** Theme: "**IA SPIRIT: India Africa Strategic Partnership for Innovation, Resilience, and Inclusive Transformation**".

2. Diplomatic and Institutional Footprint

- **Mission Expansion:** India has significantly increased its diplomatic presence, opening **17 new missions** in Africa since 2018, bringing the total to **46**.
- **G20 Integration:** Under India's 2023 Presidency, the **African Union (AU)** was admitted as a permanent member of the G20, a landmark achievement for South-South cooperation.
- **Educational Institutions:** India has established offshore campuses like **IIT Zanzibar** (Tanzania) and the National Forensic Science University (Uganda).

3. Economic and Strategic Pillars

- **Energy Security:** Amidst disruptions in the Gulf, India is diversifying its energy and fertilizer imports, targeting North African nations like **Algeria, Tunisia, Libya, and Morocco** for phosphates and gas.
- **Development Assistance:** Africa is the second-largest recipient of India's concessional **Lines of Credit (LoC)**.
- **Digital Public Infrastructure (DPI):** Deployment of the "India Stack" (UPI, Cowin, DigiLocker) to help African nations build e-governance systems.
- **Maritime Security:** Cooperation through the **SAGAR doctrine** (Security and Growth for All in the Region) and joint exercises like **AFINDEX**.

4. The "Living Bridge"

- The **3 million-strong Indian diaspora** in Africa acts as a socio-economic bridge, contributing to trade, healthcare, and education sectors across the continent.

2.5. INS NIREEKSHAK & DIVEX 2026

Context:

Recently, the Indian Navy's Diving Support and Submarine Rescue Vessel, **INS Nireekshak**, arrived at the Port of Colombo, Sri Lanka, to participate in the fourth edition of the **India-Sri Lanka Diving Exercise (DIVEX 2026)**. The week-long exercise (April 21–27, 2026) aims to strengthen interoperability between the diving teams of both navies and involves the handover of essential humanitarian and security aid to Sri Lanka.



1. About INS Nireekshak (A15)

- **Type of Vessel:** It is a sophisticated **Diving Support Vessel (DSV)** that also serves as an interim **Submarine Rescue Vessel (SRV)**.
- **Manufacturer:** Built by **Mazagon Dock Limited (MDL)**, Mumbai, and commissioned in 1989.
- **Core Capabilities:** * Equipped with two **Deep Submergence Rescue Vehicles (DSRV)** capable of rescue operations at depths up to 300 meters.
 - Features a **Diving Bell**, recompression chambers, and dynamic positioning systems to maintain a steady station during deep-sea operations.
- **Record Holder:** In 2013, its saturation divers set a national record by diving to a depth of **257 meters** in the Arabian Sea.

2. India-Sri Lanka DIVEX 2026

- **Edition:** 4th Edition.
- **Objective:** To undertake specialized underwater operations, enhance operational cohesion, and exchange "Best Practices" in diving and submarine rescue.
- **Strategic Alignment:** The exercise is part of India's **MAHASAGAR** (Mutual and Holistic Advancement for Security and Growth Across Regions) initiative—a high-level virtual interaction for maritime security in the IOR.

3. Humanitarian Outreach & Security Assistance

During this visit, India extended support under its "Neighbourhood First" policy:

- **Project BHISHM (Bharat Health Initiative for Sahyog Hita & Maitri):** India presented two **BHISHM Cubes** to Sri Lanka. These are portable, integrated medical units (part of **Aarogya Maitri**) capable of treating up to 200 emergency cases, including trauma and fractures, in remote areas.
- **Ammunition Handover:** The Indian Navy handed over **50,000 rounds of 9mm ammunition** to the Sri Lankan Navy to bolster their security capabilities.

4. Broader Strategic Frameworks

- **SAGAR (Security and Growth for All in the Region):** India's vision to deepen economic and security cooperation with its maritime neighbors.
- **Submarine Rescue Treaties:** India is one of the few nations with advanced DSRV capabilities, often providing "Submarine Rescue Provider" status to friendly foreign navies in the Indian Ocean.

2.6. SHANGHAI COOPERATION ORGANISATION (SCO)

Context:

Recently, India's Defence Minister Rajnath Singh has been scheduled to travel to Bishkek, Kyrgyzstan, on April 27-28, 2026, to participate in the Shanghai Cooperation Organisation (SCO) Defence Ministers' meeting.



This high-level visit aims to address pressing regional security challenges, including terrorism and extremism, amidst rapidly shifting global alignments. The meet is significant as it provides a platform for India to engage in bilateral discussions with member states to enhance strategic partnerships and reinforce its commitment to Eurasian stability.

1. Overview and Evolution

The SCO is a permanent intergovernmental international organization established to ensure security and maintain stability across the vast Eurasian region.

- **Genesis:** It evolved from the **Shanghai Five** (1996), which consisted of China, Russia, Kazakhstan, Kyrgyzstan, and Tajikistan.

- **Establishment:** The SCO was officially founded on **June 15, 2001**, in Shanghai, with the addition of **Uzbekistan**.
- **Charter:** The SCO Charter was signed in 2002 and entered into force in 2003, serving as the organization's fundamental legal document.

2. Membership and Expansion

The SCO has transitioned from a Central Asian centric group to a major Eurasian power bloc.

- **Current Members (10):** China, Russia, Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan, India, Pakistan, **Iran** (joined 2023), and **Belarus** (joined 2024).
- **India and Pakistan:** Both countries became permanent members during the Astana Summit in **2017**.
- **The 2025 Reform:** The summit in Tianjin streamlined the organization by merging "Observer States" and "Dialogue Partners" into a single **Partner Status** category to enhance operational efficiency.

3. Institutional Structure

The SCO operates through several specialized bodies to handle political and security mandates.

- **Council of Heads of State (CHS):** This is the supreme decision-making body that meets annually to define the organization's primary goals.
- **Secretariat:** Based in **Beijing**, China, it provides administrative and technical support.
- **Regional Anti-Terrorist Structure (RATS):** Headquartered in **Tashkent**, Uzbekistan, it is a permanent organ focused on combating the "three evils": terrorism, separatism, and extremism.
- **Official Languages:** The working languages of the organization are **Russian** and **Chinese**.

4. Key Principles and Strategic Focus

- **Shanghai Spirit:** The organization is guided by principles of mutual trust, mutual benefit, equality, and respect for cultural diversity.
- **Security Focus:** A major portion of SCO's activity involves intelligence sharing and joint military exercises, such as the "Peace Mission" series.
- **Economic Connectivity:** The SCO serves as a platform for discussing energy security and the development of transit corridors, though India remains cautious of projects like the Belt and Road Initiative (BRI).

5. Current Leadership (2025–2026)

- **Chairmanship:** The **Kyrgyz Republic** currently holds the chairmanship for the 2025–2026 period.
- **Theme:** The motto for the current tenure is "25 Years of the SCO: Together Towards Sustainable Peace, Development, and Prosperity."

2.7. PLACE IN NEWS

2.7.1. RED SEA & BAB AL-MANDEB

Context:

Recently, the Red Sea region has faced a critical escalation as Iran's central military command (Khatam al-Anbiya) warned it would "completely block" the **Bab al-Mandeb Strait** and the **Strait of Hormuz** if the United States continues its naval blockade of Iranian ports.



1. The Red Sea

The Red Sea is a narrow seawater inlet of the **Indian Ocean**, lying between Africa and the Arabian Peninsula.

- **Bordering Countries (Littoral States):**
 - **Eastern Shore:** Saudi Arabia, Yemen.
 - **Western Shore:** Egypt, Sudan, Eritrea, Djibouti.
 - **Northern Extremity:** Bordered by the **Sinai Peninsula**, the Gulf of Aqaba, and the Gulf of Suez (connecting to the Mediterranean via the Suez Canal).
- **Physical Characteristics:** It is one of the **hottest and saltiest** bodies of water in the world due to high evaporation rates and low freshwater inflow from rivers.
- **Geological Origin:** It occupies part of the **Great Rift Valley** and was formed by the divergence of the Arabian and African tectonic plates.

2. The Bab al-Mandeb Strait

Known as the "**Gate of Tears**" (Bab al-Mandeb), it is a strategic chokepoint between the Horn of Africa and the Middle East.

- **Connection:** It connects the **Red Sea** (Northwest) to the **Gulf of Aden** and the Arabian Sea (Southeast).
- **Bordering Nations:** It separates **Yemen** on the Arabian Peninsula from **Djibouti and Eritrea** in Africa.
- **Key Feature:** The strait is divided into two channels by **Perim Island** (Mayyun Island), which belongs to Yemen. The western channel is wider and deeper, facilitating the movement of large oil tankers.

Strategic and Economic Importance

I. Global Trade Chokepoint

The Red Sea-Suez Canal-Bab al-Mandeb corridor is the shortest maritime route between **Europe and Asia**. If this passage is blocked, ships must travel an additional 6,000 nautical miles around Africa, increasing transit time by **14 to 20 days**.

II. Energy Security

It is a critical transit point for crude oil and Liquefied Natural Gas (LNG) from the Persian Gulf to European and American markets. Any disruption here causes an immediate spike in global **Brent crude prices**.

III. Importance for India

- **Exports:** Over 50% of India's exports to Europe and the US East Coast pass through this route.
- **Energy:** While India gets much of its oil from Russia and the Gulf via the Strait of Hormuz, the Red Sea remains vital for refined petroleum exports.
- **Security:** The Indian Navy often conducts "Anti-Piracy" and "Maritime Security Operations" (like **Operation Sankalp**) in this region to protect Indian-flagged vessels.

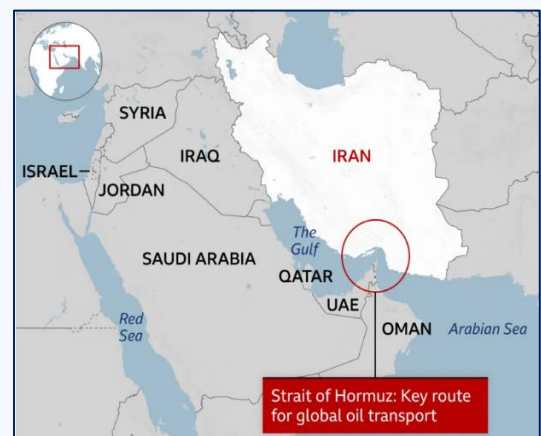
2.7.2. STRAIT OF HORMUZ

Context:

Recently, the Strait of Hormuz has re-emerged as a major global concern due to escalating tensions between the United States and Iran since February 2026.

The situation intensified following **military strikes, naval blockades, and threats to close the strait**, raising serious fears of disruption in global oil and gas supplies.

The region has witnessed **missile and drone attacks on vessels, mining threats, and restrictions on shipping**, significantly impacting global energy markets and trade flows.



1. What is a Maritime Chokepoint?

- A **maritime chokepoint** is a **narrow water passage** that connects major seas or oceans.
- It serves as an **alternative or shorter route for shipping**.
- Disruption in chokepoints can:
 - Delay shipping
 - Increase transport costs
 - Disrupt global trade and energy flows

2. Why is the Strait of Hormuz Critical?

- Located between **Persian Gulf and Gulf of Oman**.
- Acts as the **only sea passage** for oil exports from major producers like:
 - Saudi Arabia
 - Iran
 - Iraq
 - UAE
 - Kuwait
- **Width:** ~21 nautical miles (38 km) at narrowest point.

3. Energy Significance

- Around **21 million barrels/day of oil** pass through → ~**1/5th of global oil consumption**.
- Also major route for **Liquefied Natural Gas (LNG)**, especially from **Qatar**.

Key Importers:

- India
- China
- Japan
- South Korea

4. Other Key Global Chokepoints

I. Strait of Malacca

- Connects **Indian Ocean & South China Sea**
- Major route for trade between **Asia and Europe**

II. Bab el-Mandeb Strait

- Connects **Red Sea to Gulf of Aden**
- Important for access to **Suez Canal**

III. Suez Canal

- Artificial waterway in **Egypt**
- Connects **Mediterranean Sea & Red Sea**
- Shortens Europe–Asia trade route

IV. Panama Canal

- Connects **Atlantic & Pacific Oceans**
- Avoids long journey around South America

5. International Law (UNCLOS)

- Governed by **United Nations Convention on the Law of the Sea (UNCLOS)**

Key Principle: Transit Passage

- Applies to **international straits** like Hormuz
- Allows:
 - Continuous and **uninterrupted navigation**
 - Applies to **all ships and aircraft**

Limitations: Countries along the strait can regulate shipping for safety and environmental reasons, but they **cannot stop ships from passing** through or impose selective restrictions.

UPSC PRELIMS PRACTICE QUESTIONS

Q. With reference to Lebanon's political system, consider the following statements:

1. The Lebanese system of governance, known as confessionalism, distributes political power along religious lines.
2. The Taif Agreement of 1989 established the rule that the President of Lebanon must be a Sunni Muslim.
3. Lebanon officially recognises 18 religious communities.

Which of the statements given above is/are correct?

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

Ans. (a)

Explanation:

- **Statement 1 is correct** — confessionalism distributes power along religious lines.
- **Statement 2 is incorrect** — under the National Pact (1943) and Taif Agreement (1989), the President must be a **Maronite Christian**, the PM a **Sunni Muslim**, and Speaker a **Shia Muslim**.
- **Statement 3 is correct** — Lebanon recognises 18 religious communities.

Q. Consider the following statements:

1. Zambia shares its Copperbelt region with the Democratic Republic of the Congo.
2. Zambia is a landlocked country bordered by only five countries.

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)

Explanation:

Statement 1: Correct

The **Central African Copperbelt** is a major geological and mineral region that spans the border between northern **Zambia** and the southern **Democratic Republic of the Congo (DRC)**. It is one of the world's most significant sources of copper and cobalt, which explains the high strategic interest from countries like India.

Statement 2: Incorrect

While Zambia is indeed a **landlocked** country, it is bordered by **eight** countries, not five. Its neighbors include:

1. **Democratic Republic of the Congo** (North/Northwest)
2. **Tanzania** (Northeast)
3. **Malawi** (East)
4. **Mozambique** (Southeast)
5. **Zimbabwe** (South)
6. **Botswana** (South - meeting at a single point/quadripoint)
7. **Namibia** (Southwest)
8. **Angola** (West)

Q. The principle of 'Non-Refoulement' is a cornerstone of international refugee law. What does this principle primarily prohibit?

- (a) The return of a refugee to a country where they face a threat to their life or freedom
- (b) The denial of humanitarian aid to registered refugees
- (c) The granting of citizenship to stateless individuals
- (d) The mandatory detention of asylum seekers upon arrival

Ans. (a)

Explanation:

Prohibition of Forced Return: The principle strictly prohibits states from expelling or returning ("refouler") a refugee to the frontiers

of territories where his or her life or freedom would be threatened on account of race, religion, nationality, membership of a particular social group, or political opinion.

Q. With reference to the India-Africa Forum Summit (IAFS), consider the following statements:

1. The first India-Africa Forum Summit was held in Addis Ababa, Ethiopia, in 2008.
2. The African Union was granted permanent membership in the G20 during India's Presidency.
3. India currently maintains more than 50 full-fledged diplomatic missions across the African continent.

Which of the statements given above is/are correct?

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

Ans. (b)

Explanation:

- **STATEMENT 1 IS INCORRECT:** The first IAFS was held in **New Delhi**, India, in 2008. The second summit (2011) was held in Addis Ababa.
- **STATEMENT 2 IS CORRECT:** In a historic move during the 18th G20 Summit in New Delhi (2023), the African Union was made a **permanent member** of the group.
- **STATEMENT 3 IS INCORRECT:** As per the latest official updates in April 2026, India has a total of **46 diplomatic missions** in Africa, having added 17 new ones recently. It has not yet crossed the 50 mark.

Q. Consider the following statements regarding INS Nireekshak:

1. It is an indigenously built Diving Support Vessel that can also perform submarine rescue operations.
2. It is currently participating in the 4th edition of the bilateral diving exercise (DIVEX 2026) with the Sri Lankan Navy.
3. As part of Project BHISHM, it is equipped with portable medical units called 'BHISHM Cubes' for humanitarian assistance.

How many of the above statements are correct?

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

Ans. (c)

Explanation:

- **STATEMENT 1 IS CORRECT:** INS Nireekshak was built by Mazagon Dock Limited and serves as the Navy's primary diving support and interim submarine rescue vessel.
- **STATEMENT 2 IS CORRECT:** The vessel arrived in Colombo in April 2026 specifically for the 4th edition of the DIVEX exercise.
- **STATEMENT 3 IS CORRECT:** Under the 'Aarogya Maitri' initiative, the ship is involved in delivering BHISHM cubes (portable hospitals) to Sri Lanka.



Scan to attempt more questions

3.1. SMALL SAVINGS SCHEMES

Context:

Recently, the Government of India announced that interest rates for various **Small Savings Schemes (SSS)** will remain unchanged for the first quarter of the 2026-27 financial year (April-June 2026). This marks the eighth consecutive quarter where the Ministry of Finance has maintained a status quo on rates for popular instruments like the Public Provident Fund (PPF) and National Savings Certificate (NSC), despite fluctuations in benchmark government bond yields.



1. Overview of Small Savings Schemes

Small Savings Schemes are a set of investment vehicles managed by the Central Government to encourage household savings and provide secure investment options to citizens.

- **Administration:** These are managed by the **Department of Economic Affairs (DEA)** under the Ministry of Finance.
- **Operating Agencies:** They are primarily operated through **Post Offices** across the country, though designated public and private sector banks also offer these services.
- **Target Audience:** These schemes are designed to provide "risk-free" returns to small investors, especially in rural and semi-urban areas where formal banking penetration may be lower.

2. The National Small Savings Fund (NSSF)

The NSSF is a critical component of the government's fiscal management.

- **Establishment:** It was set up in **1999** within the **Public Account of India** under Article 266(2) of the Constitution.
- **Mechanism:** All deposits received under small savings schemes are credited to this fund. Conversely, all withdrawals by depositors are made from it.
- **Usage by Government:** The net collections (deposits minus withdrawals) are invested in Special Central Government Securities and Special State Government Securities. This effectively helps the Union Government fund its **Fiscal Deficit**.

3. Classification of Schemes

The schemes are generally categorized into three main buckets:

Category	Key Schemes
Post Office Deposits	Post Office Savings Account, Recurring Deposits, Time Deposits (1, 2, 3, and 5 years).
Savings Certificates	National Savings Certificate (NSC), Kisan Vikas Patra (KVP).
Social Security Schemes	Public Provident Fund (PPF), Sukanya Samridhi Yojana (SSY), Senior Citizens Savings Scheme (SCSS).

4. Interest Rate Determination

Interest rates on these schemes are not market-linked in real-time but are revised **quarterly** by the Ministry of Finance.

- **The Formula:** Based on the recommendations of the **Shyamala Gopinath Committee (2010)**, the interest rates are supposed to be 25-100 basis points higher than the yields of government bonds (G-Secs) of comparable maturity.
- **Current Status (as of March 31, 2026):**
 - **PPF:** 7.1%
 - **Sukanya Samriddhi:** 8.2%
 - **Senior Citizen Savings Scheme:** 8.2%
 - **Savings Deposit:** 4.0%

5. Mahila Samman Savings Certificate (MSSC)

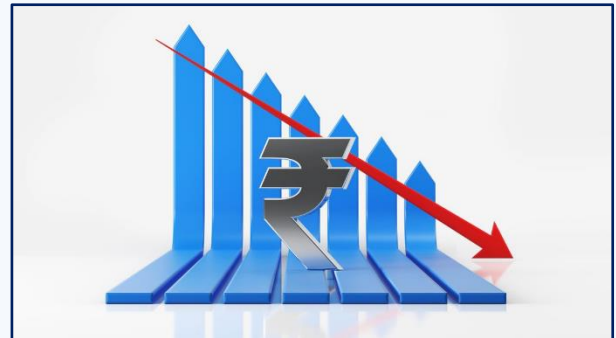
Launched in the 2023-24 Budget, this is a one-time small savings scheme for women.

- **Tenure:** 2 years
- **Deposit Limit:** Maximum of **₹2 Lakh**.
- **Interest:** Fixed at 7.5% per annum, compounded quarterly.
- **Withdrawal:** Partial withdrawal (up to 40%) is allowed after one year.

3.2. RUPEE DEPRECIATION

Context:

Recently, the Indian Rupee hit a historic low, crossing the **₹94.80 per US Dollar** mark on March 31. This slump is primarily attributed to a widening trade deficit and escalating energy prices triggered by geopolitical tensions in West Asia. The currency has witnessed a significant decline this fiscal year, prompting the Reserve Bank of India (RBI) to intervene in the foreign exchange market to curb excessive volatility.



1. Defining Rupee Depreciation

Rupee depreciation refers to the fall in the value of the Indian Rupee in terms of a foreign currency (usually the US Dollar) in a **Floating Exchange Rate System**.

- **Market-Driven:** It occurs due to the market forces of demand and supply. If the demand for Dollars exceeds the supply of Dollars in the Indian market, the Rupee weakens.
- **Depreciation vs. Devaluation:**
 - **Depreciation:** Happens in a market-determined system.
 - **Devaluation:** A deliberate downward adjustment of the official exchange rate by the Government or Central Bank in a **Fixed Exchange Rate System**.

2. Major Causes of Depreciation

The current trend is driven by a combination of domestic and global factors:

- **Surging Crude Oil Prices:** India imports over 80% of its crude oil. Higher oil prices increase the demand for Dollars to pay for these imports, weakening the Rupee.

- **US Federal Reserve Policy:** When the US Fed raises interest rates, investors pull capital out of emerging markets like India (Foreign Portfolio Investment outflows) to seek higher, safer returns in the US.
- **Trade Deficit:** A persistent gap where imports exceed exports leads to a higher outflow of foreign currency.
- **Safe-Haven Demand:** During global geopolitical crises, investors flock to the "safe" US Dollar, causing it to strengthen against all other currencies (DXY Index rise).

3. Impact on the Indian Economy

The effects of a weaker Rupee are a double-edged sword:

Impact Area	Effect of Depreciation
Imports	Become more expensive. This leads to "Imported Inflation" as prices of oil, electronics, and fertilizers rise.
Exports	Become more competitive (cheaper) in the international market, potentially benefiting IT, Textiles, and Pharma sectors.
External Debt	Indian companies with External Commercial Borrowings (ECBs) find it harder to repay as they must shell out more Rupees for every Dollar owed.
Remittances	Non-Resident Indians (NRIs) sending money home see their foreign earnings converted into more Rupees, benefiting recipient families.
Current Account	Initially, the Current Account Deficit (CAD) may widen due to higher import bills.

4. RBI's Role in Management

- India follows a **"Managed Float"** system. The RBI does not target a specific level for the Rupee but intervenes to prevent "wild swings."
- **Forex Intervention:** RBI sells Dollars from its reserves and buys Rupees to suck out excess supply.
- **Monetary Policy:** Raising interest rates can make Indian bonds more attractive to foreign investors, encouraging capital inflows.
- **Easing Inflows:** Relaxing norms for **ECBs** and **NRI deposits** to bring more Dollars into the economy.

3.3. IRDAI

Context:

Recently, **IRDAI** has mandated insurance companies to fast-track the transition to **Indian Accounting Standards (Ind AS)**. This systemic shift, specifically aligned with the global **IFRS 17** framework, aims to replace traditional "premium-based" accounting with a "fair value" model. The move is designed to ensure global comparability of Indian insurers' financial health and enhance transparency for foreign investors ahead of the 2026-27 fiscal year.



1. Statutory Framework and Origin

The Insurance Regulatory and Development Authority of India (IRDAI) is the apex body supervising the insurance sector in India.

- **Establishment:** It was constituted following the recommendations of the **Malhotra Committee Report (1994)**.
- **Legal Status:** It is an **autonomous and statutory body** formed under the **IRDAI Act, 1999**.
- **Headquarters:** Initially located in New Delhi, the headquarters shifted to **Hyderabad** in 2001.
- **Nodal Ministry:** It operates under the administrative purview of the **Ministry of Finance**.

2. Composition of the Authority

As per Section 4 of the IRDAI Act, 1999, the body consists of a ten-member team appointed by the Government of India:

- One **Chairperson**.
- Five **Whole-time Members**.
- Four **Part-time Members**.

3. Key Powers and Functions

The IRDAI acts as a guardian for policyholders while ensuring the orderly growth of the industry.

- **Licensing:** It issues, renews, modifies, withdraws, suspends, or cancels registrations for insurance and reinsurance companies.
- **Protection of Interests:** It specifies the code of conduct for surveyors, loss assessors, and intermediaries to protect policyholder interests.
- **Financial Oversight:** It regulates the investment of funds by insurance companies and maintains a percentage of the **solvency margin** (the capital an insurer holds relative to the risks it takes).
- **Adjudication:** It adjudicates disputes between insurers and intermediaries or insurance intermediaries.

