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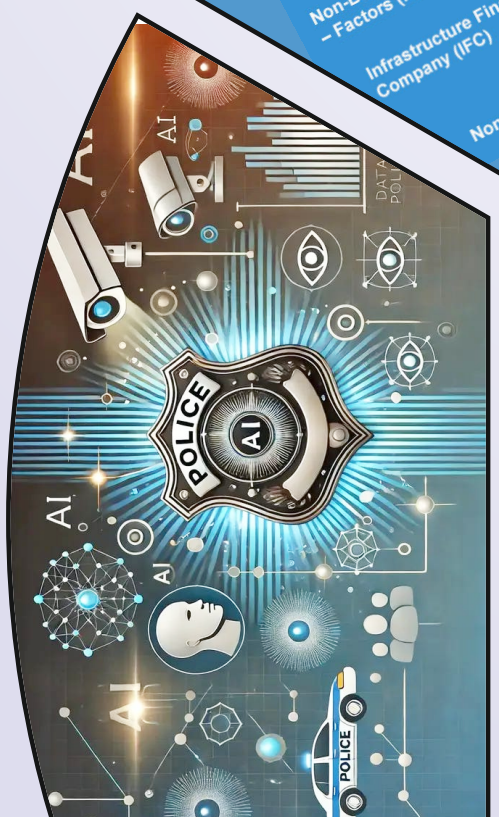
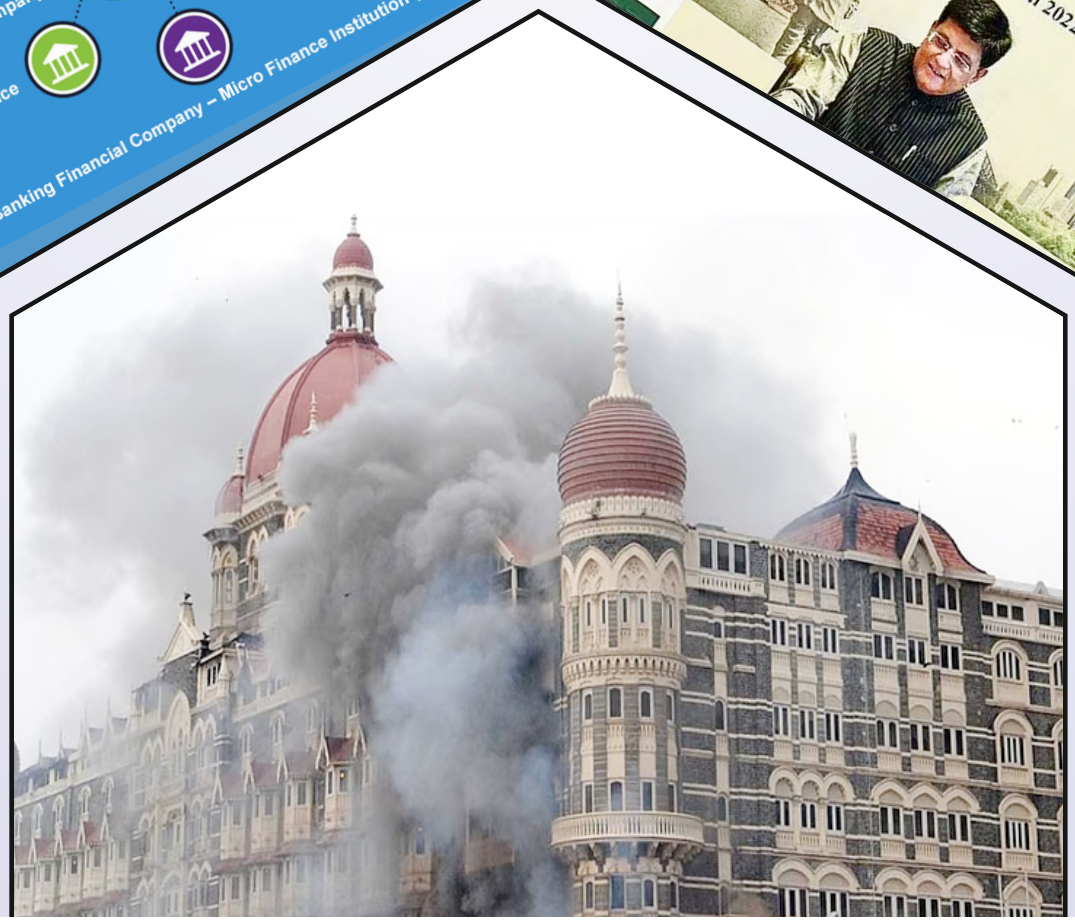
WEEKLY 29th Dec. - 04th Jan. (2026)





