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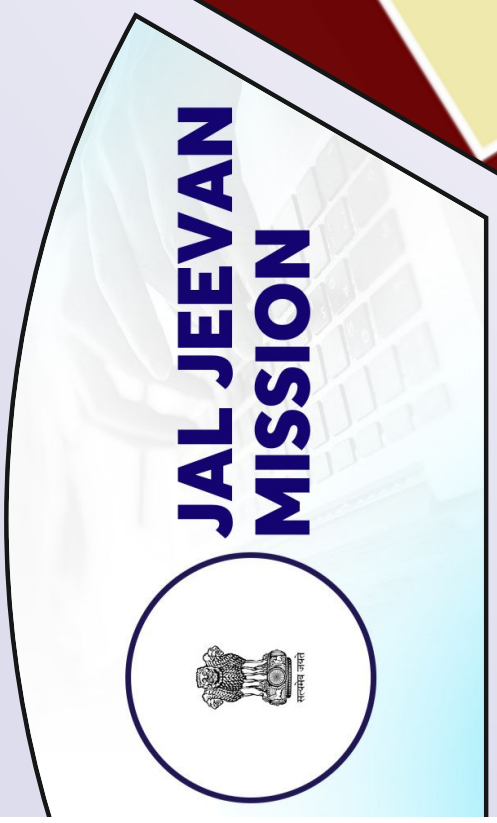
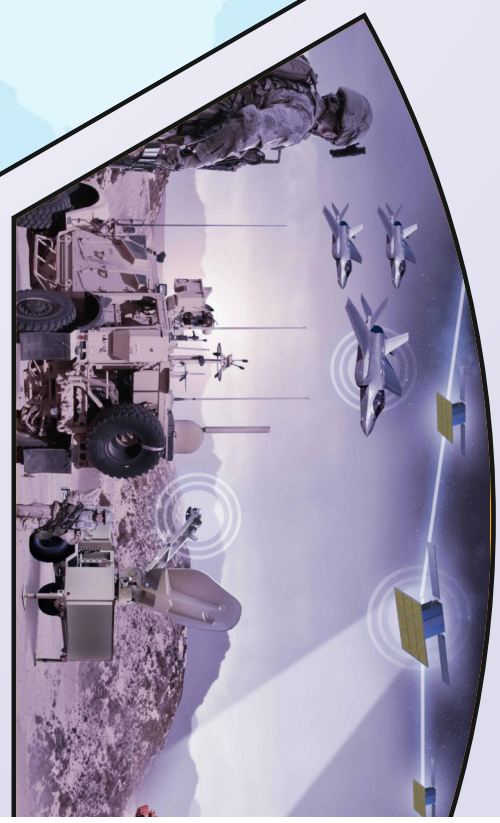
WEEKLY 07th July - 13th July (2025)





IQRA IAS

An Institute for Civil Services

WEEKLY UPDATES

DATE :7th July- 13th July

Table of Contents

POLITY

National Commission for Scheduled Castes (NCSC)

Syllabus:

Paper	Relevance
✅ GS Paper 2	Indian Constitution – Statutory and Constitutional Bodies, Social Justice
✅ GS Paper 1	Indian Society – Social Empowerment, SC Welfare
✅ Prelims	Constitutional Amendments, Articles, Commissions

1. Context: NCSC Submits Annual Report for 2023–24

- The **National Commission for Scheduled Castes (NCSC)** has presented its **Annual Report** to the **President of India**, evaluating **implementation of constitutional safeguards**, and the **status of Scheduled Castes (SCs)** in various sectors including education, employment, and legal protections.

2. Constitutional Basis and Evolution

Feature	Description
Established Under	Article **338** of the Indian Constitution
Amendment	**89th Constitutional Amendment Act, 2003**
Before 2003	Joint **SC/ST Commission** (combined body)
Post-2003	Two separate bodies:
	– **NCSC** under Article 338
	– **NCST** (Scheduled Tribes) under Article 338-A

3. Composition of NCSC

- **Chairperson**
- **Vice-Chairperson**
- **Three Members**

➡️ All members are **appointed by the President** of India by warrant under his hand and seal.

4. Functions and Duties of NCSC

As per **Article 338(5)** of the Constitution, the Commission is entrusted with the following responsibilities:

A. 🔹 **Monitoring & Safeguards:** Investigate and monitor **implementation of constitutional and legal safeguards** for SCs.
B. 🔹 **Complaint Redressal:** Inquire into **specific complaints** regarding **deprivation of rights** of SCs.
C. 🔹 **Socio-Economic Development:** Advise on **planning and socio-economic development** of SCs.
D. 🔹 **Reporting to President:** Submit **annual and special reports** to the President, including recommendations.
E. 🔹 **Evaluation:** Participate in **evaluation of development schemes** and **reservation policies**.

5. Powers of the Commission

- NCSC has **powers of a civil court** for:
  - Summoning witnesses
  - Requiring production of documents
  - Receiving evidence on affidavits
  - Requisitioning public records

6. Significance in Indian Polity

Domain	Role of NCSC
Social Justice	Ensures effective **implementation of affirmative action**
Accountability	Holds governments and institutions accountable for **SC welfare**
Legal Oversight	Acts as a **watchdog body** against atrocities and discrimination
Policy Recommendation	Advises on **reforms in education, employment, and legislation**

7. Challenges in Implementation

- Limited **enforcement powers**
- Delay in **acting on complaints**

- Political underrepresentation of SCs in decision-making
- Need for **greater institutional autonomy**

✅ Conclusion

The NCSC is a **vital constitutional body** that ensures the **upholding of rights, dignity, and development** of Scheduled Castes in India. While it performs an advisory and monitoring role, **greater institutional strengthening and public accountability** can enhance its effectiveness in the future.

"Justice delayed is justice denied – timely empowerment of SCs is critical to achieving true constitutional morality."

Mains Practice Question (GS Paper 2 – Polity and Social Justice)

Q. ***Discuss the constitutional mandate and role of the National Commission for Scheduled Castes (NCSC). Suggest measures to improve its effectiveness in addressing the socio-economic concerns of SCs.***

Admiralty (Jurisdiction and Settlement of Maritime Claims) Act, 2017

Syllabus:

Paper	Topic
GS Paper 2	Government Policies & Interventions; Judiciary and Constitutional Bodies
GS Paper 3	Infrastructure – Ports and Shipping; Environment – Marine Pollution
Prelims	Acts & Policies; Indian Judiciary

📌 Context (Why in News?)

- The **Kerala Government invoked this Act** to seek **compensation for environmental damage** after the **sinking of a vessel**, making it a test case for **environmental accountability** under maritime law.

⚓ Key Features of the Admiralty Act, 2017

Feature	Details
Purpose	To consolidate laws relating to admiralty jurisdiction, legal proceedings in connection with vessels, arrest, detention, and maritime claims.
Jurisdiction	**High Courts of coastal states** (e.g., Kerala, Bombay, Madras, etc.) have admiralty jurisdiction.
Applicability	Applies to all vessels **irrespective of the nationality** of the ship owner.
Maritime Claims Include:	
- Damage caused by a ship	
- Loss of life or personal injury at sea	
- Pollution and environmental damage	
- Disputes related to cargo, towage, pilotage	
- Wages of seamen, salvage operations, port dues	
Arrest of Ship	The Act enables **arrest or detention** of a ship **as a security** against maritime claims.
Environmental Scope	Allows claims for **removal costs, clean-up, and compensation** for pollution-related damage.
Repeals	Repealed outdated colonial laws (e.g., Admiralty Court Act, 1861).

🌐 Contemporary Significance

Relevance	Example
Maritime safety and environmental accountability	Kerala invoking the Act for environmental compensation
Expansion of India's maritime commerce	Sagarmala, increasing port-led development
Growing marine pollution threats	Oil spills, chemical discharge (e.g., MV X-Press Pearl incident near Sri Lanka)
Blue Economy growth	Ensures legal protection and dispute resolution for maritime trade

⚠️ Challenges and Concerns

- **Limited awareness** and capacity in some coastal states to enforce maritime law effectively.
- **High litigation costs** in admiralty cases may deter smaller claimants (e.g., local fishermen).
- **Implementation hurdles** in pollution compensation—scientific assessments, long legal timelines.
- **Overlap with other laws**: Environmental laws (EPA, 1986), Marine Insurance Act, etc.

✅ Conclusion (Way Forward)

The **Admiralty Act, 2017** is a **modern and progressive maritime law** that strengthens India's legal framework in maritime dispute resolution and environmental protection. With increasing ship traffic and blue economy focus, its effective implementation is **crucial for sustainable maritime**

governance.
Capacity building, **legal awareness**, and **coordination with environmental and port authorities** must be prioritized.

UPSC Mains Practice Question

Q. Discuss the significance of the Admiralty (Jurisdiction and Settlement of Maritime Claims) Act, 2017 in addressing maritime disputes and ensuring environmental accountability in India. (10 marks, 150 words)

Autonomous District Councils (ADCs) under Sixth Schedule

Syllabus:

Paper	Theme
GS Paper 2	Indian Constitution – Federalism, Devolution, Role of Governors, Sixth Schedule
GS Paper 1	Indian Society – Tribal Issues
GS Paper 3	Governance – Issues in implementation of schemes in tribal regions

Context: Governor's rule has been imposed in **Chakma Autonomous District Council (CADC)**, Mizoram — highlighting administrative challenges and the role of ADCs in tribal governance.

Constitutional Background

- **Sixth Schedule (Articles 244(2) and 275(1))** provides for **Autonomous District Councils** (ADCs) for **tribal areas**in:
  - **Assam**
  - **Meghalaya**
  - **Tripura**
  - **Mizoram**

Designed to provide **self-rule and protection of tribal customs**, especially in the **Northeast**, recognizing the **unique socio-cultural identity** of the region.

WHAT ARE Adcs?

Feature	Description
Nature	Constitutionally-recognized **autonomous administrative bodies**
Established under	**Sixth Schedule** of the Constitution
Jurisdiction	Tribal areas in Assam, Meghalaya, Mizoram, and Tripura
Objective	Protect and preserve **tribal customs, land rights**, and promote **local self-governance**

STRUCTURE OF AN ADC

Feature	Detail
Members	Generally **not more than 30**, out of which **up to 4 may be nominated** by the **Governor**
Elections	Remaining members are **directly elected** by the people
Tenure	5 years
Leadership	Headed by a **Chief Executive Member (CEM)**
Governor's Role	Power to **assent to or reject** laws passed by the council; can impose **Governor's Rule** in case of breakdown

FUNCTIONS AND POWERS

ADCs can **make laws and administer** on:

📌 **Legislative Functions:**

- Land management and transfer
- Forests (excluding reserved forests)
- Inheritance, marriage, social customs
- Village administration

Executive Functions:

- Primary education
- Public health and sanitation
- Agriculture and water management
- Markets and fairs

Judicial Powers:

- Establish **District/Village Council Courts** to settle **disputes** using **customary laws** among tribals

SIGNIFICANCE OF ADCs

Domain	Contribution
Decentralisation	Deepens grassroots governance in tribal areas
Cultural Preservation	Protects language, traditions, customary practices
Land Rights	Protects tribal land from encroachment (especially by non-tribals)
Conflict Mitigation	Empowers local resolution mechanisms, reduces insurgency triggers
Local Development	Plans and executes development schemes tailored to local needs

CONTEMPORARY ISSUES AND CHALLENGES

Issue	Example/Impact
Governance breakdown	*Governor's Rule* in Chakma ADC (2025) due to alleged mismanagement, internal conflicts
Corruption & misutilization of funds	Frequent audits reveal poor fund usage
Overlapping jurisdiction	Between State Govt., ADC, and Centre
Ethnic tensions	ADCs may aggravate inter-tribal disputes (e.g. Bru-Reang, Chakma-Mizo tensions)
Political interference	State governments often delay elections or use nomination power for control

CRITICAL THINKERS' VIEW

- **B.R. Ambedkar** envisioned **"political safeguards"** to protect minorities — ADCs reflect that spirit.
- **Hiren Gohain** (Northeast scholar): ADCs are vital for cultural autonomy but need structural reforms for efficiency.
- **NITI Aayog Reports**: Urged for rationalising ADC functions with performance-based funding and capacity building.

WAY FORWARD

Recommendation	Details
Codify Customary Laws	To ensure uniform justice and legal clarity
Capacity Building	Train ADC officials in governance, planning, and public finance
Synchronisation	Clear demarcation of roles between ADC, state, and panchayats
Digital Governance	Encourage transparency and reduce leakages via digitisation
Regular Audits	Independent financial reviews for ADCs

PRELIMS POINTERS

Fact	Detail
Total ADCs	10 ADCs across 4 states
Mizoram	Chakma, Lai, and Mara ADCs
Tripura	Tripura Tribal Areas Autonomous District Council (TTAADC)
Governor's Powers	Can dissolve ADC, appoint administrators, approve/reject laws

CONCLUSION

The **Autonomous District Councils** exemplify India's **asymmetric federalism** that respects **diversity and decentralisation**. However, to realize their full potential, **structural reforms, financial prudence, and accountability mechanisms** must be strengthened — ensuring **tribal empowerment with good governance**

MAINS QUESTION (GS2)

"Autonomous District Councils under the Sixth Schedule are both a reflection of tribal self-governance and a challenge to administrative cohesion." Examine in light of recent events in Mizoram. (250 words | 15 marks)

Inter-State River Water Disputes Act, 1956

📌 Syllabus:

- **GS Paper 2** – Functions and Responsibilities of the Union and the States; Dispute Redressal Mechanisms
- **GS Paper 3** – Water Resources; Infrastructure; Environmental Governance
- **Prelims** – Indian Polity (Articles), River Systems, Tribunals
- **Essay Paper** – Federalism in India; Water Security

1. Context: Extension of Ravi-Beas Tribunal

Recently, the **Central Government granted an extension to the Ravi and Beas Waters Tribunal**, originally constituted in 1986, to adjudicate disputes among **Punjab, Haryana, and Rajasthan** regarding water-sharing from these rivers. The move revives attention toward India's **legal mechanism for inter-state river disputes**, governed by the **ISRWD Act, 1956**.

2. About the Inter-State River Water Disputes Act, 1956

The **ISRWD Act** was enacted by **Parliament under Article 262** of the Constitution to **resolve disputes related to inter-state river waters**.

🔹 **Key Provisions of the Act:**

- **Tribunal Formation**: Central Government may constitute a **water disputes tribunal** if it believes a dispute cannot be resolved through negotiation.
- **Jurisdictional Bar**: Once a dispute is referred to a tribunal, **no court, including the Supreme Court, has jurisdiction** (as per Article 262(2)).
- **Binding Award**: The tribunal's decision is **final and binding** on the parties involved.
- **Amendments**: The **2002 Amendment** provided for a single permanent tribunal with multiple benches, though it has not been fully implemented.

3. Constitutional Backing

Provision	Details
Article 262(1)	Parliament may provide for adjudication of disputes relating to inter-State rivers and river valleys.
Article 262(2)	Parliament may bar courts from interfering in such disputes.
7th Schedule, Entry 56 (Union List)	Empowers Parliament to regulate and develop inter-state rivers and river valleys.
Entry 17 (State List)	Water remains a state subject, causing federal complexities.

4. Major River Water Disputes in India

River System	States Involved	Tribunal Status
Krishna	Maharashtra, Karnataka, Telangana, Andhra Pradesh	Award revised multiple times
Cauvery	Karnataka, Tamil Nadu, Kerala, Puducherry	Award enforced by SC
Ravi-Beas	Punjab, Haryana, Rajasthan	Ongoing since 1986
Mahadayi	Goa, Karnataka, Maharashtra	Tribunal awarded in 2018
Mahanadi	Odisha, Chhattisgarh	Tribunal constituted in 2018

5. Challenges in the Current Framework

- **Delays in Tribunal Awards**: Most tribunals take **decades to deliver judgments**, undermining justice delivery.
- **Implementation Gaps**: Lack of effective mechanism to **enforce tribunal awards** (e.g., Cauvery dispute).
- **Political Sensitivity**: Water is a **highly emotive and politicised issue**, often affecting state elections and Centre-State relations.
- **Climate Change & Demand Surge**: Increasing variability of rainfall and growing demand intensify inter-state tensions.
- **Fragmented Institutions**: Absence of a unified **water governance framework** exacerbates legal and administrative delays.

6. Way Forward and Reform Proposals

- **Establishment of Permanent Tribunal**: As envisaged in the **2019 Inter-State River Water Disputes (Amendment) Bill**, replacing ad hoc tribunals with a permanent body.
- **Time-Bound Decisions**: Imposing **fixed timelines** for tribunal decisions to avoid prolonged litigation.
- **Strengthening Data Systems**: A centralized, neutral **river basin authority** for transparent data-sharing and equitable allocation.
- **Integrated River Basin Management**: Moving from state-wise allocation to **basin-based planning and cooperation**.
- **Political Will and Consensus Building**: Promoting **cooperative federalism** through inter-state river boards and judicial pre-litigation settlement mechanisms.

✅ Conclusion

The **ISRWD Act, 1956** is a crucial tool in India's **federal dispute resolution mechanism**, especially concerning water — a vital, scarce, and shared resource. However, evolving climate risks, rising demand, and prolonged litigation necessitate **urgent reforms**. A robust, timely, and integrated water governance architecture is critical to resolving river water disputes in a **cooperative and sustainable** manner.

Mains Practice Question

Q. ***Discuss the relevance and limitations of the Inter-State River Water Disputes Act, 1956 in addressing India's growing inter-state water conflicts. Suggest reforms to make river water sharing more efficient and equitable.***

GOVERNANCE & GOVT POLICIES

Jal Jeevan Mission (JJM): Progress, Challenges, and Way Forward

📌 Syllabus:

Paper	Relevance
✅ GS Paper 2	Government Schemes, Centre-State Relations, Social Welfare Schemes
✅ GS Paper 3	Infrastructure – Water Supply, Rural Development, Resource Management
✅ Prelims	Flagship Schemes, Drinking Water Programmes, Ministry Roles

1. Context: Roadblocks in Jal Jeevan Mission

The **Jal Jeevan Mission (JJM)**, India's flagship rural drinking water supply programme, is reportedly **facing financial hurdles** that are affecting its **implementation timelines** and **infrastructure rollout**, particularly in **water-scarce and backward districts**.

2. About Jal Jeevan Mission

- **Launched**: August 2019
- **Nodal Ministry**: **Ministry of Jal Shakti**
- **Type**: **Centrally Sponsored Scheme** (shared funding pattern between Centre and States)
- **Current Timeline**: Extended from **2024 to 2028**

🔹 **Objective:**

To provide **Functional Household Tap Connections (FHTCs)** to **all rural households**, ensuring **safe, adequate and regular drinking water** supply.

Vision: ***"Har Ghar Jal" (Water in every home)***

3. Salient Features

Component	Details
Target Beneficiaries	~19 crore rural households across India
Water Source	Groundwater, surface water, rainwater harvesting, and spring-based sources
Implementation Mode	**Village Action Plans (VAPs)** prepared by Gram Panchayats with community participation
Technology Use	Real-time monitoring, IoT sensors, quality testing kits
Women's Involvement	At least 50% representation of women in **Village Water and Sanitation Committees**

4. Constitutional and Federal Dimensions

- **Water and Sanitation**: **State subject** under **Entry 17 of the State List**, Seventh Schedule.
- The **Centre** plays a **supplementary role** by:
  - Providing **financial assistance**
  - Offering **technical guidance**
  - Promoting **inter-state coordination**

5. Current Challenges Faced

Challenge	Description
Funding Constraints	Delayed fund release from Centre and States; mismatch in financial commitment
Capacity Issues	Shortage of skilled manpower at state and panchayat levels
Water Source Sustainability	Over-extraction of groundwater, seasonal variability, lack of local water source management
Quality Concerns	Inadequate fluoride, arsenic, and iron mitigation in certain regions
Monitoring & MIS	Gaps in real-time monitoring and third-party audits

6. Government's Steps to Overcome Roadblocks

- Launch of **Rural Water Supply Monitoring Systems (IMIS, JJM Dashboard)**
- **National Jal Jeevan Kosh** for CSR and philanthropic contributions
- Convergence with schemes like:
  - **MGNREGA** (for source sustainability)
  - **Swachh Bharat Mission-Grameen** (SBM-G)
  - **AMRUT 2.0** in urban areas
- Capacity building through **Rural Infrastructure Development Fund (RIDF)**

✅ Conclusion

The **Jal Jeevan Mission** represents India's transformative step toward achieving **UN SDG 6** (*Clean Water and Sanitation*). However, the scheme's success will hinge on resolving **financial bottlenecks**, ensuring **community participation**, and integrating **source sustainability and quality control** in the long run.

"Water security begins not with pipelines, but with people, participation, and policy clarity."

Mains Practice Question (GS Paper 2 – Governance)

Q. *Jal Jeevan Mission aims to provide functional tap water to all rural households. Discuss the key challenges and reforms needed for the effective implementation of the mission in a federal setup.*

PARAKH Rashtriya Sarvekshan (PARAKH RS)

📌 Syllabus:

Paper	Relevance
✅ GS Paper 2	Governance: Education, Policy Implementation, NEP 2020
✅ GS Paper 1	Society: Issues Related to Education
✅ Prelims	Government Schemes, Education Bodies (NCERT, NEP), Surveys

1. Context: Results of PARAKH RS Released

- The **Performance Assessment, Review, and Analysis of Knowledge for Holistic Development Rashtriya Sarvekshan (PARAKH RS)** was recently released.
- Formerly known as the **National Achievement Survey (NAS)**.
- It evaluates **student learning outcomes** at the national level across grades and subjects.

2. What is PARAKH RS?

A large-scale assessment framework to measure the **quality of education delivery and learning** across government and private schools in India.

🔷 Subjects and Grades Assessed

Grade	Subjects
Grade 3	Language, Mathematics, World Around Us
Grade 6	Language, Mathematics, World Around Us
Grade 9	Language, Mathematics, Science, Social Science

3. About PARAKH (Assessment Body)

Feature	Details
Full Form	Performance Assessment, Review and Analysis of Knowledge for Holistic Development
Institutional Base	Set up as an **independent constituent unit under NCERT (2023)**
Mandated by	**National Education Policy (NEP) 2020**
Objective	To **set norms and standards** for student assessment, examination reforms, and evaluation practices

4. Key Objectives of PARAKH

- Establishing **benchmark frameworks** for school-level learning outcomes.
- **Shift from rote learning** to competency-based education.
- Conducting **comparative assessments** across states, regions, and schools.
- Guide states/UTs in strengthening **state-level assessments**.
- Ensuring alignment with the **NIPUN Bharat Mission** and **NEP 2020 vision**.

5. Significance of PARAKH RS

Dimension	Contribution
Evidence-based Policy	Helps design informed **interventions at school and system level**
Federal Education Data	Supports Centre and States in **cooperative education planning**
NEP Alignment	Aids implementation of **foundational literacy and numeracy (FLN)** goals
Inclusivity	Includes children across schools: govt., aided, private

6. Challenges and Way Forward

🔻 **Challenges:**

- **Assessment Diversity**: One-size-fits-all may not suit diverse learner backgrounds.
- **Teacher Training**: Educators need orientation in **competency-based learning**.
- **Data Utilisation**: Risk of underuse of insights for real-time course correction.

✅ **Way Forward:**

- Capacity building of teachers and administrators.
- Integration with **Digital Infrastructure for School Education (DIKSHA)**.
- Community and parental involvement in bridging learning gaps.

✅ Conclusion

PARAKH RS marks a pivotal transition toward **competency-based assessments** in India's school education system. As envisioned under **NEP 2020**, such initiatives promote **equity, quality, and learning-centred reforms**. It empowers stakeholders with **data-driven insights** for holistic educational transformation.

"You can't improve what you don't measure—PARAKH ensures that every child counts and every learning outcome is visible."