4. Transformational Initiatives (The "Trinity" of Insurance)

To achieve the goal of "Insurance for All by 2047," IRDAI has introduced three pillars:

- **Bima Sugam:** An online platform serving as a protocol for all insurance needs—buying policies, servicing, and claim settlement—modeled after the UPI or ONDC.
- **Bima Vahak:** A women-centric field force aimed at increasing insurance penetration in every Gram Panchayat.
- **Bima Vistaar:** An affordable, bundled insurance product covering life, health, property, and accidents specifically designed for the rural population.

5. Recent Regulatory Updates (2025-2026)

- **Removal of Age Bar:** IRDAI recently abolished the age limit (previously 65 years) for purchasing health insurance, making coverage accessible to senior citizens regardless of age.
- **Ind AS Implementation:** The regulator has proposed the implementation of **Indian Accounting Standards (Ind AS)** for all insurers effective from April 1, 2026, to align with global financial reporting standards.
- **Pre-existing Disease (PED) Waiting Period:** The waiting period for covering pre-existing diseases in health insurance has been reduced from 48 months to **36 months**.

3.4. NATIONAL JUTE BOARD AND JUTE CORPORATION OF INDIA

Context:

Recently, the Cabinet Committee on Economic Affairs (CCEA) approved a significant increase in the **Minimum Support Price (MSP) for raw jute** for the 2026-27 marketing season. The **Jute Corporation of India (JCI)** continues to serve as the nodal agency for price support operations, while the **National Jute Board (NJB)** focuses on market promotion and technological interventions to modernize the sector.



1. About Jute: The "Golden Fiber"

Jute is a natural fiber with a golden and silky shine, making it the second most important vegetable fiber after cotton in terms of usage and production.

- **Geographical Conditions:**
 - **Climate:** It requires a hot and humid climate with temperatures ranging between **24°C and 35°C**.
 - **Rainfall:** Heavy rainfall of **120 cm to 150 cm** is essential, with high relative humidity (80-90%).
 - **Soil:** It thrives best in **alluvial soil** (silt-laden) found in the floodplains of the Ganges-Brahmaputra delta.
- **Production Hubs:** India is the world's largest producer. **West Bengal** is the leading state, followed by **Bihar, Assam, and Odisha**.
- **Environmental Benefits:**
 - Jute is **100% biodegradable** and recyclable.
 - A hectare of jute plants consumes about 15 tonnes of CO₂ and releases 11 tonnes of Oxygen during a single season.
- **The Retting Process:** This is a crucial post-harvest step where jute stems are submerged in water to separate the fiber from the woody core. The government is promoting **In-situ Tank Retting** to save water and improve fiber quality.

2. National Jute Board (NJB)

The National Jute Board is the apex body responsible for the overall development and promotion of the jute industry in India.

- **Establishment:** It is a **statutory body** established under the **National Jute Board Act, 2008**.
- **Ministry:** It functions under the administrative control of the **Ministry of Textiles**, Government of India.
- **Merger:** It was formed by merging the erstwhile Jute Manufacturers Development Council (JMDC) and the National Centre for Jute Diversification (NCJD).
- **Headquarters:** Kolkata, West Bengal.
- **Key Functions:**
 - **Market Promotion:** Organizing domestic and international fairs to promote Indian jute products.
 - **Research & Development:** Funding R&D projects for product diversification, such as jute geotextiles and agro-textiles.
 - **Incentive Schemes:** Implementing schemes like the Jute Integrated Development Scheme (JIDS) to support MSMEs and artisans.

- **Standardization:** Working towards improving the quality of jute fiber through better retting technologies (e.g., JUTE-ICARE).

3. Jute Corporation of India (JCI)

While the NJB handles promotion, the JCI is primarily concerned with the commercial and price-stabilization aspects of raw jute.

- **Establishment:** It was set up in **1971** as a Government of India enterprise.
- **Status:** It is a **Central Public Sector Undertaking (CPSU)** under the **Ministry of Textiles**.
- **Primary Objective:** To protect the interests of jute growers through **Price Support Operations**.
- **Key Functions:**
 - **MSP Procurement:** Acting as the nodal agency to purchase raw jute from farmers at the MSP whenever market prices fall below the threshold.
 - **Commercial Purchase:** Engaging in the commercial purchase of jute to ensure a steady supply to the industry.
 - **Stabilizing Prices:** Managing buffer stocks to prevent extreme price volatility in the market.
 - **Direct Interaction:** Operating through a network of Departmental Purchase Centres (DPCs) to eliminate middlemen.

4. Regulatory and Economic Framework

- **Jute Packaging Materials (Compulsory Use in Packaging Commodities) Act, 1987:** This act mandates the compulsory use of jute packaging for certain commodities. Currently, the government mandates **100% of food grains** and **20% of sugar** to be packed in diversified jute bags.
- **MSP Determination:** The MSP for raw jute is fixed by the government based on the recommendations of the **Commission for Agricultural Costs and Prices (CACP)**.

3.5. THE LPG TO PNG SHIFT

Context:

India is currently pushing for a massive expansion of **Piped Natural Gas (PNG)** to replace **Liquefied Petroleum Gas (LPG)** for domestic cooking. Recent government data indicates that while India has 32 crore LPG connections, domestic natural gas production is now sufficient to cater to 30 crore connections if converted to PNG. This shift is part of India's broader goal to increase the share of natural gas in its energy mix from the current **~6.7% to 15% by 2030**.



1. Comparative Analysis: LPG, LNG, CNG, and PNG

Feature	CNG (Compressed Natural Gas)	PNG (Piped Natural Gas)	LPG (Liquefied Petroleum Gas)
Nature/Form	Gas (compressed at high pressure)	Gas (supplied via pipeline)	Liquid (stored under pressure)
Main Composition	Methane (CH₄)	Methane (CH₄)	Propane + Butane

Storage	Cylinders (200–250 bar pressure)	No storage (direct supply)	Cylinders (moderate pressure)
Mode of Delivery	Fuel stations (cylinders)	Pipeline network (CGD system)	Cylinders (portable)
Primary Use	Transport fuel (vehicles)	Domestic & industrial use	Domestic & commercial cooking
Safety	Lighter than air (disperses fast)	Lighter than air	Heavier than air (can accumulate at floor level)
Environmental Impact	Cleanest fossil fuel	Clean	More polluting than CNG/PNG

2. Why is India Pushing for PNG? (The Strategic Drivers)

- **Reduction of Import Dependence:** India imports nearly 60% of its LPG requirements.
 - 90% of these imports were historically routed through the **Strait of Hormuz** (now a geopolitical flashpoint due to conflict in West Asia).
- **Cost and Efficiency:** Natural gas is much lighter than LPG. While energy density varies slightly, PNG acts as a "drop-in replacement" for LPG without requiring significant equipment changes for households.
- **Domestic Production Surplus:** Major fields like the **KG-DWN-98/2 Block (ONGC)** in the **Krishna-Godavari** basin are ramping up production, projected to increase India's total gas production by 10-15%.
- **Infrastructure Efficiency:** Pipelines eliminate the need for the "last-mile delivery" of heavy cylinders via trucks, reducing the carbon footprint of the supply chain.

3. Major Gas Pipelines

- **Location of Natural Gas Fields:** Krishna-Godavari (KG) Basin, Mumbai High, Cauvery Basin and Assam's Digboi, Dibrugarh, Sivasagar regions.
- **Pipeline Geography:** HAJIRA-VIJAIPUR-JAGDISHPUR (HVJ) pipeline, Jagdishpur-Haldia & Bokaro-Dhamra Pipeline (JHBDPL): Part of the Pradhan Mantri Urja Ganga project, Dahej-Uran-Dabhol-Panvel Pipeline (DUPL/DPPL): Operated by GAIL.

4. Regulatory Body: The Petroleum and Natural Gas Regulatory Board (PNGRB)

- **Establishment:** Set up under the PNGRB Act, 2006, effective from March 31, 2006.
- **Mandate:** Regulate downstream activities (refining, processing, storage, transport, distribution, marketing, and sale).
- **Functions:** Protects consumer interests, ensures uninterrupted supply, and authorizes City Gas Distribution (CGD) networks.
- **Exclusion:** Upstream activities (production of crude oil and natural gas) are outside its jurisdiction.
- **Appellate Authority:** The Appellate Tribunal for Electricity, established under the Electricity Act 2003, handles appeals against PNGRB decisions.

3.6. RoDTEP SCHEME

Context:

The **Directorate General of Foreign Trade (DGFT)** has extended the RoDTEP scheme for an additional **six months**. This extension aims to provide stability and certainty to Indian exporters amidst global economic fluctuations.

1. What is RoDTEP?

The **Remission of Duties and Taxes on Exported Products (RoDTEP)** is a flagship export promotion scheme aimed at refunding central, state, and local taxes incurred during the manufacturing and distribution of exported goods. By ensuring that such embedded taxes are not exported, the scheme enhances the global competitiveness of Indian products.

2. Launch

The scheme was implemented on **January 1, 2021**, replacing the earlier **Merchandise Exports from India Scheme (MEIS)**, which was found to be non-compliant with WTO norms.

3. Implementing Authority

The scheme is administered by the **Ministry of Commerce and Industry**.

4. Objective

RoDTEP seeks to establish a comprehensive mechanism for reimbursing taxes, duties, and levies that are **not covered under existing refund frameworks** such as GST or Duty Drawback, thereby promoting export growth in both volume and value.

5. Key Features

- **Wide Coverage:** Encompasses over 10,000 export products across sectors such as agriculture, marine, leather, and gems and jewellery.
- **Digital Duty Credit System:** Benefits are provided in the form of transferable duty credit scrips, maintained electronically through the Customs portal.
- **WTO Compliance:** Based strictly on the principle of tax remission, ensuring conformity with **World Trade Organization** rules.
- **Automated Processing:** Rebates are calculated as a percentage of the **Freight on Board (FOB)** value and are automatically processed upon submission of shipping bills.
- **Inclusion of Embedded Taxes:** Covers previously unreimbursed costs such as mandi tax, VAT on fuel used in transportation, and electricity duties.

6. Significance

- **Enhancing Export Competitiveness:** By eliminating embedded taxes, Indian exports become more price-competitive in global markets.
- **Liquidity Support to Exporters:** Transferable digital scrips provide timely financial assistance, particularly during global disruptions such as geopolitical crises.



- **Ease of Doing Business:** The fully digital, paperless system minimizes delays, reduces human intervention, and improves transparency in the refund process.

3.7. THE GREAT NICOBAR MEGA-INFRASTRUCTURE PROJECT

Context:

The Union government is moving forward with a **₹92,000-crore mega-infrastructure project** on Great Nicobar Island. Recently, a draft "**Comprehensive Tribal Welfare Plan**" (with a ₹42.52-crore outlay) was circulated to outline the relocation of **Nicobarese tribal communities**. This has triggered fresh concerns regarding **tribal consent, forest rights, and the displacement of indigenous groups**.

1. Key Tribal Groups Involved

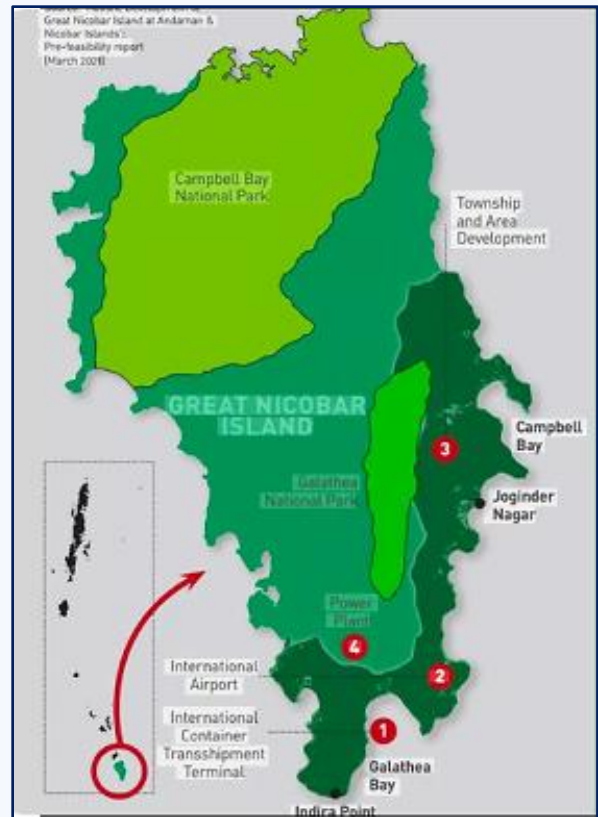
- **Nicobarese:** A scheduled tribe primarily affected by the 2004 tsunami and now by the proposed infrastructure project. They are traditionally settled along the coasts.
- **Shompen: A Particularly Vulnerable Tribal Group (PVTG).** They are hunter-gatherers living in the interior forests of Great Nicobar.
- **Legal Protections:** The project is under scrutiny for potential violations of the **Forest Rights Act (2006)** and the requirement of "Informed Consent" from the Tribal Councils.

2. Components of the Project

- The integrated project is designed to transform the island into a major hub through the following developments: **International Transshipment Port**, International Airport, **Power Plant**, **Greenfield Township**.
- **Promoting Body:** NITI Aayog
- **Implementing Agency:** Andaman and Nicobar Islands Integrated Development Corporation Limited (ANIIDCO)
 - ANIIDCO was incorporated on 28th June 1988 under the Companies Act 1956 for rapid economic growth of the Islands.
- **Operates under:** Ministry of Home Affairs

3. The Relocation Controversy

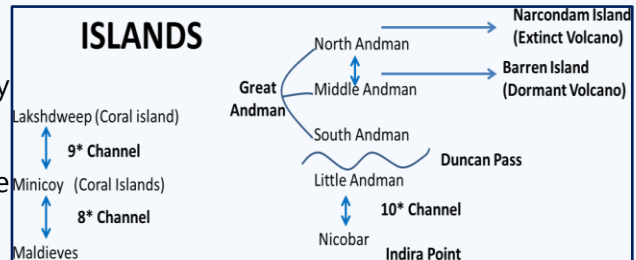
- **Ambiguity in the Draft:** The government claims the project will not "disturb or displace" tribes, yet the draft plan specifically uses the term "**relocation**" for 62 enumerated families (approx. 218 persons).
- **Ancestral Lands:** Tribal leaders are demanding a return to ancestral sites like **Pulobhabi** on the west coast, which were lost during the tsunami.



- **Consent Issues:** The Tribal Council withdrew its previous consent in 2022, alleging that forest rights were not settled. The Calcutta High Court is currently hearing petitions regarding whether "genuine consent" was obtained.

4. About Andaman and Nicobar Islands (ANI)

- ANI is a UT with 572 islands (Bay of Bengal), of which 38 are inhabited.
- **Comprises two groups:** Andaman Islands and Nicobar Islands, divided by the 10° Channel.
- **Duncan Passage** separates Little Andaman from South Andaman.
- **Closer to equator:** Located between 6° to 14°



- Separated from Thailand and Myanmar by the **Andaman Sea**.
- Island chain is a submerged extension of the **Arakan Mountains**.
- **Dugong** (sea mammal) is the official animal, endemic to the Indo-Pacific coast, especially Andaman.
- In 2018, three islands were renamed to honour **Subhas Chandra Bose**:
 - Ross → Netaji Subhash Chandra Bose Island
 - Neil → Shaheed Island
 - Havelock → Swaraj Island
- In September 2024, the capital of the ANI (Port Blair) was renamed **Sri Vijaya Puram**.

5. PVTGs in Andaman & Nicobar Islands (ANI)

- ANI has **five PVTGs**: Great Andamanese, Jarawa, Onge, Sentinelese, and Shompen.
- They are geographically isolated, depend on hunter-gathering or simple horticulture, have very small populations, and are **highly vulnerable**.
- **Recently**, members of the **Shompen tribe voted for the first time** in the ANI Lok Sabha constituency.

6. Hotspot Status and biodiversity:

- Nicobar fall under the Sundaland Biodiversity Hotspot.
- **Great Nicobar Biosphere Reserve:** It covers 885 km² across **Campbell Bay and Galathea National Parks (core zone)**.

3.8. MONETARY POLICY COMMITTEE (MPC)

Context:

Recently, the Monetary Policy Committee (MPC) of the Reserve Bank of India (RBI), led by Governor **Sanjay Malhotra**, unanimously voted to keep the benchmark **Repo Rate** unchanged at **5.25%**.

This decision comes in the wake of a temporary ceasefire in West Asia announced by the U.S. administration. Despite the easing of immediate



hostilities, the RBI has adopted a cautious "wait and watch" approach, maintaining a **neutral stance** while factoring in supply-side shocks, elevated energy prices, and their subsequent impact on India's inflation and growth trajectory for the fiscal year 2026-27.

1. What is the Monetary Policy Committee?

The MPC is a statutory and institutionalized framework under the **Reserve Bank of India Act, 1934**, tasked with maintaining price stability while keeping in mind the objective of growth.

- **Origin:** It was established based on the recommendations of the **Urjit Patel Committee**.
- **Mandate:** The primary objective is to fix the benchmark policy rate (Repo Rate) to contain inflation within the specified target level (4% +_ 2%).
- **Legal Provision:** Section 45ZB of the amended RBI Act, 1934.

2. Composition of the MPC

The committee consists of **six members**:

1. **Governor of the RBI** – Chairperson, ex officio.
2. **Deputy Governor of the RBI** in charge of monetary policy – Member, ex officio.
3. **One officer of the RBI** to be nominated by the Central Board – Member, ex officio.
4. **Three external members** appointed by the Central Government – Members (usually economists of international repute).

Note for Prelims: Each member has one vote. In case of a tie, the **Governor has a casting vote** (a second vote). The quorum for the meeting is four members.

3. Key Policy Tools and Terms

- **Repo Rate (Repurchasing Option):** The rate at which the RBI lends money to commercial banks against the collateral of government securities. It is the primary tool to control the money supply.
- **Neutral Stance:** This indicates that the RBI is flexible and can move the interest rates in either direction (increase or decrease) based on incoming data. It suggests that the current rates are neither stimulative nor restrictive.
- **Inflation Targeting:** The RBI uses **Consumer Price Index (CPI)** combined as the headline inflation measure for its targets.

4. Current Macro-Economic Projections (April 2026)

Parameter	New Projection (FY27)	Reason for Change
Real GDP Growth	6.9% (Revised down from 7.6%)	Impact of West Asia conflict on energy/infra and supply shocks.
CPI Inflation	4.6% (Revised up from 4.4%)	Elevated crude oil prices (factored at \$85/barrel) and supply disruptions.
Repo Rate	5.25%	Neutral stance to balance growth-inflation trade-off.

3.9. WORLD BANK'S INDIA GROWTH OUTLOOK (FY27)

Context:

The World Bank has revised India's real GDP growth forecast downward for the fiscal year **2026-27 (FY27)** to **6.6%**, down from an earlier projection of **7.2%**. This revision is primarily attributed to the spillover effects of the ongoing **conflict in West Asia (Middle East)** on global energy markets and domestic consumption.



1. Major Factors Influencing Growth

A. Sectoral Trends

- **Industrial Slowdown:** Growth is expected to moderate to **7.5%**.
- **Resilient Sectors:** Manufacturing—specifically **electronics and automobiles**—is expected to prop up industrial growth.
- **Impacted Services:** Business services, food, and accommodation services are likely to be adversely affected by higher input costs (especially **LPG**) and the global slowdown.

B. External Risks & Vulnerabilities

- **Energy Prices:** Extended disruptions in global **oil and gas** supply due to the Middle East conflict are expected to last until the end of 2026.
- **Remittances:** The Gulf economies account for nearly **38% of India's remittance inflows**. Labor market disruptions in this region could significantly lower these inflows, widening the **Current Account Deficit (CAD)**.
- **Export Demand:** Decreased demand from the Gulf region will weigh on overall industrial growth.

C. Domestic Challenges

- **Inflation:** Persistently high global energy prices are expected to eventually lead to higher **retail inflation**, weighing on domestic demand.
- **Fiscal Consolidation:** Efforts to reduce the fiscal deficit could be reversed if the government increases subsidies or cuts excise rates to shield consumers from high energy prices.

2. Strategic Recommendations for Resilience

- **Private Sector Growth:** Boosting private sector-led growth is deemed critical for strengthening economic resilience.
- **Workforce Entry:** Supporting more young people to enter the workforce is highlighted as a key priority.
- **Policy Buffers:** Maintaining energy-source diversification and robust policy buffers can provide some insulation from external shocks.

3. About World Bank

The World Bank is an international financial institution that provides loans and grants to the governments of low- and middle-income countries for the purpose of pursuing capital projects.

- **Foundation:** Established in **1944** during the **Bretton Woods Conference** alongside the IMF.
- **Headquarters:** Washington, D.C., USA.

- **The World Bank Group:** It consists of five institutions:
 1. **IBRD:** International Bank for Reconstruction and Development.
 2. **IDA:** International Development Association.
 3. **IFC:** International Finance Corporation (Private sector arm).
 4. **MIGA:** Multilateral Investment Guarantee Agency.
 5. **ICSID:** International Centre for Settlement of Investment Disputes.
- Important Reports by World Bank
 - **World Development Report (WDR)**
 - **Global Economic Prospects (GEP)**
 - **Logistics Performance Index (LPI)**

3.10. MSME SECTOR AND GLOBAL SUPPLY CHAIN DISRUPTIONS

Context:

Recently, the Union Government held high-level inter-ministerial meetings to address the escalating **compliance burden** and financial stress on **Micro, Small, and Medium Enterprises (MSMEs)** arising from the **West Asia crisis**. The disruption in maritime routes has led to shipments being rerouted or returned, triggering complex paperwork, regulatory uncertainties, and a "triple whammy" of logistics challenges for Indian exporters.



1. Nature of the Crisis

The conflict in West Asia (specifically affecting the Red Sea and Strait of Hormuz) has shifted the burden from mere logistics to heavy **regulatory compliance**. MSMEs, unlike large corporations, lack dedicated compliance teams and specialized software, making them vulnerable to:

- **Back-to-Town Procedure:** When a cargo is diverted back to India, it must undergo a specific customs procedure to return to the factory. This involves high warehousing costs and excludes the exporter from certain government benefits like the **RELIEF scheme**.
- **Rerouting Challenges:** If a shipping line drops cargo at an alternate port due to safety, the responsibility (and cost) of moving it to the final destination falls entirely on the exporter.
- **Tariff Quotas:** Many regions (e.g., Europe) have quarterly quotas for products like steel. Delays of even a few days can result in missing the quota window, forcing exporters to wait 90 days for the next cycle.

2. Key Government Interventions (2025-26)

- **RELIEF Scheme:** A dedicated financial support mechanism announced by the government to assist exporters specifically impacted by the West Asian crisis.
- **Credit Guarantee Scheme:** Plans for a **₹2.5 lakh crore** credit guarantee to ensure liquidity for businesses affected by war-induced disruptions.
- **Jan Vishwas 2.0 (2026):** Aimed at the **decriminalization** of minor technical and procedural lapses to reduce "compliance anxiety" for small businesses.

3. Significance of the MSME Sector

- **GDP Contribution:** Approximately **30%** of India's GDP.
- **Exports:** MSME-related products account for nearly **45%** of India's total exports.
- **Employment:** The second-largest employer after agriculture, providing livelihoods to over 11 crore people.
- **Udyam Portal:** The unified digital identity for MSMEs, which has seen over 7 crore registrations by early 2026.

4. Structural Challenges

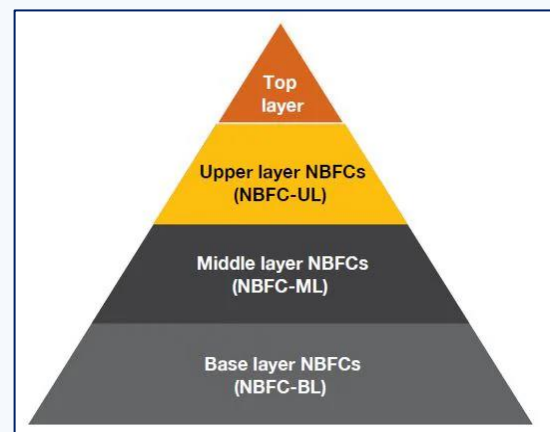
- **The "Missing Middle":** A high concentration of micro-units but very few firms scaling up to become medium enterprises.
- **Digital Divide:** Over-reliance on fragmented systems (like basic spreadsheets) instead of integrated Enterprise Resource Planning (ERP) software.
- **Working Capital Stress:** Delayed payments and rising freight costs (which have surged by up to 10x on certain routes) have stretched the credit cycle from 40 days to nearly 120 days.

3.11. SCALE-BASED REGULATION (SBR) AND NBFC-UL FRAMEWORK

Context:

Recently, the Reserve Bank of India (RBI) issued a draft review of the "Scale Based Regulation" (SBR) to streamline the identification of **Upper Layer NBFCs (NBFC-UL)**. The RBI proposes to replace the current complex scoring methodology with a transparent, absolute asset-size threshold of **₹1,00,000 crore**.