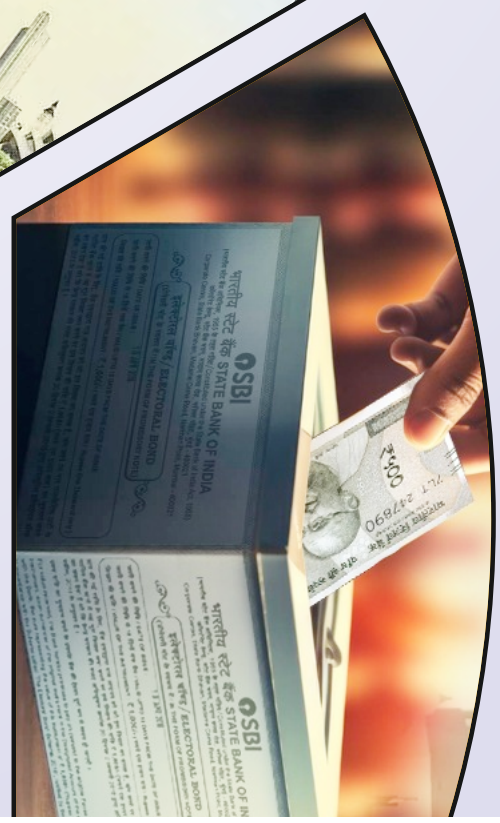


Table of Contents

POLITY

Political Funding in India: Transparency and Risks

📌 **Syllabus Mapping:**
✅ **GS Paper II – Constitution, Polity, Governance & Electoral Reforms**
✅ **GS Paper IV – Ethics in Public Life (Probity, Corruption, Accountability)**

Introduction (Contextual Background)

The **Annual Report on contributions received by Electoral Trusts**, released by the **Election Commission of India**, has once again drawn attention to **systemic concerns in political financing**, particularly the **disproportionate flow of funds towards incumbent political parties**. This trend raises fundamental questions about **electoral fairness, transparency, and democratic accountability** in India.

Political Funding in India: Existing Framework

🔹 **Legal and Regulatory Architecture**

Political funding in India is governed by a combination of statutory and fiscal laws:

- **Representation of the People Act, 1951** – regulates reporting and disclosure of contributions
- **Income Tax Act, 1961** – provides tax exemptions to political parties subject to conditions
- **Companies Act, 2013** – governs corporate donations and disclosure norms

🔹 **Modes of Political Contributions**

- **Individual Donations**
  - Voluntary contributions permitted
  - Donations **above ₹20,000** must be disclosed to the ECI
  - Contributions **above ₹2,000** must be made through **traceable banking instruments**
- **Electoral Trusts**
  - Act as intermediaries between donors and political parties
  - Intended to promote transparency, but outcomes remain mixed

Key Issues and Concerns in Political Funding

1️⃣ **Lack of Transparency and Anonymous Funding**

- Between **2004–05 and 2022–23**, India's six national parties received **₹19,083.08 crore from unknown sources**
- This data, highlighted by the **Association for Democratic Reforms**, underscores:
  - Weak disclosure norms
  - Limited voter awareness
  - Inadequate audit mechanisms

➡️ Transparency is central to **Robert Dahl's theory of procedural democracy**, where informed citizens are essential for meaningful participation.

2️⃣ **Unequal Electoral Playing Field**

- While **candidates face strict expenditure ceilings**, **political parties do not**
- This asymmetry:
  - Favors financially dominant parties
  - Marginalises smaller and emerging political formations
  - Undermines political pluralism

3️⃣ **Corporate Influence and Crony Capitalism**

- Corporate donations form a significant share of political funding
- This dependence risks:
  - Policy capture
  - Regulatory favoritism
  - Distortion of public interest

The **Supreme Court of India**, in its **Electoral Bonds judgment (2024)**, described such quid pro quo arrangements as **"institutionalised corruption"**, noting their corrosive impact on democratic governance.

4️⃣ **Incumbency Advantage**

- Electoral Trust data reveals:
  - Incumbent parties attract larger donations due to perceived access to power
- This creates a **self-reinforcing cycle**:
  - Power → Funding → Electoral Advantage → Continued Power

Democratic and Ethical Implications

- Weakens **political equality**
- Erodes **public trust in institutions**
- Compromises **probity in governance**
- Conflicts with constitutional values of **free and fair elections**

Way Forward: Reforming Political Finance

🔹 **Public Funding of Elections**

- Recommended by the **Indrajit Gupta Committee (1998)**
- Partial or conditional state funding can:
  - Reduce financial asymmetry
  - Curb corporate dependence
  - Strengthen issue-based politics

🔹 **National Election Fund**

- Creation of a **centralised, transparent fund**
- All individual and corporate donations routed through it
- Equitable allocation based on objective criteria such as vote share

🔹 **Expenditure Ceilings for Political Parties**

- Introduce legal caps on **party-level campaign expenditure**
- Align party spending limits with candidate-level restrictions

🔹 **Enhanced Disclosure and Auditing**

- Real-time disclosure of political donations
- Independent audit of party accounts
- Stronger enforcement powers for the ECI

Conclusion

Political funding lies at the heart of **electoral integrity and democratic legitimacy**. Persistent **opacity, corporate dominance, and incumbency bias** threaten the constitutional promise of **free and fair elections**. Comprehensive reforms—combining **public funding, transparency, expenditure regulation, and institutional oversight**—are essential to restore **trust, equity, and accountability** in India's electoral democracy.