Mains Practice Question (GS Paper 2 – Education)

Q. ***Discuss the role of large-scale student assessments like PARAKH Rashtriya Sarvekshan in achieving the learning outcome goals of NEP 2020. What challenges need to be addressed to make such assessments more impactful?***

Battery Passport: Towards Circular and Transparent Battery Ecosystems

📌 Syllabus:

Paper	Relevance
✅ GS Paper 2	Governance – e-Governance, Inter-Ministerial Coordination, Policy Frameworks
✅ GS Paper 3	Environment – Sustainable Development, Battery Waste, Circular Economy
✅ GS Paper 3	Science & Technology – Electric Vehicles, Energy Storage
✅ Prelims	Emerging Technologies, Environmental Governance, NITI Aayog Initiatives

1. Context: India's Move Towards Battery Transparency

The **NITI Aayog** has initiated consultations with various ministries and stakeholders to develop a **Battery Passport Framework** for India. This aligns with **international sustainability standards** and the **EU Battery Regulation (2023)**, which mandates battery passports for **industrial batteries exceeding 2 kWh capacity**.

This move is significant for India's ambitions in the **Electric Vehicle (EV)** and **battery manufacturing ecosystem**, especially under the **PLI Scheme for Advanced Chemistry Cell (ACC)**.

2. What is a Battery Passport?

A **Battery Passport** is a **digital identity document** embedded in a **QR code** on the battery, much like an **Aadhaar for batteries**.

🔷 **Key Features:**

- **Unique ID** for each battery
- Contains data on:
  - **Manufacturer and origin**
  - **Battery chemistry and materials used**
  - **Carbon footprint**
  - **Performance metrics**
  - **Recycling and end-of-life info**
- Cloud-based, **interoperable digital registry** accessible across borders and industries

3. Significance and Benefits

Domain	Importance
✅ **Safety & Quality Assurance**	Prevents use of low-grade or counterfeit battery cells; standardises quality control
✅ **Boost to EV Exports**	Compliance with **EU's Green Trade Standards** will enable **Indian EVs and battery components** to access global markets
✅ **Circular Economy Enablement**	Tracks **battery life cycle**, promotes **reuse, refurbishing, and recycling**
✅ **Environmental Monitoring**	Helps monitor **carbon footprint**, **material toxicity**, and supports **Extended Producer Responsibility (EPR)**
✅ **Supply Chain Transparency**	Identifies sourcing of materials (e.g. lithium, cobalt), discouraging use of conflict minerals

4. Global Context: EU Battery Passport Framework

- **Mandated under**: European Union **Batteries Regulation 2023**
- **Applies to**: All **industrial and electric vehicle batteries** with capacity >2kWh
- Aims to achieve:
  - **Traceability**
  - **Performance benchmarking**
  - **Sustainable production**
- Battery passports to be **mandatory from 2026** in the EU.

5. Challenges Ahead for India

- **Standardisation & Interoperability**: Creating a **unified digital platform** across manufacturers
- **Data Confidentiality vs. Transparency**: Balancing **trade secrets** with **public accountability**
- **Skilling & Infrastructure**: Capacity building in **battery analytics**, QR-based tracking, and **end-of-life data systems**
- **Regulatory Clarity**: Need for a **comprehensive Battery Waste Management Rule** that aligns with circular economy goals

✅ Conclusion: Driving Towards a Green Battery Ecosystem

The **Battery Passport** is a critical innovation in India's shift towards **green mobility and sustainable supply chains**. It will bolster India's **global competitiveness**, promote **battery stewardship**, and prepare the nation for a **carbon-accountable global economy**.

"The Battery Passport is to clean energy what Aadhaar was to digital identity—a foundational shift."

Mains Practice Question (GS Paper 3 – Environment/S&T)

Q. ***What is a Battery Passport? How can it contribute to India's goals of sustainable development, electric mobility, and circular economy? Discuss the challenges and the way forward.***

India's First 700 MWe PHWR Licensed: A Milestone in Nuclear Self-Reliance

📌 Syllabus:

Paper	Relevance
✅ **GS Paper 2**	**Statutory and Regulatory Bodies (AERB), Government Policies**
✅ **GS Paper 3**	**Science and Technology – Nuclear Energy, Energy Security, Indigenisation**
✅ **Prelims**	**AERB, PHWR, India's Nuclear Programme**
✅ **Essay Paper**	**Energy Security, Indigenous Technology Development**

1. Introduction: Strategic Nuclear Leap

In July 2025, the **Atomic Energy Regulatory Board (AERB)** granted operational licenses for **two indigenously developed 700 MWe Pressurised Heavy Water Reactors (PHWRs)** — Units 3 and 4 at **Kakrapar Atomic Power Station (KAPS), Gujarat**. This milestone reflects India's **technological maturity**, **regulatory robustness**, and alignment with the vision of **Atmanirbhar Bharat in nuclear energy**.

2. What is a PHWR?

Pressurised Heavy Water Reactor – Features

Feature	Description
Fuel	**Natural uranium** (U-238 dominant)
Coolant & Moderator	**Heavy water (D_2O)** serves as both
Core Design	Uses **pressure tubes** instead of large pressure vessels
Power Output	Latest design: **700 MWe**
By-product	**Plutonium-239**, later used in Fast Breeder Reactors (Stage 2)

3. Role in India's Three-Stage Nuclear Programme

Stage	Technology	Fuel Cycle
Stage 1	PHWRs	Uses **natural uranium**, produces **Pu-239**
Stage 2	Fast Breeder Reactors (FBRs)	Uses **MOX fuel** (U-Pu mix), breeds more Pu
Stage 3	Advanced Heavy Water Reactors (AHWRs)	Utilizes **thorium (Th-232)** as fuel

PHWRs form the **foundation of India's nuclear programme**, enabling the transition to plutonium-based and later thorium-based reactors.

4. Advantages of PHWR Technology

Advantage	Explanation
Fuel Efficiency	Uses natural uranium without enrichment
Safety	Pressure tube design localizes failure, reduces catastrophic risk
Economy	Lower fuel processing and enrichment cost
Indigenous Capability	Entire design and construction done domestically post-1974

5. Historical Evolution of PHWR in India

Phase	Key Milestones
1960s	PHWR introduced via Indo-Canadian cooperation (RAPS-1, 220 MWe)
1974	Canada withdrew support post Pokhran-1 nuclear test
1980s–2000s	Indigenous development of 220 MWe reactors (e.g., Narora, Kaiga)
2010s–2020s	Standardization of **700 MWe** PHWRs (e.g., Kakrapar, Gorakhpur)

From dependency to self-sufficiency, India's PHWR journey exemplifies **strategic technological resilience**.

6. About Atomic Energy Regulatory Board (AERB)

Feature	Details
Established	1983 by Presidential order under Atomic Energy Act, 1962
Legal Authority	Drawn from Atomic Energy Act, 1962 & Environment (Protection) Act, 1986
Mandate	Ensure safe use of ionizing radiation and nuclear energy
Role	Licensing, regulation, safety enforcement, radiation protection

AERB is India's **independent nuclear watchdog**, ensuring that energy production does not endanger people or the environment.

7. Strategic Significance of Indigenous 700 MWe PHWRs

A. Energy Security

- Reduces dependency on foreign fuel technologies
- Adds significant capacity to India's **baseload power** supply

B. Clean Energy Goals

- Supports India's **net-zero 2070 commitment** under the Paris Agreement
- Emits **zero greenhouse gases** during operation

C. Strategic Autonomy

- India's nuclear programme is outside the NPT regime; **indigenous capacity ensures global independence**

D. Export Potential

- Standardised 700 MWe PHWR may become a candidate for **nuclear exports to friendly countries**

8. Challenges Ahead

Challenge	Details
High Capital Cost	Nuclear power projects are expensive and long-gestating
Public Opposition	Concerns over safety, waste disposal
Regulatory Bottlenecks	Environmental and land clearances cause delays
Nuclear Waste Management	Long-term storage of spent fuel remains unresolved globally

9. Conclusion: A Reactor for Self-Reliance

The operational licensing of **India's first 700 MWe indigenously developed PHWRs** represents a **technological and strategic inflection point** in India's nuclear journey. It showcases India's ability to **design, construct, regulate, and operate complex energy systems** autonomously—essential for both national development and global credibility.

“Atoms for Peace” was the motto of early nuclear diplomacy. India today stands as a torchbearer of peaceful, self-reliant atomic energy.

Mains Practice Question (GS Paper 3)

Q. ***Discuss the role of Pressurised Heavy Water Reactors (PHWRs) in India's nuclear energy programme. How does the indigenous development of 700 MWe PHWRs contribute to India's energy security and strategic autonomy?***

Answer Structure Hint:

- Introduction: Define PHWR + recent development
- Body: Link with 3-stage programme, features, advantages, strategic gains
- Conclusion: Emphasise clean energy, export potential, and energy sovereignty

Aspirational DMF Programme: Bridging Mining Impact with Development Goals

📌 Syllabus:

Paper	Theme
✅ GS Paper 2	Government Policies & Interventions, Welfare Schemes, Health & Education
✅ GS Paper 3	Inclusive Growth, Infrastructure, Development in Mining Regions
✅ Essay	Resource Governance, Regional Disparities, Convergence in Governance

1. Context

The **Ministry of Mines** has launched the **Aspirational DMF Programme** by releasing its operational guidelines. The initiative aims at **integrating DMF projects with NITI Aayog’s Aspirational District and Block Programmes** to **amplify development outcomes** in mining-affected regions.

2. What is the Aspirational DMF Programme?

Feature	Details
🛠️ **Objective**	Align DMF initiatives with priority sectors of ADP and ABP
🎯 **Target**	Catalyse **socio-economic development** in mining-impacted communities
📊 **Coverage**	Currently aligns with **106 Aspirational Districts** and **473 Blocks**
🔁 **Approach**	Convergence, outcome-based monitoring, and participatory development

3. Convergence Framework

The programme aligns DMF-funded projects with **key performance indicators** of ADP/ABP for a **multiplier impact** on development.

🔷 Priority Sectors for Convergence

- **Health and Nutrition**
- **Education**
- **Agriculture & Water Resources**
- **Infrastructure Development**
- **Financial Inclusion & Skill Development**
- **Social Development**

🧩 *This convergence reduces duplication, promotes accountability, and supports mission-mode delivery.*

4. Institutional Background

About District Mineral Foundations (DMF)

- **Legal Basis**: Section 9(B), **Mines and Minerals (Development and Regulation) Act, 1957** *(amended in 2015 to introduce DMFs)*
- **Structure**: Non-profit trusts, established at the **district level**
- **Purpose**: To benefit persons and areas **affected by mining activities**
- **Funding**: Primarily from royalties paid by mining leaseholders

DMF is aligned with the principles of ***resource justice and local area development****.*

🔷 About PMKKKY (Pradhan Mantri Khanij Kshetra Kalyan Yojana)

- Framework for **utilising DMF funds**
- Ensures **inclusive growth and sustainability** in mining-impacted regions

5. About Aspirational District & Block Programmes

Programme	Launched By	Objective
ADP	NITI Aayog	Rapid transformation of **112 districts**
ABP	NITI Aayog	Covers **500+ blocks** in backward regions

Both programmes focus on:

- **Convergence of central & state schemes**
- **Data-driven governance**
- **Real-time monitoring through the Champions of Change portal**

6. Significance of the Aspirational DMF Programme

Dimension	Impact
🔄 **Synergistic Planning**	Bridges resource-based funding (DMF) with outcome-based planning (ADP/ABP)
📈 **Improved Efficiency**	Promotes **evidence-based targeting** and reduction in fund under-utilisation
👥 **Empowerment**	Ensures **community participation** and promotes **social justice**
💰 **Resource Optimisation**	Leverages DMF funds for **multi-sectoral development**

✅ Conclusion

The **Aspirational DMF Programme** reflects India's maturing approach to **resource federalism**—aligning local development with national priorities. It ensures that **mining revenues translate into tangible development**, especially for marginalised communities, while also enhancing accountability through convergence with flagship programmes like ADP and ABP.

Mains Practice Question (GS Paper 2/3)

Q. The Aspirational DMF Programme aims to align natural resource-based development funding with broader socio-economic priorities. Examine how the convergence approach under this programme enhances governance in mining-affected regions. Also, suggest ways to improve its implementation.

India Launches First-Ever e-Truck Incentive Scheme under PM E-DRIVE

📌 Syllabus:

Paper	Relevant Topics
GS Paper 2	Government policies & interventions for development in sectors
GS Paper 3	Infrastructure – Transport; Environment – Pollution; Science & Tech – Renewable Technology
Prelims	Government Schemes (PM E-DRIVE); EV Policies; Vehicle Categories (N2, N3)
Essay	Sustainable Development; Energy Transition; Green Mobility

1. Context: India's Push for Decarbonized Logistics

- On **12 July 2025**, the Government of India launched the **first e-Truck Incentive Scheme** under the **PM Electric Drive Revolution in Innovative Vehicle Enhancement (PM E-DRIVE)**.
- The move aims to reduce the **high emission footprint** of diesel trucks, boost **Make in India EV manufacturing**, and promote **green logistics**.

2. About the e-Truck Incentive Scheme

Aspect	Details
Launched Under	PM E-DRIVE initiative
Target Vehicles	N2 (GVW > 3.5–12 tonnes) and N3 (GVW >12–55 tonnes) category e-trucks
Max Incentive	₹9.6 lakh per e-truck (upfront incentive)
Objective	Promote domestic production and adoption of electric trucks, reduce GHG emissions from freight sector

⚠️ *Why Focus on Trucks?*

- Diesel trucks constitute only **~3% of India's vehicle fleet**, but contribute to **42% of transport-sector GHG emissions**.
- Decarbonizing heavy-duty transport is key to achieving **Net Zero by 2070**.

3. About PM E-DRIVE

Feature	Description
Ministry	Ministry of Heavy Industries (MHI)
Launch Year	2024
Coverage	E-2Ws, E-3Ws, E-buses, E-trucks, E-ambulances, Charging Infra, Testing Labs
Goal	Scale up EV deployment, reduce carbon emissions, build domestic EV ecosystem

🔍 ***Key Differentiators from FAME-II***

Aspect	PM E-DRIVE	FAME-II
Scope	Wider (includes trucks, ambulances, infra)	Limited to 2W, 3W, 4W, buses
Incentives	Scrapping-linked	Direct purchase incentives
Target	Public and commercial transport	Public and personal mobility
Emphasis	Infrastructure and testing ecosystem	Vehicle category-specific

4. Expected Benefits

Environmental Gains

- **Lower tailpipe emissions** → Better urban air quality
- **Reduced diesel dependence** → Energy security

Industrial Growth

- Boost to **EV supply chains**, domestic battery manufacturing, and **job creation** in green sectors

Logistics Efficiency

- Electrification of long-haul and last-mile logistics could reduce **cost per km**, enabling **greener e-commerce and freight transport**

5. Challenges & Way Forward

Challenge	Recommendation
High Initial Cost of E-Trucks	Continue targeted incentives; Offer credit guarantees for fleet operators
Charging Infrastructure	Expand **fast-charging corridors** on highways
Battery Performance & Range Anxiety	Support **battery R&D** under Mission Innovation
Scrap Policy Integration	Ensure synergy between **Vehicle Scrappage Policy** and PM E-DRIVE incentives

6. Contemporary Linkages & International Comparisons

Country	Initiative	Remark
USA	Inflation Reduction Act (IRA)	Offers tax credits for electric commercial vehicles
China	New Energy Vehicles (NEV) Policy	Leading global e-truck market with subsidies and infra support
India	PM E-DRIVE + EV Policy	Indigenous approach aligned with Net Zero & Aatmanirbhar Bharat

✅ Conclusion

India's first-ever **e-Truck Incentive Scheme** is a **milestone in green logistics and industrial decarbonization**. Backed by **PM E-DRIVE**, it brings commercial freight vehicles into the clean mobility transition. With strategic fiscal support, charging infrastructure, and private sector engagement, the scheme will not only reduce carbon footprint but also catalyze a robust **EV manufacturing ecosystem** and bolster India's **Net Zero ambitions**.

Mains Practice Question

Q. ***Discuss the significance of the e-Truck Incentive Scheme in transforming India's freight sector. How does it align with India's goals of sustainable mobility and energy security?***

Strengthening State S&T Councils for Viksit Bharat 2047

📌 Syllabus:

Paper	Topic
GS Paper 2	Governance – Government Policies & Interventions; Role of NGOs, SHGs, Pressure Groups, and Formal/Informal Associations
GS Paper 3	Science and Technology – Developments and Indigenization of Technology, Government Policies
Essay/GS 2/3	Innovation, Science Diplomacy, Cooperative Federalism

Context

The **NITI Aayog** released a report titled **'A Roadmap for Strengthening State S&T Councils'** which provides a strategic vision to **transform state-level science and technology institutions** into critical enablers of innovation in line with the goal of **Viksit Bharat @2047**.

Background: What Are State S&T Councils?

- **Established in 1971** under the National Council for Science and Technology Communication (NCSTC).
- Function as **autonomous bodies under State Planning Departments** or Departments of Science & Technology.
- Aimed to **decentralize scientific planning and foster grassroots-level innovations**.
- Present in **all states and most UTs**, yet plagued by **funding and structural challenges**.

❌ Key Issues Identified by the Report

Domain	Challenge
Finance	Inadequate state funding, delays in budget release, and **poor fund utilization**.
Human Resource	Shortage of trained scientists; **vacant technical posts**, lack of incentives, poor work culture.
Collaboration	Weak institutional linkages with **research labs, academia, and industries**.
Regulatory Bottlenecks	Bureaucratic hurdles leading to **delays in project execution and poor accountability**.
Low Visibility	Limited engagement in **national missions or global partnerships**.

✅ Key Recommendations of NITI Aayog

1. Financial Reforms

- **States must allocate ≥0.5% of GSDP** for science and tech activities.
- Shift from **core grants** (fixed funding) to **performance-linked and project-based funding**.
- Encourage **competitive research schemes** with CSR and private participation.

2. Human Capital Enhancement

- Maintain **scientific: non-scientific staff ratio at 70:30**.
- Recruit talent from **national research labs**, including **retired scientists** and professionals.
- Create **secondment programs** for faculty between state institutes and central institutions (IITs, CSIR, etc.)

3. Strengthening Linkages

- Foster **Public-Private Partnerships (PPP)** to facilitate **technology transfer and innovation**.
- Collaborate with **startups, incubators, and MSMEs**.
- Map state-specific S&T needs and link with flagship missions like **PM Gati Shakti, NIP, and Atmanirbhar Bharat**.

4. Administrative Reforms

- Build a **Digital Monitoring Dashboard** for transparency and timely delivery.
- Introduce **performance reviews** and **Key Result Areas (KRAs)** for project assessment.

🌐 Broader Significance

Area	Contribution
Viksit Bharat 2047	Builds **self-reliant S&T capacity** for futuristic planning.
Cooperative Federalism	Empowers states to align with **national missions**.
Grassroots Innovation	Leverages **local knowledge and ecosystems** for sustainable tech development.
Demographic Dividend	Taps into India's youth potential via **skill development and research exposure**.

🔍 Thinkers' Insight

"Science is a beautiful gift to humanity; we should not distort it." — **Dr. A.P.J. Abdul Kalam**

The report resonates with **Kalam's vision of transforming India into a knowledge economy** led by **innovation and technology**, not just at the central level, but with empowered **state ecosystems**.

⬅ END Conclusion: The Way Forward

To transform India into a global innovation hub, it is **imperative to decentralize S&T governance**. Strengthening State S&T Councils will unlock **context-specific, people-driven innovations**, crucial for achieving **sustainable, inclusive, and resilient development** in India.

Mains Practice Question

Q. ***Critically evaluate the role of State Science & Technology Councils in achieving the vision of Viksit Bharat @2047. Suggest measures for enhancing their effectiveness.***
(10 marks | 150 words)

INTERNATIONAL RELATIONS

Kaladan Multimodal Transit Transport Project (KMTTP)

📌 Syllabus:

Paper	Relevance
✅ **GS Paper 2**	International Relations – India & Neighbourhood, Bilateral Agreements, Act East Policy
✅ **GS Paper 3**	Infrastructure – Transport & Connectivity, Inclusive Development
✅ **GS Paper 1**	Geography – India's North-East, Border Areas
✅ **Essay Paper**	Regional Integration, Connectivity & Diplomacy, India's Northeast as a Growth Engine

1. Context: KMTTP to be Operational by 2027

The **Kaladan Multimodal Transit Transport Project (KMTTP)**, jointly undertaken by **India and Myanmar**, is slated for completion by **2027**, as confirmed by the Union Minister. The project is key to **improving access to the North-Eastern Region (NER)** through an **alternative route** via **Myanmar**, reducing dependency on the narrow **"Chicken's Neck"** corridor.

2. Overview: Kaladan Multimodal Transit Transport Project

Feature	Details
Framework Agreement Signed	2008
Nodal Ministry	Ministry of External Affairs (MEA), GoI
Project Consultant	Inland Waterways Authority of India (IWAI)
Partner Country	Myanmar
Status (as of 2025)	Final phase of road construction underway; expected operationalisation by **2027**

3. Transit Components of KMTTP

Mode	Segment	Location
✅ **Sea Route**	Kolkata Port → Sittwe Port	Bay of Bengal
✅ **Inland Waterways**	Sittwe → Paletwa	**Kaladan River**, Myanmar
✅ **Road Route**	Paletwa → Zorinpui	India-Myanmar Border (Mizoram)
✅ **Land Route**	Zorinpui → Aizawl	Existing roads in **Mizoram**, India

This multi-modal setup integrates **sea, river, and road transport** to create a seamless logistics corridor.

4. Significance of KMTTP for India

A. Strategic & Security Relevance

- Provides **alternate connectivity** to Northeast, bypassing the vulnerable **Siliguri Corridor ("Chicken's Neck")**
- Enhances India's **strategic depth** in the region adjacent to **China and Bangladesh**

B. Act East Policy in Action

- Reinforces India's commitment to its **Act East Policy** (AEP, 2014)
- Facilitates **political, economic, and cultural engagement** with Southeast Asia

C. Economic Integration of North-East

- Reduces logistics **cost and time by over 50%** from **Kolkata to Aizawl**
- Encourages **investment in agro-processing, manufacturing**, and **tourism**
- Empowers **border trade** and enhances **connectivity of tribal and hill regions**

D. Regional Diplomacy

- Strengthens India-Myanmar bilateral ties
- Serves as a **confidence-building initiative** amid concerns of Chinese influence in Myanmar

5. Other Key Connectivity Projects for Northeast India

Project	Description
India-Myanmar-Thailand (IMT) Trilateral Highway	Connects Moreh (Manipur) to Mae Sot (Thailand) via Myanmar
PIWT&T	Inland Waterway Transit Protocol between **India and Bangladesh** for trade and tourism

BBIN Motor Vehicle Agreement	Regional connectivity among Bangladesh, Bhutan, India, and Nepal
MoU with Bangladesh	Allows Indian goods to use **Chattogram & Mongla Ports** for reaching NER

Together, these projects contribute to building a **regional multimodal logistics grid** for India's Northeast.

6. Challenges in Execution

Challenge	Explanation
Political Instability in Myanmar	Military rule, civil unrest, and ethnic conflicts delay execution
Terrain & Geography	Hilly, forested zones pose engineering and logistical barriers
Insurgency & Security	Both Myanmar and Indian sides face **insurgent activity**
Local Participation	Land acquisition and stakeholder resistance need careful management
Bureaucratic Delays	Coordination between multiple ministries and two sovereign states

✅ Conclusion: A Gateway to Economic Transformation of the Northeast

The **Kaladan Project** is more than just a transport corridor — it is a symbol of **connectivity diplomacy**, **sub-regional integration**, and the aspiration to transform the **Northeast into an economic gateway to Southeast Asia**. For India, it represents the **synthesis of development, security, and diplomacy** in one strategic intervention.

"Connectivity is productivity." – Narendra Modi
The Kaladan Project demonstrates this by turning **geographic disadvantage into economic opportunity**.