This change aims to provide regulatory clarity for large entities, including Core Investment Companies (CICs) and government-owned lenders, regarding their mandatory listing and enhanced capital requirements.



What is an NBFC?

A **Non-Banking Financial Company (NBFC)** is a financial institution registered under the **Companies Act, 1956/2013**, that provides banking services without meeting the legal definition of a bank.

- **Principal Business:** A company is classified as an NBFC if its financial assets constitute more than **50%** of its total assets, and its income from financial assets constitutes more than **50%** of its gross income (the **50-50 test**).
- **Key Distinctions from Banks:**
 - NBFCs **cannot accept demand deposits** (savings or current accounts).
 - They do not form part of the **Payment and Settlement System**; hence, they cannot issue cheques drawn on themselves.
 - The **Deposit Insurance and Credit Guarantee Corporation (DICGC)** facility is not available to NBFC depositors.
- **Regulation:** Primarily regulated by the RBI under the **RBI Act, 1934**. However, certain NBFCs like Insurance companies (IRDAI), Stock Broking (SEBI), and Nidhi companies (MCA) are regulated by other bodies.

The Scale-Based Regulation (SBR) Framework

The SBR framework (effective since 2022) organizes NBFCs into four layers based on their size, activity, and risk.

Layer	Criteria & Composition
Base Layer (NBFC-BL)	Non-deposit taking NBFCs with assets < ₹1,000 crore; includes P2P platforms and Account Aggregators.
Middle Layer (NBFC-ML)	All deposit-taking NBFCs (regardless of size); Non-deposit NBFCs with assets ≥ ₹1,000 crore; HFCs and SPDs.
Upper Layer (NBFC-UL)	Identified by RBI as "systemically significant." Requires higher capital (CET-1) and mandatory listing.
Top Layer (NBFC-TL)	Remains empty by default; populated only if the RBI finds a specific NBFC-UL poses extreme systemic risk.

Key Proposed Changes in the RBI Review

- Simplified Threshold:** Instead of the current "top 10" rule and parametric scoring, any NBFC with assets of **₹1 lakh crore and above** will automatically enter the Upper Layer.
- Inclusion of PSUs:** Government-owned NBFCs (like PFC and REC) will no longer be restricted to the Middle Layer. If they meet the asset size, they will face the same stringent regulations as private NBFC-ULs.
- Credit Risk Transfers:** NBFC-ULs can now use **State Government Guarantees** as risk mitigants without a cap, attracting a lower risk weight of **20%**, aligning them with bank-like standards.
- Mandatory Listing:** Entities identified as NBFC-UL are required to list on a stock exchange within **three years**. The new asset-based rule reinforces this requirement for large conglomerates and core investment companies (CICs) that exceed the ₹1 lakh crore mark

3.12. ALTERNATIVE INVESTMENT FUND (AIF)

Context:

Recently, the Securities and Exchange Board of India (SEBI) sharply reduced the minimum investment threshold for individual investors in **Social Impact Funds (SIFs)** from ₹2 lakh to just **₹1,000**.

This amendment aims to democratize access and widen retail participation on the **Social Stock Exchange (SSE)** by aligning the minimum application size with Zero Coupon Zero Principal (ZCZP) instruments.

What is an AIF?

An Alternative Investment Fund is a pooled investment vehicle that collects money from investors to invest in non-traditional asset classes. Unlike mutual funds (which invest in stocks and bonds), AIFs often target startups, private equity, or social ventures.

- Regulator:** SEBI (Alternative Investment Funds) Regulations, 2012.



- **Legal Structure:** Can be a trust, company, LLP, or body corporate.
- **Target Audience:** Traditionally aimed at high-net-worth individuals (HNIs) due to high entry costs, though recent rules are lowering bars for "Social" categories.

Comprehensive Classification of AIFs

SEBI regulates AIFs under three distinct categories. Each category has a specific "flavor" based on where the money goes and how the fund operates.

1. Category I AIF: Socially and Economically Desirable

These funds invest in sectors that the government and regulators want to promote because they create jobs or improve infrastructure.

- **Venture Capital Funds (VCF):** Focus on new, high-growth potential startups that face a capital crunch in their early stages.
- **Angel Funds:** A sub-category of VCF where "Angel Investors" provide very early-stage funding to startups.
- **Infrastructure Funds:** Invest in public assets like roads, rail, and power plants.
- **Social Impact Funds (SIF):** Formerly known as Social Venture Funds, these invest in NPOs or social enterprises. As per recent rules, they now allow small-ticket entry (₹1,000) for social causes.
- **SME Funds:** Dedicated to investing in Small and Medium Enterprises that are listed or unlisted.

2. Category II AIF: The "Residual" Category

This is the most common category. These funds do not get special tax incentives like Category I, nor do they use high-risk strategies like Category III. They cannot borrow money except for basic operational needs.

- **Private Equity (PE) Funds:** Invest in unlisted private companies. They usually take a management stake to help the company grow before selling it for a profit.
- **Debt Funds:** Instead of buying shares (equity), these funds lend money to companies. They are preferred for companies with high capital needs but lower credit ratings.
- **Fund of Funds (FoF):** A fund that does not invest in companies directly but instead invests in other AIFs.
- **Distressed Asset Funds:** These invest in "sick" companies or those undergoing bankruptcy to turn them around.

3. Category III AIF: Complex and Leveraged

These are the most "aggressive" funds. They aim for high short-term returns and are allowed to borrow money (leverage) to make larger bets.

- **Hedge Funds:** These use pooled funds and various strategies (like short-selling or derivatives) to earn active returns regardless of whether the market is going up or down.
- **Private Investment in Public Equity (PIPE) Funds:** These funds buy large chunks of shares in publicly traded companies at a discounted price.

Understanding the Recent Change (Social Impact Funds)

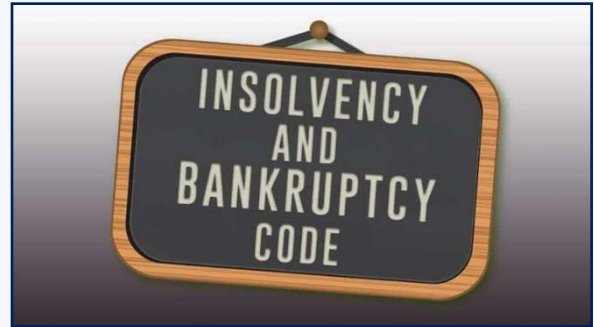
- **The "Social" Angle:** Social Impact Funds are a sub-category of Category I AIFs. They invest in securities of Not-for-Profit Organizations (NPOs) or social enterprises.

- **Retail Inclusion:** By dropping the minimum investment from ₹2 lakh to ₹1,000, SEBI is allowing regular individuals (retail investors) to support social causes through the Social Stock Exchange.
- **ZCZP Instruments:** These are "Zero Coupon Zero Principal" instruments. They are like donations; you don't get interest (Zero Coupon) and you don't get the initial money back (Zero Principal), but you get a certificate showing you funded a social project.

3.13. INSOLVENCY AND BANKRUPTCY CODE (IBC), 2016

Context:

Recently, the State Bank of India (SBI) has moved a review petition in the Supreme Court against its February 13 judgment. The apex court had previously ruled that **telecom spectrum**, being a finite public resource owned by the Union of India in trust for the people, cannot be treated as an "asset" owned by Telecom Service Providers (TSPs) during IBC



proceedings. This development is significant for the banking sector as it challenges the ability of lenders to recover dues from bankrupt telecom groups like Aircel, potentially impacting future bank financing and risk assessment for companies reliant on natural resource licenses.

Core Pillars of IBC 2016

The IBC was enacted to consolidate the existing framework (like SICA, SARFAESI) into a single law for time-bound insolvency resolution.

1. The Four Pillars of Institutional Infrastructure

- **Insolvency Professionals (IPs):** Licensed professionals who take over the management of the debtor during the resolution process.
- **Insolvency Professional Agencies (IPAs):** Regulatory bodies that enroll and monitor IPs.
- **Information Utilities (IUs):** Centralized repositories that maintain electronic records of contractual liabilities and evidence of default (e.g., NeSL).
- **Insolvency and Bankruptcy Board of India (IBBI):** The apex regulator overseeing the entire ecosystem.

2. Adjudicating Authorities

- **National Company Law Tribunal (NCLT):** Handles insolvency for **Companies and Limited Liability Partnerships (LLPs)**.
- **Debt Recovery Tribunal (DRT):** Handles insolvency for **Individuals and Partnership Firms**.

Key Provisions & 2026 Amendments

1. Corporate Insolvency Resolution Process (CIRP)

- **Initiation:** Can be triggered by a Financial Creditor (banks), Operational Creditor (suppliers), or the Corporate Debtor itself upon a minimum default of ₹1 Crore.
- **The 2026 Shift:** Admission is now **mandatory** within 30 days if the default is proven via Information Utilities, removing the discretionary power of NCLT that previously caused years of delay.

2. Creditor-Initiated Insolvency Resolution Process (CIIRP)

- **New Mechanism:** Introduced in 2026, this allows financial creditors with **51% approval** to initiate out-of-court resolutions. This reduces the burden on the NCLT and accelerates the rescue of stressed firms.

3. The Waterfall Mechanism (Section 53)

This dictates the order of priority for payout during liquidation:

1. Insolvency resolution process costs.
2. Secured creditors and workmen's dues (up to 24 months).
3. Other employee wages.
4. Unsecured creditors.
5. **Government dues** (The 2026 Amendment clarifies these are placed lower than secured creditors to encourage private investment).
6. Equity shareholders (Last).

4. Group and Cross-Border Insolvency

- The 2026 law introduces a framework to handle **interconnected companies** (Group Insolvency) and provides a mechanism to coordinate with foreign jurisdictions for assets located abroad (based on the UNCITRAL Model Law).

3.14. FOREIGN DIRECT INVESTMENT (FDI)

Context:

Recent data released by the Reserve Bank of India (RBI) for February 2026 shows that Net Foreign Direct Investment (FDI) into India has turned positive, reaching **\$4.6 billion**. This marks a significant recovery after a six-month period of negative net inflows, representing the highest level since May 2022.



1. Key Highlights from the February 2026 Data

- **Negative net FDI:** India experienced negative net FDI for six consecutive months (August 2025 – January 2026) due to high outflows. February 2026 reversed this slump.
- **Gross FDI Surge:** Gross inflows grew by **61.6%** to reach nearly **\$9 billion**, a seven-month high.
- **Reduced Outflows:** A primary driver for the net increase was a sharp decrease in "repatriation and disinvestment" by foreign companies, which fell to \$1.7 billion (a 30% year-on-year drop).
- **Sectoral Leaders:** Manufacturing, computer services, financial services, and communication services accounted for over two-thirds of total equity inflows in FY 2025-26.
- **Source Countries:** Singapore, the U.S., Mauritius, Japan, and the Netherlands remain the top sources, accounting for roughly 75% of total inflows.
- **Greenfield Projects:** While the RBI maintains India is an attractive destination for new (Greenfield) projects, data shows a slight 11% dip in project announcements for the April-January period compared to the previous year.

2. Understanding Foreign Direct Investment (FDI)

I. What is FDI?

- FDI is an investment made by a firm or individual in one country into business interests located in another country.
- In India, it generally involves establishing business operations or acquiring business assets, including establishing ownership or controlling interest in a foreign company.
- **Regulatory Framework:** Governed by the FDI Policy 2020 and FEMA rules, primarily regulated by DPIIT. RBI also plays a key role by enforcing the FDI Rules.
- **FDI Prohibition in India:** FDI is strictly prohibited in sectors like atomic energy generation, gambling and betting, lotteries, chit funds, real estate, and the tobacco industry.
- **FDI Trend:** The services sector emerged as the top recipient of FDI equity in FY 2024–25, attracting 19% of total inflows, followed by computer software and hardware (16%) and trading (8%).
 - Maharashtra accounted for the highest share (39%) of total FDI equity inflows in FY 2024–25, followed by Karnataka (13%) and Delhi (12%).

II. Routes of FDI in India:

1. **Automatic Route:** The non-resident investor or the Indian company does not require any prior approval from the Government of India or the RBI.
2. **Government Route:** Prior approval from the government is required. Proposals are considered by the respective Administrative Ministry/Department.

III. FDI vs. FPI: Key Differences

Feature	Foreign Direct Investment (FDI)	Foreign Portfolio Investment (FPI)
Definition	Investment in physical assets/infrastructure or significant stake in a company.	Investment in financial assets like stocks and bonds.
Control	Investor typically gains a degree of management control.	Investor has no direct control over the company's operations.
Nature	Long-term and stable ("Lasting Interest").	Short-term and volatile ("Hot Money").
Entry/Exit	Difficult to exit quickly (low liquidity).	Easy to enter and exit (high liquidity).
Impact	Leads to technology transfer, job creation, and infrastructure.	Enhances capital market liquidity but can lead to market volatility.
Threshold	In India, any investment of 10% or more of the post-issue paid-up equity capital is treated as FDI.	Any investment below 10% of the post-issue paid-up equity capital is treated as FPI.

IV. Some core Concepts

- **Greenfield FDI:** Greenfield Foreign Direct Investment (FDI) is a type of investment where a parent company creates a new subsidiary in a foreign country, constructing new facilities—such as offices, plants, or infrastructure—from scratch.

- **Brownfield FDI:** Brownfield Foreign Direct Investment (FDI) involves a foreign company investing in or acquiring existing, pre-built production facilities and infrastructure, rather than building from scratch. It is a popular, faster market-entry strategy offering lower setup costs, existing supply chains, and trained staff. Common examples include mergers, acquisitions, or leasing existing plants.
- **Net FDI Formula:** $\text{Net FDI} = (\text{Gross Inflows}) - (\text{Repatriation/Disinvestment} + \text{Outward FDI by Indians})$.
- **Repatriation:** The process of converting foreign currency back into the currency of one's own country (e.g., foreign companies sending profits back home).

3.15. PAYMENTS BANK

Context:

Recently, the Reserve Bank of India (RBI) has officially cancelled the banking license of **Paytm Payments Bank Limited (PPBL)** under **Section 22 (4)** of the **Banking Regulation Act, 1949**, effective from April 24, 2026.

This action follows a series of regulatory non-compliance issues and persistent supervisory concerns observed over the last few years. The RBI has further initiated an application before the High Court for the winding up of the bank.



Regulatory Framework and RBI Powers

- **Section 22 of the Banking Regulation Act, 1949:** This section grants the RBI the authority to issue and cancel licenses to banking companies in India. A license can be cancelled if the company ceases to carry on banking business or fails to comply with conditions stipulated by the RBI.
- **Winding Up Process:** Unlike regular companies, the liquidation of a bank is a specialized process involving the High Court and a liquidator, ensuring that depositor interests are prioritized.
- **Deposit Insurance:** Even in a winding-up scenario, depositors are protected by the **Deposit Insurance and Credit Guarantee Corporation (DICGC)**, which provides insurance cover up to **₹5 lakh** per depositor per bank.

Integrated Guide to Payments Banks (PBs) in India

Payments Banks were established based on the recommendations of the **Nachiket Mor Committee** to further financial inclusion.

1. Key Objectives

- To provide small savings accounts and payments/remittance services to migrant labor workforce, low-income households, and small businesses.
- To enable high-volume, low-value transactions in a secured technology-driven environment.

2. Features and Scope of Activities

- **Registration:** Registered as a public limited company under the **Companies Act of 2013**.
- **Governance:** Governed by the provisions of **Banking Regulation Act of 1949**.

- **Acceptance of Deposits:** They can accept demand deposits (savings and current accounts). The maximum balance per individual customer is currently capped at **₹2 lakh**.
- **No Lending:** They are strictly **prohibited** from undertaking lending activities. They **cannot issue credit cards or provide loans**.
- **Remittance Services:** They can facilitate domestic remittances and act as BCs (Business Correspondents) for other banks.
- **Issuance of Instruments:** They can issue ATM/Debit cards but **not credit cards**.

3. Regulatory Requirements

- **Minimum Capital:** The minimum paid-up equity capital for PBs shall be **₹100 crore**.
- **Capital Adequacy Ratio (CAR):** They must maintain a minimum CAR of **15%** of its risk-weighted assets.
- **Statutory Liquidity Ratio (SLR):** They are required to invest minimum **75%** of their "demand deposit balances" in Government securities/Treasury Bills with maturity up to one year.
- **Cash Reserve Ratio (CRR):** payments banks in India are required to maintain a Cash Reserve Ratio (CRR) with the Reserve Bank of India (RBI).
- **FDI Limit:** The Foreign Direct Investment (FDI) limit for these banks is **74%** (consistent with other private sector banks).

4. Recent Developments and Policy Directions

- **Deposit limit raised from ₹1 lakh to ₹2 lakh (2023):** The RBI doubled the per-customer deposit ceiling to improve viability and encourage greater usage
- **Interoperability mandate:** All payment banks must be fully interoperable with UPI, IMPS, and ATM networks
- **CBDC (Central Bank Digital Currency) integration:** Payment banks are being considered as key distributors of the Digital Rupee (e-R) for retail use
- **Account Aggregator Framework:** Payment banks are being integrated into the Account Aggregator ecosystem to enable data-based credit access for their customers through partner lenders

UPSC PRELIMS PRACTICE QUESTIONS

Q. With reference to the Small Savings Schemes (SSS) in India, consider the following statements:

1. The interest rates on these schemes are revised annually by the Reserve Bank of India.
2. The National Small Savings Fund (NSSF) is part of the Public Account of India.
3. All Small Savings Schemes are mandatory for all citizens under the Financial Inclusion Act.
4. The interest rates are generally kept higher than the prevailing Government Security (G-Sec) yields of comparable maturity.

How many of the statements given above are correct?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four

Ans. (b)

Explanation:

- **Statement 1 is incorrect:** Interest rates are revised quarterly (not annually) by the Ministry of Finance (not the RBI).
- **Statement 2 is correct:** The NSSF was established in 1999 within the Public Account of India under Article 266(2).
- **Statement 3 is incorrect:** These schemes are voluntary investment options; there is no "Financial Inclusion Act" making them mandatory for all citizens.
- **Statement 4 is correct:** Based on the Shyamala Gopinath Committee recommendations, these rates typically carry a spread (premium) over G-Sec yields to remain attractive to small investors.

Q. With reference to the Indian economy, consider the following statements regarding the depreciation of the Rupee:

1. A persistent depreciation of the Rupee generally leads to a decrease in the burden

of External Commercial Borrowings for Indian corporates.

2. If the Real Effective Exchange Rate (REER) of the Rupee is increasing, it indicates that India's exports are becoming more price-competitive.
3. The Reserve Bank of India typically intervenes in the forex market by buying Dollars when the Rupee is depreciating rapidly.
4. Depreciation of the currency can lead to 'Imported Inflation' particularly in a country that is a net importer of essential commodities.

How many of the statements given above are correct?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four

Ans. (a)

Explanation:

- **Statement 1 is incorrect:** Depreciation **increases** the burden of ECBs because companies have to pay more Rupees to service the same amount of Dollar debt.
- **Statement 2 is incorrect:** An increasing REER implies that the currency is becoming **overvalued** relative to trading partners, making exports **less** competitive.
- **Statement 3 is incorrect:** To support a depreciating Rupee, the RBI **sells** Dollars (to increase Dollar supply) and buys Rupees. Buying Dollars would further weaken the Rupee.
- **Statement 4 is correct:** This is the standard definition of imported inflation; as the Rupee weakens, the cost of importing essentials like crude oil rises, pushing up domestic price levels.

Q. With reference to the Insurance Regulatory and Development Authority of India (IRDAI), consider the following statements:

Statement-I: The IRDAI is a constitutional body established to regulate and promote the insurance and re-insurance industries in India.

Statement-II: The IRDAI has recently mandated that health insurance providers cannot deny coverage to individuals based on their age.

Which one of the following is correct in respect of the above statements?

- Both Statement-I and Statement-II are correct and Statement-II is the correct explanation for Statement-I.
- Both Statement-I and Statement-II are correct and Statement-II is not the correct explanation for Statement-I.
- Statement-I is incorrect but Statement-II is correct.
- Statement-I correct and Statement-II are incorrect.

Ans. (c)

Explanation:

- Statement I is incorrect:** IRDAI is a **statutory body** (created by an Act of Parliament, the IRDAI Act 1999), not a constitutional body. Constitutional bodies are those mentioned in the Constitution of India (e.g., Election Commission, UPSC).
- Statement II is correct:** In a landmark move to enhance inclusivity, IRDAI recently removed the 65-year age ceiling for buying health insurance policies, ensuring that senior citizens can enter the insurance net at any age.

Q. Consider the following statements regarding the Jute sector in India:

Statement-I: The National Jute Board is a statutory body established to handle the

procurement of raw jute from farmers at Minimum Support Price (MSP).

Statement-II: The Jute Packaging Materials Act of 1987 mandates the compulsory use of jute for 100% of food grain packaging in India.

Which one of the following is correct in respect of the above statements?

- Both Statement-I and Statement-II are correct and Statement-II is the correct explanation for Statement-I.
- Both Statement-I and Statement-II are correct and Statement-II is not the correct explanation for Statement-I.
- Statement-I is correct but Statement-II is incorrect.
- Statement-I is incorrect but Statement-II is correct.

Ans. (d)

Explanation:

- Statement-I is INCORRECT:** The **National Jute Board (NJB)** is indeed a statutory body, but its role is the **promotion and development** of the industry. The procurement of raw jute at MSP is the mandate of the **Jute Corporation of India (JCI)**.
- Statement-II is CORRECT:** Under the Jute Packaging Materials (Compulsory Use in Packaging Commodities) Act, 1987, the government currently mandates **100% of food grains** and **20% of sugar** to be packed in jute bags to support the industry and farmers.



Scan to attempt more questions

ENVIRONMENT & GEOGRAPHY

4.1. JUNGLE CAT VS. FISHING CAT

Context:

Recently, a study highlighted that the secretive **Jungle Cat (*Felis chaus*)** increasingly requires habitat conservation efforts outside of traditionally protected areas. The report emphasizes that while these felines are adaptable, the rapid conversion of wetlands and scrublands into agricultural or urban landscapes isolating their populations.



1. Jungle Cat (*Felis chaus*)

- **Physical Features:** It is a medium-sized cat with long legs and a short tail. It is distinguished by small **black ear tufts** and a lack of prominent body spots.
- **Behavior:** Unlike most cats, it is **diurnal** (active during the day). It is an agile hunter of rodents, birds, and small reptiles.
- **Habitat:** It inhabits **scrublands, grasslands, and wetlands**. It is highly adaptable and is often found in agricultural fields like sugarcane and cotton.
- **Distribution:** It is the **most widespread** small cat in India, found from the Himalayan foothills to the tip of Kanyakumari.

2. Fishing Cat (*Prionailurus viverrinus*)

- **Physical Features:** It is roughly twice the size of a typical house cat, with a stocky build, short legs, and a powerful tail. It has a **spotted and striped coat** and **partially webbed paws** which aid in swimming.
- **Behavior:** It is a specialist predator that primarily **hunts fish**. It is known to dive into water to catch prey and is predominantly nocturnal.
- **Habitat:** It is an **obligate wetland specialist**. It is strictly found in mangroves, marshes, swamps, and reed beds. It is the **State Animal of West Bengal**.
- **Distribution:** In India, its population is fragmented, with major strongholds in the **Sundarbans**, the **Chilika Lake** (Odisha), and the **Coringa Wildlife Sanctuary** (Andhra Pradesh).

3. Comparative Conservation Status

Feature	Jungle Cat	Fishing Cat
IUCN Red List	Least Concern	Vulnerable
WPA, 1972	Schedule I	Schedule I
CITES	Appendix II	Appendix II
Primary Threat	Habitat fragmentation / Hybridization	Wetland drainage / Mangrove loss

4.2. HEATWAVE

Context:

The **India Meteorological Department (IMD)** has forecasted an increased number of **heatwave days** across most parts of East, Central, and Northwest India from April to June 2026. This occurs alongside concerns regarding the emergence of a "**super**" **El Niño**, which could potentially diminish monsoon rainfall and disrupt agricultural output.