Mains Practice Question

"Examine the key challenges associated with political funding in India. How do issues of transparency and corporate influence affect electoral democracy? Suggest reforms to ensure fairness and accountability in political financing.

GOVERNANCE

Anti-Terrorism Architecture in India

📌 **Syllabus Mapping:**
✅ **GS Paper II – Governance, Polity & Internal Security**
✅ **GS Paper III – Internal Security, Terrorism, Organised Crime**

Introduction (Contextual Background)

At the **Anti-Terrorism Conference-2025**, organised by the **National Investigation Agency**, the Union Home Minister underlined the need for a **uniform Anti-Terrorism Squad (ATS) structure across all States and Union Territories**. The initiative reflects India's evolving internal security challenges, where terrorism has become **technology-intensive, decentralised, and trans-regional**.

Why a Common ATS Framework? – Rationale

1️⃣ **Changing Nature of Terrorism**

- Terrorism today is **network-based rather than cell-based**
- Increased use of:
  - **Artificial Intelligence**
  - **Encrypted communication platforms**
  - **Blockchain-based financial transactions**
- Rise of **hybrid threats**: terror-crime-cyber nexus

➡️ As noted by security scholar **David Kilcullen**, modern terrorism thrives in "**complex adaptive systems**," requiring institutional standardisation rather than fragmented responses.

2️⃣ **Need for Uniformity and Standardisation**

- Presently, **ATS units vary widely** in:
  - Manpower
  - Training standards
  - Technological capacity
- A **common SOP framework** ensures:
  - Seamless coordination from **investigation → prosecution → conviction**
  - Predictable response mechanisms during crises

3️⃣ **Enhanced Inter-Agency Coordination**

A unified ATS structure improves operational synergy among:

- State Police Forces
- **Intelligence Bureau**
- **Research and Analysis Wing**
- Central Armed Police Forces
- National counter-terror bodies

➡️ This aligns with the **"whole-of-government approach"** to internal security.

4️⃣ **Operational and Logistical Efficiency**

- Standardised:
  - Training modules
  - Investigation protocols
  - Forensic and cyber tools
- Common databases enable:
  - Faster intelligence dissemination
  - Reduction in duplication of effort
  - Evidence-based policing

Key Initiatives Unveiled by NIA

- **Common ATS Framework Document** shared with all States
- **Updated Crime Manual** – modernised investigation techniques
- **Organised Crime Network Database** – mapping terror-crime syndicates
- **Lost and Recovered Weapon Database** – curbing illicit arms circulation

These initiatives strengthen **data-driven counter-terrorism**.

India's Broader National Anti-Terrorism Architecture

🔹 **Institutional Framework**

- **National Investigation Agency** – federal investigation of terror offences
- **National Security Guard** – tactical counter-terror operations
- **Intelligence Bureau** – internal intelligence
- **Research and Analysis Wing** – external intelligence

🔹 **Integrated Intelligence & Databases**

- **National Intelligence Grid (NATGRID)** – real-time data integration under **Ministry of Home Affairs**
- **National Integrated Database on Arrested Narco-Offenders (NIDAAN)** – tackling narco-terror linkages

🔹 **Terror Financing Counter-Measures**

- **Terror Funding and Fake Currency Cell (TFFC)** under NIA
- **Combating Financing of Terrorism (CFT) Cell** under MHA
- Alignment with **FATF standards** on terror financing

Critical Challenges

- Federal concerns over **policing as a State subject**
- Variations in **state capacity and political will**
- Cyber and financial anonymity outpacing legal frameworks

Way Forward (Policy Perspective)

- Cooperative federalism in internal security
- Periodic **joint simulations and audits**
- Capacity-building for state ATS units
- Legislative backing for data-sharing and cyber-forensics
- Human rights-compliant counter-terror practices

Conclusion

A **common ATS structure** represents a shift from fragmented policing to a **networked, intelligence-led, and technology-enabled counter-terrorism framework**. In an era of **borderless terror threats**, **standardisation, coordination, and institutional synergy** are indispensable for safeguarding India's internal security.

Mains Practice Question

"Discuss the significance of a uniform Anti-Terrorism Squad (ATS) framework in strengthening India's internal security architecture. Examine the challenges involved and suggest a way forward."

Human Capital for Viksit Bharat

📌 **Syllabus Mapping:**
✅ **GS Paper II – Governance, Social Sector, Education & Health**
✅ **GS Paper III – Economic Development, Demography, Skills & Human Resources**

Introduction (Contextual Background)

The recent **Conference of Chief Secretaries**, chaired by the Government of India, deliberated on the theme **"Human Capital for Viksit Bharat"**, underscoring the centrality of **people-centric development** in India's transition towards a developed nation. In contemporary development

discourse, **human capital**—the aggregate of **knowledge, skills, health, and capabilities of individuals**—is increasingly viewed as the **primary driver of sustainable and inclusive growth**.