Mains Practice Question (GS Paper 2)

Q. ***Kaladan Multimodal Transit Transport Project is not only a strategic route for India's Northeast but also a key component of its Act East Policy. Examine the significance and challenges of the project in the context of India's regional connectivity goals.***

Answer Structure Hint:

- **Intro**: Background on KMTTP, strategic location
- **Body**: Features of the project, components, AEP alignment, economic and diplomatic relevance
- **Challenges**: Myanmar politics, terrain, insurgency
- **Way Forward**: Multilateral support, local participation, faster execution
- **Conclusion**: Role in transforming NER into a regional growth engine

India's Strategic Outreach to Latin America and the Caribbean

📌 Syllabus:

Paper	Relevance
✅ **GS Paper 2**	India's Foreign Policy, International Relations, Regional Groupings
✅ **GS Paper 3**	Economic Diplomacy, Trade Relations, Strategic Minerals
✅ **Essay Paper**	India and the Global South; Multilateralism and Strategic Autonomy
✅ **Prelims**	CELAC, SICA, CARICOM, MERCOSUR, India–Chile CEPA, India–Peru FTA

1. Introduction: Diplomacy Rooted in Strategic South-South Solidarity

In July 2025, the **Prime Minister concluded visits to Argentina and Trinidad & Tobago**, followed by a **landmark visit to Brazil**. This diplomatic tour aimed to deepen India's engagement with the **Latin America and Caribbean (LAC)**region and reassert India's leadership within the **Global South**, promoting cooperation on trade, energy, and multilateral diplomacy.

The visit is a step towards **rebalancing global partnerships** beyond traditional power centres like the West and East Asia.

2. Overview of the Latin America and Caribbean (LAC) Region

Region	Description
South America	Brazil, Argentina, Chile, Peru, etc.
Central America	Panama, Costa Rica, Honduras, etc.
Caribbean	Trinidad and Tobago, Jamaica, Cuba, etc.
Total Countries	~45 sovereign states

The region holds growing significance due to its **resource wealth, market potential, and strategic geography**.

3. India–LAC Economic Engagement

A. Trade Performance (2023–24)

- **Total Trade**: USD **35.73 billion**
- **Exports**: USD **14.5 billion**
- **India's Rank**:
  - **9th** largest exporter to LAC
  - LAC is **8th** largest import source for India

B. Trade Targets & Ambitions

- **Target**: USD **100 billion** bilateral trade by **2027–28**
- **Diversification** into **non-traditional markets** as part of South-South strategy

C. Key Commodities

India's Imports	India's Exports
Crude oil, petroleum	Motor vehicles
Precious stones	Chemical products
Vegetable oils	Mineral fuels

4. Trade Agreements and Economic Architecture

Agreement	Description
India–MERCOSUR PTA	Covers 450+ tariff lines; aims at deeper integration
India–Chile CEPA	Ongoing expansion of product coverage
FTA with Peru	Under negotiation; would be India's first in South America

These frameworks are key to facilitating **duty reductions**, **market access**, and **investment flows**.

5. Strategic Resources & Energy Cooperation

- LAC is a **critical supplier of minerals** vital to India's green economy:
  - **Lithium** (key for EV batteries)
  - **Copper, gold**, and other rare metals
- India aims to secure long-term supply through:
  - **Bilateral mining cooperation**
  - **Investments by PSUs and private firms** in LAC mining sectors

6. India's Engagement with Regional Blocs

Bloc	Description
CELAC (Community of Latin American and Caribbean States)	33-member grouping; India participates in India–CELAC Troika meetings
SICA (Central American Integration System)	Includes 8 Central American countries; strategic engagement in trade, IT
CARICOM (Caribbean Community)	15 members; cooperation in health, education, disaster resilience

These multilateral ties **expand India's diplomatic bandwidth** in the Western Hemisphere.

7. Strategic and Diplomatic Significance

A. Reinvigorating Global South Solidarity

- Counters Western-dominated narratives in global forums
- Encourages **multilateral equity and fair representation** (UNSC, WTO reform)

B. Strategic Autonomy

- Reduces overdependence on traditional partners
- Builds **new poles of influence** for India in **Latin America and Africa**

C. Economic Diplomacy

- Expands India's export base
- Promotes **Make in India** through preferential access in emerging markets

✅ Conclusion: A Renewed South-South Compact

India's outreach to Latin America and the Caribbean is **not just symbolic**, but a **strategic recalibration** of its foreign policy, reflecting:

- Economic pragmatism
- Diplomatic diversification
- Multilateral leadership among developing nations

With shared post-colonial experiences and growing economic complementarity, **India and LAC can co-shape a just, multipolar world order**.

"The Global South is not a bloc but a shared experience. And that experience now needs collective action." – Contemporary Diplomatic Thought

Mains Practice Question (GS Paper 2)

Q. ***India's engagement with the Latin American and Caribbean (LAC) region reflects a recalibration of its foreign policy towards the Global South. Discuss the economic, strategic, and geopolitical significance of this outreach.***

Answer Structure Hint:

- **Intro**: Brief context of the 2025 LAC visit
- **Body**: Economic relations, trade, energy, diplomacy, multilateral blocs
- **Conclusion**: Strategic autonomy + multipolarity vision

Sudan: Conflict, Geography & Strategic Significance

📌 Syllabus:

Paper	Relevance
✅ GS Paper 2	International Relations – India-Africa, UN Peacekeeping, Global Conflicts
✅ GS Paper 1	World Geography – Africa (Location, Resources, Physical Features)
✅ GS Paper 3	Internal Security (Geopolitical Impact on India's Security)
✅ Prelims	Map-Based Questions, Strategic Geography, Current Affairs

1. Context: Humanitarian Crisis in El Fasher, Sudan

The **United Nations** has warned of a rapidly deteriorating humanitarian situation in **El Fasher**, the capital of **North Darfur province**. The crisis is a result of ongoing **civil war-like conflict** between Sudan's military and paramilitary forces (RSF), displacing millions and cutting access to food, water, and medicine.

This adds to the long-standing ethnic and political instability in the Darfur region and complicates UN peacekeeping and aid delivery efforts.

2. Political and Geopolitical Overview

- **Capital**: Khartoum
- **Region**: Northeast Africa
- **Political Background**:
  - Sudan has been under **military rule** since the 2021 coup.
  - Conflict primarily between **Sudanese Armed Forces (SAF)** and **Rapid Support Forces (RSF)**.
  - Ethnic tensions and historical marginalisation in **Darfur** exacerbate the crisis.

3. Geographic and Resource Profile

Feature	Details
Rank	3rd-largest country in Africa by area
Land Borders	
• North: Egypt	
• East: Eritrea, Ethiopia	
• South: South Sudan	
• West: Central African Republic, Chad	
• Northwest: Libya	
Maritime Access	**Red Sea** – critical for global shipping
Major River	**Nile River** and tributaries – drain most of the country
Highest Point	**Marrah Mountains** (Darfur)
Natural Resources	
• Petroleum	
• Gold, Silver, Copper, Zinc	

• **Iron Ore, Mica, Tungsten, Chromium**	

4. Strategic Importance of Sudan

- **Red Sea Location**: Controls **access to Bab el-Mandeb strait**—a vital choke point for oil trade and naval routes.
- **Resource Potential**: Rich in untapped minerals and oil fields, often linked to foreign powers like **Russia, UAE, China**.
- **Proximity to Conflict Zones**: Near **Horn of Africa**, Middle East, and Sahel—fragile regions prone to extremism and refugee flows.

5. India-Sudan Relations

- India has historical ties through the **Non-Aligned Movement** and **Pan-African cooperation**.
- Indian firms have been active in Sudan's **oil sector** (e.g., ONGC Videsh Ltd).
- Over **3,500 Indians** were evacuated under **Operation Kaveri (2023)** due to conflict.
- Sudan is a member of **International Solar Alliance (ISA)** co-founded by India.

✅ Conclusion

Sudan's crisis reflects the complex interplay of **geography, colonial legacies, resource competition, and fragile statehood**. For UPSC aspirants, it serves as a critical case study in **geopolitics**, **map-based awareness**, and **India's foreign policy in conflict-prone regions**.

Mains Practice Question (GS Paper 2 – IR)

Q. ***Discuss the strategic importance of Sudan in regional geopolitics. How should India balance its humanitarian, diplomatic, and energy interests in conflict-prone regions like Sudan?***

Red Sea: Strategic Maritime Zone Under Stress

📌 Syllabus:

Paper	Relevance
✅ GS Paper 1	World Geography – Seas, Straits, Regional Geography
✅ GS Paper 2	International Relations – Geopolitical Conflicts, West Asia
✅ GS Paper 3	Internal Security – Maritime Security, Strategic Waterways
✅ Prelims	Map-based Geography, Straits & Canals, Recent Events

1. Context: Renewed Tensions in the Red Sea

The **Houthi rebels** in Yemen recently claimed responsibility for attacking and sinking a **cargo vessel** in the **Red Sea**, intensifying concerns over **maritime security** in this vital international trade route. The Red Sea region has become a **flashpoint** due to geopolitical tensions involving **Yemen, Saudi Arabia, Iran, and Western powers**.

2. Red Sea: Geographical Profile

- The **Red Sea** is a **marginal sea** of the northwestern **Indian Ocean**, located between **Africa** and the **Arabian Peninsula**.

🔷 **Connecting Water Bodies:**

- **South**: Connected to the **Gulf of Aden** via the **Bab el-Mandeb Strait**.
- **North**: Connected to the **Mediterranean Sea** via the **Suez Canal**.

🔷 **Red Sea's Northern Split:**

- **Gulf of Suez** (Northwest) – leads to the **Suez Canal**.
- **Gulf of Aqaba** (Northeast) – touches **Israel and Jordan**.

3. Bordering Nations

Direction	Countries
West	**Egypt, Sudan, Eritrea**
East	**Saudi Arabia, Yemen**
North-East (via Gulf of Aqaba)	**Israel, Jordan**

4. Physical & Climatic Features

- **Highly saline**: Among the most saline seawaters globally due to **high evaporation** and **lack of freshwater inflow**.
- **No river inflow**: The Red Sea receives **no permanent river water**.
- **Low precipitation**: Desert climate dominates its surroundings.

- **Coral Reefs**: Hosts ecologically significant reef systems, sensitive to global warming and salinity shifts.

5. Strategic Importance

🔶 **Global Shipping Route:**

- Major route for ships carrying oil, gas, and cargo between **Europe and Asia**.
- Around **10% of global maritime trade** passes through **Suez Canal** and Red Sea.

🔶 **Choke Point: Bab el-Mandeb Strait**

- Separates the **Horn of Africa (Djibouti/Eritrea)** from **Yemen**.
- A vital link between the **Indian Ocean** and **Mediterranean Sea**.
- Frequent attacks threaten **global energy supply chains**.

🔶 **Geopolitical Flashpoint:**

- **Yemen Conflict**: Houthi rebels (backed by Iran) target ships linked to **Western or Israeli interests**.
- Involves regional power struggle: **Saudi Arabia vs. Iran**.

✅ Conclusion: Maritime Geography Meets Geopolitics

The Red Sea serves as a **confluence of trade, strategy, and tension**. While its **physical characteristics make it unique**, its **strategic geography has made it vulnerable** to evolving geopolitical conflicts, especially in West Asia and the Horn of Africa. For India, this reinforces the importance of **securing sea lanes of communication (SLOCs)** and maintaining **maritime awareness** in the extended Indian Ocean Region (IOR).

"In today's world, geography decides not just climate, but conflict."

Mains Practice Question (GS Paper 3 – Internal Security / Maritime Security)

Q. ***The Red Sea is not just a maritime zone but a geopolitical hotspot. Discuss the geographical significance and recent security threats to maritime trade passing through this region.***

India–Brazil Strategic Engagement

📌 Syllabus:

Paper	Relevance
✅ GS Paper 2	International Relations: Bilateral & Multilateral Relations, Strategic Partnerships
✅ GS Paper 3	Economy: Trade Agreements; Environment: Renewable Energy Diplomacy
✅ Prelims	Current Affairs: Awards, Agreements, International Institutions

1. Context: Strengthening Strategic Ties through State Visit

- During the **Indian Prime Minister's official visit to Brazil (2025)**, **six key bilateral agreements** were signed.
- India's PM was conferred **Brazil's highest civilian honour**:
  Grand Collar of the National Order of the Southern Cross.

This visit is a major boost to **South-South cooperation** and India's outreach to the **Latin American region**.

2. Key Agreements Signed

Area	Agreement
Security	Agreement on Cooperation in **Combating International Terrorism** and **Transnational Organized Crime**
Digital	MoU for **exchange of digital solutions** to support **digital transformation**
Agriculture & Energy	MoU between **EMBRAPA** (Brazil) and **ICAR** (India) on **agricultural research and renewable energy**
Information Security	Framework for **mutual protection of classified information**
Intellectual Property	MoU on **IPR collaboration**
Trade Governance	Establishment of **ministerial-level mechanism** for **monitoring trade, commerce, and investment**

3. Pillars for Future India–Brazil Partnership

- **Defence and Strategic Security**
- **Food and Nutritional Security**
- **Energy Transition and Climate Change**
- **Digital Cooperation**
- **Multilateral Reform and South-South Solidarity**

4. India–Brazil Relations: Overview

🔹 **Diplomatic and Multilateral Engagements**

- **Strategic Partnership** since **2006**
- Common membership in:
  - **BRICS, IBSA, G-4**, **BASIC**, **G-20**, **WTO**, **UN**, **UNESCO**, **WIPO**

🔹 **Trade Relations**

- Bilateral Trade (2024–25): **USD 12.2 billion**
- India enjoys a **trade surplus**
- Major items:
  - **India's exports**: Pharmaceuticals, machinery, chemicals
  - **Imports from Brazil**: Crude oil, gold, sugar, soy, and iron

🔹 **Defence Cooperation**

- **Defence Cooperation Agreement (2006)**: Established **Joint Defence Committee (JDC)**
- Regular **military exchanges**, **defence R&D**, and **capacity building**

🔹 **Renewable Energy & Climate Diplomacy**

- **Brazil**: Co-founder of **Global Biofuel Alliance**
- Brazil ratified the **International Solar Alliance (ISA)**, aligning with India's **green leadership agenda**

5. Significance of the Visit

- **South-South Solidarity**: Strengthens Global South voice in multilateral forums.
- **Geo-economic Diversification**: Reduces India's over-dependence on traditional trade partners.
- **Tech and Innovation Diplomacy**: Enables AI, digital tech, and IP cooperation.
- **Agri-tech and Energy Synergy**: Complements India's push for agri-modernization and clean energy.

✅ Conclusion

The India–Brazil strategic reset through the 2025 bilateral visit marks a **holistic alignment** across defence, economy, digital innovation, and climate action. As both nations lead voices from the **Global South**, this cooperation will be central to building **inclusive multilateral governance** in the emerging world order.

"India and Brazil stand not just as partners, but as co-authors of a reformed and inclusive global future."

Mains Practice Question (GS Paper 2 – IR)

Q. ***India's engagement with Brazil reflects the growing significance of South-South cooperation in shaping the 21st-century multilateral order. Discuss in light of recent bilateral developments.***

Carbon Border Adjustment Mechanism (CBAM)

📌 Syllabus:

Paper	Relevance
✅ GS Paper 2	International Relations: Multilateralism, Global South, WTO
✅ GS Paper 3	Environment: Climate Change, Climate Finance, Carbon Pricing
✅ Prelims	Environmental Agreements, Climate Instruments, International Trade Tools

1. Context: BRICS Rejects CBAM

- **BRICS nations (Brazil, Russia, India, China, South Africa)** have **condemned the European Union's CBAM**, labeling it a **"unilateral, discriminatory trade barrier"**.
- They argue it **undermines equity and common but differentiated responsibilities (CBDR)** under the **UNFCCC**framework.

2. What is CBAM?

The **Carbon Border Adjustment Mechanism (CBAM)** is a **climate policy tool** introduced by the **European Union (EU)** to **reduce carbon leakage** and **promote clean industrial production** globally.

🔹 **Objective:** To ensure that **imported goods** pay the same carbon price as products manufactured within the EU under the **EU Emissions Trading System (EU ETS)**.

3. Key Features of CBAM

Feature	Details
Policy Type	Border carbon tax / environmental tariff
Launched by	European Union
Sectors Covered (Phase 1)	Iron & steel, cement, aluminium, fertilizers, electricity, and hydrogen
Transitional Phase	2023–2025 (reporting only, no financial adjustment yet)
Full Enforcement	From **January 2026**, importers must buy **CBAM certificates** reflecting embedded carbon emissions
Calculation Basis	Based on **difference between carbon cost** in EU ETS and non-EU jurisdictions

4. Why is CBAM Controversial?

Perspective	Concern
Developing Countries / Global South	Viewed as a **non-tariff barrier** violating **climate equity** principles
Trade Impact	Penalises exports from **high-emission economies** lacking robust carbon pricing
WTO Legality	Raises questions on **non-discrimination (MFN clause)** under WTO rules
Double Burden	Exporters may face both **domestic emission taxes** and **CBAM charges**

5. India's Stand on CBAM

- India is one of the most vocal critics, calling it a **"protectionist measure under the guise of climate action."**
- It may affect **India's exports** in aluminium, steel, and cement sectors.
- Pushing for **carbon market mechanisms domestically** under **Carbon Credit Trading Scheme (2023)** to mitigate CBAM impact.
- Exploring **Free Trade Agreements (FTAs)** with climate-related safeguard clauses.

6. Way Forward and Global Implications

Action Point	Impact
Multilateral Climate Dialogue	Reform global carbon accounting in line with **CBDR-RC principle**
Global Carbon Pricing Framework	Could bring fairness across both developing and developed countries
Low-Carbon Tech Transfers	Need for **climate finance and green technology** to assist developing nations
Domestic Carbon Markets	Countries like India can develop **robust carbon trading systems**

✅ Conclusion

While CBAM is a **climate-aligned trade instrument**, it raises significant concerns for **climate justice, trade equity, and developing country competitiveness**. Its implementation could redefine the **interface of climate policy and trade rules**and demands **multilateral engagement**, not unilateral imposition.

"Climate action must not become climate protectionism."

Mains Practice Question (GS Paper 3 – Environment + Trade)

Q. ***Critically examine the implications of the Carbon Border Adjustment Mechanism (CBAM) for developing countries like India. How can India safeguard its interests while maintaining climate commitments?***

FATF Report on Terrorist Financing Risks (2025)

📌 Syllabus:

Paper	Relevance
✅ **GS Paper 2**	**International Relations – Global Groupings (FATF), Terrorism**
✅ **GS Paper 3**	**Internal Security – Terror Financing, Role of Technology in Security**
✅ **Essay**	**Issues related to internal & international security**

1. Context: FATF Releases 'Comprehensive Update on Terrorist Financing Risks'

- The **Financial Action Task Force (FATF)** has released a detailed global risk assessment of **Terrorist Financing (TF)** mechanisms in 2025.
- The report highlights how terrorist organizations are **adapting to modern technology and global loopholes** to finance their operations.

2. Key Trends in Terrorist Financing (TF)

🔹 **Conventional Channels**

- **Cash-based transactions**, couriers, and **Hawala networks** (informal value transfer systems)
- Used by groups like **Hamas, Al-Shabaab**, and **ISIS factions**

- **Porous borders** in regions like **South Asia and the Sahel** enable illicit movements

🔹 **Emerging Channels**

Mode	Examples & Concerns
Virtual Assets (VAs)	Bitcoin, Monero, etc. used to bypass regulated financial systems
Crowdfunding & Social Media	Campaigns disguised as charity; often hosted on global platforms
Online Gaming	Covert transfer of value using in-game currencies or tokens
Illicit Trade	Natural resources (e.g. **timber, gold**) used by **Boko Haram** to raise funds
Front & Shell Companies	Legal entities used to obscure money trails
Kidnapping for Ransom (KFR)	Especially in Africa and West Asia as seen with ISIS, Boko Haram

3. Geopolitical and Structural Enablers

- **State-sponsored terrorism** and safe havens (e.g., Taliban-ruled Afghanistan, as per recent UNSC reports)
- **Free Trade Zones** with weak regulatory frameworks
- Lack of oversight on **non-profit organizations (NPOs)**

4. FATF's Recommendations for Counter-Terrorism Financing (CTF)

A. Risk Identification and Regulation

- Monitor **frequent transfers to high-risk jurisdictions**
- Watch for usage of **anonymity-enhancing tools** like prepaid cards, encrypted apps, mixers

B. Expand Regulatory Coverage

- Include **online platforms**, **fintech startups**, and **gaming industries** under AML-CFT frameworks

C. Multilateral and Coordinated Action

- Promote **multilateral designation** of terrorist entities under **UNSC 1267 sanctions regime**
- Enhance **inter-agency cooperation** (FIs, intelligence, customs, tech regulators)

D. Public-Private Partnerships (PPP)

- Encourage **information sharing** between governments and private platforms
- **Capacity-building** in developing economies to trace digital TF trails

5. India's Approach and Relevance

- **India is a member of FATF and Asia Pacific Group (APG)** and has enacted key legislations:
  - **Unlawful Activities (Prevention) Act (UAPA)**
  - **Prevention of Money Laundering Act (PMLA)**
  - **National Investigation Agency (NIA)** tasked with TF probes
- India's **concerns with cross-border terrorism** from Pakistan and **digital radicalization** highlight the importance of aligning with FATF's recommendations.

✅ Conclusion

Terrorist groups are **innovative, resilient, and adaptive**, posing a growing challenge to national and global financial systems. To ensure financial integrity and internal security, **global cooperation, legislative innovation, and tech-driven intelligence sharing** are indispensable.

"Financing terror is the silent fuel that keeps extremism alive — choking its flow is key to peace."

Mains Practice Question (GS Paper 3 – Internal Security)

Q. ***Discuss the emerging trends in terrorist financing and critically analyse India's preparedness in addressing these threats. Suggest reforms to align with international standards like those of the FATF.***

Namibia Adopts UPI: India's Digital Diplomacy Expands in Africa

📌 Syllabus:

Paper	Relevant Topics
✅ GS Paper 2	India's foreign policy, International Relations
✅ GS Paper 3	Indian Economy – Inclusive growth, E-Governance, Fintech
✅ Essay	Science & Tech for inclusive growth, India-Africa relations

Context

During the **Indian Prime Minister's state visit to Namibia**, the country became the **first African nation** to adopt India's **Unified Payments Interface (UPI)** for digital transactions, marking a historic step in **digital financial diplomacy**.

Key Highlights

- **Licensing Agreement** signed to implement **UPI-based digital payments** in Namibia.
- Part of RBI and **NPCI International Payments Ltd. (NIPL)**'s vision to expand **UPI to 20 countries by 2028–29**.
- **Namibia joins other countries** like:
  - **Bhutan, France, Nepal, Singapore, Sri Lanka, UAE**, and **Mauritius** in accepting UPI-powered payments.

About UPI

Feature	Details
Launched by	**National Payments Corporation of India (NPCI)** in 2016
Function	Links multiple bank accounts into a single app; supports fund transfers, merchant payments, and more
Core Feature	Operates on **real-time basis**; uses mobile platforms
Backed by	India Stack's **Digital Public Infrastructure (DPI)** framework

Significance of UPI Internationalization

1. Strategic & Economic Diplomacy

- **Soft Power Tool**: Like the **International Solar Alliance**, UPI is now a vector of **Digital Diplomacy**.
- **Technology Transfer** to Global South enhances India's leadership role in **Digital Public Infrastructure (DPI)**.

2. Boost to Trade & Commerce

- Enables **fast, low-cost remittances and payments**, especially in South-South partnerships.
- Promotes **interoperability** between national payment platforms globally.

3. Fintech Leadership

- Positions India as a **global leader in real-time payment systems**.
- Promotes adoption of Indian digital standards as **international benchmarks**.