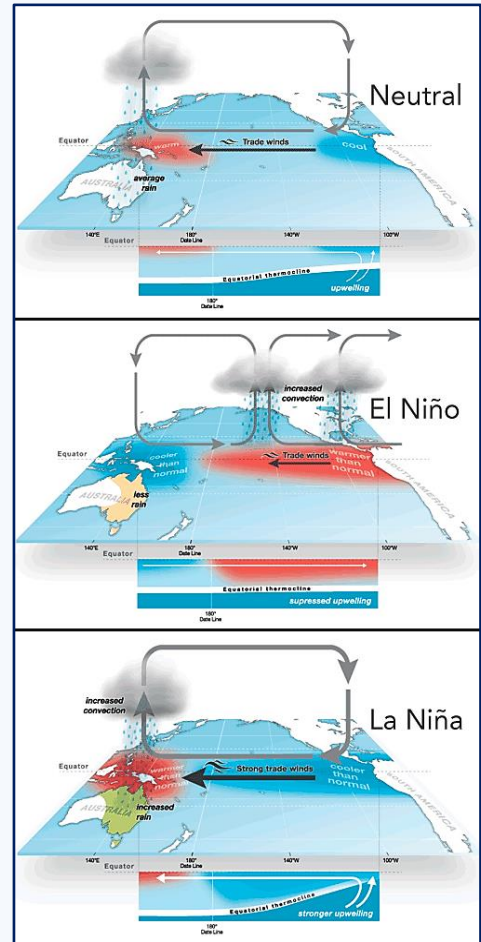


1. IMD Heatwave Forecast (April–June 2026)

- **Affected Regions:** Above-normal maximum temperatures are expected in East, Northeast, Central India, and the adjoining peninsular regions.
- **Specific States:** Coastal Odisha, West Bengal, Tamil Nadu, Puducherry, Andhra Pradesh, Gujarat, Maharashtra, and Karnataka are likely to see more heatwave days in April.
- **Anomalies:** North India is predicted to experience a cooler-than-normal summer, with the country overall expected to receive **12% more rainfall** in April due to increased western disturbances.

2. The El Niño Factor and Monsoon Performance

- **Super El Niño Concerns:** Forecasts suggest a potential **1+ degree Celsius warming** in the Central Pacific Ocean, a pattern frequently linked to reduced rainfall in India.
- **Impact on Monsoon:** While cooler summers in the north typically lead to less heating of the landmass—reducing the natural "pull" for moisture—experts suggest it is still early to definitively link these to a diminished monsoon.
- **Drought Management:** Climatologists emphasize that if El Niño signals persist through May, the government must prioritize **drought management**.



3. Mechanism of Heatwaves and strategic linkages

A. Geography:

- **Definition:** A heatwave is a period of abnormally high temperatures, more than the normal maximum temperature.
- **IMD Criteria:**
 - **Plains:** Maximum temperature reaches at least **40°C**.
 - **Coast-** The maximum temperature recorded at a station is 37 degrees Celsius or more.
 - **Hilly Regions:** Maximum temperature reaches at least **30°C**.

- **Departure from Normal:** Heatwave is declared if the departure from normal is **4.5°C to 6.4°C**.

B. Climatology

- **El Niño:** The warming of sea surface temperatures in the Central and Eastern Pacific. It usually weakens the trade winds and results in **deficient monsoon rainfall** in India.
- **La Niña:** The cooling phase, often leading to better-than-normal monsoons in India.

C. Impact on Agriculture

- **Kharif Sowing:** Weak rainfall and heatwaves could severely impact the sowing of Kharif crops.
- **Impact on Water Resources:** Heatwaves exacerbate water scarcity issues in India due to drying up of water bodies and decrease in the groundwater table.

4. Causes of Heatwaves

- **Hot & Dry Air Masses:** Large reservoirs of hot air spread via winds, raising temperatures.
- **Low Moisture Levels:** Dry air allows more solar heating and faster daytime temperature rise.
- **Clear Skies:** Absence of clouds permits maximum solar radiation reaching the surface.
- **Anticyclonic Conditions:** Anticyclones are high-pressure systems characterized by sinking air, creating stable, dry, and sunny conditions, which often cause severe heatwaves by trapping heat near the surface.
- **Geographical Factors:** Arid/semi-arid regions (e.g., Northwest India) are more heatwave-prone.
- **Climate Change:** Rising global temperatures intensify and increase frequency of heatwaves.

4.3. PLASTIC WASTE MANAGEMENT (AMENDMENT) RULES, 2026

Context:

Recently, the Ministry of Environment, Forest and Climate Change (MoEFCC) notified the **Plastic Waste Management (Amendment) Rules, 2026**.

These rules are in the news because they mandate, for the first time, a minimum percentage of **recycled plastic content** in all new packaging and introduce a centralized digital tracking system using QR codes.

The amendment aims to accelerate India's transition toward a **Circular Economy** by making "Extended Producer Responsibility" (EPR) targets more stringent and enforceable through independent environmental audits starting from the 2026-27 financial year.



Key Highlights of the 2026 Amendment Rules

1. Mandatory Recycled Content Targets

- **Graded Requirements:** The rules specify that all plastic packaging must contain a minimum percentage of recycled plastic. For **Rigid Plastic Packaging**, the target has been raised to **60%** for the 2026-27 period.

- **Flexible and Multi-layered Plastics:** These categories also have specific, albeit lower, mandatory recycled content goals to encourage the recycling industry while maintaining material integrity.
- **Exceptions:** The rules provide limited exemptions where recycled plastic is legally prohibited, such as in certain highly sensitive medical or food-contact applications as per FSSAI standards.

2. Enhanced "Reuse" Mandates

- **Rigid Plastic Focus:** Large brand owners are now required to meet specific reuse targets, particularly for rigid containers (e.g., beverage bottles, bulk chemical containers).
- **Target Levels:** For specific large-format packaging, the reuse percentage is mandated to reach as high as **85%**, significantly reducing the demand for virgin plastic.

3. New Definitions & Accountability

- **Sellers:** A new category of "Sellers" has been defined to include any entity dealing in plastic raw materials like resins, pellets, or intermediate materials. They must now register and report annually to ensure the source of plastic is tracked.
- **Microplastics:** Defined as any solid plastic particle insoluble in water with dimensions between **1 micron and 1,000 microns**.
- **End-of-Life Disposal:** The rules now provide a clear legal definition for disposal methods like waste-to-energy, co-processing in cement kilns, and road construction.

4. Digital Traceability and QR Codes

- **Mandatory Labeling:** Every piece of plastic packaging must now carry a **traceable QR code** or barcode.
- **Purpose:** This allows regulators and consumers to verify the origin of the plastic, the percentage of recycled content, and the EPR registration status of the producer.

5. Registered Environmental Auditors

- **Independent Verification:** The 2026 rules introduce **Registered Environmental Auditors** who are tasked with certifying the EPR claims made by companies.
- **Anti-Fraud Mechanism:** This step is designed to eliminate "paper-only" compliance and ensures that the reported recycling and reuse figures are physically verified.

6. Strategic Implementation Framework

- **Polluter Pays Principle:** Environmental compensation is strictly levied for non-compliance, with fines ranging from ₹10,000 to ₹15 lakhs depending on the scale of the violation.
- **Four-Stream Segregation:** While linked to the Solid Waste Management Rules 2026, the plastic rules rely on the mandatory segregation of waste into **Wet, Dry (Plastic/Paper/Metal), Sanitary, and Special Care** streams at the source.



4.4. GROUNDWATER MANAGEMENT AND REGULATION IN INDIA

Context:

The **Public Accounts Committee (PAC)** recently presented its **41st report**, titled '**Ground Water Management and Regulation**,' in the Lok Sabha. The report highlights the alarming rate of groundwater depletion in India and the need for urgent regulatory intervention.



1. Key Findings: India's Global Footprint

- **Global Share:** India accounts for approximately **25% of global groundwater withdrawals**.
- **PAC Flagship:** The Public Accounts Committee has flagged this massive extraction rate as a critical concern for the country's water security.

2. Institutional Framework & Monitoring Networks

- **Central Ground Water Board (CGWB):** The apex central organization under the **Ministry of Jal Shakti** responsible for monitoring groundwater levels and quality.
 - The Central Ground Water Authority (CGWA) was constituted under Section 3 of the Environment (Protection) Act, 1986
- **Monitoring Infrastructure: National Network:** Approximately **27,000** stations for water level and **20,000** for water quality.
 - **Digital Integration:** Around **22,000 Digital Water Level Recorders (DWLRs)** with Telemetry transmit real-time data to central servers under the National Hydrology Project (NHP) and Atal Bhujal Yojana (ABY).
- **Jal Shakti Kendras (JSKs):** 712 district-level centers established as community hubs for knowledge dissemination and local dialogue on water issues.

3. Key Schemes and Initiatives

- **Jal Shakti Abhiyan (JSA):** An annual mission-mode campaign for water harvesting and artificial recharge. Over **2 Crore** works have been completed through convergence.
- **Jal Sanchay Jan Bhagidari (JSJB):** Launched in **2024** to turn rainwater harvesting into a mass movement; over **49 lakh** structures have been constructed.
- **National Aquifer Mapping & Management (NAQUIM):**
 - **Phase 1.0:** Completed mapping of the entire mappable area (**25 lakh sq. km**).
 - **Phase 2.0:** Focuses on high-resolution data for priority areas using state-of-the-art technologies.
- **Atal Bhujal Yojana (ABY):** A unique, community-led participatory scheme implemented in **8,203 water-stressed Gram Panchayats** across 7 states (Gujarat, Haryana, Karnataka, MP, Maharashtra, Rajasthan, and UP).
- **Mission Amrit Sarovar:** Aimed at developing/rejuvenating **75 water bodies per district**.

4. Regulatory & Legal Framework

- **Constitutional Status:** 'Water' is a **State subject**.
- **Model Groundwater Bill:** Drafted by the Centre to provide a framework for states to curb indiscriminate extraction and mandate rainwater harvesting. **21 States/UTs** have adopted it so far.
- **Central Ground Water Authority (CGWA):** Established for central-level regulation. It issues **No Objection Certificates (NOCs)** for industrial, infrastructure, and mining extraction in 19 States/UTs.
 - **Penalty Mechanism:** Environmental Compensation (EC) charges and penalties are imposed for unlawful extraction.

4.5. SAND MINING REGULATIONS AND GOVERNANCE

Context:

Recently, the Supreme Court's scrutiny of illegal mining in the National Chambal Sanctuary has brought the spotlight back to the "Sand Mafia" and the collapse of riverine governance. While sand is essential for the construction boom in North India, its extraction has moved from a regulated activity to an organized crime, threatening the structural integrity of bridges and the survival of aquatic species.



1. Legal Status: A "Minor Mineral"

In India, minerals are classified into 'Major' and 'Minor' under the **Mines and Minerals (Development and Regulation) Act, 1957 (MMDR Act)**.

- **Minor Mineral:** Sand is classified as a minor mineral.
- **Regulatory Authority:** Unlike major minerals (where the Union has significant control), the **State Governments** have the power to frame rules for the grant of concessions, fixing royalty rates, and monitoring minor minerals.
- **Constitutional Link:** This falls under the **State List (List II)** of the Seventh Schedule, though the Union can provide a broad framework for conservation.

2. Ecological and Physical Impact

Unregulated or "instream" sand mining causes irreversible damage to river systems:

- **Riverbed Incision:** Excessive mining lowers the riverbed, leading to bank erosion and the deepening of the river channel.
- **Loss of Biodiversity:** As seen in the Chambal region, mining destroys the sandbars required by **Gharials and Turtles** for nesting.
- **Water Quality:** Increased turbidity (muddiness) affects the penetration of sunlight, harming aquatic plants and fish.
- **Infrastructure Risk:** By lowering the water table and eroding banks, mining can undermine the foundations of **bridges and piers**.

3. Regulatory Framework: Guidelines & Monitoring

To balance development with ecology, the MoEF&CC issued two key documents:

- **Sustainable Sand Mining Management Guidelines (SSMG) 2016:** Focused on the "District Survey Report" (DSR) to identify areas where mining is sustainable. It emphasizes that the amount of sand extracted should not exceed the annual rate of replenishment.
- **Enforcement & Monitoring Guidelines 2020:** Introduced technical tools like **Drones, GPS tracking of vehicles, and Night Vision Surveillance** to prevent illegal extraction. It also mandated "Replenishment Studies" to be conducted before renewing mining leases.

4. Environmental Clearance (EC)

Following the Supreme Court's judgment in the **Deepak Kumar vs. State of Haryana (2012)** case:

- **Mandatory EC:** Environmental clearance is mandatory for mining minor minerals even in areas **less than 5 hectares**.
- **Categorization:** Large projects (Category A) require clearance from the Central Government (MoEF&CC), while smaller projects (Category B) are cleared by the **State Environment Impact Assessment Authority (SEIAA)**.

4.6. WETLAND CONSERVATION AND ENVIRONMENTAL GOVERNANCE

Context:

Recently, the National Green Tribunal (NGT) ruled that the National Highway Authority of India (NHAI) violated environmental regulations during the construction of the **Urban Extension Road-II (UER-II)** in Delhi. The tribunal found that the NHAI encroached upon a protected wetland in **Goyla Khurd village** by constructing permanent concrete pillars within the water body.



This violation came to light through a media report, prompting the NGT to take *suo motu* cognizance of the 80% disappearance of the pond. The court has now directed the Ministry of Environment, Forest and Climate Change (MoEF&CC) to review the environmental clearance granted to the project and take corrective measures within six months.

1. The Wetlands (Conservation and Management) Rules, 2017

Wetlands are often called the "kidneys of the landscape" due to their water purification abilities. In India, they are protected under these specific rules:

- **Prohibited Activities (Rule 4):** The rules strictly prohibit any reclamation of wetlands or the construction of any permanent structures on them.
- **Definition:** Wetlands include areas of marsh, fen, peatland, or water, whether natural or artificial, permanent or temporary.
- **State Wetland Authority:** The 2017 rules decentralized power, making State/UT Wetland Authorities responsible for identifying and notifying wetlands in their jurisdiction.
- **Digital Inventory:** Authorities are required to maintain a digital inventory of all wetlands to prevent encroachment.

2. Environmental Impact Assessment (EIA)

The EIA is a statutory process under the **Environment Protection Act, 1986**, used to evaluate the likely environmental impacts of a proposed project.

- **Transparency:** Project proponents (like NHAI) must disclose all potential impacts, such as construction within water bodies.
- **The Violation:** In the Urban Extension Road-II (UER-II) case, the NGT noted that NHAI failed to disclose the construction of pillars within the pond during the clearance process, leading to a lack of proper impact assessment by the MoEF&CC.

3. National Green Tribunal (NGT)

Established under the **NGT Act, 2010**, it is a specialized body for the effective disposal of environmental cases.

- **Suo Motu Power:** As affirmed by the Supreme Court, the NGT has the power to take up cases on its own (without a formal complaint) based on media reports or other information.
- **Composition:** It consists of a Chairperson (Judicial Member) and both Judicial and Expert Members to ensure technical accuracy in judgments.
- **Mandate:** It must endeavor to dispose of cases within **6 months** of filing.
- **Principles of natural justice:** The Tribunal shall not be bound by the procedure laid down under the Code of Civil Procedure, 1908, and 1908 or the Indian Evidence Act, 1872 but shall be guided by principles of natural justice.
- **Key Environmental Laws Handled by NGT:**
 - The Water (Prevention and Control of Pollution) Act, 1974,
 - The Water (Prevention and Control of Pollution) Cess Act, 1977,
 - The Forest (Conservation) Act, 1980,
 - The Air (Prevention and Control of Pollution) Act, 1981,
 - The Environment (Protection) Act, 1986,
 - The Public Liability Insurance Act, 1991 and
 - The Biological Diversity Act, 2002.

4. Urban Wetlands: Challenges and Importance

Urban wetlands like the one in Goyla Khurd are critical for:

- **Groundwater Recharge:** Essential for cities like Delhi facing water scarcity.
- **Flood Mitigation:** Acting as sponges during heavy monsoon rains.
- **Biodiversity:** Supporting local flora and avian species.

4.7. BAUXITE MINING AND TRIBAL RIGHTS

Context:

Recently, violent clashes broke out in Odisha's Rayagada district as local tribal communities protested against the construction of a road leading to the proposed Sijimali bauxite mine. The residents of Kutamal village expressed deep concerns that the mining project, estimated to hold 311 million tonnes of bauxite, would deplete perennial water sources and severely impact their traditional livelihoods.



This incident highlights the ongoing tension between industrial development by companies like Vedanta Limited and the protection of tribal rights under the constitutional framework.

1. Bauxite: The Ore of Aluminum

- **Composition:** Bauxite is not a specific mineral, but a rock consisting mainly of hydrated aluminum oxides.
- **Geological Formation:** It is formed by the decomposition of a wide variety of rocks rich in aluminum silicates under tropical and sub-tropical conditions (lateralization process).
- **Usage:** It is the primary ore used to produce Alumina, which is then smelted to create Aluminum—a critical metal for the aerospace, construction, and packaging industries.

2. Bauxite Distribution in India

- India is home to significant bauxite reserves, estimated at approximately **650 million tonnes** as of 2026. Production is dominated by a few key states, with the **Eastern Ghats** being the most productive region.

a. Odisha (The Leader)

- **Share:** Produces over **50%** of India's total output.
- **Key Belts:** The 300-km-long belt across **Kalahandi and Koraput** is the largest bauxite-bearing region in the country.
- **Major Mines: Panchpatmali (Koraput):** Often cited as Asia's largest bauxite mine; it supplies the NALCO refinery at Damanjodi.
 - **Gandhamardan (Bargarh):** A high-grade deposit of strategic importance.
 - **Kodingamali (Rayagada):** A major site for OMC (Odisha Mining Corporation).

b. Gujarat

- **Share:** Second largest producer (~15-18%).
- **Key Locations:** The deposits are found in a belt between the Gulf of Kachchh and the Arabian Sea.
- **Districts:** Jamnagar (Kalyanpur), Devbhumi Dwarka, Junagadh, and Bhavnagar.

c. Jharkhand

- **Key Locations:** The **Patlands** of **Lohardaga and Gumla** are famous for high-grade bauxite.
- **Districts:** Lohardaga, Gumla, Latehar, and Ranchi.

d. Chhattisgarh & Madhya Pradesh

- **Maikala Range:** Deposits are abundant in the Maikala range covering Bilaspur and Durg (Chhattisgarh).
- **Amarkantak Plateau:** Spans across Shahdol and Mandla (MP) and Surguja (Chhattisgarh).
- **Katni (MP):** Known for specialized grades used in the refractory and chemical industries.

3. Top Bauxite Producing Countries

- **Australia and Guinea** are the world's leading bauxite producers, together driving global supply, with **China and Brazil** also ranking among the top producers.

4. Constitutional and Legal Protections for Tribal Areas

- **Fifth Schedule:** Most bauxite-rich areas in **Odisha fall under the Fifth Schedule** of the Constitution, which provides for the administration and control of Scheduled Areas and Scheduled Tribes.
- **PESA Act, 1996:** The Provisions of the Panchayats (Extension to Scheduled Areas) Act mandates that the **Gram Sabha** must be consulted before making any decision on land acquisition or mining leases in these areas.
- **Forest Rights Act (FRA), 2006:** Recognizes the rights of forest-dwelling communities over forest land and resources, requiring their consent for diversion of forest land for non-forest purposes.

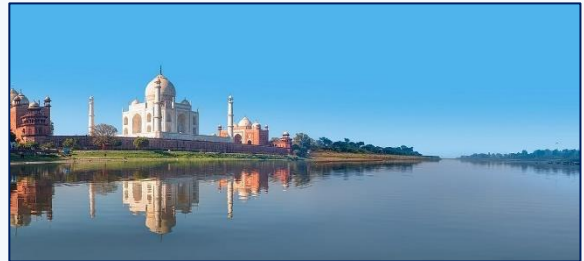
5. Environmental and Social Concerns

- **Water Depletion:** Bauxite cappings on hills act as natural aquifers that feed perennial streams; mining these caps can lead to the drying up of water sources.
- **Displacement:** Mining often leads to the involuntary displacement of tribal communities, resulting in the loss of cultural heritage and traditional economic structures.
- **Ecological Impact:** Open-cast mining leads to large-scale deforestation and loss of biodiversity in the Eastern Ghats region.

4.8. YAMUNA RIVER

Context:

A tragic boat capsizing incident occurred in the **Yamuna River** in the **Mathura district** of Uttar Pradesh. The boat was carrying devotees from Punjab towards **Keshi Ghat** near Vrindavan. Preliminary reports suggest the vessel was overcrowded and collided with an iron **pontoon bridge** due to gusty winds, leading to the accident. The National and State Disaster Response Forces (NDRF and SDRF) were deployed for rescue operations.



1. Geographical Profile of the Yamuna River

- **Origin:** The river originates from the **Yamunotri Glacier** on the southwestern slopes of the **Bandarpunch peaks** in the Mussoorie range of the lower Himalayas (Uttarakhand).
- **Length:** It is the longest tributary of the Ganges.
- **Confluence:** It meets the Ganges at **Prayagraj** (Allahabad), Uttar Pradesh, at a point known as the **Triveni Sangam**.
- **Basin States:** Uttarakhand, Himachal Pradesh, Haryana, Rajasthan, Delhi, and Uttar Pradesh.

2. Key Tributaries

Bank	Major Tributaries
Right Bank	Chambal (Gandhi Sagar dam, Rana Pratap Sagar dam), Sind, Betwa, and Ken.
Left Bank	Hindan, Tons.

3. Historical and Cultural Significance

The banks of the Yamuna are home to several significant Indian cities and heritage sites:

- **Delhi:** The national capital.

- **Agra:** Location of the Taj Mahal.
- **Mathura & Vrindavan:** Birthplace and childhood home of Lord Krishna.
- **Prayagraj (Allahabad):** Renowned for the Triveni Sangam.

4. Environmental Challenges

- **Pollution:** The Yamuna is one of the most polluted rivers in the world, especially the stretch between Wazirabad and Okhla in Delhi.
- **Ammonia Levels:** Frequent "Ammonia spikes" in the river often disrupt the drinking water supply in the national capital region.

4.9. NATURE'S SIGNALS — SENTINEL SPECIES

Context:

Recently, the **International Union for Conservation of Nature (IUCN)** declared the **Emperor Penguin** an endangered species, bringing the concept of **sentinel species** back into focus.



1. What is a Sentinel Species?

- Sentinel species are organisms—including animals, plants, and microbes—that act as **early warning signals** for environmental degradation, pollution, or ecological imbalance. Their health, population levels, or behavior reflect the overall condition of their ecosystem, providing vital data often before humans notice broader environmental issues.
- They are among the **first to respond to stressors** in their environment such as **pollution, disease, and environmental change**.
- Their response to threats tends to be **more apparent than most other species**.

Key Characteristics

- **High Sensitivity:** They are often among the first to respond to environmental stressors like pollutants, disease, or climate changes.
- **Bioaccumulation:** They often accumulate toxins in their tissues, acting as natural indicators of hazardous levels of pollution.
- **Fixed Territory:** Many sentinel species occupy a specific area, allowing researchers to pinpoint the source of a problem.
- **Physiological Indicators:** Their physiology often amplifies environmental changes, making it easier to detect issues.

2. Examples of Sentinel Species and Their Significance

Species	Ecosystem/Environment	Stressor/Indicator
Frogs (Amphibians)	Aquatic & Terrestrial	Permeable skin absorbs pesticides and pathogens; indicates overall ecological stress.
Canaries	Coal Mines	Faster metabolism makes them succumb to Carbon Monoxide before humans notice.
Honeybees	Agricultural Lands	Used to track agricultural chemical loads (pesticides).

Polar Bears	Arctic Region	Monitor the accumulation of Arctic contaminants.
Emperor Penguins	Antarctic Region	Sentinel for Climate Warming ; their population is projected to halve by the 2080s.
Fish Species	Rivers/Oceans	Used to detect industrial runoff and water pollution.