According to the **Organisation for Economic Co-operation and Development (OECD)**, human capital constitutes the productive attributes embedded in individuals that enhance economic output and societal well-being.

Significance of Human Capital for a Developed India

1️⃣ Harnessing the Demographic Dividend

- Nearly **60% of India's population** currently lies in the **working-age group (15–59 years)**
- This share is projected to peak at **68.9% by 2030**
- If adequately educated and skilled, this cohort can:
  - Accelerate economic growth
  - Increase savings and investment
  - Strengthen social security systems

➡️ As economist **Gary Becker (Human Capital Theory)** argues, investment in people yields long-term economic returns comparable to physical capital.

2️⃣ Linkage with Economic Growth

- Education, skills, and health:
  - Improve **labour productivity**
  - Enable structural transformation from low-productivity sectors to high-value industries
- Empirical evidence shows nations with higher human capital indices experience **faster and more resilient growth trajectories**

3️⃣ Catalysing an Innovation-Driven Economy

Human capital underpins:

- **Research and Development**
- **Entrepreneurship and start-up ecosystems**
- Adoption of **frontier technologies**

India's success in:

- **Digital Public Infrastructure** such as **Aadhaar** and **Unified Payments Interface**
- Expansion of start-ups
- Emerging domains like **Artificial Intelligence** and **green energy**

…is closely linked to its growing pool of skilled human resources.

Key Challenges in Human Capital Development

1️⃣ Weak Foundational Literacy and Numeracy

- According to **PARAKH 2024**, only **46% of Class V students** demonstrate proficiency in mathematics
- Learning deficits at early stages:
  - Accumulate over time
  - Reduce employability and productivity in later years

2️⃣ High Dropout Rates

- **Secondary-level dropout rate** stands at **10.9%**
- Driven by:
  - Socio-economic constraints
  - Poor learning outcomes
  - Limited relevance of curriculum to real-world skills

3️⃣ Low Expected Years of Schooling (EYS)

- India's **EYS: 13.3 years**
- Compared to **~18 years** in developed economies
- Reflects gaps in:
  - Retention
  - Quality of education
  - Lifelong learning opportunities

Way Forward: Strengthening India's Human Capital Base

🔹 **Strengthening Foundational Learning**

- Expansion of **NIPUN Bharat Mission**
- Universalisation of **Balvatikas** and Early Childhood Care and Education (ECCE)
- Focus on **learning outcomes**, not just enrolment

🔹 **Skill Integration and Employability**

- Align education with **National Education Policy (NEP) 2020**
- Promote:
  - Vocational education through **National Skills Qualifications Framework (NSQF)**
  - Innovation culture via **Atal Tinkering Labs**
- Bridge the gap between **education and labour market needs**

🔹 **Health and Nutrition as Human Capital Inputs**

- Improved learning outcomes are contingent on:
  - Physical health
  - Nutritional security
- Strengthen convergence with **PM POSHAN** and primary healthcare systems
- Emphasise preventive healthcare and adolescent nutrition

Broader Governance Perspective

- Human capital investment yields **intergenerational dividends**
- Requires:
  - Centre–State coordination
  - Data-driven policymaking
  - Outcome-based budgeting
- Aligns with **SDG 3 (Health)**, **SDG 4 (Education)**, and **SDG 8 (Decent Work)**

Conclusion

Human capital is the **most strategic asset** for achieving **Viksit Bharat**. India's demographic advantage can translate into a **development dividend** only through sustained investments in **education, skills, health, and innovation capacity**. Addressing foundational deficits and aligning human capital formation with future economic needs will determine whether India's demographic moment becomes a **historic opportunity or a missed chance**.

Mains Practice Question

"Human capital is the most critical determinant of a nation's long-term growth and competitiveness." In the context of India's demographic transition, examine the challenges in human capital development and suggest measures to realise the goal of Viksit Bharat.

Sports Governance Reforms in India

📌 **Syllabus Mapping:**
✅ **GS Paper II – Governance, Institutional Reforms & Public Administration**
✅ **GS Paper I – Society & Role of Institutions (Sports and Nation-Building)**
✅ **GS Paper IV – Ethics, Accountability & Probity in Public Institutions**

Introduction (Contextual Background)

The **Task Force on Capacity Building of Sports Administrators**, chaired by Olympic medalist **Abhinav Bindra**, has submitted a comprehensive report outlining a roadmap to transform India's sports governance into a **professional, transparent, and athlete-centric ecosystem**. The report recognises that India's sporting performance on the global stage is increasingly constrained not by talent alone, but by **institutional and administrative weaknesses**.