Institutional Framework

Institution / Initiative	Role
NPCI International (NIPL)	Subsidiary of NPCI to expand **UPI & RuPay** globally (est. 2020)
UPI One World	Allows **G20 foreign nationals and NRIs** to use UPI-linked wallets
G20 Presidency Initiatives	Global DPI Repository; Social Impact Fund for Global South

Strategic Importance for India–Africa Ties

- Strengthens **India-Namibia bilateral cooperation** in fintech.
- UPI internationalization can serve as a **model for South-South collaboration**.
- Supports Africa's goal of building **inclusive digital financial ecosystems** (aligns with **Agenda 2063** of African Union).

✅ Conclusion

Namibia's adoption of UPI is a **milestone in India's digital diplomacy** and part of a broader effort to position India as a **tech partner to the Global South**. It aligns financial inclusion, digital innovation, and foreign policy into a single strategic vision.

Mains Practice Question (GS Paper 2)

Q. ***UPI is emerging as a key instrument of India's digital diplomacy. Discuss how the internationalization of UPI can support India's geopolitical and economic interests, especially in the Global South.***

India Urges IMO for Global Review of Maritime Incidents

📌 Syllabus:

Paper	Subtopic
GS Paper 2	International Institutions, Maritime Security, Global Governance
GS Paper 3	Environmental Pollution, Disaster Management, Infrastructure (Shipping)

CONTEXT

India has called upon the **International Maritime Organization (IMO)** for a **comprehensive investigation and global review of maritime safety protocols**, especially related to **undeclared hazardous cargo** and **lithium-ion batteries**. This comes in light of rising **maritime incidents in Indian waters** involving **foreign vessels**.

ABOUT INTERNATIONAL MARITIME ORGANIZATION (IMO)

Feature	Description
Establishment	1948 (by a UN convention), came into force in 1958
Headquarters	London, UK
Members	174 Member States (including India)
Type	Specialized Agency of the **United Nations**
Mandate	To ensure **safe, secure, environmentally sound, efficient and sustainable shipping**

ISSUE: Rise in Maritime Incidents in Indian Waters

- Recent **accidents** due to:
  - **Undeclared or misdeclared cargo** (e.g. lithium-ion batteries, hazardous chemicals)
  - Improper **packaging and stowage**
  - Inadequate **real-time monitoring systems**
- Results in **explosions, fires, and environmental pollution**.

International Maritime Dangerous Goods (IMDG) Code

Aspect	Details
Purpose	Governs the **classification, packaging, marking, labeling, and documentation** of dangerous goods on ships.
Adopted by	IMO
Categories	Includes explosives, flammable liquids/gases, radioactive substances, corrosives, etc.
India's Concern	Rise in non-compliance with IMDG protocols by foreign vessels poses **ecological and security risks**.

IMPLICATIONS OF NON-COMPLIANCE

Safety & Environmental Risks

- Fires on vessels carrying **lithium-ion batteries**.
- Potential **oil spills** and toxic leakages.

Risk to Indian Maritime Interests

- Ports like **Nhava Sheva, Kochi, Paradip** see increased **foreign vessel traffic**.
- Threatens **Blue Economy and Coastal Security** initiatives.

Global Maritime Governance Breakdown

- Undermines **Rule-based Shipping Norms**.
- Raises questions on **accountability of shipping firms** and **flag states**.

INDIA'S STAND & PROPOSALS AT IMO

- **Comprehensive Review** of incidents globally.
- Better **enforcement of IMDG Code**.
- Establish **global monitoring system** for high-risk cargo.
- Standardized **disclosure obligations** for battery shipments.
- Focus on **training and capacity-building** of port authorities.

THINKERS' PERSPECTIVE

- **Grotius' Mare Liberum (1609)**: Open seas should be governed by **international law**.
- **Joseph Nye**: Maritime cooperation as a tool of **smart power**.
- India's approach aligns with **constructive multilateralism** to ensure **shared maritime security**.

INDIA & IMO: RECENT INITIATIVES

- India elected to **IMO Council under Category B** (nations with largest interest in international seaborne trade).
- Promoting **Green Shipbuilding**, **e-navigation**, and **Maritime Digitalisation**.
- **SAGAR (Security and Growth for All in the Region)** aligns with IMO's sustainable shipping goals.

WAY FORWARD

Strategic Measures	Operational Measures
Push for IMO reform to enhance compliance transparency	Deploy **container scanning tech** at Indian ports
Establish a South-South coalition for safe maritime practices	Develop a **national maritime cargo database**
Promote regional coast guard coordination in Indian Ocean	Conduct **joint IMO-inspections** with flag states

CONCLUSION

India's proactive stand at the IMO reflects a growing need to **modernize global maritime safety protocols**, especially amid the **emerging risks of energy-dense cargoes** like lithium batteries. A **collaborative and technology-driven approach** is vital to safeguard both **national maritime interests** and **global shipping norms** in the 21st century.

MAINS PRACTICE QUESTION

Q. Examine the role of the International Maritime Organization (IMO) in ensuring maritime safety. Highlight India's concerns regarding hazardous cargo and the steps needed to strengthen maritime governance globally. (250 words | 15 marks)

CYBERSECURITY & DEFENCE

Transforming Defence for Future Warfare

📌 Syllabus:

Paper	Relevance
✅ GS Paper 2	Governance, Security Challenges, Role of Institutions
✅ GS Paper 3	Internal Security, Defence Technology, Indigenisation of Defence
✅ Prelims	Defence agencies, iDEX, ICDP, advanced weapon systems
✅ Essay Paper	Science, security, and the future of warfare

1. Introduction: Defence Reimagined for the 21st Century

In July 2025, the **Indian Army unveiled a comprehensive modernisation roadmap** to prepare for future warfare in land, air, space, cyber, and electronic domains. It reflects India's evolving strategic posture, embracing **technological superiority**, **indigenous capability**, and **multi-stakeholder synergy** as critical drivers of national defence.

2. Key Pillars of the Modernisation Roadmap

A. Advanced Weapon Systems

Focus Area	Highlights
Hypersonic Technology	Development of **hypersonic glide vehicles** and **air-breathing engines (HEBs)**
Missile Advancements	Upgrades in **4th, 5th, and 6th generation missiles**
Precision Munitions	Shift from conventional to **smart, loitering, precision-guided weapons**

These enhance lethality, reduce collateral damage, and offer tactical surprise.

B. Directed Energy Weapons (DEWs)

- **High-energy lasers** and **microwave-based systems** under development
- Applications in **counter-drone**, **missile interception**, and **anti-satellite operations**

DEWs offer a silent, cost-effective deterrence with high-speed, non-kinetic impact.

C. Cyber and Electronic Warfare (EW)

- Deployment of **next-gen cyber defence tools**

- Development of **autonomous EW systems** and **spectrum dominance tools**
- Focus on **resilient satellite networks** for secure communications

Warfare is increasingly digital. **Spectrum control and cyber dominance** are now decisive.

D. Soldier-Centric Modernisation

Technology	Impact
Exoskeletons, Smart Armour	Enhanced mobility and protection
AI Helmets, AR Battle Systems	Tactical situational awareness
Wearable Health Devices	Real-time monitoring of vitals during combat

Objective: Build a **networked, tech-enhanced soldier** capable of operating in a digitised battlefield.

E. Logistics & Infrastructure Innovation

- Integration of **AI, blockchain, and IoT** in **supply chain management**
- Creation of **green, cyber-resilient logistics networks**
- Modern infrastructure for **rapid troop mobility and strategic reach**

F. Institutional Synergy

Stakeholder	Role
Military	Define operational capability requirements
Policymakers	Frame enabling policies and allocate resources
Industry	Innovate and manufacture tech-driven defence solutions

Effective modernisation needs a **whole-of-system approach** with clear coordination.

3. Supporting Initiatives for Defence Modernisation

Initiative	Key Features
ICDP (Integrated Capability Development Plan)	10-year strategic planning for capacity enhancement
Tri-Services Integration	Creation of **Defence Space Agency**, **Cyber Agency**, **Special Operations Division**
iDEX (Innovations for Defence Excellence)	Funds startups up to ₹1.5 crore for defence innovation
Atmanirbhar Bharat in Defence	- Positive indigenisation lists - **SRIJAN Portal** for vendor collaboration - FDI liberalised in defence R&D

A. **Deterrence through Technological Superiority:** Prepares India for asymmetric threats from both state and non-state actors.
B. **Defence Self-Reliance:** Boosts **indigenous R&D**, reduces import dependency, and strengthens India's defence economy.
C. **Information Warfare Readiness:** Supports a shift from **hardware-intensive to information-intensive warfare**.
D. **Operational Effectiveness:** Enhances battlefield awareness, decision-making speed, and real-time coordination.

5. Challenges in Implementation

Challenge	Concern
Budget Constraints	Modern systems are capital-intensive
Bureaucratic Delays	Long procurement cycles hinder rapid deployment
Private Sector Engagement	Still limited integration with armed forces needs
Skill Shortage	Lack of trained cyber, AI, and space warfare professionals

6. Conclusion: Shaping India's Future-Ready Military

The Indian Army's modernisation roadmap is a **critical blueprint** for transforming India's defence posture in an era of unpredictable threats. The shift toward **AI-enabled, cyber-resilient, and indigenously equipped forces** signals a **strategic recalibration** for multi-domain dominance.

As India rises as a global power, **military reform must keep pace** with technological change, geopolitical shifts, and the imperatives of Atmanirbhar Bharat.

"If your deterrence is credible, your battle may never be fought." – Military Doctrine Insight

Mains Practice Question (GS Paper 3)

Q. ***The future of warfare will be dominated by information, automation, and integration. Discuss in light of the Indian Army's modernisation roadmap. What are the challenges and opportunities in implementing such a vision?***

Answer Structure Hint:

- Introduction: Define future warfare; introduce the roadmap
- Body: Key initiatives + strategic significance + challenges
- Conclusion: Balanced view with way forward

India Urges IMO for Global Review of Maritime Incidents

📌 Syllabus:

Paper	Subtopic
GS Paper 2	International Institutions, Maritime Security, Global Governance
GS Paper 3	Environmental Pollution, Disaster Management, Infrastructure (Shipping)

CONTEXT

India has called upon the **International Maritime Organization (IMO)** for a **comprehensive investigation and global review of maritime safety protocols**, especially related to **undeclared hazardous cargo** and **lithium-ion batteries**. This comes in light of rising **maritime incidents in Indian waters** involving **foreign vessels**.

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India's Concern	Rise in non-compliance with IMDG protocols by foreign vessels poses **ecological and security risks**.

IMPLICATIONS OF NON-COMPLIANCE

🔥 **Safety & Environmental Risks**

- Fires on vessels carrying **lithium-ion batteries**.
- Potential **oil spills** and toxic leakages.

🇮🇳 **Risk to Indian Maritime Interests**

- Ports like **Nhava Sheva, Kochi, Paradip** see increased **foreign vessel traffic**.
- Threatens **Blue Economy and Coastal Security** initiatives.

⚓ **Global Maritime Governance Breakdown**

- Undermines **Rule-based Shipping Norms**.
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🇮🇳 INDIA'S STAND & PROPOSALS AT IMO

- **Comprehensive Review** of incidents globally.
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WAY FORWARD

Strategic Measures	Operational Measures
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MAINS PRACTICE QUESTION

Q. Examine the role of the International Maritime Organization (IMO) in ensuring maritime safety. Highlight India's concerns regarding hazardous cargo and the steps needed to strengthen maritime governance globally.
(250 words | 15 marks)

S-400 Triumf Air Defence System

📌 Syllabus:

Paper	Theme
GS Paper 2	International Relations – India-Russia defence cooperation
GS Paper 3	Security – Defence technology, Strategic forces, MRO ecosystem in India

? WHY IN NEWS?

- The **Ministry of Defence** has identified an **Indian firm** for setting up a **Maintenance, Repair and Overhaul (MRO) facility** for the **S-400 air defence system**.
- Aims to reduce dependency on Russia and strengthen indigenous defence capability under **Atmanirbhar Bharat**.

🔍 ABOUT S-400 TRIUMF (SA-21 Growler)

Feature	Details
Type	Long-Range Surface-to-Air Missile (SAM) System
Origin	Developed by **Almaz-Antey** (Russia)
Indian Name	**Sudarshan Chakra** (unofficial reference)
Inducted in India	Deal signed in **2018**, worth **$5.43 billion** for 5 systems

TECHNICAL FEATURES

Parameter	Specification
Tracking Range	Up to **600 km**
Engagement Range	Up to **400 km** (depends on missile variant)
Target Altitude	From **30 meters to 30 km**
Speed	Missiles travel at **13–14 Mach**
Radar	**Phased-array**, 360° surveillance
Target Handling	Can **track and engage 80+ targets** simultaneously
Missile Types	40N6 (400 km), 48N6 (250 km), 9M96E2 (120 km), 9M96E (40 km) – enables **layered defence**

COMPONENTS

- **Command and Control Centre**
- **Multi-Function Radar System**
- **Launch Units (Transporter-Erector-Launchers)**

- **Interceptor Missiles**
- **Electronic Warfare Countermeasures**

STRATEGIC SIGNIFICANCE FOR INDIA

Dimension	Significance
National Security	Provides **multi-layered defence** against **hostile aircraft, drones, cruise & ballistic missiles**. Crucial for air defence of metros and strategic assets.
Deterrence	Enhances India's **air superiority** in the region, deterring adversaries like **Pakistan** and **China**.
Geopolitical Assertion	Despite US pressure and **CAATSA threat**, India prioritized strategic autonomy by proceeding with the deal.
Force Multiplier	Complements indigenous systems like **Akash, QRSAM, and Barak-8**, creating a robust integrated air defence grid.

CONTEMPORARY DEVELOPMENTS

Indigenous MRO Facility

- India is establishing a **dedicated MRO unit** for S-400 systems.
- Aligns with **Atmanirbhar Bharat** and enhances **operational availability**.
- Reduces **logistical delay** in spare parts, repair cycles, and dependency on Russian technicians.

CAATSA Issue (Countering America's Adversaries Through Sanctions Act)

- A US legislation aimed at **discouraging defence deals with Russia**.
- Despite CAATSA, **India received a waiver**, showing **US-India strategic ties**.

COMPARISON WITH OTHER SYSTEMS

System	Country	Max Range	Comparable To
S-400 Triumf	Russia	400 km	Best globally
THAAD	USA	200 km	Anti-ballistic focus
Iron Dome	Israel	70 km	Low-altitude short-range
HQ-9	China	200 km	Inspired by S-300

THINKER'S INSIGHT

"In modern warfare, air supremacy is the beginning of victory" – **Colin Powell**

CONCLUSION

The **S-400 Triumf system** is a vital component in India's air defence arsenal, combining **technological sophistication**with **strategic deterrence**. The recent move to establish a **domestic MRO facility** is a major step toward achieving **self-reliance** in defence infrastructure while also asserting India's **strategic autonomy** in global geopolitics.

MAINS QUESTION (GS3 – Internal Security)

Discuss the strategic significance of the S-400 Triumf system for India's national security architecture. Also, examine how the indigenisation of its maintenance facilities can impact India's defence preparedness.
(250 words | 15 marks)

ECONOMY

Fugitive Economic Offenders Act, 2018

📌 Syllabus:

Paper	Relevance
✅ **GS Paper 2**	Statutory & Regulatory Frameworks, Judiciary, Governance
✅ **GS Paper 3**	Economic Offences, Money Laundering, Black Money, Reforms in Laws
✅ **Prelims**	Legal Definitions (FEO, Scheduled Offence), Special Court, PMLA
✅ **Essay Paper**	Ethics in Governance, Corruption and Accountability in Economy

1. Context: Delhi Court Declares Arms Consultant as FEO

A **Delhi court** recently declared a **U.K.-based arms consultant** as a **Fugitive Economic Offender (FEO)** under the **Fugitive Economic Offenders Act, 2018**, in connection with high-value financial crime. The ruling underlines India's resolve to prevent high-profile economic offenders from evading justice by residing abroad.

2. What is the Fugitive Economic Offenders Act, 2018?

Feature	Description
Purpose	To deter economic offenders from **evading Indian legal system** by fleeing abroad
Definition of FEO	Any individual **against whom an arrest warrant is issued** for a scheduled offence and who **refuses to return to India**
Monetary Threshold	Applies to cases involving **economic offences of ₹100 crore or more**
Scheduled Offences	Listed in the Schedule (e.g., money laundering, fraud, corruption, tax evasion, benami transactions)
Special Court	Designated **Court of Session** under **PMLA, 2002** (Prevention of Money Laundering Act)
Application Process	Enforcement Directorate (ED) or designated authority files application to declare an individual as FEO

3. Key Provisions of the Act

A. Declaration Process:

- Initiated by **Director or authorised officer of ED**
- Application filed before **Special Court** with evidence of:
  - Issued warrant
  - Absconding status
  - Scheduled offence of ₹100 crore+

B. Consequences of Declaration as FEO:

Action	Impact
Confiscation of Property	All assets — **in India or abroad** — including **benami and proceeds of crime**
Civil Disqualification	FEOs are **barred from civil claims or defences** in Indian courts (e.g., contesting suits, contracts)
No Return = No Relief	Legal remedies (appeal, bail, etc.) restricted unless offender returns to India

4. Why the Act Was Needed

- Past cases (e.g., **Vijay Mallya**, **Nirav Modi**, **Mehul Choksi**) highlighted **gaps in enforcement** when high-value offenders fled abroad
- Existing laws like **PMLA**, **CrPC**, and **Extradition Act** had **limited teeth** without cooperation of foreign jurisdictions
- FEO Act creates a **civil forfeiture framework**, bypassing prolonged criminal trials

5. Recent Developments and Use

- Over a dozen individuals declared FEOs since 2018, including:
  - Vijay Mallya
  - Nirav Modi
  - Mehul Choksi
  - Economic offenders in defence and telecom sectors
- Strengthens India's global image in **economic integrity and law enforcement**

6. Critical Evaluation

✅ **Positive Aspects:**

- **Speedy Asset Recovery**

- Acts as a **deterrent to white-collar fugitives**
- Shifts burden of cooperation onto the accused
- Helps India fulfil **FATF obligations** on anti-money laundering

⚠️ **Challenges & Criticisms:**

- **Potential violation of natural justice** if assets seized without full trial
- Limited success in **actual extradition** of FEOs from foreign soil
- Enforcement depends on **bilateral legal cooperation treaties (MLATs/Extradition)**
- Concerns over **due process and human rights safeguards**

✅ Conclusion: Balancing Enforcement and Rights

The **Fugitive Economic Offenders Act, 2018** is a vital legal tool in India's **fight against economic fugitives** who undermine financial integrity and public trust. However, it must be implemented with **judicial scrutiny, international cooperation**, and **transparency**, ensuring that justice is served without compromising the rights of the accused.

"Rule of law is not only about punishment, but also about **procedural fairness**." — Reflecting the spirit of constitutional morality.

Mains Practice Question (GS Paper 2/3)

Q. Discuss the key features and significance of the Fugitive Economic Offenders Act, 2018. How does it strengthen India's economic justice framework, and what challenges persist in its effective implementation?

Answer Structure Hint:

- **Intro**: Define the Act and recent developments
- **Body**: Key provisions, cases, advantages
- **Challenges**: Due process, extradition limitations, enforcement hurdles
- **Conclusion**: Suggest reforms for transparency and international cooperation

India and Rare Earth Elements (REE)

📌 Syllabus:

Paper	Relevance
✅ GS Paper 1	Economic Geography – Distribution of Minerals, Resources of India
✅ GS Paper 2	International Relations – Strategic Resources and Supply Chain Risks
✅ GS Paper 3	Economy – Industrial Policy, Mineral Resources, Strategic Technologies
✅ Prelims	Geography – Mineral Distribution, Industrial Bodies

1. Context: India's Strategic REE Positioning and Current Lag

A recent **CareEdge Report (2025)** revealed that:

- **India holds ~8% of global Rare Earth Element (REE) reserves** (3rd largest),
- But **contributes <1% to global mining**,
- While **China controls 49% of reserves**, **69% of mining**, and **~90% of global REE refining** capacity.

This strategic imbalance raises questions about India's industrial self-reliance, especially in the age of green technology and electronic warfare systems.

2. What are Rare Earth Elements (REEs)?

- Group of **17 chemically similar elements** (15 lanthanides + Scandium + Yttrium).
- Divided into:
  - **Light REEs (LREEs)**: Lanthanum, Cerium, Neodymium etc.
  - **Heavy REEs (HREEs)**: Dysprosium, Terbium etc.

🔶 **Uses:**

- **Green tech**: EVs, wind turbines, solar panels
- **Electronics**: Smartphones, LCDs
- **Defence**: Guidance systems, lasers
- **Clean Energy**: Permanent magnets for electric motors

3. Distribution of REEs in India

- Primarily found in **Monazite sands**, which also contain **Thorium**.
- Major Deposits: **Eastern and Southern coastal regions**
  - **Kerala**, **Tamil Nadu**, **Odisha**, **Andhra Pradesh**
- Source: **Indian Minerals Yearbook 2023 (IBM)**

India's reserves are **LREE-dominant**, while **HREEs are scarcely available** in extractable quantities.

4. Why India Lags in REE Mining and Processing

Category	Bottlenecks
⚙️ **Technological**	Complex separation processes; REEs are often bound with **radioactive elements**
🧱 **Industrial**	Lack of end-to-end value chain: Can mine, separate & produce oxides, but **lacks alloy and magnet production** infrastructure
🏛️ **Regulatory**	**Coastal Regulation Zone (CRZ) norms** restrict mining in monazite-rich coastal zones
🏢 **Institutional**	Monopoly of **IREL (India) Ltd.**, a **Mini Ratna PSU**, with limited private sector involvement
🧪 **Environmental**	Concerns over **radioactive waste**, water contamination, and **community resistance**

5. Strategic and Economic Importance of REEs

- **Critical for Atmanirbhar Bharat**: REEs are key to indigenous manufacturing in **EVs, defence, semiconductors, and renewables**.
- **Geopolitical leverage**: China's dominance poses **supply chain vulnerability**.
- **Supports Energy Transition**: High demand expected under **COP goals and Net Zero 2070**.
- **Emerging Sectors**: PLI Scheme for electronics and batteries depends on REE-based components.

6. India's Initiatives & Way Forward

Initiative/Policy	Description
Indian Rare Earths Limited (IREL)	Public sector miner under Department of Atomic Energy
Deep Ocean Mission	Potential for REE mining in polymetallic nodules
National Mineral Policy (2019)	Emphasis on critical and strategic minerals
Exploration Tie-ups	MoUs with countries like **Australia, Argentina, Kazakhstan** for REE sourcing
PLI for Advanced Chemistry Cells	Encourages domestic battery manufacturing

✅ Conclusion

India's **REE paradox**—large reserves but low utilisation—demands immediate attention through **value chain integration**, **regulatory flexibility**, and **public-private R&D partnerships**. With the right investment and innovation, India can reduce **strategic mineral dependency** and play a bigger role in the **global clean-tech ecosystem**.

"Critical minerals like REEs are not just resources—they are strategic instruments in the 21st-century power play."

Mains Practice Question (GS Paper 3 – Economy & S&T)

Q. ***Despite holding significant reserves of Rare Earth Elements (REEs), India lags in their extraction and processing. Analyse the challenges and suggest a strategy to bridge this gap in the context of Atmanirbhar Bharat and energy security.***

Telecom Services in India: Yearly Performance 2024–25 (TRAI Report)

📌 Syllabus:

Paper	Relevance
✅ **GS Paper 2**	**E-Governance, Government Policies, Digital Infrastructure, Service Delivery**
✅ **GS Paper 3**	**Economic Development: Infrastructure (Telecom), Inclusive Growth**
✅ **Prelims**	**Key Reports and Indices, Regulatory Bodies, ICT in Governance**

1. Context: TRAI's Annual Telecom Performance Report 2024–25

- **Telecom Regulatory Authority of India (TRAI)** released its **yearly performance indicators**, offering a snapshot of **digital growth trends** in India's telecom sector.
- Despite modest growth in users, **tele-density has declined**, raising concerns about **equitable digital access**.