3. Emperor Penguin

- **IUCN Status:** Endangered (declared April 9, 2025)
- **Habitat:** Antarctic region
- **Role:** Sentinel species for **warming in the Antarctic region**
- **Threat:** Climate change is projected to **halve their population by the 2080s**
- **Scientific significance:** Their declining population signals broader Antarctic ecosystem stress

4. Why Scientists Monitor Sentinel Species

- They help **detect pollution** (chemical, industrial, agricultural)
- They serve as **bio-indicators** of ecosystem health
- Their physiological sensitivity makes them **natural early-warning systems**
- Monitoring them is **cost-effective** compared to direct environmental testing
- A declining sentinel population often signals **wider ecological stress** even before other indicators detect the problem

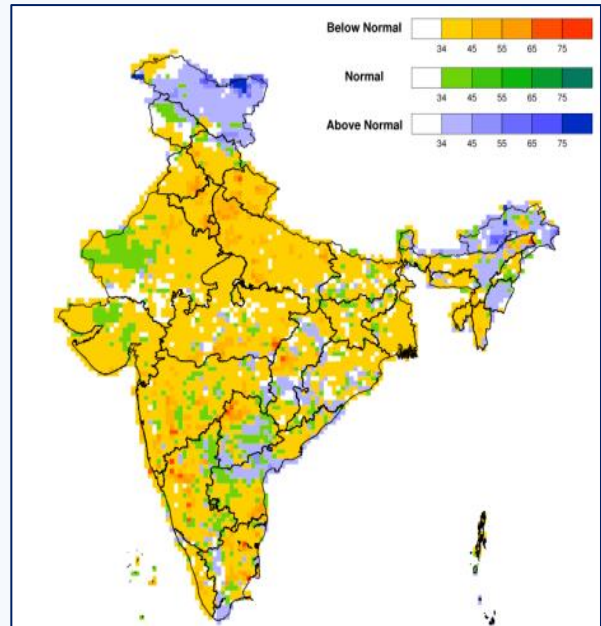
5. Difference Between Sentinel Species and Indicator Species

Feature	Sentinel Species	Indicator Species
Primary Goal	<p>Early Warning: To alert humans to a specific threat (pollution, disease) before it affects the wider population.</p> <p>Sentinel = Health Signal: Think of a medical check-up for the planet. It's about the physiology of the animal (e.g., a bird getting a tumor from toxic runoff).</p>	<p>Assessment: To reflect the general health, quality, or character of an ecosystem.</p> <p>Indicator = Presence Signal: Think of a census. It's about whether the animal can exist there (e.g., if the forest is healthy, the Spotted Owl will be there).</p>
Observation	Focuses on the physical health or physiological changes in individuals (e.g., getting sick).	Focuses on the presence, absence, or population density of the species in a habitat.
Response Time	Responds very rapidly to stressors.	Responds over a period of time as the habitat changes.
Example	Canaries in coal mines (dying from gas before humans notice).	Lichens on trees (their presence indicates clean air/lack of sulfur dioxide).

4.10. IMD's 2026 MONSOON FORECAST AND CLIMATIC VARIABLES

Context:

The India Meteorological Department (IMD) has projected a "**below-normal**" southwest monsoon for 2026, the first such forecast in 11 years. India is expected to receive only **92% of the Long Period Average (LPA)** of 87 cm rainfall this year.



1. Key Climatic Drivers and Their Impact

The monsoon performance in India is heavily influenced by global atmospheric and oceanic phenomena:

- **El Niño:** Identified as the primary reason for the "below-normal" projection. It involves the periodic warming of the Central Equatorial Pacific. Since 1960, El Niño has emerged in 16 years and depressed Indian monsoon rainfall nine times.
- **Indian Ocean Dipole (IOD):** A "positive" IOD is likely to develop toward the end of the 2026 monsoon season. This condition refers to oscillations of sea-surface temperatures between the western (near Africa) and eastern (near Indonesia) tropical Indian Ocean. A positive dipole generally tends to bring more rain to India and can offset the negative impact of El Niño.
- **Northern Hemisphere Snow Cover:** The snow cover from January to March 2026 has been slightly below normal. Reduced snow cover is generally associated with better rainfall in India.
- **Transition from La Niña:** At present, the region is transitioning from "weak" La Niña-like conditions (the cooler converse of El Niño) to neutral conditions.

2. Technical Definitions and Standards

- **Long Period Average (LPA):** The Long Period Average (LPA) of rainfall is the average rainfall recorded over a particular region for a specific interval (e.g., month or season) calculated over a long period, typically **50 years**.
 - The benchmark for monsoon rainfall in India, currently set at **87 cm**.
- **"Below-Normal" Rainfall:** Officially defined as rainfall at **90% to 95% of the LPA**.
- **"Deficient" Rainfall:** The IMD refers to rainfall less than **90% of the LPA** as "deficient" rather than using the term "drought".
- **Normal:** Rainfall is considered 'normal' if it lies between 96% and 104% of the Long Period Average.

4. Socio-Economic Implications

- **Agriculture:** Insufficient rain significantly impacts farming, as Indian agriculture remains largely **rainfed**.
- **Input Supply:** Disruptions in fertilizer supply ahead of the **Kharif season** (anticipated due to regional wars) combined with insufficient rain could further impact productivity.

5. Role of Jet Streams

Jet Stream	Season	Effect
Subtropical Westerly Jet	Winter	Brings western disturbances to North India
Tropical Easterly Jet	Summer	Drives and sustains Southwest Monsoon
Somali Jet	Summer	Low-level jet that transports moisture from Arabian Sea to India

4.11. THE IMPACT OF CLIMATE CHANGE ON COASTAL DYNAMICS

Context:

A recent study published in *Nature Climate Change* highlights a concerning trend: **global warming is weakening the sea-land breeze systems** in major coastal megacities. This "erosion" of coastal winds poses significant risks to urban health, temperature regulation, and air quality.



1. Basic Geography: The Sea-Breeze Mechanism

The sea-land breeze is a local wind system caused by the **differential heating** of land and water.

- **Sea Breeze (Daytime):** Land heats up faster than the sea. The air above the land rises (Low Pressure), and cooler air from the sea (High Pressure) blows toward the shore.
- **Land Breeze (Nighttime):** Land cools down faster than the sea. The air over the sea is now warmer and rises, causing cooler air from the land to blow toward the sea.

2. Why the Breezes are Weakening

The core driver of these winds is the **thermal contrast** (temperature difference) between land and sea.

- **Ocean Warming:** Global warming is heating the oceans significantly.
- **Reduced Gradient:** As sea surface temperatures rise, the temperature gap between the coastal land and the adjacent water shrinks.
- **The Result:** A weaker pressure gradient leads to less frequent and slower sea breezes.

3. Key Findings of the Study

- **Historical Decline:** Ocean warming has already reduced the number of "breeze days" by **3%** in most studied cities.
- **Affected Cities:** Mid-latitude cities like **London, New York, Shanghai, and Buenos Aires** have seen the most dramatic declines. Mumbai has also recorded a 3% reduction.
- **Future Projections (2050):** If carbon emissions remain high, these breezes could weaken **4.5 times faster** than historical rates.

4. Ecological and Urban Implications

The weakening of these breezes is considered an "overlooked threat" because:

- **Urban Heat Island (UHI) Effect:** Sea breezes are essential for cooling down coastal concrete jungles; without them, urban heat becomes more intense.

- **Air Quality:** Breezes help in the dispersion of pollutants. Weaker winds lead to stagnant air and **worsening air pollution** in coastal megacities.
- **Habitability:** The combination of higher heat and poor air quality threatens the long-term habitability of coastal hubs.

Quick Check for Prelims

Feature	Sea Breeze	Land Breeze
Occurrence	Daytime	Nighttime
Movement	Sea to Land	Land to Sea

4.12. MICROPLASTICS IN BLUE CARBON ECOSYSTEMS

Context:

Recently, researchers from the Indian Institute of Science Education and Research (IISER), Kolkata, published a study in the *Journal of Hazardous Materials Advances* revealing that microplastics in the Sundarbans are acting as a "novel carbon reservoir." The study highlights how plastic waste, breaking down into nanoplastics, leaches organic carbon into the water, which fuels unnatural bacterial growth and threatens to alter the delicate carbon budget of the world's largest contiguous mangrove forest.



1. The Sundarbans as a Blue Carbon Sink

- **Blue Carbon:** This refers to the carbon captured by the world's ocean and coastal ecosystems, such as mangroves, seagrasses, and salt marshes.
- **Sundarbans' Role:** The Sundarbans, situated at the confluence of the Ganga and Brahmaputra, is a highly efficient ecosystem for sequestering carbon dioxide from the atmosphere and storing it in biomass and soil.
- **Ecological Threat:** The influx of urban waste from upstream brings a high concentration of microplastics (ranging from 5 to 58 particles per liter), particularly during the monsoon due to surface runoff.

2. The "Novel Carbon Reservoir" Phenomenon

- **Leaching Carbon:** As microplastics (roughly 90% carbon) weather and break down, they release **dissolved organic carbon (DOC)** into the marine environment.
- **Biogenic Carbon:** Microbes living on the surface of plastic particles, known as **Plastispheres**, produce their own carbon, further complicating the natural carbon cycle.
- **Impact on Food Web:** This artificial carbon source allows bacteria to multiply faster than natural rates, which can disrupt the natural food web and reduce the efficiency of mangroves as carbon sinks.

3. Some Important concept

- **Plastisphere:** A term used to describe the ecosystems that have evolved to live in human-made plastic environments.
- **Microplastics:** Plastic particles less than 5mm in diameter.
- **Nanoplastics:** Extremely small particles (typically less than 1 micrometer) that can penetrate cellular membranes in marine life.

The Sundarbans

- **Geographic Confluence:** Formed by the delta of the **Ganges, Brahmaputra, and Meghna** rivers on the Bay of Bengal.
- **Largest Mangrove Forest:** It is the largest contiguous mangrove forest in the world, with roughly **40%** of its area in India (West Bengal) and the remaining in Bangladesh.
- **Flora and Fauna:**
 - **Sundari Tree (*Heritiera fomes*):** The dominant mangrove species that gives the forest its name.
 - **Pneumatophores:** Specialized "breathing roots" that grow vertically up from the mud to obtain oxygen in waterlogged soil.
 - **Royal Bengal Tiger:** The Sundarbans is the only mangrove habitat in the world inhabited by tigers.
 - **Other Species:** Estuarine crocodile, Indian Python, Irrawaddy dolphin, and Olive Ridley turtle.
- **International Recognition:**
 - **UNESCO World Heritage Site:** Designated in 1987 (India) and 1997 (Bangladesh).
 - **Ramsar Site:** The Indian Sundarban Wetland was recognized as a "Wetland of International Importance" in **January 2019**.
 - **Biosphere Reserve:** Designated under the Man and Biosphere (MAB) Programme.

4.13. DRAFT RULES FOR THE E85 ROLLOUT

Context:

The Government of India is set to notify draft rules for the introduction of **E85 fuel** (a high-ethanol blend) in response to global oil supply vulnerabilities and the need to reduce vehicular pollution. This move aligns with India's broader strategy of achieving energy security and meeting net-zero carbon targets.



1. Analysis of Ethanol Blends

- **E85:** E85 is a **high-octane, renewable fuel** blend containing **51% to 85% ethanol mixed** with gasoline, designed specifically for **Flex Fuel Vehicles (FFVs)**. It offers cleaner burning and higher performance (104+ octane) but results in lower fuel efficiency (roughly 20-30% lower MPG) compared to standard petrol.
- **E20 Fuel (20% Ethanol + 80% Petrol):**
 - The National Policy on Biofuels (2018, amended in 2022) advanced the 20% ethanol blending target from 2030 to 2025-26.
 - From April 1, 2026, all petrol vehicles in India must be compatible with E20 fuel (20% ethanol blend), requiring engines designed for higher ethanol compatibility, specifically with a minimum 95 RON (Research Octane Number) rating as per BIS standards.
- **E50 Fuel (50% Ethanol + 50% Petrol):** Requires Flex-Fuel Vehicles (FFVs) — specially designed engines capable of running on any petrol-ethanol blend from E20 to E85.

2. E-Fuel Quick Comparison Table

Feature	E20	E50	E60	E85
Ethanol %	20%	50%	60%	Up to 85%
Petrol %	80%	50%	40%	~15%
India Status	Mandatory (2023)	Transitional /Planned	Not notified separately	Draft rules being framed (2025-26)
Engine Needed	Standard/E20 compatible	FFV	FFV	Strictly FFV only
CO₂ Reduction (approx.)	~20%	~40%	~50%	~60–70%
Fuel Economy Impact	~1-2% lower	~10% lower	~15% lower	~20-25% lower
Octane Number Benefit	Moderate	High	High	Very High
Infra Changes Needed	Minimal	Moderate	Significant	Separate pumps & tanks
Global Examples	USA, India	Brazil	Sweden	USA (Midwest), Brazil

3. Key Institutions Involved

- **Ministry of Petroleum & Natural Gas (MoPNG):** Nodal ministry for EBP; issues blending mandates.
- **NITI Aayog:** Policy coordination; authored the Ethanol 100 roadmap.
- **Ministry of Road Transport (MoRTH):** Vehicle compatibility regulations; FFV mandate.
- **Ministry of Food & Agriculture:** Controls feedstock availability and pricing of sugarcane.
- **BIS (Bureau of Indian Standards):** Sets fuel quality standards for E20, E85 blends.
- **Oil Marketing Companies (OMCs):** IOCL, BPCL, HPCL — procure, blend, and distribute ethanol-blended fuel.

4. Comparison of Biofuel Generations

Feature	1st Generation (1G)	2nd Generation (2G)	3rd Generation (3G)	4th Generation (4G)
Feedstock	Edible Food Crops (Sugarcane, Corn, Wheat, Vegetable oils)	Non-Edible Waste (Rice straw, Corn stover, Wood chips etc.)	Algae (Microalgae & Seaweed)	Genetically Engineered Algae & Carbon Capture Tech
Technology	Conventional (Fermentation/ Distillation)	Advanced (Cellulosic ethanol, Gasification)	Biotechnological (Lipid extraction from Algae)	Synthetic Biology + Carbon Sequestration

Key Issues	"Food vs. Fuel" debate; high water usage.	High capital cost; complex pretreatment.	Currently expensive; mostly in R&D/Pilot stage.	Theoretical/Experimental; aiming for Carbon Negative .
GHG Reduction	Moderate (30–50%)	High (60–90%)	Very High (>90%)	Carbon Negative (Absorbs more than it emits)
Examples	Bioethanol, Biodiesel, Biogas	Cellulosic Ethanol, Bio-oil	Algal Biodiesel, Butanol	Photobiological Solar Fuels

4G –Microbes

- ❖ Fourth-generation (4G) biofuels primarily utilize genetically engineered or modified microorganisms—specifically **microalgae, cyanobacteria, fungi, and bacteria**—to enhance lipid/sugar production and directly synthesize fuels like biodiesel, biobutanol, and bioethanol.
- ❖ Key microbes include **Chlorella, Nannochloropsis, and engineered E. coli or Saccharomyces cerevisiae**, which are designed for high-efficiency photosynthesis or direct fuel secretion, often combined with carbon capture.

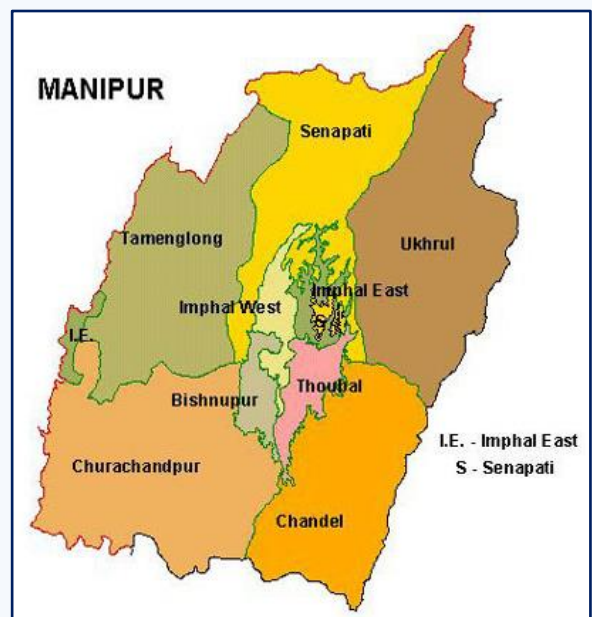
5. Flex-Fuel Vehicles (FFVs)

- **Definition:** Flex-Fuel Vehicles (FFVs) can operate on any mixture of petrol and ethanol, from pure petrol (E0) to high-ethanol blends (E85 or even E100).
- **Technology:** FFVs use sensors to detect the ethanol content and automatically adjust fuel injection, spark timing, and air-fuel ratio.
- **Key Fact:** **Brazil is the world's largest FFV market with over 30 million FFVs; USA is the second largest.**

4.14. MANIPUR - STATE PROFILE AND STRATEGIC IMPORTANCE

Context:

Ethnic tensions have intensified in Manipur following clashes between Naga and Kuki communities in Kangpokpi and Senapati districts. The violence was triggered by the killing of two Tangkhul Naga civilians in Ukhrul on April 18, prompting the United Naga Council to impose a 72-hour shutdown across Naga-inhabited areas. The situation escalated when Kuki villagers attempted to remove roadblocks, leading to physical confrontations. These developments indicate a departure from the earlier neutrality of Naga groups in the Meitei-Kuki conflict and revive memories of the Naga-Kuki clashes of the 1990s.



1. Geography and Topography

- **Location:** Manipur is a "Landlocked State" in Northeast India, sharing international borders with **Myanmar** (Sagaing Region and Chin State) to the east and south.
- **Internal Borders:** It is bounded by **Nagaland** to the north, **Mizoram** to the south, and **Assam** to the west.
- **Terrain:** The state is physically divided into two distinct regions: the central **Imphal Valley** (occupying about 10% of the land) and the surrounding **Hill Ranges** (occupying 90% of the land).
- **River Systems:** The state is drained by the **Barak River** (flowing towards Assam/Bangladesh) and the **Manipur River** (a tributary of the Chindwin River in Myanmar).

2. Biodiversity and Environment

- **Loktak Lake:** It is the largest natural freshwater lake in Northeast India and is a designated **Ramsar Site**. It is also included in the **Montreux Record** due to ecological changes.
- **Phumdis:** These are heterogeneous masses of vegetation, soil, and organic matter at various stages of decomposition that float on the lake surface.
- **Keibul Lamjao National Park:** It is the **world's only floating national park**, located in the southern part of Loktak Lake.
- **Sangai Deer:** Also known as the "Dancing Deer," it is the **State Animal** of Manipur and is found exclusively in the Keibul Lamjao National Park. It is listed as "Endangered" in the IUCN Red List.

3. Demographic and Ethnic Profile

- **Meiteis:** They are the largest ethnic group (approx. 53%) and primarily inhabit the fertile Imphal Valley. They mostly practice Vaishnavism (Hinduism) and speak **Meiteilon** (Manipuri), which is an 8th Schedule language.
- **Tribal Communities:** The hill areas are inhabited by various tribes, broadly classified into **Nagas** and **Kuki-Zomi** groups. These tribes are protected under the **Fifth or Sixth Schedule** concepts (specifically Article 371C for Manipur).
- **Article 371C:** This special provision provides for a "Hill Areas Committee" in the Manipur Legislative Assembly to ensure the development and autonomy of the tribal regions.

4. Administrative and Historical Milestones

- **Integration:** Manipur was a Princely State that signed the Instrument of Accession in 1947 and officially merged with the Indian Union on **October 15, 1949**.
- **Statehood:** It became a full-fledged state on **January 21, 1972** (along with Meghalaya and Tripura) under the North-Eastern Areas (Reorganisation) Act, 1971.
- **Inner Line Permit (ILP):** Manipur was extended the ILP system in **December 2019** to protect the indigenous population from unregulated influx. It is the fourth state in the Northeast to have ILP after Arunachal Pradesh, Nagaland, and Mizoram.
- **AFSPA:** Large parts of the state have historically been under the **Armed Forces (Special Powers) Act**, though the "Disturbed Area" tag has been removed from several police station jurisdictions in the valley in recent years.

4.15. SAFER FIREWORKS ALTERNATIVES

Context:

Recently, a major explosion at a firecracker manufacturing unit in Thrissur resulted in the death of 14 people and left over 40 injured, occurring just days before the Thrissur Pooram festival.

In the previous year, the same festival had already raised serious safety concerns when a fireworks display led to chaos after a disoriented elephant went on a rampage, injuring 42 individuals. Additionally, another elephant had attacked its handler a day prior to the incident.



1. Noise Pollution Standards in India

- **Regulatory Body:** Central Pollution Control Board (CPCB).
- **Noise Standards for Firecrackers:** Prohibits manufacture, sale, or use of firecrackers generating noise levels exceeding **125 decibels (dB)** at 4 metres distance from the point of bursting.
- **Ambient Noise Limits (National Ambient Noise Monitoring Network):**
 - **Residential Areas:** 45–55 dB.
 - **Silence Zones (Hospitals/Educational Institutions):** 40–50 dB.
- **Health Impact:** The WHO identifies noise pollution as the **third most hazardous environmental threat** to human health, following air and water pollution.

2. Cold Spark Technology (Noiseless Alternatives)

- **Mechanism:** Uses a chemical combustion reaction of fine granulated metal alloy powders (typically **Titanium and Zirconium**).
- **The "Cold Sparkular":** A device equipped with a heater and fan. The heater warms the alloy powder to increase activation energy, and the fan ejects the glowing particles.
- **Key Differences from Traditional Fireworks:**
 - **Temperature:** Traditional sparklers emit temperatures around 1,200°C. Cold sparklers/anars operate at significantly lower temperatures (**60–100°C**), reducing burn risks.
 - **Combustion:** Utilizes rapid exothermic reactions without explosive combustion, heavy smoke, or high-decibel noise.
 - **Deployment:** Can be arranged in arrays for sequential triggering to create visual effects like "cascading bursts" or "vertical expansion" without sound.

3. Ecological and Social Impact

- **Animal Welfare:** High decibel levels and specific sound frequencies disorient captive animals (e.g., festival elephants), leading to unpredictable behavior and public safety risks.
- **Vulnerable Populations:** High noise levels near hospitals pose significant risks to Neonatal Intensive Care Units (NICUs), potentially impacting infant brain development.
- **Economic Barriers:** Cold spark pyrotechnics remain expensive and are currently largely imported, though indigenous manufacturing is technologically feasible.

4.16. TOXIC RAINFALL

Context:

A long-burning fire at the **Tuapse oil refinery** (Russia) following a Ukrainian drone strike has highlighted significant environmental risks, specifically **toxic rainfall** and particulate matter pollution. This event serves as a case study for the intersection of geopolitical conflict, energy infrastructure, and environmental science.



1. Geographical Significance: Tuapse & The Black Sea

- **Location:** Tuapse is a major port city in **Krasnodar Krai, Russia**, situated on the northeast shore of the **Black Sea**.
- **Strategic Importance:** It is home to a massive oil refinery and terminal, serving as a primary hub for Russian energy exports.
- **UPSC Tip:** Map-based questions often focus on Black Sea port cities (e.g., Novorossiysk, Sevastopol, Odessa, Tuapse).

2. Environmental Impact: Toxic Rainfall & Air Quality

I. Toxic Rainfall (Black Rain)

- **Mechanism:** Large-scale combustion of hydrocarbons (oil) releases massive quantities of **Soot (Black Carbon)** and sulfur/nitrogen oxides into the atmosphere.
- **Precipitation:** When these particles interact with moisture in the clouds, they fall as "toxic rainfall," leaving a **carbonaceous black coating** on surfaces.
- **Impact:** This can lead to soil acidification, water contamination, and damage to local flora.
- **Comparison to Acid Rain:** While traditional acid rain involves sulfur and nitrogen oxides lowering the pH of precipitation, toxic "black rain" often refers to direct contamination from heavy pollution loads.

II. Particulate Matter (PM) & Emissions

- **Concentration:** Local authorities reported toxic particle levels **2–3 times higher** than permissible limits.
- **Health Hazards:** High concentrations of PM 2.5 penetrate deep into the lungs and enter the bloodstream.
- **Public Health Protocol:** Mitigation strategies include:
 - Staying indoors (Shelter-in-place).
 - Using **N95/Face masks** to filter out fine soot particles.
 - Sealing windows to prevent indoor infiltration of toxic plumes.

3. WHO Air Quality Guidelines (AQG)

The WHO significantly tightened limits in 2021 due to new evidence of health impacts at lower concentrations.

- **PM 2.5 Annual Mean:** Reduced from **10 $\mu\text{g}/\text{m}^3$** to **5 $\mu\text{g}/\text{m}^3$** .
- **PM 10 Annual Mean:** Reduced from **20 $\mu\text{g}/\text{m}^3$** to **15 $\mu\text{g}/\text{m}^3$** .

Note for Prelims: These guidelines are **not legally binding** for countries. They serve as a scientific template for nations to set their own national standards (like India's **NAAQS**).

4.17. CORPORATE AVERAGE FUEL EFFICIENCY (CAFE-III) NORMS

Context:

Recently, the Ministry of Power, through the **Bureau of Energy Efficiency (BEE)**, finalized the draft for the third phase of fuel efficiency standards, known as **CAFE-III norms**, which are set to take effect from **April 1, 2027**. This move comes as the government seeks to balance India's ambitious "Net Zero 2070" goals with the practical challenges faced by the domestic automobile industry, particularly regarding the revival of the small car segment and the transition to electric mobility.



1. What are CAFE Norms?

CAFE stands for **Corporate Average Fuel Efficiency**. These are regulations aimed at lowering the fuel consumption (and thus CO₂ emissions) of a manufacturer's entire fleet of vehicles rather than focusing on a single model.

- **Mechanism:** It is a "sales-weighted average." A manufacturer can sell high-emission vehicles (like heavy SUVs) as long as they balance them by selling enough low-emission vehicles (like EVs or Hybrids) to keep the average within the prescribed limit.
- **Legal Basis:** These norms are notified by the Ministry of Power under the **Energy Conservation Act, 2001**.
- **Applicability:** They apply to passenger vehicles weighing less than **3,500 kg**, including petrol, diesel, CNG, LPG, hybrids, and electric vehicles.