Why Sports Administration Reform Matters

- Modern sports success depends on **efficient governance, professional management, and ethical leadership**
- Global sporting powers demonstrate strong linkage between:
  - Administrative competence
  - Athlete welfare
  - High-performance outcomes
- Sports governance is now seen as part of **human capital and soft power development**

Systemic Gaps in India's Sports Administration (As Identified by the Task Force)

1️⃣ Lack of Professionalism

- Key administrative roles often occupied by:
  - Generalist civil servants
  - Short-term contractual staff
- Limited domain knowledge leads to:
  - **Ad-hoc decision-making**
  - Weak long-term planning
  - Poor performance management

2️⃣ Fragmented and Outdated Training

- Training programmes are:
  - Sporadic
  - Not standardised
  - Lacking continuity
- Absence of **continuous professional development (CPD)** culture in sports administration

3️⃣ Athlete Transition Barriers

- No structured **Dual Career Pathways**
- Athletes face difficulties transitioning into:
  - Governance
  - Administration
  - Leadership roles
- Loss of **experiential knowledge** gained through competitive sport

4️⃣ Governance Deficits in Sports Federations

- Weak separation between:
  - **Policy-making (Boards)**
  - **Day-to-day operations**
- Over-centralisation of authority
- Limited transparency and accountability in **National Sports Federations (NSFs)**

Proposed Multi-Level Capacity Building Framework

🔷 1. Civil Service Integration

- Introduce **sports governance modules** in the training of IAS officers at **Lal Bahadur Shastri National Academy of Administration (LBSNAA)**
- Objective:
  - Sensitise future administrators to sport as a **tool of nation-building**
  - Improve inter-ministerial coordination in sports policy

🔷 2. Performance Monitoring and Incentives

- Establish a **National Performance Management and Monitoring System**
- Link:
  - Administrators' **Key Performance Indicators (KPIs)**
  - Promotions, postings, and career progression
- Introduces **outcome-based governance** in sports administration

🔷 3. Apex Institutional Architecture

- Creation of a **National Council for Sports Education & Capacity Building (NCSECB)**
- Mandate:
  - Regulate
  - Accredit
  - Certify sports administration training programmes
- Ensures uniform national standards

🔷 4. Operational Mechanism

- Establish a **National Training & Development Cell** as the operational arm of NCSECB
- Responsibilities:
  - Curriculum design and delivery
  - Coordination with stakeholders

- Monitoring training outcomes

🔹 **5. India-Specific Curriculum Development**

- Move away from generic international templates
- Design curricula tailored to:
  - India's federal structure
  - Diversity of sports ecosystems
  - Grassroots-to-elite pipeline

Complementary Sports Governance Reforms in India

🔸 **National Sports Governance Act, 2025**

- Establishes:
  - Independent **National Sports Board**
  - **National Sports Tribunal** for dispute resolution
  - National Sports Election Panel
- Aims to institutionalise **autonomy with accountability**

🔸 **Khelo Bharat Niti–2025**

- Focus on:
  - Talent identification in rural and tribal regions
  - Upgrading district and block-level sports infrastructure
- Strengthens **bottom-up sports development**

🔸 **Khelo India Programme**

- Flagship initiative to:
  - Revive sports culture
  - Support young athletes
  - Create a structured talent pipeline
- Complements governance reforms with **grassroots investment**

Broader Governance and Ethical Dimensions

- Aligns with principles of:
  - **Good governance**
  - **Transparency**
  - **Accountability**
- Reflects Max Weber's emphasis on **specialised expertise in administration**
- Embeds ethics by reducing discretionary power and patronage networks

Conclusion

The Task Force Report marks a **paradigm shift** in India's approach to sports governance—from personality-driven administration to **institution-led, professional, and athlete-focused management**. By integrating capacity building, performance accountability, and institutional reform, India can build a **globally competitive sports ecosystem** that translates talent into sustained excellence.

Mains Practice Question

"Effective sports governance is as critical as athletic talent for achieving international sporting success." In this context, examine the key recommendations of the Task Force on Capacity Building of Sports Administrators and assess their significance for reforming India's sports ecosystem.

AI Regulation on Social Media

📌 **Syllabus Mapping:**
✅ **GS Paper II – Governance, Polity, Rights & Digital Regulation**
✅ **GS Paper III – Technology, Cyber Security & Emerging Risks**
✅ **GS Paper IV – Ethics, Human Values, Dignity & Accountability**

Introduction (Contextual Background)

The **Ministry of Electronics and Information Technology (MeitY)** has issued a notice to the social media platform **X**over the alleged misuse of its AI tool to generate **obscene, indecent, and sexually explicit synthetic images and videos**, particularly targeting **women and children**. The action brings into focus the **regulatory responsibility of intermediaries**, the **ethical use of Artificial Intelligence**, and the protection of **privacy and dignity** in India's digital ecosystem.