2. Key Highlights (2024–25)

Indicator	2023–24	2024–25	Remarks
Internet Subscribers	954.40 million	969.10 million	📈 Growth of ~14.7 million users
Telephone Subscribers	1,199.28 million	1,200.80 million	Marginal increase
Overall Tele-Density	85.69%	85.04%	📉 Decline, despite rise in users
Urban Tele-Density	–	131.45%	Saturated market
Rural Tele-Density	–	59.06%	Significant digital divide

3. Key Issues and Trends

🔹 **Urban-Rural Digital Divide**

- Urban India has surpassed 100% tele-density (multiple connections per user).
- Rural areas still struggle with access and affordability.

🔹 **Paradox of Declining Tele-density**

- Decline in tele-density despite increased subscriber count due to:
  - **Population growth**
  - **Discontinuation of multiple SIMs**
  - **Inactive connections being removed**

🔹 **Internet Penetration**

- Nearing **1 billion internet users**, highlighting India's **massive digital base**.
- However, issues of **speed, quality, and affordability** persist.

4. Significance for Governance and Economy

Domain	Impact
E-Governance	Wider reach enables digital delivery of services (DigiLocker, UPI)
Digital Economy	Fuels e-commerce, fintech, and remote work ecosystems
Financial Inclusion	Drives use of DBT, PM Jan Dhan, Aadhaar authentication, etc.
Education & Health	Enables EdTech, Telemedicine, but requires reliable rural connectivity

5. Government Initiatives for Telecom Expansion

- **BharatNet Project**: Connecting 2.5 lakh gram panchayats with optical fibre.
- **PM Gati Shakti – National Master Plan**: Integrated infrastructure planning including telecom.
- **USOF (Universal Service Obligation Fund)**: For boosting rural telecom infrastructure.
- **Telecommunication Act, 2023**: Modernizing telecom regulation, data security, and spectrum use.

✅ Conclusion

India continues to see **incremental growth in digital connectivity**, but **tele-density trends and rural gaps** highlight the need for focused investment and policy intervention. Bridging the **digital divide** remains critical for realizing the **Digital India vision** and achieving **inclusive growth**.

"Connectivity is the cornerstone of digital empowerment."

Mains Practice Question (GS Paper 2/3 – Governance + Infrastructure)

Q. ***"Despite a large subscriber base, tele-density in India has declined." Analyse the implications of this trend on digital inclusion. Suggest measures to ensure equitable telecom growth in rural and underserved areas.***

Shadow Banking: No Longer in the Shadows?

📌 Syllabus:

Paper	Topics
GS Paper 3	Indian Economy – Banking sector reforms, Financial institutions, Regulation of NBFCs
Prelims	Economy – Financial System, NBFCs, Regulatory Institutions

What is Shadow Banking?

- **Definition**: Shadow banking refers to **credit intermediation** involving entities and activities **outside the regulated banking system**.
- Coined by **Paul McCulley (2007)** during the global financial crisis.
- These entities **do not hold banking licenses** and hence are not subject to **stringent regulations like CRR/SLR**, etc.

Key Characteristics

Feature	Shadow Banks
Regulatory Oversight	Operate with less regulation than banks
Function	Lend like banks but without accepting public deposits
Risk	High leverage, low transparency, systemic vulnerability
Examples	NBFCs, Mutual Funds, Securitisation firms, Peer-to-peer lending platforms, Hedge Funds

Examples in India

- **Non-Banking Financial Companies (NBFCs)** like Bajaj Finance, Muthoot Finance
- **Housing Finance Companies (HFCs)** such as HDFC (before merger)
- **Microfinance Institutions (MFIs)**
- **Asset Reconstruction Companies (ARCs)**
- **FinTech Lending Platforms**

Why Shadow Banks Rose?

- **Credit gap** left by formal banks
- **Less regulatory burden** makes operations faster and cheaper
- **Innovation in financial intermediation** (e.g., digital NBFCs)
- **Sectoral demand**: MSMEs, real estate, retail loans

Issues & Concerns

Issue	Explanation
Systemic Risk	Interconnectedness with banks (e.g., IL&FS default 2018) can cause contagion
Liquidity Mismatch	Borrow short-term and lend long-term, leading to crises
Regulatory Arbitrage	Operate in less regulated grey zones
Weak Supervision	NBFCs often not monitored as stringently as scheduled commercial banks

🔧 Recent Reforms & Developments

1. **RBI's Scale-Based Regulation (SBR) Framework (2022)**
   - Classifies NBFCs into four tiers based on size & systemic importance
   - Tightens norms on **liquidity, governance, and capital adequacy**
2. **Insolvency & Bankruptcy Code (IBC) inclusion** for NBFCs above ₹500 crore
3. **Liquidity Support**: Special Liquidity Scheme for NBFCs (post-COVID)
4. **CRILC Reporting**: Now mandatory for NBFCs with assets over ₹500 crore
5. **FinMin (2025)** Statement:
   - "NBFCs have matured, are now **integral part of formal financial sector**, no longer shadowy."

Global Context

- **US 2008 Crisis**: Collapse of Lehman Brothers, triggered by shadow banking-linked mortgage securitisation.
- **China's Shadow Banks**: Used to avoid capital restrictions, recently cracked down by regulators.

Advantages

- Credit access to **underserved segments** like MSMEs and informal sector
- **Diversification** of financial system beyond traditional banks
- **Innovation**: FinTech-led credit scoring, app-based lending
- Acts as a **shock absorber** when bank lending slows down

❌ Risks

Type	Example
Liquidity Risk	IL&FS crisis (2018)
Moral Hazard	Risky lending practices due to lack of deposit insurance
Regulatory Gaps	Different rules for similar financial functions
Pro-cyclicality	Shadow banks can amplify boom-bust cycles

🧭 Conclusion

Shadow banking has evolved from being an opaque, loosely-regulated network to a **critical pillar of India's financial ecosystem**, particularly through NBFCs. With robust regulatory frameworks like the **Scale-Based Regulation** and enhanced supervision by **RBI**, India is moving towards a **hybrid financial architecture** that balances innovation with systemic safety.

UPSC Mains Practice Question

Q. ***What is shadow banking? Discuss its role in India's financial system and the challenges it poses for the regulators. Evaluate the measures taken to integrate it into the formal financial framework.*** **(15 Marks, 250 words)**

AGRICULTURE

Transforming Food Processing with Industry 4.0 Technologies

📌 Syllabus:

Paper	Relevance
✅ **GS Paper 3**	Food Processing & Related Industries, E-Technology in Agriculture, Infrastructure
✅ **GS Paper 2**	Government Policies & Interventions – Schemes for food security & digital governance
✅ **Essay Paper**	Science & Technology for Inclusive Growth, Agri-Food System Transformation
✅ **Prelims**	PM Kisan Sampada Yojana, DPDP Act, Blockchain, AI in agriculture

1. Context: ASSOCHAM-PwC Report on Tech in Food Processing

A joint report by **ASSOCHAM and PwC** highlights the potential of **Industry 4.0 technologies**—AI, ML, Blockchain, IoT—in **revolutionizing the global food processing sector**, currently valued at **$10 trillion (2025)**. Despite this, **food insecurity and wastage persist**, calling for urgent tech-driven transformation.

2. Challenges in India's Food Processing Sector

Issue	Impact
Post-Harvest Losses	Estimated loss of **INR 1.53 trillion annually** in agricultural produce
Food Wastage	Costs ~**$936 billion/year globally**
Food-Borne Illnesses	Causes economic burden of ~$110 billion globally
Resource Intensity	High consumption of **energy, water, and packaging material**
Fragmented Supply Chains	Lack of cold storage, logistics, and real-time tracking

3. Industry 4.0 Technologies: Applications in Food Processing

Technology	Application
Artificial Intelligence (AI)	Predictive maintenance, shelf-life estimation, non-invasive food inspection
Machine Learning (ML)	Automating repetitive tasks like **sorting, grading, packaging**
Blockchain	Enhances **supply chain traceability**, reduces fraud, real-time transaction verification
Internet of Things (IoT)	Monitoring temperature, humidity, and equipment performance in real time
3D Food Printing	Creating **customised nutrition food** for elderly and clinical sectors
Robotics	Used for **precision tasks** like cutting, cooking, bottling, etc.

4. Benefits of Technological Integration

A. Food Security & Efficiency

- Reduces wastage, improves quality control, enhances shelf life
- Helps **feed growing population** (9.8 billion by 2050, UN estimate)

B. Consumer-Centric Market

- Demand for **"smart food"** with tailored nutrition is growing
- Enhances branding, trust, and product traceability

C. Environmental Sustainability

- Reduces resource usage through **data-driven optimisation**
- Helps **meet SDGs** (Goal 2: Zero Hunger, Goal 12: Responsible Consumption)

5. Constraints to Technological Adoption

Challenge	Explanation
Regulatory Compliance	Data laws like **Digital Personal Data Protection Act, 2023 (DPDP Act)** need clear enforcement
Skilled Manpower	Lack of technicians and trained personnel in rural areas
High Initial Investment	Advanced tech needs heavy upfront infrastructure costs
MSME Barriers	Small food processors lack access to digital infrastructure

6. Indian Food Processing Sector: Snapshot

Indicator	Value
AGR (2014–2023)	~5.35% per annum
Share in Agri-Food Exports (2023-24)	23.4%
Top Sub-sectors	Fruits & vegetables, dairy, fisheries, meat processing, RTE food
Govt Schemes	
• PM Kisan Sampada Yojana – Cluster-based food park development	
• PLI Scheme for Food Processing – Boosts exports and investments	
• Operation Greens – Price stabilization of perishable produce	

7. Government Initiatives Supporting Tech Integration

Initiative	Purpose
Agristack	Unified database of Indian farmers to enable precision agriculture
Digital Agriculture Mission (2021–25)	Using AI, blockchain, drones in agri-food chains
eNAM	National Agriculture Market — integrating tech with mandi operations
Startup India	Boosts agri-tech startups working in AI/ML-based food safety & logistics

✅ Conclusion: Toward a Resilient and Smart Food System

The integration of **Industry 4.0 technologies** in food processing is no longer optional—it is vital. It can lead to a **nutritionally secure, environmentally sustainable, and economically efficient food system**. However, this digital revolution must be **inclusive**, involving MSMEs, farmers, and consumers alike.

"Food security is not just about production, but precision."
— Aligning India's food ecosystem with this vision will be key to **Amrit Kaal transformation**.

Mains Practice Question (GS Paper 3)

Q. ***Discuss how Industry 4.0 technologies can address the key challenges in India's food processing sector. Highlight the role of government policies in facilitating this digital transformation.***

Answer Structure Hint:

- **Intro**: Definition and context; ASSOCHAM-PwC Report
- **Body**: Challenges, tech applications (AI, Blockchain, IoT), government schemes
- **Barriers**: Investment, skills, legal frameworks
- **Conclusion**: Holistic reforms for resilient food ecosystems

Youth in Agrifood Systems

📌 Syllabus:

Paper	Relevance
✅ GS Paper 2	Welfare Schemes for Vulnerable Sections, Education, Governance & Development
✅ GS Paper 3	Agriculture, Inclusive Growth, Employment, Food Security
✅ Essay	Youth Empowerment, Future of Food Systems, Sustainable Rural Development
✅ Prelims	FAO reports, Agrifood systems, Global youth demographics, SDGs

1. Context: Global Assessment on Youth and Agrifood Systems

The **Food and Agriculture Organization (FAO)** released its flagship report on the **"Status of Youth in Agrifood Systems"** (2025), examining how engaging youth (aged **15–29**) in **agrifood value chains** can eliminate unemployment, food insecurity, and rural-urban inequality—especially in low- and middle-income countries.

Over **85% of the world's 1.3 billion youth** live in **low-income nations**, and **46% still reside in rural areas**, making them a strategic demographic for food system transformation.

2. Key Highlights of the Report

- 🌱 **Youth in Agrifood Employment**:
  - **44% of working youth** globally are employed in agrifood systems.
  - This is higher than the **38%** for working adults.
  - However, youth participation **declined** from **54% (2005)** to **44% (2021)**.
- 📉 **Food Insecurity on the Rise**:
  - Food insecurity affected **24.4% (2021–23)** of global population, up from **16.7% (2014–16)**.
- 📈 **Economic Growth Potential**:

  - Increasing youth participation could **boost global GDP by 1.4%**, with **45% of that growth** coming from agriculture and food systems.
- 🌍 **Structural Migration Patterns**:
  - Youth from **marginalised communities** (e.g., **SC/ST in India**) dominate short-term internal migration for labour.

3. Challenges Facing Youth in Agriculture

Despite their potential, youth face **multiple barriers** in entering and staying in agrifood systems:

🔶 A. Perception & Social Stigma

- Farming is often seen as **low-status**, **low-income**, and **labour-intensive**.
- Urbanisation fuels this perception, pushing youth away from agriculture.

🔶 B. Climate Uncertainty

- Youth are discouraged by the **high-risk, climate-sensitive** nature of farming.
- Extreme weather events impact productivity, income, and food security.

🔶 C. Inequity in Land Ownership

- **Landlessness** is a major issue—most young farmers **rely on leased land**.
- **Women** often **relinquish inherited land** in favour of male siblings due to socio-cultural norms.

🔶 D. Gendered Barriers

- **Limited access to credit**, market linkages, and agricultural extension services for young women.
- **Double burden** of unpaid care work and farming responsibilities.

4. India-Specific Reflections from the Report

Issue	India Context
Migration & Caste	SC/ST youth (aged 16–40) dominate short-term migration flows
Youth Landlessness	Fragmented landholdings and informal leasing prevalent
Food Insecurity	Hidden hunger, micronutrient deficiency, and seasonal food access issues
Policy Gaps	Lack of targeted youth schemes in agri-startups, mechanisation, or agri-tech training

5. Making Agrifood Systems Work for Youth

✅ Policy Recommendations from FAO:

- **Invest in rural education and digital literacy**.
- Promote **climate-resilient farming techniques** and **crop diversification**.
- Provide **secure land tenure**, especially for **young women and marginalized communities**.
- Develop **youth-focused agri-finance models** and entrepreneurship incentives.
- Support **innovation incubators** and **tech platforms** for youth-led agri-enterprises.

✅ National Schemes in India Aligned to This Vision:

- **PM Formalisation of Micro Food Processing Enterprises (PMFME)**
- **Agri-Clinics & Agri-Business Centres (ACABC)**
- **National Skill Development Mission** – with agriculture as a key sector
- **Startup India + Atal Incubation Centres** for agri-tech and rural innovation
- **Mission for Integrated Development of Horticulture (MIDH)** – youth-centric incentives

✅ Conclusion: Youth-Centric Food Systems as a Global Imperative

The FAO's report underscores a simple truth — **without the youth, there can be no sustainable food system**. As the global population ages and climate uncertainty rises, **engaging the next generation** in a dignified, innovative, and inclusive food economy becomes both a **development necessity** and a **demographic opportunity**.

"The future of agriculture lies in the hands of the young — if we give them the tools, the land, and the voice."

Mains Practice Question (GS Paper 3)

Q. ***What are the key barriers to youth participation in agrifood systems in India? How can technology, policy innovation, and institutional reforms be leveraged to make agriculture a viable career path for the younger generation?***

Maize: The Queen of Cereals and its Growing Importance in India

📌 Syllabus:

Paper	Relevance
✅ GS Paper 1	Indian Geography – Crops and Agro-Climatic Conditions
✅ GS Paper 3	Agriculture – Cropping Patterns, Food Security, Agri-Economy
✅ Prelims	Agricultural Crops, Soil-Climate Conditions, Growing Regions
✅ Essay	Sustainable Agriculture, Food Systems

1. Context: India Maize Summit 2025

The **Union Agriculture Minister** emphasised the strategic importance of **Maize** at the **India Maize Summit 2025**, highlighting its role in **food security, fodder economy, ethanol blending**, and **agro-industrial value chains**. The summit underscores India's efforts to improve **productivity and value addition** in non-rice cereals under the broader **nutri-cereal mission** and **crop diversification strategy**.

2. About Maize

- **Botanical Name**: *Zea mays*
- **Type**: Primarily a **Kharif crop**, but also cultivated in **Rabi and Spring seasons** in some states.
- **Usage**:
  - **Human consumption** (as grain)
  - **Animal feed and fodder**
  - **Industrial use** (starch, ethanol, biofuel)

Globally known as the **"Queen of Cereals"** due to its **high genetic yield potential** and **versatile uses**.

3. Agro-Climatic Requirements for Maize

Parameter	Optimal Conditions
Soil Type	**Well-drained sandy loam to silt loam**; prefers **old alluvial soil**
Soil pH	**5.5 to 7.5**
Temperature Range	**21°C to 27°C** during growth
Rainfall Requirement	Around **500–800 mm**
Sunlight	Requires **good sunlight** for photosynthesis

4. Geographic Distribution in India and World

🔹 **Major Maize Producing States in India:**

- **Karnataka, Madhya Pradesh, Bihar, Telangana, Tamil Nadu, Maharashtra, Andhra Pradesh**
- Emerging areas: **Chhattisgarh, Odisha, Uttar Pradesh, Jharkhand**

🔹 **Leading Global Producers:**

- **USA (Iowa, Illinois)** – World's largest
- **Brazil, China, Mexico, Russia, Canada**

5. Economic & Strategic Significance of Maize

🔸 **Domestic Level**

- Used in **poultry feed**, **starch industries**, **ethanol blending programme** (under Ethanol Blended Petrol Scheme)
- Key to achieving **nutritional security** under **Poshan Abhiyan** and crop diversification from rice in water-stressed regions

🔸 **Global Level**

- Demand in **biofuel market** and as an **export commodity**
- Maize prices influence **global food inflation**

6. Government Initiatives Related to Maize

Initiative	Details
National Food Security Mission (NFSM) – Maize	Focus on increasing production via hybrids, extension, and technology
Sub-Mission on Agricultural Mechanization	Encourages maize-specific equipment like planters and shellers
Crop Diversification Programme (CDP)	Encourages maize as alternative to paddy in Punjab, Haryana, Western UP
PM-PRANAM & Ethanol Blending	Promotes maize for **second-generation biofuels**

✅ Conclusion

Maize holds strategic promise not just as a **nutri-cereal** but also as a **versatile crop for food, fodder, and fuel**. Its role in **doubling farmer incomes**, improving **climate-resilient agriculture**, and aligning with **energy security goals** makes it a priority for Indian agricultural policy.

"Maize is not just a grain—it's a future-ready solution for food, fodder, and fuel."

Mains Practice Question (GS Paper 3 – Agriculture)

Q. ***Discuss the agro-climatic conditions required for maize cultivation. Examine its economic and strategic significance in the context of India's agricultural diversification and biofuel policy.***

SOCIETY AND SOCIAL ISSUES

India Among World's Most Equal Societies: A Gini-Based Milestone

📌 Syllabus:

Paper	Relevance
✅ GS Paper 2	Welfare schemes, Poverty and Human Development indicators, Global Indices
✅ GS Paper 3	Inclusive growth, Economic development, Poverty estimation
✅ Essay Paper	Inequality, growth and justice in Indian democracy
✅ Prelims	Gini Index, Lorenz Curve, World Bank reports

1. Introduction: India's Silent Social Transformation

In a significant development, the **World Bank's Spring 2025 Poverty and Equity Brief** ranked **India as the 4th most equal country** in the world based on **Gini Index** scores. India's improved ranking reflects **structural changes in income distribution**, success of **poverty alleviation programs**, and **inclusive economic growth**.

This positions India ahead of many developed nations including **China (35.7)** and the **United States (41.8)** in terms of income equality.

2. India's Global Ranking on Equality

Rank	Country	Gini Index (2022-23)
1	Slovak Republic	~23.5 (est.)
2	Slovenia	~24.0 (est.)
3	Belarus	~24.9 (est.)
4	**India**	**25.5**

- India falls in the **"moderately low inequality"** category (Gini: 25–30)
- Improved from a score of **28.8 in 2011–12** to **25.5 in 2022–23**
- Almost qualifying for the **"low inequality"** category (Gini < 25)

3. Understanding the Gini Index and Lorenz Curve

Concept	Explanation
Gini Index	A statistical measure of income inequality within a population
Range	0 = perfect equality; 100 = perfect inequality
Lorenz Curve	A graphical representation of cumulative income distribution among households
Interpretation	The **greater the area between the Lorenz curve and the line of equality**, the higher the inequality

India's Gini Index trajectory shows a **narrowing Lorenz curve**, indicating more equitable income distribution.

4. Decline in Poverty Levels

A. Extreme Poverty ($2.15/day threshold)

Year	Percentage of Population	No. of People
2011–12	16.2%	~210 million
2022–23	2.3%	~39 million

✅ **Over 171 million people lifted above the extreme poverty line**

B. Under Revised Threshold ($3.00/day)

- Poverty rate stands at **5.3% (2022–23)**
- Reflects **rising real income and welfare outcomes**

5. Drivers of Improved Equality and Poverty Reduction

A. **Welfare Reforms: Direct Benefit Transfer (DBT)**, **PM Garib Kalyan Yojana**, **Ujjwala Yojana**, **Ayushman Bharat**: Targeted income support
B. **Financial Inclusion: Jan Dhan-Aadhaar-Mobile (JAM) trinity** enabled **cashless delivery**, reduced leakages
C. **Employment Generation:** Rural schemes like **MGNREGA**, **PMEGP**, and **Skill India** supported livelihood at grassroots
D. **Rural Electrification & Infrastructure: Saubhagya, PMGSY**, and **PMAY-G** improved quality of life and productivity in rural areas

6. Critical Evaluation: A Balanced Perspective

Positive Outlook

- Reflects **broad-based economic gains** and **strong pro-poor focus**
- Improves India's **credibility on global development indices**

Caveats

- Gini Index measures **income inequality**, not **wealth or asset inequality**
- **Regional disparities** and **urban-rural divides** persist
- **Multidimensional poverty (education, health)** still prevalent in certain pockets

7. International Comparison & India's Soft Power

Country	Gini Index	Remark
India	25.5	Moderate equality, rapid poverty reduction
China	35.7	High inequality due to urban–rural and coastal–inland gaps
USA	41.8	High income and racial inequality
Brazil	~48.9	Among the highest in the world

India's position strengthens its case as a **development model for the Global South**, combining **growth with redistribution**.

8. Conclusion: Growth With Justice – A New Indian Model

India's placement among the most equal societies signals that **poverty is not destiny**, but a challenge that can be tackled through **inclusive governance, financial innovation, and social commitment**.

As the nation strives towards **Viksit Bharat@2047**, sustaining this trend demands:

- Continued welfare reforms
- Focus on **education, skilling, and health** (to avoid horizontal inequality)
- **Asset redistribution** and **land reforms** in lagging regions

"Justice, social, economic and political" – as envisioned in the Preamble, is no longer just aspirational but increasingly observable.

Mains Practice Question (GS Paper 2/3)

Q. ***India has emerged as one of the most equal societies globally, as per the World Bank. Discuss the factors behind this transformation. Also highlight the limitations of relying solely on income-based measures of inequality.***

Answer Hint:

- Introduction: Mention WB report and India's rank
- Body: Factors → DBT, JAM, welfare schemes, poverty trends
- Limitations → Wealth inequality, regional disparity, multidimensional poverty
- Conclusion: Need for holistic and sustained inclusion

Panch Sankalp under National Education Policy (NEP) 2020

📌 Syllabus:

Paper	Topics
GS Paper 2	Issues relating to development and management of Education
Essay Paper	Education reforms, Indian Knowledge Systems
GS Paper 1 *(Optional for some themes)*	Society – Education, Women empowerment (via GER stats)

CONTEXT

The **Union Education Minister** has introduced the **"Panch Sankalp" (Five Resolutions)** as a transformative initiative under the **National Education Policy (NEP) 2020**, specifically targeting reforms in **Higher Education Institutions (HEIs)**.

NEP 2020: Foundational Pillars

The National Education Policy 2020 rests on **5 core principles**:

- **Access**
- **Equity**
- **Quality**
- **Affordability**
- **Accountability**

It envisions a **holistic, multidisciplinary, and flexible education system** aligned with **21st-century needs** and rooted in **Indian ethos**.