2. Key Features of CAFE-III (2027–2032)

The CAFE-III phase introduces several strategic shifts compared to its predecessors:

- **Stricter Emission Targets:** The fleet-wide CO₂ emission target is proposed to be reduced significantly. While CAFE-II (2022-2027) set a limit of **113 g/km**, CAFE-III aims for approximately **91.7 g/km**.
- **The "Super Credit" System:** To incentivize green technology, manufacturers earn "super credits" for selling EVs and hybrids. In the calculation of the fleet average:
 - **Electric Vehicles (EVs):** Counted as **3 units**.
 - **Plug-in Hybrids:** Counted as **2.5 units**.
 - **Strong Hybrids:** Counted as **2 units**.
- **Incentives for Small Cars:** To revive the declining small car market, a relaxation of up to **9 g/km** of CO₂ is provided for compact cars (under 4m length, <1200cc engine, and <909 kg weight).
- **Emissions Pooling:** Up to three automakers can form a "pool" to meet targets jointly. This allows a company lagging in EV tech to partner with an EV-only manufacturer to avoid penalties.

- **Block Period Compliance:** Unlike the annual assessment in CAFE-II, CAFE-III proposes a **3-year block period** (followed by a 2-year phase), allowing manufacturers more flexibility to time their new model launches.

3. CAFE Norms vs. Bharat Stage (BS) Norms

Feature	CAFE Norms	Bharat Stage (BS) Norms
Primary Focus	Fuel efficiency and CO₂ emissions.	Toxic pollutants (NO_x, PM, CO, SO_x).
Measurement	Fleet-wide sales-weighted average.	Individual vehicle exhaust testing.
Objective	Reduce oil imports & climate impact.	Improve air quality & public health.
Nodal Agency	Bureau of Energy Efficiency (BEE).	Central Pollution Control Board (CPCB).

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UPSC PRELIMS PRACTICE QUESTIONS

Q. Consider the following statements regarding the Fishing Cat (*Prionailurus viverrinus*):

1. It is the only wild cat in India that possesses partially webbed paws to assist in aquatic movement.
2. It is currently categorized as 'Critically Endangered' on the IUCN Red List due to the rapid loss of mangroves.
3. In India, its distribution is limited only to the Sundarbans and the Western Ghats.

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)

Explanation:

- **STATEMENT 1 IS CORRECT:** The Fishing Cat has **partially webbed paws**, which is a specialized adaptation for swimming and catching fish in wetlands.
- **STATEMENT 2 IS INCORRECT:** The Fishing Cat is categorized as **Vulnerable**, not Critically Endangered, on the IUCN Red List.
- **STATEMENT 3 IS INCORRECT:** While found in the Sundarbans, the Fishing Cat is **not found in the Western Ghats**. Its distribution is mainly along the Eastern Coast (Chilika, Coringa) and the foothills of the Himalayas (Terai region).

Q. With reference to Heatwaves in India, consider the following statements:

1. The threshold of maximum temperature for the declaration of a heatwave is lower for plains than hilly regions.
2. A heatwave occurs due to the movement of high atmospheric pressure into an area.

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)

Explanation:

Statement 1 is incorrect: According to the criteria set by the **India Meteorological Department (IMD)**, a heatwave is declared when the maximum temperature of a station reaches at least **40°C or more for Plains** and at least **30°C or more for Hilly regions**. Therefore, the threshold for declaring a heatwave is actually **higher for plains** (40°C) than for hilly regions (30°C).

Statement 2 is correct: A heatwave typically occurs when **high atmospheric pressure** moves into an area and settles. This high-pressure system acts like a "lid," trapping heat near the ground and preventing cooler air or clouds from entering the region, which leads to a rapid increase in surface temperatures.

Q. With reference to the Plastic Waste Management (Amendment) Rules, 2026, consider the following statements:

1. The rules mandate a minimum of 60% recycled plastic content in rigid plastic packaging for the financial year 2026-27.
2. For the first time, "Sellers" of plastic raw materials like resins and pellets are brought under the regulatory and reporting framework.
3. Registered Environmental Auditors have been introduced to verify the Extended Producer Responsibility (EPR) claims of brand owners.

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)

Explanation:

- **STATEMENT 1 IS CORRECT:** The 2026 amendment sets a high bar for circularity by requiring 60% recycled content in rigid plastics to reduce reliance on virgin materials.
- **STATEMENT 2 IS CORRECT:** By defining and regulating "Sellers" of resins and pellets, the government aims to ensure full traceability of plastic from the raw material stage to the final waste stage.
- **STATEMENT 3 IS CORRECT:** The introduction of third-party Registered Environmental Auditors is a key feature of the 2026 rules to ensure the authenticity of recycling and reuse data submitted by companies.

Q. With reference to groundwater management and regulation in India, consider the following statements:

1. India accounts for nearly one-fourth of the global groundwater withdrawals.
2. The Central Ground Water Authority (CGWA) has been constituted under the Water (Prevention and Control of Pollution) Act, 1974.
3. The Atal Bhujal Yojana is a community-led participatory scheme implemented in selected water-stressed Gram Panchayats.

4. Water is listed as a subject in the Union List of the Constitution of India.

Which of the statements given above are correct?

- (a) 1 and 3 only
- (b) 2 and 4 only
- (c) 1, 2 and 3 only
- (d) 1, 3 and 4 only

Ans. (a)

Explanation:

Statement 1 is Correct: India accounts for about **25% of global groundwater withdrawals**, making it the largest user globally.

Statement 2 is Incorrect: The **Central Ground Water Authority (CGWA)** is constituted under **Section 3 of the Environment (Protection) Act, 1986**, not under the Water (Prevention and Control of Pollution) Act, 1974.

Statement 3 is Correct: The **Atal Bhujal Yojana (ABY)** is a **community-led participatory scheme** implemented in water-stressed Gram Panchayats across selected states.

Statement 4 is Incorrect: **Water is a State subject** under the Constitution of India (State List), not in the Union List.



Scan to attempt more questions

5.1. EXTRACELLULAR RNA (EXRNA)

Context:

Recently, scientists and researchers from various global institutes have reported that **Extracellular RNA (ExRNA)** derived from bacteria can surprisingly persist in **disinfected drinking water**, challenging the long-held belief that RNA is too fragile to survive outside a cellular environment for extended periods.



What is Extracellular RNA (ExRNA)?

Extracellular RNA refers to RNA molecules that exist outside the cells in which they were originally transcribed. While traditional biology focused on RNA's role within the cell (Protein synthesis), ExRNA represents a paradigm shift in understanding intercellular communication.

- **Presence in Body Fluids:** It is found in almost all biological fluids, including **blood (plasma/serum), saliva, urine, breast milk, and cerebrospinal fluid**.
- **Types of RNA involved:** ExRNA is a heterogeneous population consisting of both **coding RNA (mRNA)** and **non-coding RNA (miRNA, siRNA, lncRNA, and tRNA)**.
- **Stability Mechanism:** Since the extracellular environment is rich in **RNases** (enzymes that degrade RNA), ExRNA survives by traveling in "molecular containers." These include:
 - **Extracellular Vesicles (EVs):** Such as exosomes and microvesicles (lipid-bilayer enclosed).
 - **Lipoprotein Particles:** Such as High-Density Lipoprotein (HDL).
 - **Protein Complexes:** Binding with proteins like **Argonaute2 (Ago2)** which shield them from degradation.

Functions and Significance

1. **Intercellular Communication:** ExRNA acts as a "long-distance" signaling messenger. Cells release ExRNA to deliver genetic instructions to recipient cells, thereby influencing their behavior, gene activation, and protein translation.
2. **Immune Response:** It helps coordinate the body's response to infections, tissue repair, and general development.
3. **Disease Biomarker:** Because ExRNA patterns change during illness, they serve as "liquid biopsies." They are being researched for the early detection of **cancer, heart disease, and neurodegenerative disorders** without the need for invasive tissue biopsies.
4. **Therapeutic Potential:** Start-ups and research centers (like those collaborating with the **University of Hyderabad**) are exploring ExRNA to develop novel therapeutic agents for both communicable and non-communicable diseases.

5.2. SpaceX FALCON 9 ROCKET

Context:

Recently, scientific assessments published in March 2026 have raised significant concerns regarding the chemical footprint left by the frequent re-entry of large rocket stages like Falcon 9. Researchers have detected a substantial increase in metallic particles, specifically **lithium** and **aluminum oxides**, in the upper atmosphere following uncontrolled re-entries. This "metal rain" is increasingly scrutinized for its potential to trigger chemical reactions that could deplete the **ozone layer** and alter the Earth's thermal balance.



1. Basic Overview of Falcon 9

- **Manufacturer:** Developed by **SpaceX**, it is a two-stage-to-orbit medium-lift launch vehicle.
- **Fuel and Engine:** It is powered by **Merlin engines** which utilize a combination of **Rocket-Grade Kerosene (RP-1)** and **Liquid Oxygen (LOX)**.
- **Propellant Type:** It is a **liquid-propellant** rocket. Unlike the solid boosters used in India's PSLV/GSLV for initial thrust, Falcon 9 relies entirely on liquid engines that can be throttled and restarted.

2. Reusability: The Game Changer

- **First Stage Recovery:** The first stage (booster) is designed to return to Earth and land vertically on a landing zone or a drone ship.
- **Economic Impact:** By reusing the booster (some have flown over **30 times** by 2026), SpaceX has drastically reduced the cost of access to space, making it the most cost-effective launcher globally.
- **Fairing Recovery:** The payload fairings (the protective "clamshell" at the top) are also recovered using parachutes and specialized ships to be refurbished and flown again.

3. Capability and Orbits

- **Low Earth Orbit (LEO):** Capable of carrying approximately **22,800 kg**.
- **Geostationary Transfer Orbit (GTO):** Capable of carrying **8,300 kg** (expendable) or **5,500 kg** (reusable).
- **Crewed Missions:** It is the primary vehicle for the **Crew Dragon** capsule, transporting astronauts to the International Space Station (ISS).

India's Strategic Shift with Falcon 9

India's **NewSpace India Limited (NSIL)**, the commercial arm of ISRO, recently utilized Falcon 9 to launch the **GSAT-N2 (GSAT-20)** satellite.

- **Reason for Choice:** The satellite weighed approximately **4,700 kg**, which exceeded the maximum **4,000 kg** GTO capacity of India's heaviest rocket, the **LVM3 (GSLV Mk-III)**.
- **Significance:** This marked a departure from India's traditional reliance on the European **Ariane** rockets for heavy-lift missions, showcasing a pragmatic shift toward cost-effective private players like SpaceX.

India's Efforts: Building the Reusable Future

To reduce dependence on foreign private entities like SpaceX and lower launch costs, India is pursuing two major tracks:

1. RLV-TD (Reusable Launch Vehicle - Technology Demonstrator)

- **Design:** A winged body vehicle (often called a "Space Plane") that looks like a mini-shuttle.
- **Key Mission (RLV-LEX):** ISRO successfully conducted the **Landing Experiment (LEX)** where the vehicle performed an autonomous high-speed landing on a runway in Chitradurga.
- **Objective:** To master technologies like hypersonic flight, autonomous landing, and powered cruise flight.

2. NGLV (Next Generation Launch Vehicle) - "Project Soorya"

- **Capability:** Designed as a three-stage, partially reusable heavy-lift rocket.
- **Fuel:** It will use **Green Propulsion** (likely Methalox—Liquid Methane and Liquid Oxygen) or Semi-cryogenic engines.
- **Goal:** To replace the LVM3 and provide a 10-tonne payload capacity to GTO in reusable mode, supporting the future **Bharatiya Antariksh Station (BAS)** by 2035.

5.3. SPACE DEBRIS

Context:

Recently, an article published by World Economic Forum highlighted the escalating crisis of orbital crowding, noting that space governance has failed to keep pace with the rapid deployment of satellite mega-constellations. According to the Indian Space Situational Assessment Report (ISSAR) 2026 released by ISRO, there are currently 129 trackable objects of Indian origin—including defunct satellites and spent rocket stages—cluttering the Earth's orbit.



1. What is Space Debris?

Space debris encompasses all non-functional, human-made objects in Earth's orbit or those re-entering the atmosphere.

- **Sources:** Defunct satellites spent rocket stages (like those from PSLV or LVM3), fragments from explosions, and even small particles like paint flakes.
- **The Threat:** These objects travel at speeds of approximately **7.8 km/s** in LEO. At such velocities, even a 1-centimeter fragment can deliver the impact of a hand grenade, threatening active missions like the International Space Station (ISS) or the upcoming **Bharatiya Antariksha Station**.
- **Kessler Syndrome:** This is a theoretical tipping point where the density of objects in LEO is so high that a single collision starts with a chain reaction, creating a cloud of debris that makes space flight and satellite operations impossible for centuries.

2. India's Strategic Initiatives

India has evolved a multi-layered approach to Space Situational Awareness (SSA) and debris management.

A. Project NETRA (Network for space object Tracking and Analysis)

- **Status:** An early warning system with a dedicated control center in Bengaluru.
- **Utility:** It uses high-precision radars and telescopes to detect and track hazards, allowing ISRO to perform **Collision Avoidance Maneuvers (CAM)** for its active satellites.

B. IS4OM (ISRO System for Safe and Sustainable Operations Management)

- **Function:** Launched to centralize India's SSA activities, it provides 24/7 monitoring and coordinates with global agencies to ensure the long-term sustainability of outer space.

C. Debris Free Space Mission (DFSM) 2030

- **Objective:** To ensure no new debris is left in orbit by Indian launches after 2030.
- **Methods:** Includes "Life-extension" missions or "De-orbiting" maneuvers where satellites use remaining fuel to re-enter and burn up in the atmosphere at the end of their functional life.

3. Global Frameworks and Modern Challenges

- **IADC (Inter-Agency Space Debris Coordination Committee):** An international forum of 13 space agencies (including ISRO) that sets the global benchmark for debris mitigation.
- **UNCOPUOS Guidelines:** India aligns its policies with the United Nations' "Guidelines for the Long-term Sustainability of Outer Space Activities."
- **The "25-Year Rule":** A widely accepted international norm that suggests satellites should be de-orbited or moved to a "graveyard orbit" within 25 years of mission completion.
- **Atmospheric Concerns:** Recent research highlights that the frequent re-entry of "mega-constellations" (like Starlink) is increasing the concentration of **aluminum oxides** in the upper atmosphere, which could potentially deplete the ozone layer.

5.4. QDENGGA

Context:

Recently, the Subject Expert Committee (SEC) of the **Central Drugs Standard Control Organisation (CDSCO)** has recommended the approval for the import and marketing of the Japanese dengue vaccine, **Qdenga**, in India for the age group of 4 to 60 years. This development marks a significant step as India currently has no licensed dengue vaccine in its public immunization program despite a high disease burden.



1. Basic Profile

- **Manufacturer:** Developed by **Takeda Pharmaceuticals**, a Japanese biopharmaceutical giant.
- **Type of Vaccine:** It is a **Live-Attenuated Vaccine**, meaning it uses a weakened form of the virus that causes the disease.
- **Composition:** It is a **tetravalent** vaccine, designed to protect against all four serotypes of the dengue virus: **DENV-1, DENV-2, DENV-3, and DENV-4**.
- **Backbone:** The vaccine is built on a live-attenuated **dengue serotype 2 (DENV-2)** virus, which provides the genetic "backbone" for all four components.

2. Administration and Efficacy

- **Dosage:** It is a **two-dose** vaccine administered subcutaneously, with a gap of **three months** between doses.
- **Serostatus Independence:** Unlike its predecessor Dengvaxia, Qdenga can be administered to individuals **regardless of previous dengue exposure** (seropositive or seronegative). This eliminates the need for pre-vaccination screening.
- **Global Status:** It was prequalified by the **World Health Organization (WHO)** in May 2024 and is already approved in over 40 countries, including parts of the European Union, Brazil, and Indonesia.

3. Comparison: Qdenga vs. Dengvaxia

Feature	Qdenga (TAK-003)	Dengvaxia (CYD-TDV)
Manufacturer	Takeda (Japan)	Sanofi Pasteur (France)
Platform	DENV-2 Backbone	Yellow Fever Virus Backbone
Pre-testing	Not required	Required (Only for seropositive)
Doses	2 Doses (3 months apart)	3 Doses (6 months apart)
Risk	Lower risk of severe dengue in naive	High risk of severe dengue in naive

4. Indian Context and Manufacturing

- **CDSO Approval:** The Subject Expert Committee has recommended it for the **4–60 age group** in India.
- **Local Partnership:** Takeda has entered into a partnership with Hyderabad-based **Biological E** to manufacture the vaccine, aiming to produce 100 million doses annually to ensure supply for India and other endemic regions.
- **Indigenous Candidates:** While Qdenga is an imported technology, India is also developing indigenous candidates like **DengiAll** (by Panacea Biotec and ICMR), which is currently in Phase III trials.
- **Current Affairs:** The WHO prequalification and India's recent regulatory nod make it a high-probability topic for Prelims 2026.

5.5. ISRO'S CALL FOR SCIENTIFIC PROPOSALS

Context:

The Indian Space Research Organisation (ISRO) has issued its second **Announcement of Opportunity (AO)**, inviting proposals from the Indian solar physics community for observation time on the **Aditya-L1 mission**. This initiative aims to enhance scientific utilization of the data collected by India's **first dedicated solar observatory**.



Core Mission

- **Primary Objective:** Aditya-L1 is **India's first dedicated space-based solar mission**.

- **Operational Location:** The spacecraft is positioned at the **Sun-Earth L1 (Lagrange Point 1- 1.5 million km from Earth)**.
- **Observation Capabilities:** It conducts continuous, uninterrupted observations of the Sun from its stable orbit at the L1 point.
- **Data Policy:** Scientific data gathered from the mission is regularly released into the **public domain** for global scientific use.

Launch Details:

- Launch Vehicle: PSLV-C57
- Launch Date: 2 September 2023
- Launch Site: Satish Dhawan Space Centre

Technical Significance of L1 (Lagrange Point 1)

- **Uninterrupted View:** A major advantage of placing a satellite in a halo orbit around the L1 point is that it provides a continuous view of the Sun without any occultation or eclipses.
- **Real-time Monitoring:** This position allows for real-time tracking of solar activities and their impact on space weather.

Payloads (Instruments)

- VELC – Visible Emission Line Coronagraph (main payload)
- SUIT – Solar Ultraviolet Imaging Telescope
- ASPEX – Solar wind particle experiment
- PAPA – Plasma Analyser
- MAG – Magnetometer

Key Achievements

- Successfully inserted into halo orbit around L1 (Jan 2024)
- Continuous solar observation started

Key Solar Missions (Globally)

- **PUNCH (NASA):** It uses four suitcase-sized satellites to image the sun's inner corona, bridging the gap between the sun and Earth to understand the origins of solar flares.
- **Proba-3 (ESA):** The European Space Agency's Proba-3 is designed to study the solar corona and solar winds by creating a solar eclipse using two high-precision satellites.
- **Solar Polar Orbit Observatory (China/NSSC):** Planned for 2029, this mission aims to provide high-inclination views of the sun, which is crucial for understanding its magnetic field structure.
- **Parker Solar Probe (NASA):** Currently orbiting in the sun's atmosphere to analyze its structure, launched in 2018.
- **Solar Orbiter (ESA/NASA):** Active since 2020, capturing high-resolution images of the Sun's polar regions.

5.6. INS ARIDHAMAN

Context:

Recently, the Union Defence Minister Rajnath Singh formally commissioned **INS Aridhaman** (S4) into the Indian Navy at the Shipbuilding Centre (SBC) in Visakhapatnam. This induction is a landmark event as it marks the completion of a critical phase in India's **Advanced Technology Vessel (ATV)** project.

The commissioning coincided with the induction of the stealth frigate **INS Taragiri**, further emphasizing India's push toward *Aatmanirbharta* (self-reliance) in the maritime defense sector.



1. Classification and Project

- **Class:** It is the third **Arihant-class** nuclear-powered ballistic missile submarine (**SSBN**).
- **Project:** Developed under the highly classified **Advanced Technology Vessel (ATV) Project**, managed by the DRDO, Department of Atomic Energy (DAE), and the Indian Navy.
- **Name Meaning:** "Aridhaman" is a Sanskrit word translating to "Vanquisher of Foes" or "Destroyer of Enemies."

2. Technical Specifications

- **Displacement:** Approximately **7,000 tonnes**, making it larger and heavier than its predecessors, INS Arihant (~6,000 tonnes) and INS Arighaat.
- **Length:** The submarine features a "stretched hull" (approx. 130 meters) to accommodate additional weaponry and equipment.
- **Propulsion:** Powered by an indigenously developed **83 MW Pressurized Light-Water Reactor (PLWR)**, allowing it to remain submerged for months, limited only by food supplies and crew endurance.
- **Indigenization:** It boasts nearly **70-75% indigenous content**, involving over 200 Indian MSMEs and major firms like L&T and Tata.

3. Weaponry and Firepower

- **Vertical Launch Tubes:** INS Aridhaman is equipped with **8 launch tubes**, which is double the capacity of INS Arihant and INS Arighaat (which have 4 each).
- **Missile Payload:**
 - **K-4 SLBM:** It can carry up to **8 K-4 intermediate-range missiles** with a strike range of **3,500 km**.
 - **K-15 Sagarika:** Alternatively, it can carry **24 K-15 short-range missiles** with a range of **750 km**.
- **Strategic Reach:** The inclusion of K-4 missiles allows the submarine to target deep-seated regional threats while remaining safely stationed in the deep waters of the Indian Ocean or the Bay of Bengal.

4. Advanced Features

- **Stealth:** Features advanced silencing technologies and an upgraded reactor design that significantly reduces its acoustic signature, making it harder to detect.

- **Sensors:** Equipped with the indigenous **USHUS** sonar suite and **Panchendriya** unified fire control systems.

5. Strategic Significance

A. Completion of the Nuclear Triad

- The nuclear triad refers to a country's ability to launch nuclear strikes from land, air, and sea. While land and air legs were established earlier, a survivable sea leg is crucial.
- With three SSBNs (Arihant, Arighaat, and Aridhaman), India can now maintain **Continuous At-Sea Deterrence (CASD)**, ensuring at least one submarine is always on patrol while others are in transit or maintenance.

B. Credible Second-Strike Capability

- As a nation with a **"No First Use" (NFU)** nuclear doctrine, India requires a guaranteed retaliatory capability.
- SSBNs are the most survivable platform in the event of a first strike because they are hidden deep underwater, ensuring that India can deliver a "credible second strike."

5.7. INDIA'S PROTOTYPE FAST BREEDER REACTOR (PFBR)

Context:

Recently, the 500 MWe Prototype Fast Breeder Reactor (PFBR) at Kalpakkam, Chennai, achieved "criticality," marking a historic leap in India's civil nuclear journey. This milestone signifies that the nuclear fission chain reaction within the reactor has become self-sustaining and controlled.

Developed by **Bharatiya Nabhikiya Vidyut Nigam Limited (BHAVINI)**, the PFBR serves as

the essential bridge to the second stage of India's nuclear programme, paving the way for the eventual utilization of thorium for long-term energy security.



1. The Prototype Fast Breeder Reactor (PFBR)

- **Location:** Kalpakkam, Tamil Nadu.
- **Capacity:** 500 MWe (Megawatt electrical).
- **Agency:** Designed by **Indira Gandhi Centre for Atomic Research (IGCAR)** and built by **BHAVINI**.
- **Fuel:** Uses **Mixed Oxide (MOX) fuel**, which is a combination of Plutonium-239 (derived from Stage 1) and depleted Uranium-238.
- **Coolant:** Uses **Liquid Sodium**. Unlike water, sodium does not slow down neutrons, which is necessary for a "fast" reactor.

2. The "Breeder" Concept

- A breeder reactor is designed to produce more fissile material than it consumes.
- In the PFBR, neutrons trigger fission in Plutonium-239 to produce energy. Simultaneously, these "fast" neutrons convert the surrounding **Uranium-238 (blanket)** into more **Plutonium-239**.

- In the future, a **Thorium-232 blanket** will be used to breed **Uranium-233**, which is the fuel for the third stage.

3. India’s Three-Stage Nuclear Programme

The programme was formulated by **Dr. Homi J. Bhabha** to make India self-reliant by utilizing its modest uranium and vast thorium reserves.

Stage	Reactor Type	Fuel Used	Key By-product/Goal
Stage 1	Pressurised Heavy Water Reactor (PHWR)	Natural Uranium	Plutonium-239
Stage 2	Fast Breeder Reactor (FBR)	MOX (Pu-239 + U-238)	More Pu-239 / U-233
Stage 3	Advanced Heavy Water Reactor (AHWR)	Thorium-232 + U-233	Energy from Thorium

4. Technical and Safety Features

- **Pool-type Reactor:** The entire primary circuit (core, pumps, and heat exchangers) is immersed in a large pool of liquid sodium, providing high thermal inertia (safety against overheating).
- **Closed Fuel Cycle:** The **Demonstration Fast Reactor Fuel Reprocessing Plant (DFRP)** at Kalpakkam is designed to "close" the loop by reprocessing spent fuel from the FBR to extract plutonium and unburnt uranium.
- **Liquid Sodium Challenge:** Sodium is highly reactive with air and water; hence, the reactor requires sophisticated leak-detection and intermediate cooling loops.