Issues Flagged by the Government

1️⃣ Non-Compliance with Indian IT Laws

- Alleged failure to meet **due diligence obligations** under:
  - **Information Technology Act, 2000**
  - **IT (Intermediary Guidelines and Digital Media Ethics Code) Rules, 2021**
- Platforms are required to **prevent, detect, and expeditiously remove unlawful content**

2️⃣ Violation of Privacy and Dignity

- AI-generated sexual content:
  - Undermines **women's bodily autonomy**
  - Violates **child safety norms**
  - Causes irreversible reputational and psychological harm
- Raises serious concerns regarding **consent, dignity, and digital violence**

➡️ The issue resonates with the constitutional values of **Article 21 (Right to Life and Personal Liberty)**, which the Supreme Court has interpreted to include **privacy and dignity**.

Regulation of Social Media and AI-Generated Content in India

🔹 Information Technology Act, 2000

- **Section 66E**: Punishes violation of privacy, including capturing or transmitting private images without consent
- **Section 67**: Penalises publishing or transmitting **obscene material** in electronic form
- **Section 67A**: Covers **sexually explicit content** in electronic form
- **Section 67B**: Specifically targets **sexual content involving children**, reflecting zero tolerance for child exploitation

🔹 IT Rules, 2021 (Intermediary Guidelines & Digital Media Ethics Code)

Rule 3 – Due Diligence by Intermediaries

- Mandatory removal of:
  - Obscene
  - Sexually explicit
  - Unlawful content
- Requirement of **grievance redressal mechanisms**

Rule 4 – Obligations of Significant Social Media Intermediaries

- Appointment of:
  - **Chief Compliance Officer**
  - **Nodal Contact Person**
  - **Grievance Officer**
- Enable **traceability of originators** of unlawful content (where legally mandated)

➡️ **Non-compliance may lead to loss of "safe harbour protection"**, exposing platforms to direct legal liability for user-generated content.

🔹 Bharatiya Nagarik Suraksha Sanhita (BNSS), 2023

- Mandates digital platforms to:
  - **Inform law enforcement authorities** upon detection of serious cognisable offences
  - Particularly in cases involving **women and children**
- Strengthens the **preventive and responsive role of intermediaries**

Broader Challenges Posed by AI-Generated Content

🔸 Algorithmic Opacity

- Difficulty in tracing accountability for AI-generated outputs

- Challenges in attribution and authorship

🔶 **Speed and Scale of Harm**

- Synthetic content can be produced and disseminated rapidly
- Traditional notice-and-takedown mechanisms often lag behind

🔶 **Cross-Border Jurisdiction Issues**

- Platforms headquartered outside India complicate enforcement
- Need for international cooperation on AI governance

Governance and Ethical Dimensions

- Raises questions of:
  - **Corporate responsibility**
  - **Ethical AI deployment**
  - **Gender justice and child protection**
- Aligns with global concerns on **deepfakes, synthetic media, and digital abuse**
- Reflects the need to balance:
  - **Freedom of expression**
  - **Protection of fundamental rights**

Way Forward

- Clear **AI-specific due diligence standards** for social media platforms
- Mandatory **AI safety-by-design** and content moderation safeguards
- Faster grievance redressal and victim support mechanisms
- Capacity building of law enforcement in **AI forensics**
- International coordination on **responsible AI governance**

Conclusion

The notice issued to **X** signals India's intent to move from **reactive content moderation to proactive digital governance**, especially in the age of generative AI. As technology reshapes communication, **platform accountability, legal compliance, and ethical responsibility** must evolve in tandem to safeguard **privacy, dignity, and child safety**. Ensuring that innovation does not erode fundamental rights is central to a **rights-respecting digital public sphere**.

Mains Practice Question

"The misuse of AI-generated content on social media poses serious challenges to privacy, dignity, and child safety." Examine India's legal framework for regulating digital platforms and assess the adequacy of existing safeguards in addressing harms arising from generative AI."

India's Pharmacovigilance Governance

📌 **Syllabus Mapping:**
✅ **GS Paper II – Governance, Health Administration & Regulatory Institutions**
✅ **GS Paper III – Public Health, Science & Technology, Pharmaceuticals**

Introduction (Contextual Background)

India has recorded a significant improvement in global drug safety monitoring by rising to **8th position in 2025** from **123rd in 2014** in contributions to the **World Health Organization's pharmacovigilance database** under the **WHO Programme for International Drug Monitoring (PIDM)**. This progress reflects the growing maturity of India's drug safety ecosystem, primarily driven by the **Pharmacovigilance Programme of India (PvPI)**.

WHO Programme for International Drug Monitoring (PIDM): Overview

🔷 **Genesis and Objective**

- **Established: 1968**
- **Aim:** Place **medicine and vaccine safety** at the core of global healthcare by enabling early detection of adverse drug reactions (ADRs).

🔷 **VigiBase**

- The WHO's **global database** of ADR reports for medicines and vaccines
- Aggregates safety data from participating countries to:

- Detect safety signals
- Prevent large-scale public health harm
- Inform regulatory decisions worldwide

➡️ PIDM represents **collective global vigilance**, where each country's reporting strengthens shared safety intelligence.