About Panch Sankalp (Five Resolutions)

These **five guiding principles** serve as a roadmap for **reforming higher education institutions** under NEP 2020.

Sankalp	Key Features
1. Next-Gen Emerging Education	Emphasis on futuristic technologies (AI, Blockchain, IoT), global digital literacy, and tech-integrated pedagogy.
2. Multidisciplinary Education	Breaking rigid academic silos; promoting *multidisciplinary institutions* (like IITs with humanities or liberal arts).
3. Innovative Education	Outcome-based learning, research-focused education, startup incubation and academic-industry collaboration.
4. Holistic Education	Integration of physical, emotional, ethical, and vocational development—reflecting the *"whole-child approach"*.
5. Bharatiya Education	Infusing Indian Knowledge Systems (IKS), regional languages, cultural heritage, ethics and values into curricula.

Status of Higher Education in India (As of 2024–25)

Indicator	Data
Gross Enrollment Ratio (GER)	28.4% (Target: 50% by 2035)
Female GER	28.5% (higher than males); Gender Parity Index = **1.01**
Government universities	Contribute **73.7%** of total enrolment
Private sector	Plays increasing role, esp. in technical/professional education

Contemporary Relevance of Panch Sankalp

Dimension	Insights
Globalisation & Employability	Next-gen education needed to compete in AI-driven, digital economy.
NEP Goals Realisation	Directly contributes to NEP's 50% GER target, improved research output, & global rankings.
Cultural Reclamation	Bharatiya education allows decolonisation of curriculum and promotes *cultural self-confidence*.
Gender Equity	Strong female GER points to successful inclusion efforts; to be leveraged further through Panch Sankalp.

Critical Analysis

✅ Strengths

- Aligns with **UN SDG 4** (Quality Education).
- Brings **interdisciplinary and vocational reforms** for holistic skill development.
- Promotes **knowledge economy**, innovation and critical thinking.
- Encourages **decolonisation** of Indian education system.

❌ Challenges

- **Infrastructure gaps** in rural HEIs.
- **Faculty training** and preparedness for implementing NEP's flexible, innovative curricula.
- Resistance to **language reforms** and IKS integration.
- **Funding constraints** for public universities.

🔧 Way Forward

Area	Recommendations
Capacity Building	NEP-aligned Faculty Development Programs (FDPs), Digital training.
Research Ecosystem	Foster HEIs-Industry-Startup synergy through Atal Innovation Missions, incubation centres.
Equity	Expand financial aid and scholarships for underrepresented groups.
Evaluation Reform	Shift from rote to *comprehensive assessment* mechanisms (aligned with PARAKH, NCF 2023).

🔚 Conclusion

The **Panch Sankalp** reflects a paradigm shift in India's educational philosophy—from **exam-centric to learner-centric**, from **rote learning to creativity**, and from **fragmentation to integration**. Effective implementation, faculty engagement, and regulatory agility will determine its success in building a **globally competent yet culturally rooted India**.

Mains Practice Question

Q. The Panch Sankalp of NEP 2020 is a blueprint for reshaping higher education in India. Critically examine its potential to realise the vision of Viksit Bharat by 2047.
(250 words | 15 marks)

GEOGRAPHY AND DISASTER

AI Alliance Network (AIANET)

📌 Syllabus:

- **GS Paper 2** – International Institutions, Bilateral & Multilateral Groupings
- **GS Paper 3** – Science & Technology (Emerging Technologies – Artificial Intelligence), Cybersecurity
- **Prelims** – Current Affairs, International Organizations, AI Governance
- **Essay Paper** – Role of Technology in International Relations; AI and Ethics

1. Context

The **Digital India Foundation (DIF)**, one of the **founding members** of the AI Alliance Network (AIANET), has raised objections to the **membership application** of **Pakistan's AI Technology Centre (AITeC)**. This development brings to the fore geopolitical sensitivities in emerging tech diplomacy and governance frameworks around Artificial Intelligence.

2. What is AIANET?

Aspect	Details
Full Form	Artificial Intelligence Alliance Network (AIANET)
Nature	Informal, voluntary community
Purpose	Exchange of views, expertise, and cooperation in AI R&D
Aim	Accelerate AI development for long-term **economic and social sustainability**
Members	17 (as of July 2025)
Administered By	AI Alliance Russia (non-governmental initiative)
India's Role	Founding member through Digital India Foundation

3. Significance of AIANET

A. Geopolitical and Strategic Importance

- Acts as an **alternative to Western-led AI coalitions** (e.g. OECD AI Principles, Global Partnership on AI).
- Promotes **South-South cooperation** and technology sharing among emerging economies.
- India's participation strengthens its vision of **"AI for All"** and digital diplomacy.

B. Technological and Developmental Scope

- Enables sharing of **best practices, ethical frameworks, and innovation standards**.
- Promotes use of AI for **inclusive growth, sustainable agriculture, smart cities**, and **healthcare**.

C. National Security Angle

- Pakistan's potential entry raises concerns about **misuse of dual-use technologies** (AI-enabled drones, surveillance, etc.).

- Threat to **data integrity, cyber espionage, and critical infrastructure** risks.

4. India's Concerns Regarding Pakistan's Entry

- **Strategic mistrust** due to history of state-sponsored cyber activities.
- Potential use of AI for **disinformation warfare** or **military purposes**.
- Calls for a **transparent, rules-based admission criteria** to prevent dilution of trust in AIANET.

5. Related Global AI Groupings & India's Role

Group	Nature	India's Status
Global Partnership on AI (GPAI)	OECD initiative on AI ethics	Member
AIANET	Russia-led informal network	Founding Member
ITU AI for Good Summit	UN-led platform for AI for development	Active Participation
OECD AI Principles	Legal guidelines for AI use	Non-signatory (observer)

6. Challenges for Multilateral AI Networks

- **Lack of uniform ethical standards** and regulatory frameworks.
- **Data sovereignty vs open access** – balancing national interest with collaboration.
- **AI Weaponization** concerns in absence of global disarmament dialogue.
- Varying levels of **technological maturity** and AI capabilities among members.

✅ Conclusion

AIANET represents an **emerging model of multipolar AI governance**. India's opposition to Pakistan's entry highlights how **technology diplomacy is now deeply entangled with geopolitics**. Moving forward, India must balance its vision for **inclusive AI cooperation** with **national security imperatives** and advocate for global norms around **responsible AI development**.

Mains Practice Question

Q. ***Emerging technologies like Artificial Intelligence are no longer just technical matters but central to global geopolitics. Discuss in light of India's role in multilateral AI governance networks like AIANET.***

Lake Turkana: A Geographical & Scientific Treasure

📌 Syllabus:

- **GS Paper 1** – *Geography*: Physical geography – lakes, deserts, biogeography
- **GS Paper 3** – *Environment & Biodiversity*: Conservation, Environmental Impact, World Heritage Sites
- **Prelims** – Places in News, Physical Geography, UNESCO World Heritage Sites

In News

- Scientists have successfully **extracted 18–20 million-year-old proteins** from **tooth enamel** of extinct mammals found near **Lake Turkana**, offering new insights into human evolution and paleo-biodiversity.

About Lake Turkana

Feature	Description
Other Names	*Lake Rudolf*, *Jade Sea* (due to its distinctive green colour)
Location	**Northern Kenya**, with a small part extending into **Southwestern Ethiopia**
Lake Type	**Rift Valley Lake** (formed by tectonic activity)
Global Significance	**World's largest permanent desert lake** and **Africa's 4th largest lake**
Major Inflow	**Omo River** (originates in Ethiopia; only perennial tributary)
Outflow	*Endorheic Basin* (no natural outflow – water lost only by evaporation)

Physical and Ecological Features

- **Geological Origin**: Located within the **East African Rift System**
- **Landscape**: Arid and semi-arid surroundings; rocky shores, desert climate
- **Salinity**: Moderately saline due to evaporation
- **Climate**: Hot, arid desert; low rainfall
- **Biodiversity**: Crocodiles, flamingoes, Nile perch; breeding ground for aquatic birds

Environmental Importance

- **Lake Turkana National Parks**:
  - Includes **Sibiloi National Park**, **Central Island National Park**, and **South Island National Park**
  - Designated as **UNESCO World Heritage Site (1997)**
- **Paleoanthropological Site**:
  - Called the *"Cradle of Mankind"*
  - Fossils of early hominins and extinct species found in the Turkana Basin

⚠️ Concerns and Threats

Issue	Details
Hydrological Stress	Due to large dams on the **Omo River** (e.g., Gibe III Dam, Ethiopia)
Reduced Water Inflow	Could shrink lake size, affect biodiversity and local communities
Climate Change	Increased evaporation, salinisation and shifting weather patterns
Conflict	Cross-border resource conflicts among tribes in Kenya-Ethiopia region

🌍 Comparison with Other Rift Valley Lakes

Lake	Country	Unique Feature
Lake Turkana	Kenya, Ethiopia	World's largest permanent desert lake
Lake Tanganyika	Tanzania, DRC	Deepest lake in Africa
Lake Victoria	Uganda, Kenya, Tanzania	Largest lake in Africa by area
Lake Malawi	Malawi, Mozambique	Richest in fish species diversity

Mains Practice Question

Q. ***Lake Turkana, often called the 'Jade Sea', is a geographic, ecological, and archaeological marvel of East Africa. Discuss its significance and the threats it faces in the wake of regional development. (15 marks, 250 words)***

HISTORY, ART & CULTURE

Dr. Syama Prasad Mookerjee: Architect of Nationalism and Industrial India

📌 Syllabus:

Paper	Relevance
✅ **GS Paper 1**	Modern Indian History, Freedom Struggle, Indian Political Thought
✅ **GS Paper 2**	Constitution-Making, Political Personalities in Post-Independence India
✅ **Essay Paper**	Nation-building, National Integration, Cultural Identity
✅ **Ethics (GS Paper 4)**	Values: Leadership, Empathy, Nationalism, Integrity

1. Introduction: A Stalwart of Vision and National Purpose

On the occasion of his **125th birth anniversary**, the Prime Minister paid tribute to **Dr. Syama Prasad Mookerjee**, whose legacy spans education, politics, industrial development, and ideological vision. A multifaceted personality, he is remembered for his **unyielding patriotism**, **intellectual brilliance**, and **foundational role in shaping India's post-independence political and industrial landscape**.

2. Early Life and Academic Distinction

- **Born**: 1901, Calcutta (now Kolkata)
- **Education**: Highly accomplished academician
- Became **youngest Vice-Chancellor** of the **University of Calcutta**
- Advocated **inclusive and value-based education**

3. Political Journey and National Contributions

Phase	Contributions
Hindu Mahasabha	Became **acting President** in 1940
Constituent Assembly	Participated in debates, **defended cultural pluralism and federal structure**
Interim Government (1946)	Served as **Minister for Industry and Supply** under Jawaharlal Nehru
Industrial Initiatives	Spearheaded institutions like **Chittaranjan Locomotive Factory**, fostering India's industrial base
Parliamentarian	Nicknamed **"The Lion of Parliament"** for his assertive and nationalistic positions
Founding of Bharatiya Jana Sangh (1951)	Forerunner to the present-day Bharatiya Janata Party (BJP)

4. Literary and Ideological Contributions

Work	Nature
Leaves from a Diary	Autobiographical reflections
A Phase of the Indian Struggle	Analysis of national issues
Political Thought	Synthesised cultural nationalism with modern governance
Ideological Values	Nation-first policy, cultural rootedness, federal unity, strategic autonomy

5. Key Values and Legacy

Value	Reflected In
Nationalism	Advocated for **one constitution, one flag, one nation**—especially on J&K
Empathy	Promoted **social harmony** among diverse cultural and linguistic groups
Leadership	Guided India's industrial and educational policy during formative years
Integrity	Resigned from Nehru's Cabinet over **ideological differences**, upholding conviction
Institution Building	Strengthened India's **political plurality** and **economic sovereignty**

6. Relevance in Contemporary India

- Acts as a **bridge between pre- and post-independence political transitions**
- His **institution-building ethos** aligns with current industrial self-reliance (Atmanirbhar Bharat)
- Advocacy of **federal nationalism** echoes in **debates on J&K integration and cultural identity**
- Inspires modern discourse on **strong yet inclusive governance**

✅ Conclusion: A Life of Conviction and Contribution

Dr. Syama Prasad Mookerjee was a **visionary nationalist, an institution builder, and a principled democrat**. His contributions shaped India's **educational, political, and industrial framework**. As a political thinker and reformer, his legacy continues to inform India's **national identity and developmental narrative**.

"A nation survives through sacrifice, not compromise." — A reflection of his unwavering patriotism.

Mains Practice Question (GS Paper 1)

Q. ***Discuss the contributions of Dr. Syama Prasad Mookerjee to India's political and industrial landscape. How do his ideas and values remain relevant in contemporary governance and nation-building?***

Answer Structure Hint:

- **Intro**: Brief biographical note and his multifaceted roles
- **Body**: Political leadership, industrial growth, education, ideology
- **Values & Relevance**: Contemporary debates (federalism, nationalism, integration)
- **Conclusion**: Legacy as a constitutionalist and principled leader

Maratha Military Landscapes Added to UNESCO World Heritage List

📌 Syllabus:

Paper	Area
GS Paper 1	Indian Art and Culture – Architecture, Cultural Heritage
GS Paper 2	International Institutions – UNESCO and its role in heritage recognition
Prelims	UNESCO World Heritage Sites; Fort Architecture; ASI
Essay	Indian Heritage & Legacy; Role of International Institutions in Culture

1. Context: India's Cultural Heritage Gains Global Recognition

- On **12 July 2025**, the **UNESCO World Heritage Committee** inscribed the **Maratha Military Landscapes** as **India's 44th World Heritage Site**.
- This inclusion highlights India's **rich cultural traditions**, **indigenous defence architecture**, and historical contributions during the 17th to 19th centuries.
- With this addition, India is now ranked **6th globally** and **2nd in Asia-Pacific** in terms of the number of World Heritage Sites.

2. About Maratha Military Landscape

Feature	Details
Period	17th to 19th Century CE (Maratha rule)
Significance	Reflects strategic military planning, architectural innovation, and regional adaptation
Architectural Heritage	Forts exhibit mastery in understanding geography and constructing defences accordingly
Geographical Spread	12 Forts across Maharashtra and Tamil Nadu

📍 **List of Selected Forts**

- **Maharashtra**: Salher, Shivneri, Lohgad, Khanderi, Raigad, Rajgad, Pratapgad, Suvarnadurg, Panhala, Vijaydurg, Sindhudurg
- **Tamil Nadu**: Gingee Fort

3. Diverse and Strategic Locations

- Forts are spread across **hilltops, coastal belts, and island outposts**, showcasing adaptability to varied terrains.
- Fortifications were integral to **Shivaji's guerrilla warfare strategy** and **decentralised military control**.
- Examples:
  - **Lohgad**: Hilltop fort in the Western Ghats
  - **Suvarnadurg & Khanderi**: Coastal maritime forts protecting Konkan coastline
  - **Gingee**: A fortified citadel in Tamil Nadu, demonstrating Maratha influence in the south

4. UNESCO World Heritage Selection Criteria

Criteria	Explanation
Outstanding Universal Value (OUV)	Site must represent cultural/natural heritage of global significance
Nominated by State Party	Only nations that have ratified the **1972 World Heritage Convention** can nominate
Evaluation Process	Technical evaluation by **ICOMOS** and **IUCN**
Final Decision	Made by the **World Heritage Committee** (India is a member: 2021–25)

5. Institutional Mechanism in India

Institution	Role
Archaeological Survey of India (ASI)	Nodal agency for World Heritage Site nominations and management
Ministry of Culture	Policy framing, funding, coordination with UNESCO
State Governments	Local site conservation, tourism facilitation, and community engagement

6. Significance of the Inclusion

Domain	Benefits
Cultural	Global recognition of India's indigenous military architecture
Tourism	Boost to heritage and eco-tourism in Maharashtra and Tamil Nadu
Soft Power	Showcases India's cultural strength and architectural legacy on a global stage
Heritage Management	Strengthens efforts under the **National Heritage City Development and Augmentation Yojana (HRIDAY)** and **Swadesh Darshan Scheme**

✅ Conclusion

The inscription of the **Maratha Military Landscapes** into the **UNESCO World Heritage List** underscores the global importance of India's regional defence architecture and rich cultural legacy. It reflects a conscious step in preserving India's historical narratives and architectural wisdom for future generations. The global acknowledgment will further **strengthen India's cultural diplomacy, heritage tourism, and conservation efforts**.

Mains Practice Question

Q. ***What does the inclusion of the Maratha Military Landscapes in the UNESCO World Heritage List signify for India? Discuss its cultural, geopolitical, and tourism-related implications***

ENVIRONMENT & ECOLOGY

Draft Petroleum & Natural Gas Rules, 2025

📌 Syllabus:

Paper	Theme
✅ GS Paper 2	Government Policies & Interventions in various sectors
✅ GS Paper 3	Energy Sector Reforms, Environmental Regulation, Infrastructure
✅ Essay	Environment vs Development, Climate Governance

1. Context

The **Ministry of Petroleum and Natural Gas** has released the **Draft Petroleum & Natural Gas Rules, 2025** aimed at modernising India's hydrocarbon regulatory framework.
It seeks to replace the **Petroleum Concession Rules, 1949** and **Petroleum and Natural Gas Rules, 1959**, in line with the amended **Oilfields (Regulation and Development) Act, 1948**.

2. Key Provisions of the Draft Rules

🔹 **A. Climate-Responsive Energy Governance**

- **Greenhouse Gas Emission Monitoring**: Mandatory reporting requirements for emissions across exploration and production operations.
- **Carbon Capture & Storage (CCS)**: Regulatory provisions for CCS integration in oilfields.
- **Site Restoration Fund**: Obligatory fund and post-closure monitoring (for a **minimum of 5 years**).

🔹 **B. Enabling Low-Carbon Transition**

- **Integrated Renewable Projects**: Allows **solar, wind, hydrogen, and geothermal** energy generation within oil blocks.

🔹 **C. Investor Confidence and Fiscal Stability**

- **Stabilisation Clause**:
  - Compensates or deducts fiscal burdens arising from future adverse changes in tax or regulatory structures.
  - Aims to attract **FDI in upstream oil and gas** by ensuring legal predictability.

🔹 **D. Infrastructure Optimisation**

- **Declaration of Underutilised Infrastructure**:
  - Compulsory disclosure of unused pipeline or facility capacity.
  - Enables **third-party access**, avoiding infrastructure duplication and aiding **small operators/startups**.

🔹 **E. Dispute Resolution and Oversight**

- **Dedicated Adjudicating Authority**:
  - To ensure enforcement, impose penalties, and resolve disputes between operators and government.
  - Enhances **regulatory independence and transparency**.

🔹 **F. Data Governance**

- **Ownership**: All geological and operational data belongs to **Government of India**.
- **Export Restriction**: External sharing/export requires prior approval.

3. Significance of the Reform

Dimension	Contribution
🌍 **Climate Compliance**	Aligns with India's **Net-Zero by 2070** commitment
🛢️ **Energy Security**	Facilitates **domestic exploration**, while diversifying energy mix
💼 **Investor Confidence**	Legal clarity + stabilisation clause attracts global capital
⚖️ **Data Sovereignty**	Ensures national control over strategic energy data

4. Challenges Ahead

- Transitioning legacy contracts to new regime may face resistance.
- Capacity building for **regulatory bodies** and **field-level environmental monitoring**.
- Coordination required between **MoPNG, MoEFCC, and NITI Aayog** for cross-sectoral sustainability.

✅ Conclusion

The **Draft Petroleum & Natural Gas Rules, 2025** reflect a significant **paradigm shift**—from resource extraction-centric rules to a **low-carbon, climate-aware regulatory framework**. If implemented effectively, it can **modernise India's energy ecosystem**, promote **ease of doing business**, and align national interests with **global sustainability goals**.

Mains Practice Question (GS Paper 3 – Energy & Environment)

Q. ***Critically examine how the Draft Petroleum and Natural Gas Rules, 2025 reflect India's effort to balance energy security with climate responsibility. What are the challenges in their implementation?***

EPR for Non-Ferrous Scrap Metals: New Rules under Circular Economy Push

📌 Syllabus:

Paper	Relevance
✅ GS Paper 3	Environment: Waste Management, Circular Economy, Conservation Policies
✅ GS Paper 2	Government Policies, Regulatory Frameworks
✅ Prelims	Environmental Acts & Rules, Institutions, Schemes

1. Context: New Rules for EPR in Non-Ferrous Scrap Metal Sector

- The **Ministry of Environment, Forest and Climate Change (MoEFCC)** has notified the **Hazardous and Other Wastes (Management and Transboundary Movement) Amendment Rules, 2025**.
- These rules introduce a **dedicated Extended Producer Responsibility (EPR) framework** for **scrap of non-ferrous metals** such as **aluminium, copper, and zinc (including their alloys)**.
- Will come into effect from **April 1, 2026**.

2. About Extended Producer Responsibility (EPR)

Definition: A policy tool where the **producer is responsible** for the **entire lifecycle of a product**, especially **take-back, recycling, and final disposal**.

🔶 **Genesis in India:**

- **E-Waste Rules, 2011**: Introduced EPR in the Indian context.
- Later extended to **Plastic Waste (2016)**, **Batteries (2022)**, and now **Non-Ferrous Scrap (2025)**.

3. Salient Features of the New EPR Framework

Component	Description
Applicability	Producers of **aluminium, copper, zinc** scrap and their alloys
Targets (Phased)	Begins at **10% in 2026-27**, rising to **75% by 2032-33**
Certificate Generation	EPR Certificates will be generated by **Central Pollution Control Board**
Certificate Validity	Valid for **2 years** from the **end of financial year** of generation
Digital Compliance	Entire system will function via an **online compliance and registration portal** managed by CPCB

4. Significance of the New EPR Framework

- **Promotes Circular Economy**: Encourages **recycling, reuse, and efficient resource use**.
- **Regulates Informal Sector**: Brings informal recycling under the **formal monitoring mechanism**.
- **Boosts Domestic Supply**: Non-ferrous metals are **import-dependent** in India; this policy enhances domestic recycling.
- **Gradual Compliance**: Targets increase progressively to allow industry adaptation.

Aligns with India's commitments under **Mission LiFE**, **Swachh Bharat**, and **SDG 12 (Responsible Consumption and Production)**.

5. Why Non-Ferrous Metals Matter

Metal	Importance
Aluminium	Used in **transport, construction, and packaging**; highly recyclable
Copper	Essential for **EVs, power grids, and electronics**
Zinc	Used in **galvanization, batteries, and chemical applications**

6. Challenges in Implementation

- **Data Gaps**: Lack of baseline data on existing scrap generation and recycling
- **Integration of Informal Sector**: 70–80% recycling in India is done by informal sector workers
- **Infrastructure**: Limited licensed recycling units
- **Monitoring**: Ensuring certificate authenticity and preventing fraud

✅ Conclusion

The new EPR rules mark a **paradigm shift in waste governance**, expanding responsibility to producers in the **metal recycling domain**. It is a **strategic push** toward a **sustainable circular economy**, while addressing challenges of resource scarcity, import dependency, and environmental degradation.

"Waste isn't waste until wasted – EPR turns waste into wealth."

Mains Practice Question (GS Paper 3 – Environment & Economy)

Q. ***Extended Producer Responsibility (EPR) is emerging as a key pillar of India's circular economy. Critically evaluate the recent expansion of EPR to non-ferrous metals and its implications for sustainable development.***

Dudhwa Tiger Reserve: A Terai Conservation Success Story

📌 Syllabus:

Paper	Relevance
✅ GS Paper 3	Environment and Ecology – Protected Areas, Biodiversity, Conservation Projects
✅ GS Paper 1	Indian Geography – Physical features (Terai-Bhabar, Alluvial plains)
✅ Prelims	Tiger Reserves, Biosphere Reserves, Leopard Census, River Systems, Terai Ecosystem
✅ Essay Paper	Biodiversity Conservation, Human-Wildlife Balance

1. Context: Massive Growth in Leopard Population

The **leopard population** in **Dudhwa Tiger Reserve (DTR)** has shown a **remarkable growth of 198.91% since 2022**, showcasing a significant ecological recovery and improved wildlife protection in the region. This growth also reflects the **health of prey-predator balance** in Terai forests.