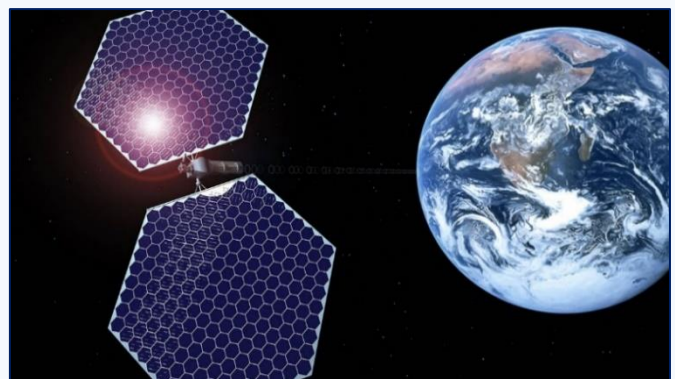
5.8. SPACE-BASED SOLAR POWER (SBSP)

Context:

Recently, the global scientific community has intensified its focus on sustainable energy alternatives, with the **Artemis II mission** achieving record-breaking lunar flybys in April 2026, renewing interest in lunar-based infrastructure.

Against this backdrop, concepts like the **Shimizu Corporation's "Lunar Ring"**—a

proposed 11,000 km belt of solar power plants on the moon's equator—have moved from speculative science fiction to serious academic and policy discussion. These systems aim to collect uninterrupted solar energy and beam it back to Earth via microwave radiation to provide a constant, clean power source.



1. What is Space-Based Solar Power?

SBSP refers to the collection of solar energy in outer space (either in Earth's orbit or on the lunar surface) and its subsequent transmission to Earth.

Working Mechanism:

- **Collection:** Large solar arrays or mirrors reflect sunlight onto photovoltaic cells.
- **Conversion:** The electricity generated is converted into **microwaves** or **laser beams**.
- **Transmission:** These beams are transmitted through the atmosphere to a ground-based receiving antenna (often called a **rectenna**).
- **Re-conversion:** The rectenna converts the microwave/laser energy back into electricity for the grid.

2. Key Concepts & Projects

- **Lunar Ring (Luna Ring):** A Japanese proposal (Shimizu Corp) to build a solar belt around the moon's equator. It utilizes **In-Situ Resource Utilization (ISRU)**, where robots build the structure using lunar soil (regolith).
- **Constant Energy:** Unlike Earth-based solar, an orbital satellite or a 360-degree lunar ring can collect sunlight **24/7**, regardless of weather, seasons, or day-night cycles.
- **Wireless Power Transfer (WPT):** The fundamental technology used to "beam" energy across the vacuum of space.

3. Advantages Over Terrestrial Solar

- **High Intensity:** Solar radiation in space is roughly **35-40%** more intense than on Earth's surface due to the absence of atmospheric scattering.
- **Zero Intermittency:** Space-based systems are not affected by cloud cover, dust, or the 12-hour night cycle.
- **Global Reach:** Energy can theoretically be beamed to any location on Earth, including remote islands or disaster-hit zones.

4. Critical Challenges

- **Economics:** The "levelized cost of energy" remains prohibitively high due to the massive cost of launching thousands of tonnes of hardware.
- **Transmission Loss:** Significant energy is lost as **heat** during the conversion and atmospheric entry phases.
- **Space Debris:** The **Kessler Syndrome** (cascading collisions) poses a major risk; a single piece of debris could destroy a billion-dollar array.
- **Environmental Impact:** Potential heating of the ionosphere or release of hazardous chemicals during frequent rocket launches required for assembly.
- **Maintenance:** Dependence on **tele-robotics** since human-led maintenance in high orbits (GEO) or on the moon is extremely costly and dangerous.

5. Institutional & Global Efforts

- **ISRO (India):** Has expressed interest in SBSP as part of its long-term space vision to ensure energy security.
- **China:** Developing "Bishantai," a space-based solar power station test facility.
- **Caltech (USA):** Recently demonstrated the first successful wireless power transfer from space to Earth via the **MAPLE** experiment.

5.9. PULSARS AND DEEP SPACE NAVIGATION

Context:

Recently, Indian astronomers have pioneered a more accurate method to measure distances in the universe by studying the radio emissions of **Pulsars** as they travel through ionized gas clouds in the Milky Way.

Published in the *Monthly Notices of the Royal Astronomical Society*, the research focuses on how signals from these pulsating stellar remnants are distorted by the interstellar medium, specifically using the **Vela pulsar wind nebula** as a primary subject of study. This breakthrough addresses long-standing inaccuracies in distance estimation caused by turbulent plasma in complex regions of our galaxy.



1. What are Pulsars?

Pulsars (short for Pulsating Radio Sources) are highly magnetized, rapidly rotating **Neutron Stars**—the dense cores left behind after a massive star undergoes a supernova explosion.

- **Emission Mechanism:** They emit beams of electromagnetic radiation (radio waves) from their magnetic poles. Because these beams sweep across Earth like a lighthouse beam, they appear as "pulses."
- **Cosmic Clocks:** Due to their extraordinarily stable rotation rates, pulsars are used as high-precision timekeepers, similar to atomic clocks on Earth.
- **Millisecond Pulsars:** These spin hundreds of times per second and are critical for detecting gravitational waves.

2. Measuring Distance: The "New Way"

Traditional methods often rely on models of electron distribution which can be unreliable. The new method combines two distinct physical effects:

- **Dispersion Measure (DM):** As radio waves travel through the interstellar medium, free electrons slow down lower-frequency waves more than higher-frequency ones. By measuring this delay, scientists estimate the number of electrons between Earth and the pulsar.
- **Scatter Broadening:** Interstellar plasma is not smooth; its irregularities scatter radio waves, causing the signal to appear "smeared" or stretched. This is similar to the twinkling of stars but occurs in the radio spectrum.
- **The "k-factor":** The researchers combined DM and scattering into a single parameter called the k -factor to refine distance estimates in complex regions like the **Gum Nebula**.

3. Comparison with Parallax Method

- **Parallax Method:** Considered the "gold standard," it uses trigonometry to measure distances based on the Earth's orbit. However, it has a "hard limit" and becomes less effective for objects at extreme distances.
- **The Novel Method:** Does not have a specific distance limitation. It can potentially be used to measure distances to objects outside the Milky Way, such as **Fast Radio Bursts (FRBs)**.

4. Key Institutions and Regions Involved

- **IIT-Kanpur & Raman Research Institute:** Leading Indian institutions involved in the study.

- **Gum Nebula:** A vast region of ionized gas where the new model was tested against 10 different pulsars.
- **Vela Pulsar Wind Nebula:** A key celestial target used to validate the scattering and dispersion models.

5.10. GAGANYAAN - INDIA'S HUMAN SPACEFLIGHT PROGRAMME

Context:

Recently, discussions regarding the safe return and recovery of Indian astronauts under the **Gaganyaan Mission** have gained prominence as ISRO intensifies its testing phase. As of April 2026, with the uncrewed G1 mission on the horizon, the focus has shifted toward the critical "Descent and Recovery" phase.

Unlike the Russian Soyuz or Chinese Shenzhou which primarily use land-based landings, India's Gaganyaan will utilize a water-based splashdown in the **Bay of Bengal**, necessitating a complex multi-stage parachute system and coordinated naval recovery operations.



1. Mission Overview

The Gaganyaan programme aims to demonstrate India's indigenous capability to send a human crew to **Low Earth Orbit (LEO)** and bring them safely back to Earth.

- **Orbit:** 400 km circular orbit.
- **Duration:** 1 to 3 days (expandable up to 7 days).
- **Crew:** 3 members (Astronaut-designates: Gp Capt P.B. Nair, Gp Capt Ajit Krishnan, Gp Capt Angad Pratap, and Wg Cdr Shubhanshu Shukla).
- **Landing:** Planned splashdown in the **Indian Ocean**.

2. Spacecraft Components

The Gaganyaan spacecraft, known as the **Orbital Module**, consists of two main parts:

- **Crew Module (CM):** A double-walled, pressurized habitable space designed to maintain an Earth-like environment (temperature, oxygen, humidity) for the astronauts.
- **Service Module (SM):** An unpressurized structure containing the propulsion system, power systems (solar arrays), and avionics to support the CM in orbit.

3. Launch Vehicle: Human-Rated LVM3 (HLVM3)

ISRO's heavy-lift launcher, **LVM3**, has been re-configured to meet "Human Rating" standards, ensuring high reliability and safety.

- **Three Stages:**
 1. **S200 Solid Boosters:** Two large solid motors.
 2. **L110 Liquid Core:** Powered by clustered Vikas engines.
 3. **C25 Cryogenic Stage:** Powered by the CE-20 engine (liquid hydrogen and liquid oxygen).
- **Safety Factor:** Includes an **Integrated Health Monitoring System** to detect anomalies in real-time.

4. Key Safety and Technology Elements

- **Crew Escape System (CES):** A crucial safety mechanism that can pull the Crew Module away from the rocket in case of an emergency during launch or ascent.
- **Environmental Control and Life Support System (ECLSS):** Maintains pressure, removes CO₂, and manages waste and temperature.
- **Vyommitra:** A female-looking humanoid robot ("Half-humanoid") designed to simulate human functions and monitor module parameters during uncrewed missions to ensure safety before humans fly.

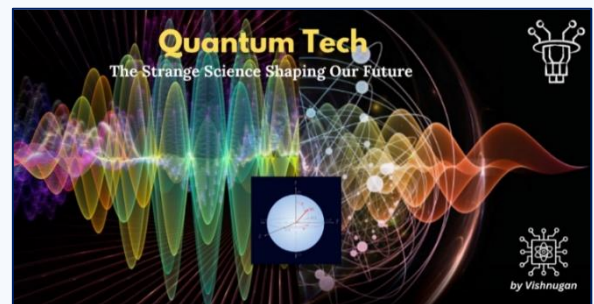
5. Phases of the Mission

1. **TV-D1 (Test Vehicle Abort Mission):** Successfully demonstrated the Crew Escape System in October 2023.
2. **Gaganyaan G1 (Uncrewed):** Expected in 2026; will carry Vyommitra.
3. **Gaganyaan G2:** Second uncrewed mission for final system validation.
4. **H1 (Manned Mission):** The final crewed flight (tentatively 2026-2027).

5.11. INDIA'S FIRST QUANTUM REFERENCE FACILITY

Context:

Recently, the Andhra Pradesh state government announced that India's first **quantum computing testing beds**, known as the **Amaravati Quantum Reference Facility (AQRF)**, will be launched. The facility is scheduled to be dedicated to the nation by Honorable Chief Minister N. Chandrababu Naidu on **April 14**, a date that coincides with **World Quantum Day**.



This initiative is part of the "**Amaravati Quantum Valley**" programme, making Andhra Pradesh the first state in the country to take such a significant step in quantum infrastructure.

1. Core Significance and Functionality

- **The Reference Gap:** Prior to this launch, India did not have a dedicated quantum testing computer that could serve as a **reference** to validate various components of the burgeoning quantum computing ecosystem.
- **Testing Bed:** The AQRF will function as a standardized platform where researchers and scientists can test and assemble quantum hardware and software components.
- **Location:** The testing beds are being developed and hosted at **SRM University, Andhra Pradesh**.

2. Collaborative Framework

The development involves a specialized team of 50 researchers, students, and scientists working on building the ecosystem. The project is a partnership between:

- **SRM University A.P.**
- **Amaravati Quantum Research Facility**
- **Qubit Force**

3. What is Quantum Technology?

- Quantum science studies how **matter and energy** behave at very small scales—atoms, electrons, and photons.
- It is based on **Quantum Mechanics**, which explains phenomena that classical physics cannot.
- **Quantum technology** leverages the principles of **quantum mechanics**—specifically **superposition, entanglement, and tunneling** (Particles pass through barriers)—to perform tasks impossible for conventional technologies.

4. Key Pillars of Quantum Technology

- **Quantum Computing:** Instead of binary bits (0 or 1), quantum computers use **qubits** that can exist in multiple states simultaneously (**superposition**). This allows them to process complex problems exponentially faster than classical supercomputers.
- **Quantum Communications:** Utilizing principles like **quantum entanglement**, this technology ensures secure communication channels, such as Quantum Key Distribution (QKD), which makes eavesdropping physically impossible to go undetected.
 - **Entanglement:** Particles become connected, sharing information instantly regardless of distance.
- **Quantum Sensing:** These sensors measure **environmental changes** with unprecedented precision. Examples include atomic-level MRI scans for early cancer detection and navigation systems that do not require GPS.
- **Quantum Materials:** Research into engineering materials that exhibit quantum properties, which can lead to new electronic devices or energy solutions.

5. Applications

- **Quantum Computing** – Fast computation, optimization, AI, drug discovery
- **Quantum Cryptography** – Ultra-secure communication (QKD)
- **Quantum Communication** – Secure satellite & fiber-based data transfer
- **Quantum Sensing** – High-precision measurement (gravity, magnetic fields)
- **Atomic Clocks** – Ultra-accurate timekeeping (GPS, navigation)
- **Healthcare & Pharma** – Drug discovery, molecular simulation
- **Cybersecurity** – Next-gen encryption systems
- **Artificial Intelligence** – Faster machine learning & big data processing
- **Finance** – Risk analysis, portfolio optimization
- **Climate Modeling** – Better prediction of climate change
- **Material Science** – Development of new materials (superconductors, etc.)
- **Space Technology** – Satellite communication, deep-space navigation
- **Defence & Military** – Secure communication, advanced radar systems
- **Energy Sector** – Battery design, nuclear simulations

6. About National Quantum Mission

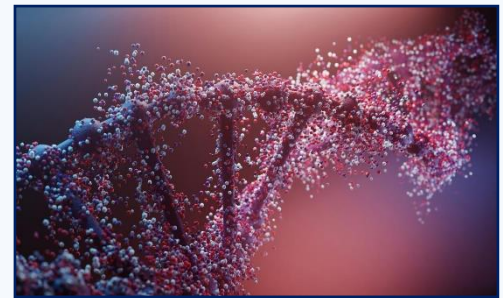
- **Launched:** For a period from 2023-24 to 2030-31 by Department of Science and Technology (DST).
- **Objectives of National Quantum Mission (Concise)**
 - **Quantum Computing:** Develop quantum computers with 20–50 qubits (3 yrs), 50–100 (5 yrs), and up to 1000 (8 yrs) using superconducting & photonic technologies.

- **Quantum Communication (Satellite):** Establish 2000 km satellite-based secure quantum communication within India and extend globally.
- **Quantum Key Distribution (QKD):** Enable 2000 km secure communication over optical fiber using trusted nodes & WDM.
- **Quantum Networks:** Build multi-node quantum networks (2–3 nodes) using entanglement, quantum repeaters & memories.
- **Quantum Sensing & Clocks:** Develop high-precision sensors (magnetometers, gravity sensors) and ultra-accurate atomic clocks.
- **Quantum Materials & Devices:** Develop advanced materials (superconductors, semiconductors) for qubits, photon sources, and quantum devices.
- **Implementation Strategy: Thematic Hubs (T-Hubs)**
 - **Under the National Quantum Mission,** 4 Thematic Hubs (T-Hubs) drive quantum innovation nationwide. They integrate 14 Technical Groups across 17 states and 2 UTs for research and development.
- **Key Institutions:**
 - IISc Bengaluru
 - IIT Madras (with C-DOT, New Delhi)
 - IIT Bombay
 - IIT Delhi

5.12. INHERITED PERIPHERAL NEUROPATHY (IPN) AND ARS MUTATIONS

Context:

Recently, new scientific research has clarified a long-standing mystery regarding why specific genetic mutations lead to debilitating nerve diseases while other, seemingly more severe mutations, do not. By utilizing yeast models to simulate human genetic behavior, researchers discovered that certain faulty proteins possess a "dominant-negative" property. This means the mutated protein does not simply disappear; it actively interferes with the healthy version, causing a critical shortage of the components needed for protein synthesis. This discovery is significant for the medical field as it identifies a specific target for future gene-silencing therapies.



1. What is Peripheral Neuropathy?

Peripheral neuropathy refers to a condition where the peripheral nerves—the vast communications network that transmits signals between the central nervous system (brain and spinal cord) and all other parts of the body—are damaged.

- **Symptoms:** High foot arches, curled toes, muscle wasting (thin calves), loss of sensation, and coordination issues.
- **Prevalence:** Inherited versions (IPN) affect approximately **1 in 2,500 individuals**.

2. The Role of Aminoacyl-tRNA Synthetases (ARS)

ARS are essential enzymes dubbed "housekeeping" enzymes because they are critical for the very first step of protein synthesis in every cell.

- **Function:** They are responsible for "**charging**" tRNA. They attach specific amino acids (like alanine or asparagine) to their corresponding tRNA molecules.
- **The Process:**
 - DNA is copied into **mRNA**.
 - ARS enzymes ensure the correct amino acid is loaded onto the tRNA.
 - tRNA delivers these amino acids to the **ribosome** (the protein factory) to build a polypeptide chain.
- **Genetic Count:** Humans have 37 genes coding for ARS enzymes; mutations in at least 7 of these are known to cause IPN.

3. The "Dominant-Negative" Phenomenon

The core question of the research was why some people with a "null" mutation (one gene copy completely missing) remain healthy, while those with a specific "missense" mutation become ill.

- **Normal State:** Humans have two copies of every gene. One functional copy is usually enough to maintain health.
- **Dominant-Negative Property:** In certain mutations, the faulty protein produced by the mutated gene does not just "stop working." Instead, it **actively interferes** with the healthy protein produced by the normal gene copy.
- **Dimerization:** These proteins often work in pairs (dimers). A mutant protein can pair with a healthy one to create a "broken duo," effectively reducing the total pool of functional enzymes to levels far below 50%, leading to cellular failure.

4. Why are Long Nerves Sensitive?

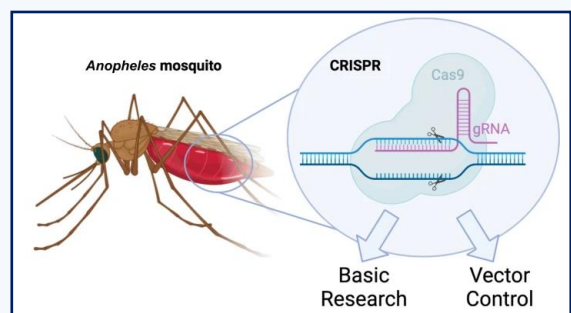
- Peripheral nerves are unique because of their extreme length (e.g., from the spine to the toe). The cell body must supply proteins to the very end of the axon. Even a slight decrease in the efficiency of protein synthesis due to these "dominant-negative" mutations can cause these long-distance supply lines to fail, leading to nerve degeneration.

5.13. GENE DRIVE TECHNOLOGY & MALARIA CONTROL

Context:

Recently, the "**Transmission Zero**" project—a collaboration between Imperial College London and the Ifakara Health Institute in **Tanzania**—achieved a breakthrough by demonstrating that genetically modified mosquitoes could block malaria parasite transmission in a real-world endemic setting. This marks

a shift from laboratory-only success to potential field application of **Population Modification** using **CRISPR-Cas9 gene drives**.



1. Understanding Gene Drive Technology

- **Definition:** A genetic engineering technology that bypasses traditional **Mendelian inheritance** to ensure a specific trait is passed to almost **100% of offspring** (instead of the usual 50%).

- **Mechanism:** Uses the **CRISPR-Cas9** system to "copy and paste" a modified gene into the partner chromosome during reproduction.
- **Goal:** Rapidly spread a desired trait through an entire wild population over a few generations.

2. Highlights of the Tanzania Study

- **First for Africa:** It demonstrated that modified mosquitoes could suppress malaria parasites from **real-world infections**, not just laboratory cultures.
- **Localized Engineering:** Conducted in a high-containment insectary in **Bagamoyo, Tanzania**, using local **Anopheles gambiae** mosquitoes.
- **Effector Molecules:** Engineered mosquitoes produced two antimicrobial peptides in their midgut upon taking a blood meal, preventing the *Plasmodium* parasite from reaching the salivary glands.
- **Safety Features:** Researchers are exploring "**Self-limiting**" drives (which disappear over time) and "Off-switches" to reverse the spread if needed.

3. Key Approaches in CRISPR-Cas9 Malaria Control

- **Population Suppression (Gene Drives):** CRISPR-Cas9 disrupts essential female reproduction genes (e.g., AGAP005958, AGAP011377), leading to a drastic reduction in mosquito numbers and, consequently, reduced transmission.
- **Population Modification/Replacement:** Mosquitoes are engineered to be resistant to the malaria parasite, making them unable to transmit it, such as through the knockout of the FREP1 gene.
- **Precision-Guided Sterile Insect Technique (pgSIT):** A specialized CRISPR approach that releases sterile males to reduce the population without using a self-sustaining gene drive.

4. Comparative Analysis: Malaria vs. Dengue

Feature	Malaria	Dengue
Causative Agent	Protozoa (<i>Plasmodium</i> species like <i>P. falciparum</i> , <i>P. vivax</i>)	Virus (<i>Flavivirus</i> - DENV 1, 2, 3, 4)
Primary Vector	Anopheles Mosquito (Female)	Aedes aegypti (and <i>Aedes albopictus</i>)
Feeding Pattern	Mostly Night-biters (Dusk to Dawn)	Mostly Day-biters (Early morning/Late afternoon)
Breeding Habitat	Clean, stagnant water (Puddles, ponds, slow streams)	Artificial containers (Coolers, tires, pots, trays)
Incubation Period	Longer (Usually 10–15 days)	Shorter (Usually 3–14 days)
Key Symptoms	High fever with chills and rigors (shaking); cycling fever patterns.	High fever, severe "break-bone" joint/muscle pain , behind-the-eye pain, skin rash.
Major Complication	Cerebral Malaria, Severe Anemia.	Dengue Hemorrhagic Fever (DHF) , Platelet drop.

Diagnostic Test	Blood Smear (Microscopy) or RDT (Rapid Diagnostic Test).	NS1 Antigen test (early), IgM/IgG Antibody tests.
Vaccine Status	RTS,S and R21/Matrix-M (Approved for children).	Dengvaxia (limited use); Qdenga .

Some Key Facts

- World Malaria Day, observed on **25th April annually**, was established by the World Health Organization (WHO) in 2007 to raise awareness and drive action against malaria.
- Malaria is a life-threatening disease caused by the **Plasmodium parasite**, transmitted to humans by infected **female Anopheles mosquitoes**.
- **Treatment & Prevention:** Advanced with effective drugs like chloroquine and artemisinin, supported by tools like insecticide-treated nets (ITNs) and indoor spraying.
- **Vaccine:** In October 2021, the WHO recommended widespread use of the **RTS,S/AS01 (Mosquirix) vaccine** for children in sub-Saharan Africa and moderate-to-high malaria transmission areas.
- **WHO E-2025 initiative:** The World Health Organization (WHO) launched the E-2025 initiative in April 2021 to support 25 identified countries in eliminating malaria by 2025.

5.14. LUNAR GOVERNANCE

Context:

Recently, the global discourse on lunar governance has intensified following the **65th session of the Legal Subcommittee of the UN Committee on the Peaceful Uses of Outer Space (UNCOPUOS)** held in April 2026. The session focused on the urgent need for a transparent and sustainable framework to manage accelerating lunar activities, particularly concerning the extraction of resources like water ice in the Moon’s South Pole.



1. The International Legal Framework

Lunar governance is primarily anchored in the "Five UN Treaties on Outer Space," with the following being most relevant:

- **Outer Space Treaty (1967):** Considered the "Magna Carta" of space law. It stipulates that space is the **"province of all mankind"** and prohibits national appropriation by claim of sovereignty. It forbids the placement of weapons of mass destruction (WMDs) on the Moon.
- **The Rescue Agreement (1968):** Mandates the rescue and return of astronauts (envoys of mankind) in distress.
- **Liability Convention (1972):** Established that launching states are "absolutely liable" to pay compensation for damage caused by their space objects.
- **Registration Convention (1975):** Requires states to maintain a registry of objects launched into space.

- **The Moon Agreement (1979):** Declares the Moon and its resources as the "**Common Heritage of Mankind.**" It is controversial because it restricts commercial exploitation. **India has signed but not ratified** this agreement, while major powers like the USA, Russia, and China have not signed it at all.