Pharmacovigilance Programme of India (PvPI): The Driving Force

🔹 **Institutional Framework**

- **Launched: 2010**
- **Nature:** Government of India's **flagship drug safety monitoring programme**
- Function: Collects, analyses, and assesses ADRs and safety signals from across the country.

🔹 **Regulatory Interface**

- PvPI sends evidence-based recommendations to the **Central Drugs Standard Control Organization (CDSCO)**for:
  - Label changes
  - Usage restrictions
  - Market withdrawal (where necessary)

Factors Behind India's Improved Global Ranking

1️⃣ **Expanded ADR Reporting Network**

- Increased participation of:
  - Hospitals
  - Medical colleges
  - Healthcare professionals
- Integration of ADR Monitoring Centres (AMCs) nationwide

2️⃣ **Improved Data Quality and Timeliness**

- Standardised reporting formats
- Enhanced digital submission systems
- Better causality assessment and follow-up

3️⃣ **Regulatory Responsiveness**

- Closer coordination between PvPI and CDSCO
- Faster translation of safety signals into **regulatory action**

4️⃣ **Public Health Orientation**

- Focus on patient safety rather than post-market compliance alone
- Inclusion of **vaccines, biologics, and new-age therapies**

Significance for India and Global Health

🔸 **Domestic Public Health Gains**

- Early detection of ADRs reduces:
  - Drug-related morbidity and mortality
  - Financial burden on health systems
- Enhances **trust in medicines and vaccination programmes**

🔸 **Global Health Contribution**

- India is one of the **largest producers and exporters of pharmaceuticals**
- Higher-quality reporting from India strengthens **global drug safety surveillance**

🔸 **Regulatory Credibility**

- Improves India's standing as a **responsible pharmaceutical regulator**
- Supports India's ambition to be a **global pharmacy with robust safety governance**

Challenges and Areas for Further Improvement

- Under-reporting of ADRs in peripheral and rural healthcare settings
- Limited patient awareness about ADR reporting
- Need for advanced analytics (AI-based signal detection)
- Capacity building among frontline healthcare workers

Way Forward

- Promote **patient-centric pharmacovigilance** and consumer reporting
- Integrate PvPI data with digital health platforms
- Use AI and big data tools for predictive safety analytics
- Strengthen training in pharmacovigilance across medical curricula
- Deepen coordination with global regulators

Conclusion

India's sharp rise in the **WHO pharmacovigilance rankings** marks a transformation from a peripheral contributor to a **key global stakeholder in drug safety**. Anchored by the **Pharmacovigilance Programme of India**, this achievement enhances **patient safety, regulatory credibility, and global health cooperation**. Sustaining this momentum will require continuous innovation, wider participation, and a strong culture of safety-first healthcare governance.

Mains Practice Question

"India's improved ranking in the WHO Programme for International Drug Monitoring reflects the growing strength of its pharmacovigilance ecosystem." Examine the role of the Pharmacovigilance Programme of India (PvPI) in enhancing drug safety and discuss the challenges that remain in ensuring effective pharmacovigilance."

INTERNATIONAL RELATIONS

India–Australia ECTA: Three Years

📌 **Syllabus Mapping:**
✅ **GS Paper II – International Relations (Bilateral & Multilateral Relations)**
✅ **GS Paper III – External Trade, Supply Chains & Economic Diplomacy**

Introduction (Contextual Background)

The **India–Australia Economic Cooperation and Trade Agreement (ECTA)**, signed in **2022**, marks **three years of implementation**, representing a watershed in India's trade diplomacy. It is **India's first comprehensive trade agreement with a developed country in over a decade**, with an explicit objective of **doubling bilateral trade within five years**. Beyond tariffs, ECTA embeds **services liberalisation, regulatory cooperation, and mobility**, reflecting a modern, strategic trade compact.

Core Features of the India–Australia ECTA

🔹 **Trade in Goods**

- **Australia provides 100% duty-free market access** to Indian exports, notably:
  - **Textiles**
  - **Leather**
  - **Gems and jewellery**
- Enhances India's competitiveness in high-income markets and supports **export diversification**.

🔹 **Trade in Services & Professional Mobility**

- **Extended post-study work visas (2–4 years)** for Indian students in Australia.
- Dedicated quotas under **"Work and Holiday" visas**, facilitating youth mobility.
- Supports India's strength in **IT, professional services, and education-linked mobility**.

🔹 **Safeguards & Regulatory Cooperation**

- **Robust Rules of Origin (RoO)** to prevent **third-country routing**.

- **Fast-track pharmaceutical approvals**, improving market access for Indian pharma.
- Cooperation on standards reduces **non-tariff barriers**.

🔹 **Other Provisions**

- **Elimination of double taxation** on Indian IT offshore income.
- Institutional mechanisms for dispute resolution and review.