2. About Dudhwa Tiger Reserve (DTR)

Feature	Details
Location	Terai region of Uttar Pradesh, along the Indo-Nepal border
Constituent Units	1. **Dudhwa National Park** 2. **Katerniaghat Wildlife Sanctuary** 3. **Kishanpur Wildlife Sanctuary**
Bio-geographic Zone	Part of **Upper Gangetic Plains** – characterized by **Tarai-Bhabar** ecosystem
Terrain	**Moist deciduous forests**, **grasslands**, and **alluvial floodplains**
Major Rivers	Mohana, Suheli, Joraha, Nagro (tributaries of **Ghagra** and **Sharda** rivers)

3. Faunal Diversity of DTR

Species	Status
Tiger	Keystone species, part of **Project Tiger**
Leopard	Apex predator, population rising steadily
Indian Rhinoceros	Reintroduced in the park under Rhino Recovery Programme
Swamp Deer (Barasingha)	State animal of Uttar Pradesh; found in Terai grasslands
Asian Elephant	Transboundary species, migrates between India and Nepal
Sloth Bear, Sambar, Hog Deer	Indicative of rich trophic diversity

4. Reasons for Leopard Population Surge

Factor	Explanation
Improved Monitoring	Enhanced use of **camera traps**, AI-based monitoring, drone surveillance
Prey Base Recovery	Protection of herbivores like deer and wild boar supports predator rise
Reduced Poaching	Joint forest patrols, community engagement, and legal action
Habitat Management	Grassland revival, removal of invasive species, waterhole rejuvenation
Corridor Connectivity	Maintenance of wildlife corridors with **Shuklaphanta (Nepal)** and Pilibhit

5. Ecological Significance of DTR

- Part of **Terai Arc Landscape (TAL)** — a transboundary conservation zone between India and Nepal
- Critical for **genetic exchange of species** like tigers, rhinos, and elephants
- Rich in **wetlands, grasslands, and riparian ecosystems**
- Important for **carbon sequestration and monsoon water retention**

6. Challenges to DTR Conservation

Challenge	Details
Human-Wildlife Conflict	Crop damage and livestock predation by leopards/tigers
Encroachments	Agricultural pressure and village expansion
Climate Change	Altered rainfall patterns affecting vegetation and water bodies
Invasive Species	Proliferation of species like **Parthenium** impacts native flora
Flooding	Seasonal flooding due to river systems affects wildlife movement

7. Related Conservation Initiatives

- **Project Tiger (1973)** – Flagship conservation programme under MoEFCC
- **Terai Arc Landscape (TAL)** – Joint India-Nepal programme with WWF
- **Census Mechanisms** – All India Tiger Estimation and Leopard Monitoring

- **Eco-Sensitive Zones (ESZs)** – Notified buffer zones for wildlife movement
- **State Wildlife Board** – Advises on protection and development of DTR

✅ Conclusion: A Model for Grassland and Carnivore Conservation

The **near 200% rise in leopard numbers** in Dudhwa highlights the **resilience of India's protected areas** when backed by sustained investment, technology, and community support. As a **transboundary ecological asset**, DTR is essential to India's goals of **biodiversity protection and ecological security** in the Gangetic plains.

"Conservation is not just about saving species — it's about saving systems." — Edward O. Wilson

Mains Practice Question (GS Paper 3)

Q. ***Discuss the ecological and conservation significance of Dudhwa Tiger Reserve. How does the recent surge in leopard population reflect on India's wildlife management strategies in the Terai region?***

Answer Structure Hint:

- **Intro**: Brief on DTR and leopard rise
- **Body**: Geography, faunal diversity, conservation efforts, population growth factors
- **Challenges & Measures**: HWC, climate, policy suggestions
- **Conclusion**: Link with India's global biodiversity commitments (CBD, COP15, etc.)

Kharai Camels: A Swimming Camel Adapted to Saline-Coastal Ecosystems

📌 Syllabus:

Paper	Relevance
✅ GS Paper 1	Indian Culture: Indigenous Communities, Tribal Practices
✅ GS Paper 3	Environment: Biodiversity, Conservation, Animal Husbandry
✅ Prelims	Species in News, Animal Adaptations, Geography of Gujarat

1. Context: Rescue of Kharai Camels from Sea Tide in Gujarat

- Kharai camels, a **rare and swimming breed** native to Gujarat's Kutch region, were recently **rescued from rising sea tides** while grazing in mangrove areas.

2. About Kharai Camels

Feature	Description
Name Origin	Derived from "Khara" (Gujarati), meaning *saline* – reflects their habitat.
Location	Endemic to **Kutch, Gujarat**
Ecological Niche	Thrive in **desert-coastal interface**, including saline lands and mangroves
Diet	Feed on **mangrove vegetation** (e.g., Avicennia, Rhizophora species)
Adaptation	Can **swim up to 3 km in seawater** to access grazing islands

3. Cultural and Tribal Significance

- Traditionally reared by the **Rabari** and **Fakirani Jat** pastoral communities of Gujarat.
- Part of **semi-nomadic transhumance** practices.
- Used in **livelihood, milk production, and local rituals**.

4. Economic & Nutritional Importance

🔹 **Kharai Camel Milk**

- High in **nutrients** such as **Vitamin C, iron**, and **insulin-like proteins**
- Believed to have **therapeutic potential**: anti-diabetic, anti-inflammatory, and immunity-boosting properties
- Demand for camel milk has grown due to its benefits in managing **autism and diabetes**

5. Conservation Status & Threats

Concern	Description
Population Decline	Due to **habitat loss**, shrinking mangrove forests, and coastal pollution
Neglected Breed Status	Lesser known compared to Bactrian or Dromedary camels
Policy Gaps	Lack of breed-specific **conservation and recognition**

In 2015, the **National Bureau of Animal Genetic Resources (NBAGR)** recognized Kharai as a **distinct camel breed**.

✅ Conclusion

The Kharai camel, a rare ecological and cultural marvel of **India's desert-maritime interface**, represents **resilience, biodiversity, and tribal wisdom**. Conservation of such **locally adapted breeds** is crucial for **climate-resilient livelihoods** and **preserving agro-pastoral traditions**.

"In diversity lies sustainability."

Mains Practice Question (GS Paper 3 – Environment + Agriculture)

Q. ***Discuss the ecological and socio-economic significance of indigenous livestock breeds like the Kharai camel. Suggest steps to promote their conservation in India's changing climate and habitat landscape.***

Island Protection Zone (IPZ) Notification, 2011

📌 Syllabus:

Paper	Theme
GS Paper 2	Governance – Environmental policies and legislation
GS Paper 3	Environment – Conservation, Environmental Impact Assessment, Disaster management

? Why in News?

- The **Union Environment Ministry** has **extended the validity** of infrastructure projects approved under the **2011 Island Protection Zone (IPZ) Notification**, emphasizing the balance between **development** and **ecological sustainability** in **island territories**.

📘 What is IPZ?

Feature	Description
Notified by	Ministry of Environment, Forest & Climate Change (MoEFCC)
Legal Basis	Under **Environment (Protection) Act, 1986**
Year of Notification	**2011**
Objective	To **regulate developmental activities** while ensuring the **ecological integrity** of island ecosystems
Applies to	**Andaman & Nicobar Islands** and **Lakshadweep group of islands**

Key Components of IPZ Notification, 2011

🏝️ Island Coastal Regulation Zones (ICRZ)

- Applicable to **major islands** such as:
  - **North Andaman, South Andaman, Middle Andaman, Little Andaman, Great Nicobar**
- Regulations relate to:
  - **Construction activities**, land use zoning
  - Preservation of **mangroves, coral reefs**, turtle nesting sites
  - Protection of **tribal reserves** and forest areas

🗺️ Integrated Island Management Plans (IIMPs)

- Applicable to:
  - **All smaller islands** in A&N and **all Lakshadweep islands**
- IIMPs are **holistic spatial plans** covering:
  - Conservation zones
  - Ecologically sensitive areas (ESAs)
  - Carrying capacity evaluation
  - Disaster resilience strategies

IPZ vs CRZ: A Comparison

Feature	IPZ	CRZ
Region	Andaman & Nicobar and Lakshadweep Islands	Indian mainland coast
Year	2011	Latest: CRZ 2019
Special Provisions	Island-specific, accounts for **ecological fragility**	Based on population density, developmental pressures
Scope	Smaller landmass, high marine biodiversity	Large coastal states with varied ecology

Significance of the IPZ Notification

- ✅ **Protects fragile ecosystems** – coral reefs, mangroves, turtle habitats

- ✅ **Promotes climate resilience** – against sea-level rise, coastal erosion
- ✅ **Ensures sustainable tourism** – e.g., eco-tourism in Neil Island
- ✅ **Tribal rights safeguard** – restricts large-scale land diversion
- ✅ **Disaster management** – especially crucial in **cyclone-prone islands**

⚠️ Concerns and Challenges

Issue	Example
Delayed Implementation	Several IIMPs still pending or inadequately enforced
Pressure from Infrastructure Development	E.g., ₹75,000 crore NITI Aayog proposal for **Great Nicobar**, may threaten ESAs
Ecological Damage	Island ecosystems are **biodiversity hotspots** but extremely fragile
Limited Local Participation	Top-down approach in planning has led to **alienation of tribal and local communities**

Thinkers & Reports

- **UNEP Report on Small Island Developing States (SIDS):** Islands face **triple threats**: ecological degradation, climate change, and economic over-exploitation.
- **Gadgil Committee (Western Ghats):** Highlighted need for **zoning and carrying capacity-based development** – relevant to island ecosystems too.

✅ CONCLUSION

The **Island Protection Zone (IPZ)** framework marks a **progressive step toward balancing development and ecological sustainability** in India's island regions. However, the growing threats of **climate change, unregulated tourism, and mega infrastructure projects** necessitate **periodic review, stricter enforcement, and participatory planning**, in line with the **principle of intergenerational equity** and **Sustainable Development Goals (SDG 13, 14, and 15).**

MAINS QUESTION (GS3 – Environment)

"While the Island Protection Zone (IPZ) Notification, 2011 is a step in the right direction, ecological fragility of India's islands demands more stringent conservation mechanisms." Discuss.
(250 words | 15 marks)

Gharial and Sloth Bear recommended for inclusion under the Species Recovery Programme of CSS-IDWH"

📌 Syllabus:

Paper	Theme
GS Paper 3	Environment – **Conservation**, **Biodiversity**, and **Environmental Protection**
Prelims	Environment – Flagship species, Wildlife schemes, IUCN, WPA schedules, CITES

? WHY IN NEWS?

The **Standing Committee of the National Board for Wildlife (SC-NBWL)** has **recommended the inclusion** of the **Gharial** and **Sloth Bear** under the **Species Recovery Programme** of the **Centrally Sponsored Scheme for Integrated Development of Wildlife Habitats (CSS-IDWH)**.

ABOUT GHARIAL

Aspect	Description
Scientific Name	*Gavialis gangeticus*
Habitat	Fast-flowing **freshwater rivers** – Chambal, Girwa (India), Rapti-Narayani (Nepal)
IUCN Status	**Critically Endangered**
WPA Schedule	**Schedule I**
CITES	**Appendix I**
Key Features	- Long, thin snout with interlocking teeth Males have a bulbous growth called **'ghara'** Highly aquatic among crocodilians

ABOUT SLOTH BEAR

Aspect	Description
Scientific Name	*Melursus ursinus*
Habitat	Native to **India, Nepal, Sri Lanka**
Found across 5 biogeographic zones: Western Ghats, Peninsular India, Deccan Plateau, Gangetic Plains, North-East India	

IUCN Status	**Vulnerable**
WPA Schedule	**Schedule I**
CITES	**Appendix I**
Key Traits	- Shaggy black coat Insectivorous: Feeds on ants, termites **Solitary** and mostly **nocturnal** Plays critical role in forest ecology

ABOUT CSS-IDWH (Centrally Sponsored Scheme for Integrated Development of Wildlife Habitats)

Feature	Description
Launched by	**Ministry of Environment, Forest and Climate Change (MoEFCC)**
Objective	Provide **financial & technical assistance** to State/UTs for **wildlife conservation**
Components	• Support to **Protected Areas** • **Habitat improvement** • **Species Recovery Programme** • **Mitigation of Human-Wildlife Conflict** • Protection of wildlife **outside PAs**

SPECIES RECOVERY PROGRAMME (under CSS-IDWH)

Parameter	Details
Purpose	To conserve and revive populations of **critically endangered species** and their habitats
Mechanism	Targeted species-specific recovery plans with state participation
Examples	Snow Leopard, Great Indian Bustard, Manipur Brow-antlered deer, Asiatic Lion, Malabar Civet, etc.
Total Species (before this inclusion)	22 species

SIGNIFICANCE OF INCLUSION

✅ ***Why this move is important?***

- 🐊 **Gharial** populations have declined by **over 90%** due to damming, fishing, and habitat loss.
- 🐻 **Sloth bears** are frequently involved in **human-animal conflicts**, and their habitats are rapidly shrinking.
- 🔄 Inclusion under **Species Recovery Programme** will:
  - Enable **focused funding and research**
  - Facilitate **scientific habitat management**
  - Promote **community engagement**
  - Strengthen **monitoring and conservation capacity**

CRITICAL ANALYSIS

✅ **Pros**

- Ensures **eco-restoration** of riverine and forest ecosystems.
- Boosts **inter-state cooperation** for species sharing transboundary ranges (like Chambal for Gharial).
- Addresses **human-wildlife conflict**, especially for Sloth bears in Central and Southern India.

❌ **Challenges**

- Limited availability of **continuous funding** and **technical expertise**.
- **Low public awareness** about lesser-known species like the Gharial.
- Conflicts with **livelihood interests** (e.g., fishermen, honey collectors).
- **Lack of baseline data** on population and ecology.

CONTEMPORARY CONTEXT & LINKAGES

- **Chambal River Sanctuary** is key to Gharial conservation.
- India's **commitment to Global Biodiversity Framework** (GBF-30x30 target).
- Human-wildlife conflict incidents rising in Chhattisgarh, Karnataka (Sloth bear attacks).
- **Namami Gange** also supports habitat rejuvenation for Gharials.
- **International Tiger Project** has shown successful models for apex predator recovery.

✅ CONCLUSION

The inclusion of **Gharial and Sloth Bear** marks a **progressive step** towards **holistic wildlife conservation** in India. By addressing both habitat preservation and human-animal interface, the **Species Recovery Programme** under **CSS-IDWH**strengthens India's commitment to the **Convention on Biological Diversity** and **sustainable development goals**.

MAINS PRACTICE QUESTION (GS-3 – 10 Marks)

Q. Discuss the significance of the Species Recovery Programme under the Centrally Sponsored Scheme for Integrated Development of Wildlife Habitats (CSS-IDWH) in India's biodiversity conservation efforts. Highlight its role in conserving lesser-known endangered species.

UNEP Frontiers 2025

📌 Syllabus:

- **GS Paper 3**: Environment – Conservation, Pollution, Biodiversity, Climate Change
- **Prelims**: International Reports and Environmental Terminologies
- **Essay Paper**: Climate Change and Sustainable Development

1. Context

The **United Nations Environment Programme (UNEP)** released its flagship report titled **"Frontiers 2025: The Weight of Time"**. This report draws attention to **emerging and overlooked environmental challenges** that are on the brink of becoming regional or global crises. It emphasizes the need for **early action** through scientific understanding and policy intervention to prevent irreversible damage.

2. Key Environmental Issues Highlighted in the Report

A. Reactivation of Dormant Microbes in the Cryosphere

- Due to **global warming**, frozen landscapes like glaciers and permafrost are melting, potentially **reactivating ancient microbes**.
- These microbes, known as **psychrophiles**, may spread into new environments and introduce **pathogenic threats** or **alter ecosystems**.
- Thawed microbes may interact with human populations or wildlife, **increasing the risk of zoonotic outbreaks**.

B. River Barriers and Ecosystem Fragmentation

- Human-made barriers such as **dams, barrages, and sluices** are altering **natural river flows**, sediment transport, and water temperature.
- These structures disrupt **fish migration**, reduce **biodiversity**, and displace **indigenous riverine communities**.
- The report promotes **"barrier removal"** as a strategy to restore **river connectivity** and reduce ecological stress—crucial given that **89% of global river volume** is now fragmented.

C. Climate Change and Older Adult Populations

- With the growing population of elderly individuals globally, **climate risks like heatwaves and air pollution** are proving more lethal.
- The report calls for **age-sensitive public health infrastructure** and better adaptive planning for the **demographic-vulnerable groups**.

D. Remobilization of Legacy Pollutants by Flooding

- Climate-induced floods are remobilizing **old industrial pollutants** such as **heavy metals** and **persistent organic pollutants (POPs)**.
- These pollutants bioaccumulate in organisms and biomagnify through the food chain, threatening **ecosystem health and human safety**.

3. Relevance to India

- **Public Health**: India's rapidly aging population will be more vulnerable to climate-induced health issues such as heatstroke and respiratory illness.
- **River Barriers**: India is home to **5,000+ large dams**. Fragmentation affects the Ganga, Yamuna, Brahmaputra and more.
- **Cryosphere Zones**: **Himalayan and Trans-Himalayan regions** like Ladakh and Himachal Pradesh are witnessing permafrost thaw, increasing microbial risk.
- **Pollution Risk**: Frequent flooding in **Assam, Bihar, Kerala**, etc., is likely to remobilize **arsenic and other toxic residues** from old industrial or mining sites.

4. Global Parallels

- **Russia and Canada** are reporting thawed viruses from Siberian permafrost.
- **EU's Water Framework Directive** encourages **barrier removal** to restore free-flowing rivers.
- In the **US**, hurricanes have caused the remobilization of pollutants from **toxic waste sites**, known as Superfund locations.

5. Challenges and the Way Forward

- Ensuring **data collection** and **scientific modeling** of emerging risks such as permafrost microbes or pollutant release.
- Integrating **climate resilience** in **urban planning**, especially for vulnerable groups such as the elderly and indigenous communities.
- Emphasizing **river restoration** under India's Namami Gange, Ken-Betwa projects by adopting **ecological engineering**.

- Strengthening **environmental legislation** to address future risks and developing **early-warning systems**.

✅ Conclusion

The **UNEP Frontiers 2025 report** acts as an early warning system, spotlighting future environmental hazards that require present-day action. From the **melting of ancient ice** to **barrier-fragmented rivers**, the report shows how time-sensitive and interconnected the environmental challenges are. For India, aligning national policies with such global environmental foresight will be crucial in safeguarding **ecosystems, public health, and biodiversity** in the years ahead.

Mains Practice Question

Q. ***What are the key takeaways from the UNEP Frontiers 2025 Report? Discuss how emerging environmental threats like cryosphere thawing and river fragmentation impact public health and biodiversity in India.***

Uttarakhand Geo-Thermal Energy Policy 2025

📌 Syllabus:

- **GS Paper 3**: Environment – Renewable Energy, Energy Security, Climate Change
- **GS Paper 2**: Government Policies and Interventions
- **Prelims**: Indian Renewable Energy Initiatives, Geothermal Sites
- **Essay**: Sustainable Development, Climate Action

1. Context

The **Uttarakhand Cabinet** has approved the **Uttarakhand Geo-Thermal Energy Policy 2025** to harness clean, renewable energy from the Earth's subsurface heat. This policy promotes **scientific and technological exploration** of geothermal resources, aligning with India's broader goals of **energy diversification, net-zero targets**, and sustainable mountain development.

2. Understanding Geothermal Energy

- **Definition**: It is the thermal energy stored beneath the Earth's surface, generated from:
  - Residual heat from the planet's formation.
  - Continuous radioactive decay of elements like uranium and thorium.
- **Uses**:
  - **Electricity generation**
  - **Space heating and cooling**
  - **Thermal storage and agricultural drying**

3. Types of Geothermal Technologies

Type	Description
Conventional	Utilizes **naturally available hydrothermal reservoirs** with underground water/steam to generate energy
Enhanced Geothermal Systems (EGS)	Drills deep wells and injects water through **fractured rocks** to extract heat
Closed-Loop Geothermal Systems (CLGSs)	Circulates a working fluid in a **sealed loop** without fluid-rock contact—less water-intensive and safer

4. Potential of Geothermal Energy in India

- **Geothermal Atlas of India (2022)** estimates a potential of **10,600 MW**.
- **Promising sites**:
  - **Puga & Chumathang (Ladakh)**
  - **Manikaran (Himachal Pradesh)**
  - **Tattapani (Chhattisgarh)**
  - **Tapoban (Uttarakhand)**
  - **Bakreshwar (West Bengal)**

5. Benefits of Geothermal Energy

- **Baseload Power**: Unlike solar or wind, it is **available 24×7**.
- **High Efficiency**: Utilization rate of **75–90%** (much higher than solar/wind).
- **Minimal Land Use and Emissions**: Very low carbon footprint and minimal environmental disruption.
- **Decentralized Energy**: Ideal for **remote and tribal areas**, especially in **Himalayan terrain**.

6. Challenges in Development

Challenges	Explanation
High Initial Costs	Deep drilling and infrastructure setup is capital-intensive
Technology Gaps	Lack of indigenous R&D and skilled geothermal workforce
Environmental Concerns	Risk of groundwater contamination, seismicity in EGS
Regulatory Bottlenecks	Lack of clear **licensing framework and coordination** among agencies

7. Government and Global Initiatives

🏛️ **National:**

- **Geothermal Atlas of India (2022)**: Comprehensive mapping of sites.
- **Task Force on Geothermal Energy**: Recommends policy, targets, and private investment.
- **RE-RTD Scheme**: For research and development in advanced geothermal tech.

🌐 **International:**

- **India–Iceland collaboration**: Iceland is a global leader in geothermal expertise.
- **India–USA RETAP platform**: Enhancing **clean energy partnerships**.
- **Cooperation with Saudi Arabia** on geothermal heat pumps.

✅ Conclusion

The **Uttarakhand Geothermal Policy 2025** signifies a major shift toward tapping **underutilized clean energy sources**. In the face of climate change and rising energy demand, geothermal energy offers **reliable, eco-friendly** and **location-specific solutions**. If developed properly, it can serve as a **sustainable solution** for hill states and remote regions, reduce fossil dependence, and position India as a leader in next-generation clean technologies.

Mains Practice Question

Q. ***Discuss the potential and challenges of geothermal energy in India. How can policies like the Uttarakhand Geo-Thermal Energy Policy 2025 aid in achieving India's renewable energy goals?***

BIOTECHNOLOGY & HEALTH

India's National Biobank

📌 Syllabus:

Paper	Relevance
✅ GS Paper 2	Health policy, institutional mechanisms, inclusive governance
✅ GS Paper 3	Science and Tech – Biotechnology, AI in healthcare, innovation ecosystem
✅ Prelims	CSIR, Phenome, Biobank, National Digital Health Mission
✅ Essay Paper	Science and technology for development; Data governance and ethics

1. Introduction: Redefining Healthcare through Data-Driven Innovation

India's first **National Biobank**, inaugurated at the **CSIR-Institute of Genomics and Integrative Biology (IGIB)** in July 2025, represents a transformational shift in healthcare delivery—from generalized treatment to **predictive and personalized medicine**. It marks India's entry into the global genomic race with an indigenous, inclusive model.