2. Emerging Blocs: Artemis vs. ILRS

The modern "Space Race" has led to two distinct governance models:

- **Artemis Accords (US-led):** A non-binding set of principles for civil space exploration. India became a signatory in 2023. Key features include "**Safety Zones**" (to prevent harmful interference) and the affirmation that extracting lunar resources does not constitute national appropriation.
- **International Lunar Research Station (ILRS) (China-Russia led):** A rival mission aimed at building a permanent lunar base. It emphasizes a "multipolar" governance model and invites global partners, primarily from the Global South.

3. Key Governance Concepts for Prelims

- **In-Situ Resource Utilization (ISRU):** The practice of collecting, processing, and using materials found on the Moon (like water ice for oxygen/fuel) to support missions. Legal ambiguity exists whether ISRU violates the "non-appropriation" principle of the 1967 Treaty.
- **Safety Zones:** Areas established around lunar bases to prevent "harmful interference" from other nations' activities. Critics argue these could become "de facto" territorial claims.
- **Space Situational Awareness (SSA):** The monitoring of space debris and traffic. With the Moon becoming crowded, SSA is vital for "Lunar Traffic Management."

4. India's Lunar Roadmap

- **Indian Space Policy 2023:** Encourages **Non-Government Entities (NGEs)** to participate in end-to-end space activities, including lunar exploration.
- **Space Vision 2047:**
 - **Bharatiya Antariksh Station (BAS):** India's own space station by 2035.
 - **Crewed Moon Landing:** Targeted for 2040.
 - **Chandrayaan-4:** A mission designed to demonstrate docking/undocking and lunar sample return capabilities.

UPSC PRELIMS PRACTICE QUESTIONS

Q. With reference to Extracellular RNA (ExRNA), consider the following statements:

1. It refers to RNA molecules that remain stable outside the cell by being enclosed in lipid-based molecular containers.
2. ExRNA is exclusively composed of messenger RNA (mRNA) and does not include non-coding RNA varieties.
3. It can act as a signaling medium to mediate communication between distant cells in the human body.

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)

Explanation:

- **STATEMENT 1 IS CORRECT:** ExRNA survives in the extracellular milieu because it is protected by molecular containers like extracellular vesicles (exosomes) or lipoproteins that prevent enzymatic degradation.
- **STATEMENT 2 IS INCORRECT:** ExRNA is a heterogeneous population. It includes not only coding RNA (mRNA) but also various non-coding RNAs such as **microRNA (miRNA)**, **small interfering RNA (siRNA)**, and **long non-coding RNA (lncRNA)**.
- **STATEMENT 3 IS CORRECT:** One of the primary biological functions of ExRNA is to serve as a sophisticated long-distance communication system, allowing donor cells to influence the gene expression of recipient cells.

Q. With reference to the Falcon 9 launch vehicle, consider the following statements:

1. It is the world's first orbital-class rocket capable of vertical landing and reusability of its first stage.
2. It uses a cryogenic engine in its upper stage that functions primarily on Liquid Hydrogen (H₂) and Liquid Oxygen (O₂).
3. Recent studies suggest that the re-entry of its components may lead to the accumulation of aluminum oxides in the stratosphere, potentially affecting the ozone layer.

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)

Explanation:

- **STATEMENT 1 IS CORRECT:** Falcon 9 is renowned for being the first orbital rocket to achieve reusability through vertical propulsive landing.
- **STATEMENT 2 IS INCORRECT:** Falcon 9 does **not** use Liquid Hydrogen. Both its first and second stages use **RP-1 (Kerosene)** and **Liquid Oxygen**. Cryogenic engines using H₂ are common in GSLV or Ariane rockets, but not Falcon 9.
- **STATEMENT 3 IS CORRECT:** As reported in today's news (**The Hindu**), the metallic debris from frequent re-entries is a growing concern for stratospheric chemistry and the ozone layer.

Q. With reference to the Indian Space Situational Assessment Report (ISSAR) and space debris, consider the following statements:

Statement-I: India has committed to achieving a "Zero Debris" status for all its space missions by the year 2030 through the Debris Free Space Mission (DFSM).

Statement-II: The Project NETRA is a dedicated Indian communication satellite designed to provide high-speed internet to the Arctic region.

Which one of the following is correct in respect of the above statements?

- (a) Both Statement-I and Statement-II are correct and Statement-II is the correct explanation for Statement-I.
- (b) Both Statement-I and Statement-II are correct and Statement-II is not the correct explanation for Statement-I.
- (c) Statement-I is correct but Statement-II is incorrect.
- (d) Statement-I is incorrect but Statement-II is correct.

Ans. (c)

Explanation:

- **STATEMENT I IS CORRECT:** India, through ISRO, has officially announced the **Debris Free Space Mission (DFSM)** to ensure zero debris creation by both government and private Indian space actors by 2030.
- **STATEMENT II IS INCORRECT:** **Project NETRA** is not a communication satellite; it is an **Early Warning System** and a network of observational facilities (radars and telescopes) used to track space debris and protect Indian space assets from collisions.

Q. With reference to the recently commissioned submarine INS Aridhaman, consider the following statements:

- 1. It is a nuclear-powered attack submarine (SSN) primarily designed for anti-submarine warfare.
- 2. It features double the number of vertical launch tubes compared to its predecessor, INS Arihant.

- 3. It is the first vessel in the Arihant-class to be equipped with the K-4 ballistic missile.

Which of the statements given above is/are correct?

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

Ans. (b)

Explanation:

- **STATEMENT 1 IS INCORRECT:** INS Aridhaman is a **Nuclear-powered Ballistic Missile Submarine (SSBN)**, not an attack submarine (SSN). Its primary role is strategic deterrence and carrying nuclear missiles, whereas SSNs carry conventional weapons.
- **STATEMENT 2 IS CORRECT:** INS Aridhaman has **8 vertical launch tubes**, whereas INS Arihant and INS Arighaat were equipped with only 4 launch tubes.
- **STATEMENT 3 IS INCORRECT:** While INS Aridhaman is optimized for the K-4, the K-4 missile was also tested and intended for use with previous vessels like INS Arighaat; hence, it is not the "first" class vessel to utilize K-series technology, though it is the first to carry 8 such missiles.



Scan to attempt more questions

HISTORY & CULTURE

6.1. CHAR DHAM YATRA

Context:

The sacred Char Dham Yatra in Uttarakhand has recently been scheduled to commence from April 19, 2026, marking the beginning of one of the most significant pilgrimages in Hinduism.

The Char Dham Yatra is one of the most sacred Hindu pilgrimages in India, located in the Garhwal region of Uttarakhand. It consists of four holy sites nestled in the Himalayas, traditionally visited in a specific clockwise direction (Parikrama).

1. About Char Dham:

The 4 Dham (Char Dham) refers to two sets of sacred Hindu pilgrimages. The primary Bada Char Dham (nationwide) includes Badrinath (North), Puri (East), Rameswaram (South), and Dwarka (West), established to promote national unity. The Chota Char Dham (Himalayas) features Yamunotri, Gangotri, Kedarnath, and Badrinath, usually visited from May to October.



2. The Four Sacred Sites

- **Yamunotri:** Dedicated to **Goddess Yamuna**. It is the first stop and the source of the Yamuna River. Pilgrims often cook rice in the Surya Kund (hot springs) as *Prasad*.
- **Gangotri:** Dedicated to **Goddess Ganga**. Located on the banks of the Bhagirathi River, it marks the place where the Ganges is said to have descended from heaven.
- **Kedarnath:** One of the 12 **Jyotirlingas** dedicated to **Lord Shiva**. Located in Rudraprayag district of Uttarakhand at an altitude of 3584 m near the **Mandakini River**, is a sacred abode of Lord Shiva and one of the 12 Jyotirlingas.
- **Badrinath:** Badrinath Temple, situated at 3415 m in the Garhwal Himalayas along the **Alaknanda River**, is a major Char Dham shrine dedicated to Lord Vishnu (Badri form). Linked to his penance under the Badri tree, it houses a meditative shaligram idol, was revived **by Adi Shankaracharya** in the 9th century.

3. Winter Char Dham Circuit

During winter (typically November to April/May), the high-altitude Char Dham deities in Uttarakhand are moved to lower altitudes to allow for continued worship.

- Kedarnath moves to Omkareshwar Temple in **Ukhimath**.
- Badrinath moves to Yogadhyan Badri in Pandukeshwar/Joshimath.
- Gangotri moves to Mukhba village.
- Yamunotri moves to Kharsali (Khushimath).

4. Panch Prayag

The Panch Prayag refers to five sacred river confluences in the Garhwal Himalayas of Uttarakhand, India, where tributaries meet the Alaknanda River before it becomes the Ganga at Devprayag. These sites—**Vishnuprayag, Nandaprayag, Karnaprayag, Rudraprayag, and Devprayag**.

- **Vishnuprayag:** Confluence of **Dhauliganga** and Alaknanda; linked to sage Narada and a Vishnu temple.
- **Nandaprayag:** Meeting of Alaknanda and **Nandakini**; associated with King Nanda's yajna.
- **Karnaprayag:** Confluence of Alaknanda and **Pindar**; linked to Karna's penance.
- **Rudraprayag:** Meeting of Alaknanda and **Mandakini**; associated with Lord Shiva.
- **Devprayag:** Confluence of Alaknanda and **Bhagirathi** forming the Ganga; the most sacred.



6.2. INVENTORY OF JEWELS IN INNER CHAMBER OF JAGANNATH TEMPLE

Context:

Recently, the **Odisha High Court** ordered an inventory of valuables stored in the **Bhitara Ratna Bhandar** (inner chamber) of the **Shree Jagannath Temple, Puri** — the first such exercise since **1978** (after 48 years). A team of goldsmiths, RBI representatives, and temple priests is conducting this exercise using **3D mapping and colour-coded categorization**.

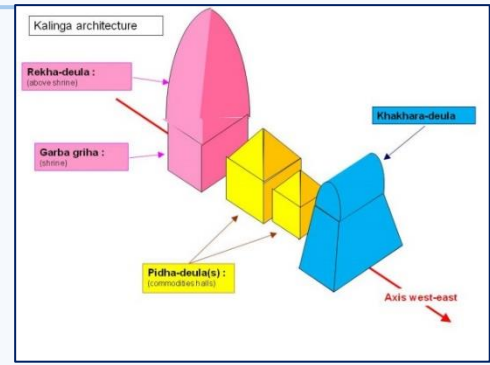


1. Historical and Architectural Context

- **Temple Era:** The Shree Jagannath Temple was constructed in the **12th century**.
- **Dynastic Link:** It was commissioned by King **Anantavarman Chodaganga Deva** of the Eastern **Ganga Dynasty**.
- **Architectural Style:** It is a classic example of **Kalinga Architecture**, specifically the **Rekha Deul** (Sanctum with a curvilinear spire) style.
- **Deities:** The temple is dedicated to **Lord Jagannath, Lord Balabhadra, and Goddess Subhadra**. Unlike traditional stone idols, these are made of **wood** and are ritually replaced during the *Nabakalebara* ceremony.
- **The Four Dhams:** It is one of the four holiest pilgrimage sites (**Char Dham**) in Hinduism.
- **Associated Bhakti Saints:** Many great Vaishnava saints, such as Chaitanya Mahaprabhu, Ramanujacharya, Madhvacharya, Nimbarkacharya, Vallabhacharya and Ramananda were closely associated with the temple.

2. The Ratna Bhandar and Inventory Process

- **Bhitara Ratna Bhandar:** This is the inner chamber of the treasury used to store unused jewelry and ancient valuables of the temple.
- **Supervision:** The documentation is conducted by a team including goldsmiths, representatives of the **Reserve Bank of India (RBI)**, and temple priests.
- **Modern Technology:** For the first time, **3D mapping** is being used to document items, along with a systematic weighing and cataloging process.
- **Color-Coding System:** A specific system is used for storage—gold ornaments are wrapped in **yellow velvet**, while silver and precious stones are stored in **white and red clothing**.



3. Kalinga Temple Architecture: Key Features

- **Rekha Deula (Main Shrine):** A tall, vertical, sugar-loaf-shaped building covering the sanctum sanctorum, designed to look like a mountain peak. Examples include the main spire of the Lingaraj and Konark Sun temples.
- **Pidha Deula (Assembly Hall):** A rectangular or square hall featuring a pyramid-shaped roof built with horizontal tiers (pidhas), typically used for the jagamohana (audience hall).
- **Khakhra Deula (Shakti Temples):** Rare rectangular structures with a barrel-vaulted roof (resembling a pumpkin or gourd), often dedicated to female deities like Shakti (e.g., Baitala Temple).

4. Important Festivals Associated with Jagannath Temple

Festival	Significance
Rath Yatra	Annual chariot procession; deities taken out in three massive chariots — Nandighosa (Jagannath), Taladhwaja (Balabhadra), Darpadalana (Subhadra)
Snana Yatra	Bathing festival of the deities on Jyeshtha Purnima
Nabakalebara	Ritual replacement of wooden deities (Daru Brahma) — occurs once in 8, 12, or 19 years
Chandan Yatra	42-day festival involving boat processions
Bahuda Yatra	Return chariot procession after Rath Yatra

5. UNESCO and Heritage Status

- Jagannath Temple is part of the **Puri Heritage Corridor** project
- Puri is being developed as a **heritage smart city**
- The **Konark Sun Temple** (also in Odisha, Eastern Ganga dynasty) is a **UNESCO World Heritage Site**
- The three major temples of Odisha — Jagannath (Puri), **Lingaraj** (Bhubaneswar), and **Konark** (Sun Temple) — represent the pinnacle of Kalinga architecture

6.3. ADI SHANKARACHARYA

Context:

Recently, the **1238th birth anniversary** of Jagadguru Adi Shankaracharya is being celebrated as **Sri Shankara Jayanti Mahotsav** on **April 21, 2026 (Vaishakha Shukla Panchami)**. Major celebrations are organized by the **Dakshinamnaya Sringeri Sharada Peetham** from April 18 to April 21, 2026, highlighting the rediscovery of his birthplace, **Kalady**, and his role in the national and dharmic integration of India.



1. Life and Background

- **Birthplace:** Born in **Kalady**, Kerala, on the banks of the **River Poorna** (Periyar) to **Aryamba** and **Shivaguru**.
- **Early Genius:** At age 8, he set out to find a Guru, eventually studying under **Sri Govinda Bhagavatpadacharya** on the banks of the Narmada.
- **The Rediscovery of Kalady:** His birthplace had faded from public memory for centuries until it was rediscovered in the late 19th century by **Sri Sacchidananda Shivabhinava Narasimha Bharati Mahaswamiji** (the 33rd Shankaracharya of Sringeri).
- **The Four Amnaya Peethams:** To unify India spiritually and geographically, he established four main monasteries (Mathas) based on the *Mathamnaya Stotra*.
 - **Jyotir Math (North):** Badrinath (Uttarakhand).
 - **Govardhan Math (East):** Puri (Odisha).
 - **Dwarka Sharada Peeth (West):** Dwarka (Gujarat).
 - **Sringeri Sharada Peeth (South):** Sringeri (Karnataka).

2. Philosophy: Advaita Vedanta

Adi Shankaracharya is the most famous exponent of **Advaita** (Non-dualism).

- **The Ultimate Reality:** He taught that **Brahman** is the only truth (*Satya*), while the world (*Jagat*) is an appearance (*Mithya*) caused by the power of **Maya**.
- **Concept of Liberation:** True liberation (*Moksha*) comes from realizing that the individual soul (**Atman**) is identical to Brahman.

3. Key Contributions to National Integration

- **Bridging Regional Identities:** He fostered a shared national identity by appointing priests from specific regions to serve in distant corners (e.g., **Kerala Nambudiri** priests to serve at Badrinath in the North, and **Maharashtra priests** to conduct worship at Rameswaram in the South).
- **Shanmata System:** He resolved sectarian conflicts by reviving the **Panchayatana Puja** (Shanmata), encouraging the simultaneous worship of Shiva, Vishnu, Shakti, Ganesha, and Surya & Lord Kartikeya.
- **Literary Gems:** Apart from philosophical texts, he composed soul-stirring hymns like the **Kanakadhara Stotram** (composed as a young boy to help a poor household) and **Bhaja Govindam**.

- **Role of Women:** He demonstrated the importance of women in the Vedic tradition, notably evidenced by the appointment of **Ubhaya Bharati** (Mandana Mishra's wife) to adjudicate his famous debate.
- **Dashanami Sampradaya:** He organized monks into ten orders to protect the Dharma: *Giri, Puri, Bharati, Vana, Aranya, Tirtha, Ashrama, Saraswati, Parvata, and Sagara*.

Comprehensive Literary Works

Shankaracharya's literary output is categorized into three distinct types, all written in Sanskrit.

1. Bhashyas (Commentaries)

These are his most scholarly works, interpreting the **Prasthanatrayi** (The three sources of authority):

- **Brahmasutrabhashya:** His commentary on the Brahma Sutras of Badarayana (the foundational text of Advaita).
- **Gita Bhashya:** Commentary on the Bhagavad Gita.
- **Upanishad Bhashyas:** Commentaries on the ten principal (*Mukhya*) Upanishads, including the **Brihadaranyaka, Chandogya, and Taittiriya**.

2. Prakarana Granthas (Introductory Treatises)

These texts simplify complex non-dualistic philosophy for students:

- **Vivekachudamani** (The Crest Jewel of Discrimination).
- **Upadesasahasri** (A Thousand Teachings).
- **Atma Bodha** (Self-Knowledge).
- **Tattva Bodha** (Knowledge of Truth).

3. Stotras (Devotional Hymns)

Though a philosopher of the "Abstract Brahman," he composed many emotional hymns:

- **Bhaja Govindam:** Highlighting the futility of worldly attachments.
- **Saundarya Lahari** and **Ananda Lahari:** Tantric and devotional hymns in praise of Shakti.
- **Nirvana Shatakam:** A six-verse summary of the identity of the soul with Shiva (Brahman).
- **Kanakadhara Stotram:** Composed in his childhood to bring a rain of golden amlas to a poor woman.

UPSC PRELIMS PRACTICE QUESTIONS

Q. With reference to Panch Prayag, consider the following statements:

1. All five confluences involve the Alaknanda River.
2. Rudraprayag is the meeting point of Mandakini and Bhagirathi rivers.
3. Karnaprayag is associated with Karna from the Mahabharata.

Which of the statements given above is/are correct?

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

Ans. (a)

Explanation:

Statement 1 is Correct: The **Alaknanda River** is the common thread in all five confluences. It originates from the Satopanth Glacier and flows through each "Prayag," meeting a different tributary at every stage until it finally meets the Bhagirathi to form the Ganga.

Statement 2 is Incorrect: **Rudraprayag** is the meeting point of the **Alaknanda** and the **Mandakini** (which flows from Kedarnath). The meeting point of the **Bhagirathi** and the **Alaknanda** is actually **Devprayag**, which is the final of the five prayags where the river officially becomes the **Ganga**.

Statement 3 is Correct: **Karnaprayag** is where the **Alaknanda** meets the **Pindar River**. Local tradition and mythology hold that this is the place where **Karna** of the Mahabharata meditated to please Surya (the Sun God) and received his indestructible armor (*Kavacha*) and earrings (*Kundala*).

Q. With reference to the recently discovered 1,500-year-old reservoir on Elephanta Island, consider the following statements:

1. The reservoir is a rock-cut cistern excavated directly into the basalt hills of Gharapuri.
2. Artifacts found at the site include amphorae of Mediterranean origin, suggesting ancient maritime trade.
3. Numismatic evidence from the site confirms the presence of the Kalachuri dynasty in the 6th century CE.

How many of the statements given above are correct?

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

Ans. (b)

Explanation:

- **Statement 1 is incorrect:** According to the Archaeological Survey of India, this specific reservoir is a **built structure** using stone blocks ferried from the mainland, not a rock-cut cistern.
- **Statement 2 is correct:** Archaeologists recovered over 3,000 sherds of Mediterranean amphorae and West Asian torpedo jars, proving the island's role in long-distance trade.
- **Statement 3 is correct:** Several copper and silver coins belonging to the Kalachuri ruler **Krishnaraja** (6th century CE) were identified based on the seated bull motif and the king's legend.

Q. With reference to Adi Shankaracharya, consider the following statements:

1. He established the Govardhan Math in the eastern part of India, which is associated with the Rigveda.
2. The "Kanakadhara Stotram" is a philosophical commentary written by him on the Brahma Sutras.

3. He promoted the "Shanmata" system to harmonize the worship of different Hindu deities.
4. His birthplace, Kalady, was rediscovered in the 19th century by the 33rd Shankaracharya of Sringeri.

How many of the statements given above are correct?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four

Ans. (c)

Explanation:

- **STATEMENT 1 IS CORRECT:** The Govardhan Math in Puri (Odisha) is the eastern peetham and is traditionally associated with the Rigveda.
- **STATEMENT 2 IS INCORRECT:** The *Kanakadhara Stotram* is a devotional hymn (Stotra) requesting the Goddess of wealth for a poor woman; his commentary on the Brahma Sutras is titled *Brahma Sutra Bhashya*.
- **STATEMENT 3 IS CORRECT:** He introduced the Shanmata (six-fold) system and Panchayatana Puja to unify various sects.
- **STATEMENT 4 IS CORRECT:** According to recent historical records, Sri Sacchidananda Shivabhinava Narasimha Bharati Mahaswamiji was instrumental in identifying Kalady as the birth site.

Q. With reference to the religious significance of the Jagannath Temple, consider the following statements:

1. It is one of the Char Dham pilgrimage sites.

2. It is associated with several Bhakti saints like Chaitanya Mahaprabhu.

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:

Statement 1 is Correct: The Shree Jagannath Temple in Puri is one of the four holiest pilgrimage sites in Hinduism, known as the **Char Dham**. The other three sites are Badrinath (North), Dwaraka (West), and Rameswaram (South). These sites were traditionally defined by the 8th-century philosopher and saint Adi Shankaracharya to unite the diverse geographic regions of India under a shared spiritual identity.

Statement 2 is Correct: The temple has deep roots in the **Bhakti Movement**. It is famously associated with **Chaitanya Mahaprabhu**, the 15th-century saint and founder of Gaudiya Vaishnavism, who spent the last 18 years of his life in Puri worshipping Lord Jagannath. Other prominent Bhakti figures associated with the temple include Ramanujacharya and Jayadeva (author of the *Gita Govinda*).



Scan to attempt more questions

Through the Eyes of Aspirants



P.V. Surendra

Monthly Current affairs magazine of RICE IAS is really helping me alot. It is comprehensively covering current events with segregation of topics in subject wise.



Aindrila saha

The monthly magazines for current affairs are exam-oriented and written in a very concise manner suitable for performing well in the examinations.



Sulagna Roy

Provides gainful insights about the current relevant news. Really beneficial.



Kashish Kapoor

By reading Monthly Current Affairs it has become easy to conclude the important news at the end of the month.



Shreya Mondal

By reading current affairs, it has become easy to conclude the important news at the end of monthly magazine.



Kishore Muddada

The topics are comprehensively covered in each magazine content was crisp, clear & to the point that are very much important for the preparation & the current is also covered with the static part. Keep up the good work.

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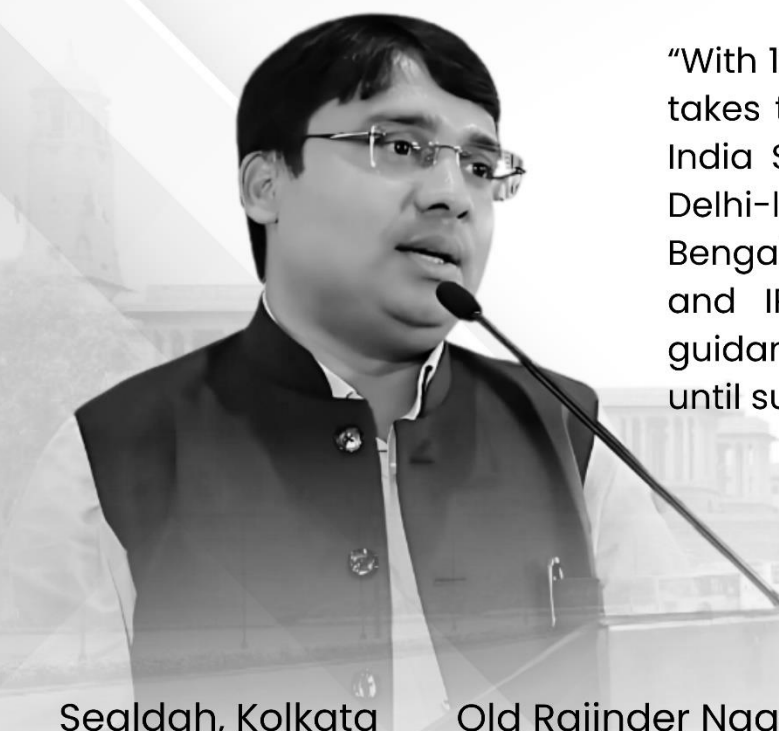
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