2. About the National Biobank – Summary Table

Attribute	Description
Agency	Council of Scientific and Industrial Research (CSIR)
Modelled on	UK Biobank
Coverage	10,000 participants from across Indian regions
Data	Genomic, lifestyle, environment, clinical history
Purpose	Develop AI-driven health interventions, gene therapy, and early diagnostics
Launched Under	**Phenome India – CSIR Health Cohort Knowledgebase (PI-CheCK)**

3. What is Phenome? Why Does it Matter?

Term	Explanation
Genotype	Genetic structure of an individual
Phenotype	Observable traits (height, immunity, disease risk) influenced by environment
Phenome	Collective set of all phenotypes in a cell, organ, or organism

Why Important?

- Bridges the gap between **genes and real-world health outcomes**
- Enables **precision targeting** in diagnosis and treatment
- Helps decipher **gene-environment interactions** unique to India's diversity

4. Significance: Why National Biobank Matters for India

A. Health Innovation

- Supports **AI-enabled early detection** for cancer, diabetes, cardiovascular conditions
- Enables **personalized medicine**, reducing ineffective treatments

B. Public Policy Support

- Informs **National Health Mission (NHM)** and **Ayushman Bharat** interventions
- Strengthens **health surveillance**, epidemiology, and disease prediction

C. Research & Self-Reliance

- Reduces reliance on foreign datasets
- Creates indigenous tools for drug development, gene mapping (aligns with **Atmanirbhar Bharat** in biotech)

D. Equity & Representation

- Captures data from underrepresented populations—tribals, women, rural
- Facilitates **inclusive genomics** by representing Indian heterogeneity

5. Global Comparison: Learning & Leading

Country	Initiative	Strength	India's Edge
UK	UK Biobank	Global gold standard	India's diversity adds complexity
USA	All of Us	Diversity and scale	India's biobank rooted in public health system
India	PI-CheCK	Targeted, inclusive, AI-powered	Focus on ethical, constitutional, and policy synergy

6. Ethical & Governance Challenges

Concern	Implication
Data Privacy	Need for robust safeguards under **DPDP Act 2023**
Consent & Awareness	Many participants may lack full informed consent
AI Bias	Risk of skewed outcomes if data is underrepresentative
Biopiracy & Pharma Control	Risk of commercial exploitation of native genomes
Data Nationalism vs Global Science	Balancing openness with sovereignty

7. Government & Institutional Framework

- **CSIR**: Lead implementing body
- **NDHM Integration**: Possibility of linking with health IDs
- **Policy Synergies**: Ayushman Bharat, Digital India, IndiaAI Mission
- **Global Cooperation**: Potential to collaborate on vaccine development, rare disease therapies

8. Conclusion: A Genomic Foundation for Public Health Sovereignty

The National Biobank signifies not just a scientific milestone, but a shift in how **healthcare, data, and governance converge** to build a resilient, inclusive system. As India steps into the era of **bio-data economy**, the biobank strengthens:

- Health equity
- Research capacity
- Digital trust
- Policy preparedness

"Science is a beautiful gift to humanity. We should not distort it." – Dr. APJ Abdul Kalam
The National Biobank fulfills this vision by using science to **serve**, not dominate.

Mains Practice Question (UPSC – GS Paper 2/3)

Q. ***Discuss the significance of biobanks in transforming India's healthcare system. Examine how initiatives like the National Biobank can support innovation, equity, and ethical governance in public health.***

Answer Structure Hint:

- Introduction: Define biobank + context
- Body: Significance (health, research, equity) + challenges (privacy, AI bias)
- Conclusion: Way forward – regulation, trust, tech-scaling

National Medical Commission Notifies Faculty Regulations 2025

📌 Syllabus:

Paper	Relevance
✅ **GS Paper 2**	Health Governance, Regulatory Bodies, Government Policies
✅ **GS Paper 3**	Science and Technology – Medical Education, Human Resource Development
✅ **Prelims**	NMC Act, PGMEB, Medical Council of India (MCI), NMC Functions
✅ **Essay Paper**	Health Sector Reforms, Regulation vs Autonomy in Professional Education

1. Context: New Faculty Norms for Medical Institutions

The **National Medical Commission (NMC)** has issued the **Medical Institutions (Qualifications of Faculty) Regulations, 2025**, through its **Post Graduate Medical Education Board (PGMEB)**. These reforms aim to standardize and elevate the **quality of medical teaching professionals** across India.

2. About National Medical Commission (NMC)

Feature	Details
Established Under	**NMC Act, 2019**
Predecessor	Replaced the **Medical Council of India (MCI)**
Regulatory Status	Apex statutory body for medical education and practice
Headquarters	New Delhi
Structure	Four autonomous boards: • Undergraduate Medical Education Board (UGMEB) • Postgraduate Medical Education Board (PGMEB) • Medical Assessment and Rating Board (MARB) • Ethics and Medical Registration Board (EMRB)

3. Key Functions of NMC

- Formulate **standards and policies** for medical education and research
- Regulate **medical institutions**, **curriculum**, and **faculty norms**
- Maintain **National Register of licensed medical practitioners**
- Promote **affordable and ethical healthcare practices**
- Facilitate **exit exams and common entrance tests** (e.g., NEXT, NEET)

4. About PGMEB (Post Graduate Medical Education Board)

Attribute	Description
Autonomous Board	Under NMC, responsible for PG education and faculty standards
Recent Notification	**Faculty Qualifications Regulations, 2025**
Aim	To improve quality, transparency, and uniformity in faculty appointments
Scope	Applicable to all recognized medical colleges and PG teaching institutions

5. Significance of 2025 Faculty Regulations

A. Standardisation of Qualifications

- Prescribes **minimum qualifications and experience** for various teaching posts (e.g., Professor, Associate, Assistant)
- Aligns Indian norms with **global best practices in medical teaching**

B. Enhancing Quality of Medical Education

- Addresses concerns of **shortage and uneven distribution** of qualified faculty
- Encourages **merit-based recruitment and promotions**

C. Transparency and Accountability

- Prevents irregularities in faculty appointments
- Mandates **digital documentation** and **self-declaration systems**

6. Evolution from MCI to NMC: A Reformist Shift

Aspect	MCI (Before 2019)	NMC (After 2019)
Governance	Elected body, often accused of corruption	Expert-based regulatory structure
Focus	Regulation-heavy, exam light	Integrated system with **NEXT**, NEET, and transparent rating
Accountability	Weak enforcement	Autonomous rating board (MARB), e-governance

The NMC model aligns with **National Education Policy (NEP 2020)** by promoting **outcome-based and professional education reform**.

7. Challenges Ahead

Challenge	Explanation
Implementation Uniformity	Varying capacities among government and private colleges
Faculty Shortage	Urban–rural divide in quality educators
Resistance to Reform	Legacy institutions adapting to new norms
Monitoring	Need for robust audit and feedback systems

✅ Conclusion: NMC as a Pillar of Medical Reforms

The **Faculty Qualifications Regulations 2025** signal a transformative shift in India's medical education framework, moving towards **merit, uniformity, and quality assurance**. As India aspires to become a **global healthcare hub**, NMC's role is pivotal in creating a **skilled and ethical medical workforce**.

"Health systems cannot be strong unless education systems are stronger." – WHO

Mains Practice Question (GS Paper 2)

Q. ***The National Medical Commission (NMC) has replaced the Medical Council of India with the aim of improving medical education governance in India. Discuss the role and recent initiatives of NMC in reforming healthcare education. What are the challenges in its implementation?***

Answer Structure Hint:

- **Intro**: Mention NMC Act, 2019 and objective
- **Body**: Structure, PGMEB, Faculty Regulations 2025, reform comparison with MCI
- **Challenges**: Faculty shortage, enforcement, regulatory adaptation
- **Conclusion**: Role in improving health outcomes through quality education

Central Drugs Standard Control Organisation (CDSCO)

📌 Syllabus:

Paper	Relevance
✅ GS Paper 2	Government Policies & Interventions – Health Regulation, Institutional Framework
✅ GS Paper 3	Science and Technology – Drug Regulation, Bioethics, Public Safety
✅ Prelims	Regulatory Bodies, Health Acts, Recent Developments

1. Context: CDSCO's Advisory on Drug Disposal

The **Central Drugs Standard Control Organisation (CDSCO)** has issued an advisory recommending that **17 specific drugs**—primarily **narcotics and psychoactive substances**—be disposed of by **flushing down the sink** to avoid harm to **pets, children, or others who may accidentally consume them**.

This includes drugs like **Fentanyl, Tramadol, Diazepam**, etc., which are prone to **misuse, accidental poisoning**, or **abuse** if not safely discarded.

2. Why This Advisory?

- **Public Health Risk**: Unused or expired narcotics pose significant risks if left unattended at homes or disposed inappropriately.
- **Animal Safety**: Accidental consumption by **pets or stray animals** has led to toxicity cases.
- **Drug Misuse Prevention**: Narcotic painkillers and sedatives like **Fentanyl** have high abuse potential (e.g., opioid crisis in the U.S.).

3. About CDSCO: India's Central Drug Regulator

The **Central Drugs Standard Control Organisation (CDSCO)** functions under the **Directorate General of Health Services**, **Ministry of Health & Family Welfare**. It is India's apex drug regulatory authority.

🔹 **Legal Basis:**

- Operates under the **Drugs and Cosmetics Act, 1940** and **Rules, 1945**.

🔹 **Organisational Role:**

Function	Details
New Drug Approval	Authorises approval for new drugs and vaccines at the national level
Import Regulation	Controls and licenses **drug imports into India**
Clinical Trials	Grants permissions for **clinical research** and monitors ethical compliance
Bans & Withdrawals	Can **ban unsafe drugs** or cosmetics in the public interest
Advisory Role	Coordinates with State drug controllers; leads the **Drugs Technical Advisory Board (DTAB)** and **Drugs Consultative Committee (DCC)**

4. Division of Responsibilities: Centre vs. States

Authority	Responsibility
Centre (CDSCO)	Approval of **new drugs**, clinical trials, import regulation, banning unsafe drugs
State Drug Controllers	Licensing and oversight of **drug manufacture, sale, and distribution** within their jurisdictions

5. Ethical and Environmental Dimensions

- Safe disposal of drugs aligns with **bioethical principles** of **non-maleficence** (do no harm).
- Improper disposal (e.g., in trash) can lead to **drug diversion**, **water contamination**, and **public health hazards**.
- It is part of a broader shift toward **pharmaceutical waste management protocols**, also recognised under the **Biomedical Waste Management Rules, 2016**.

✅ Conclusion: Responsible Regulation for Safer Society

This advisory by CDSCO reflects a growing recognition that **drug regulation doesn't end at consumption**, but must extend to **safe disposal**. As India's healthcare system expands, ensuring **drug safety, ethical compliance, and environmental safeguards** will be key to public trust and effective governance.

"A drug that saves a life in one context may become a silent hazard in another—regulation must cover both ends."

Mains Practice Question (GS Paper 2 – Governance & Health)

Q. ***Discuss the role of the Central Drugs Standard Control Organisation (CDSCO) in regulating public health and pharmaceutical safety in India. How can India strengthen the safe disposal and ethical use of medicines in line with global best practices?***

WASH Progress Tracker 2025 Highlights Funding Gaps

📌 Syllabus:

Paper	Topic
GS Paper 2	Issues relating to Health, Education, and Human Resources
GS Paper 3	Conservation, Environmental Pollution and Degradation, Environmental Impact Assessment
Essay Paper	Topics related to Public Health, Infrastructure, and Human Rights

Context

The **WHO and UNICEF's 2025 WASH Progress Tracker** highlights the **critical funding gaps** and **implementation barriers** in ensuring **Water, Sanitation, and Hygiene (WASH)** in **healthcare facilities across 100+ countries**. Only **17% of countries have adequate funding** to meet WASH goals.

About WASH

WASH = Water, Sanitation, and Hygiene
It refers to basic services required for:

- Access to **safe drinking water**
- Use of **improved sanitation facilities**

- **Handwashing and hygiene** practices

Importance of WASH

Domain	Relevance
Health	Prevents infections like cholera, diarrhea, sepsis, and NTDs
Education	Lack of toilets → dropouts, esp. among girls
SDGs Alignment	Linked to **SDG 3** (Health), **SDG 6** (Clean Water)
Gender Equality	Disproportionate burden on women & girls in managing water needs
Human Rights	UNGA 2010: Declared water & sanitation as a **basic human right**

Global Frameworks & Efforts

Initiative	Key Features
UNGA Resolution (2023)	Urged access to WASH, electricity, and waste in all health facilities
Protocol on Water & Health	Europe's legal agreement linking water, sanitation, and disease control
WHO WASH Strategy (2018–25)	Focused on hygiene in healthcare facilities
UNICEF WASH Strategy (2016–30)	Supports universal WASH access under SDG 6
Sanitation and Hygiene Fund (2020)	Finances WASH programs in high-burden countries

2025 Progress Tracker Findings

- **Coverage**: Assessed progress in **8 priority action areas** of WASH in health care facilities.
- **Funding Gap**: Only **17% of countries** have adequate and sustained financing.
- **Disparities**: Many **low- and middle-income countries** still lack basic WASH infrastructure in hospitals.
- **Waste & Electricity**: Linked issues such as poor biomedical waste disposal and lack of electricity add to health hazards.

India's Progress and Initiatives

National Achievements:

- Recognized for incorporating **WASH standards** in **healthcare infrastructure**
- Introduced **WASH indicators** in national monitoring tools

Major Indian Schemes:

Scheme	Purpose
Swachh Bharat Mission (SBM)	Eliminated open defecation in many districts
Jal Jeevan Mission (JJM)	Rural tap water supply – 80.15% rural households now covered
Namami Gange	River conservation with integrated sanitation and WASH components

⚠️ Challenges in WASH Implementation

- **Funding**: Insufficient, especially in rural and peri-urban health facilities
- **Behavioural Change**: Lack of awareness and sustained hygiene practices
- **Infrastructure Deficit**: Poor waste management and sewage systems
- **Monitoring**: Fragmented data and lack of real-time evaluation

✅ Conclusion: Way Forward

The WASH Progress Tracker 2025 is a **wake-up call** for governments and global institutions to **prioritize WASH financing** and improve implementation in **healthcare facilities**. For India, aligning schemes like **JJM, SBM** with **health sector reforms**, enhancing **public-private partnerships**, and leveraging **local governance** can fast-track WASH for **universal health security** by **SDG 2030**.

UPSC Mains Practice Question

Q. ***Water, Sanitation, and Hygiene (WASH) services are critical to achieving universal health care. Examine the global and Indian efforts in this domain and suggest measures to address the funding and implementation gaps.***
(10 Marks | 150 words)

Trans Fats: A Double-Edged Sword for Health and Nutrition Policy

📌 Syllabus:

- **GS Paper 2**: Health Issues, Government Interventions, International Organisations (UN, WHO)
- **GS Paper 3**: Science & Tech (Biochemistry & Public Health); Food Security
- **Prelims**: Basic Biology/Health, WHO policies
- **Essay**: Health vs Development Debate, Nutrition Policy

1. Context

Recently, **experts warned the United Nations** against a **blanket ban on trans fats**, arguing that such a move could potentially harm **nutrition security** in **developing countries**, where low-cost processed foods remain a key dietary staple. The debate has reignited global concerns about balancing **public health objectives** with **food access equity**.

2. What are Trans Fats?

- **Trans fats (Trans-fatty acids, TFA)** are a type of **unsaturated fatty acids**.
- They exist in two forms:
  - **Naturally occurring**: Found in small amounts in meat and dairy (ruminant fat).
  - **Artificially produced**: Through **partial hydrogenation** of vegetable oils for use in baked goods, fried foods, margarine, etc.

3. Why Are Trans Fats Used?

- Increase **shelf life** of products.
- Provide **texture and stability** to processed foods.
- Used extensively in the food industry for **cost efficiency**, especially in LMICs (Low- and Middle-Income Countries).

4. Health Impacts of Trans Fats

Health Effect	Impact
Cholesterol	Raises **LDL ("bad")** and **VLDL** cholesterol while lowering **HDL ("good")** cholesterol
Cardiovascular Risks	Increases risk of **coronary heart disease**, **stroke**, and **atherosclerosis**
Other Conditions	Linked with **obesity**, **inflammation**, **high blood pressure**, **type 2 diabetes**, and **cancers**
WHO Estimate	Trans fats are responsible for over **500,000 deaths annually worldwide** due to heart disease

5. Global Action and India's Response

🌍 ***International Measures*:**

- **WHO REPLACE Framework (2018)**: Global initiative to **eliminate industrial trans fats by 2023**.
- **UN SDG Goal 3 (Health)**: Elimination of harmful dietary substances like trans fats is a global priority.

🇮🇳 ***India's Measures*:**

- **FSSAI Regulation**: India capped trans fats in oils and fats to **2% by 2022**.
- **Eat Right India Movement**: Promotes healthy eating through food fortification and trans fat elimination.
- **Heart Attack Rewind Campaign**: Mass media campaign to eliminate industrial TFA.
- **Food Labelling Rules**: Mandatory declaration of TFA content in packaged foods.

6. Why Are Developing Countries Concerned About a Blanket Ban?

- **Nutrition vs Affordability**: Processed foods with TFA are often **cheaper** and accessible to the poor.
- **Sudden removal** may raise **food prices**, creating food insecurity.
- **Lack of alternatives**: Limited access to affordable, safe oil substitutes in rural and low-income settings.
- **Implementation Capacity**: Weak regulatory infrastructure to monitor compliance.

✅ Conclusion

The debate over trans fats reflects the larger **public policy dilemma** between **health security** and **nutritional access**. While **elimination of industrial TFAs** is critical for public health, especially in reducing **non-communicable diseases**, it must be **phased, contextual, and equitable**, especially in developing nations. India's model of **regulation + awareness + reformulation** offers a balanced pathway for other countries to emulate.

Mains Practice Question

Q. ***Discuss the public health and policy challenges posed by trans fats in developing countries. What measures has India taken to address the issue, and how can the global approach balance health with nutrition equity?***

Fentanyl Crisis: A Global Public Health and Geopolitical Concern

📌 Syllabus:

- **GS Paper 2** – International Relations (India-USA relations; Global governance of public health)
- **GS Paper 3** – Science & Technology (Drugs & Narcotics), Internal Security (Drug Abuse & Illicit Trafficking)
- **Prelims** – Science & Tech (Synthetic Opioids), Current Affairs
- **Essay Paper** – Issues of public health, international policy, global drug crisis

1. Context: Fentanyl Overdose and Trade Tensions

The **fentanyl crisis** has emerged as a **serious public health emergency**, particularly in the **United States**, where it reportedly caused **over 112,000 overdose deaths in 2024**. Recently, **former US President Donald Trump invoked the fentanyl issue** to justify imposing **35% tariffs on Canada**, citing lax cross-border trafficking enforcement.

2. What is Fentanyl?

Aspect	Details
Nature	Synthetic opioid (laboratory-made narcotic drug)
Medical Use	Approved for use as a powerful **analgesic and anesthetic**
Potency	**~100 times stronger than morphine** and **50 times more than heroin**
Street Names	Apache, China Girl, Dance Fever, King Ivory, Jackpot, etc.
Form	Powder, pill, patch, or mixed with other drugs (e.g., heroin, cocaine)

3. Health Impacts of Fentanyl

- **Extreme Potency**: Even **2 mg** of fentanyl can be fatal
- **Overdose Effects**:
  - Cold, clammy skin
  - Cyanosis (bluish skin due to low oxygen)
  - Respiratory failure, coma, and eventual death
- **Addiction & Dependence**: High risk due to intense euphoria and short half-life
- **No Tolerance**: Users unaware of fentanyl presence in drugs have high fatality rates

4. Global and National Dimensions of the Fentanyl Crisis

A. United States:

- Leading consumer of illegally manufactured fentanyl
- Overdose death toll has risen sharply over the last 5 years
- Major sources: Smuggled from Mexico, China, or via online dark web networks

B. Canada:

- Alleged to be a **transit point** for fentanyl entering the U.S.
- Increasing domestic fentanyl-related fatalities

C. India's Relevance:

- India is a major **pharmaceutical hub**
- Potential risks of being misused for synthetic opioid production or as a transit country
- India banned **several fentanyl analogues under NDPS Act**

5. Regulatory and Enforcement Measures

Country	Measures Taken
USA	Opioid detection at borders, Naloxone distribution, public health advisories
China	Controlled fentanyl under its **non-medical drugs law**, but illicit labs remain
India	Narcotic Drugs and Psychotropic Substances Act, 1985 amended to cover synthetic opioids; INCB coordination

6. Concerns and Challenges

- **Illicit Production**: Easy to manufacture in clandestine labs
- **Regulation Gaps**: Delay in identifying and scheduling new analogues
- **Dark Web Trafficking**: Anonymous marketplaces make tracking difficult

- **Overburdened Health Systems**: Struggle with overdose response and rehabilitation
- **Geopolitical Tensions**: Weaponization of fentanyl crisis in trade or diplomatic disputes

✅ Conclusion

Fentanyl represents a **nexus of public health crisis, drug trafficking, and international geopolitics**. For India, vigilance in monitoring pharmaceutical exports, strong forensic capabilities, and cooperation with global drug enforcement agencies are essential. At a global level, **a harmonized, science-driven, and humanitarian approach** is needed to counter the fentanyl epidemic without turning it into a tool of economic retaliation or populism.

Mains Practice Question

Q. ***Fentanyl has emerged as a serious global public health threat with wide-ranging implications. Discuss the challenges posed by synthetic opioids like fentanyl and examine India's role and responsibilities in curbing the misuse of such substances.***

SCIENCE & TECHNOLOGY

Advanced Towed Artillery Gun Systems (ATAGS)

📌 Syllabus:

- **GS Paper 3:**
  ✅ ***Science & Technology*** **– Developments in Defence Technology**
  ✅ ***Internal Security*** **– Defence Preparedness and Indigenisation of Technology**
  ✅ ***Infrastructure & Manufacturing*** **– Defence Production in India**

Context

- The **Ministry of Defence** recently hailed the **Advanced Towed Artillery Gun System (ATAGS)** as an **"exemplary mission mode success"**, underlining its significance in India's journey towards **defence self-reliance**and **modernisation of artillery capability**.

About ATAGS

Feature	Description
Designed by	Armament Research and Development Establishment (**ARDE**), Pune (DRDO Lab)
Manufacturing Partners	Bharat Forge & Tata Advanced Systems (private industry collaboration)
Caliber	155 mm/52 calibre (NATO standard)
Firing Range	Over **48 km** with Extended Range Full Bore (ERFB) ammunition
Mobility	Towed artillery with **automatic mobility deployment system**
Firing Modes	Both **burst** and **sustained fire** capabilities
Fire Control	Integrated with **electronic suite** for **navigation, sighting & positioning**
Automation	Equipped with **Automatic Ammunition Handling System** and on-board crane
Power Source	Operates on an **electrically driven system**, reducing maintenance needs

Key Features & Strategic Advantages

- ✅ **Indigenous Capability**: Boosts *Atmanirbhar Bharat* in defence.
- ✅ **Precision & Range**: Among the longest-range howitzers in its class.
- ✅ **Automation**: Improves efficiency, safety, and speed in combat.
- ✅ **Mobility**: Rapid deployment in diverse terrains (e.g., borders, high-altitude).
- ✅ **Maintenance-friendly**: Uses electric drives instead of complex hydraulic systems.

Strategic and Contemporary Relevance

- **Induction Plan**: Over **114 units planned for Indian Army**.
- **Kargil Lessons**: Necessitated modern artillery post 1999 Kargil conflict.
- **Comparison with Bofors**: ATAGS has higher range and better automation.
- **Support for Export**: Can position India as a **global artillery exporter** (e.g., to ASEAN, Africa).

Challenges and Way Forward

Challenges	Way Forward
Delay in user trials and procurement process	Fast-tracking through mission-mode procurement
Compatibility with legacy systems	Adaptability with Indian Army's current systems
Industrial scaling	Public-private partnerships for bulk production
Maintenance in field conditions	Training and robust logistics network for spares and repair

Mains Practice Question

Q. ***Discuss the significance of the Advanced Towed Artillery Gun System (ATAGS) project in the context of India's defence indigenisation and strategic preparedness. Highlight the role of public-private partnership in its development.***