India–Australia Economic Relations: Current Snapshot

🔹 **Trade Status (FY25)**

- India: **Australia's 8th largest trading partner**
- Australia: **India's 14th largest trading partner**
- **Total bilateral trade: US$ 24.1 billion**

🔹 **Trade Composition**

- **Indian Exports:** Petroleum products, engineering goods, drugs and pharmaceuticals
- **Indian Imports:** Coal, gold, and other resource-based commodities

➡️ ECTA has helped **stabilise and diversify trade baskets**, reducing over-reliance on a narrow set of commodities.

Strategic Significance Beyond Trade

1️⃣ **Indo-Pacific Convergence**

- Alignment through initiatives such as the **Australia–India Indo-Pacific Oceans Initiative Partnership (AIIPOIP)**.
- Reinforces **rules-based maritime order** and ocean governance.

2️⃣ **The QUAD Pillar**

- India and Australia are key members of the **Quadrilateral Security Dialogue**, alongside the US and Japan.
- Trade cooperation complements **security and technology collaboration**.

3️⃣ **Defence and Security Cooperation**

- **Mutual Logistics Support Agreement (MLSA)** enhances operational interoperability.
- Joint exercises such as **Exercise Malabar** and **AUSINDEX** deepen naval and military coordination.

4️⃣ **Multilateral Alignment**

- Shared engagement across platforms:
  - **G20**
  - **East Asia Summit (EAS)**
  - **Indian Ocean Rim Association (IORA)**
- Reflects convergence on **global governance and regional stability**.

5️⃣ **Supply Chain Resilience**

- Participation in the **Supply Chain Resilience Initiative (SCRI)** with Japan.
- Reduces vulnerabilities exposed during global shocks and pandemics.

6️⃣ **Critical Minerals Partnership**

- Australia as a reliable source of **lithium and cobalt**
- Crucial for India's:
  - **Electric Vehicle (EV) mission**
  - **Clean energy transition**
- Supports India's long-term **energy and industrial security**.

Assessment: Achievements and Gaps

Key Gains

- Improved market access for Indian exports
- Services and mobility-centric trade architecture
- Strategic trust-building beyond commerce

Persistent Challenges

- Trade volume growth below potential
- Need for deeper utilisation by MSMEs
- Logistics and standards-related constraints

Way Forward

- Expand ECTA into a **Comprehensive Economic Cooperation Agreement (CECA)**
- Enhance MSME awareness and export facilitation
- Strengthen digital trade, green technologies, and critical minerals cooperation
- Continuous review of RoO and NTBs to maximise utilisation

Conclusion

Three years of the **India–Australia ECTA** demonstrate that **modern trade agreements are strategic instruments**, not merely tariff-reduction tools. By integrating **goods, services, mobility, supply chains, and geopolitics**, ECTA has laid a durable foundation for a **trusted, resilient, and future-oriented partnership** in the Indo-Pacific.

Mains Practice Question

"Evaluate the significance of the India–Australia Economic Cooperation and Trade Agreement (ECTA) in strengthening bilateral economic ties and advancing strategic convergence in the Indo-Pacific. What challenges remain, and how can the partnership be deepened further?"

India and RCEP: Strategic Trade Choice

📌 **Syllabus Mapping:**
✅ **GS Paper II – International Relations (India's Trade Diplomacy, Indo-Pacific)**
✅ **GS Paper III – External Trade, Economic Policy & Strategic Autonomy**

Introduction (Contextual Background)

With the impending Free Trade Agreement (FTA) with New Zealand, India is set to have **trade agreements with all members of the Regional Comprehensive Economic Partnership (RCEP) except China**. This marks a distinctive outcome in India's trade strategy—**securing RCEP-like market access while avoiding China-related risks**—reflecting a calibrated approach to openness, safeguards, and strategic autonomy.

RCEP: A Brief Overview

- **Nature:** Comprehensive mega-regional FTA in the Asia–Pacific
- **Members:**
  - **ASEAN-10:** Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam
  - **Plus Five:** Australia, China, Japan, South Korea, New Zealand
- **India's Status:** Withdrew from negotiations in **2019**

Why India Opted Out of RCEP

1️⃣ China Risk and Trade Imbalances

- RCEP would have enabled **near duty-free access** for Chinese goods into India
- Risk of **import surge** in manufactured products, exacerbating India's trade deficit
- Concerns over **non-tariff barriers** and weak safeguards against circumvention

2️⃣ Protection of Domestic Industry and Agriculture

- Sensitive sectors—**dairy, agriculture, MSMEs**—required calibrated protection
- Fear of livelihood impacts due to scale advantages of RCEP exporters

3️⃣ Unaddressed Technical and Legal Concerns

- Disagreements on:
  - **Tariff base rates**
  - **MFN modifications**
  - Recognition of **India's federal structure** in investment decisions

4️⃣ **Strategic Autonomy and Self-Reliance**

- RCEP participation was seen as potentially diluting initiatives such as:
  - **Atmanirbhar Bharat**
  - **Make in India**
  - **Vocal for Local**

How India Secured RCEP Advantages without Joining

🔹 **The "RCEP minus China" Strategy**

- By late **2025**, India concluded **bilateral FTAs with all RCEP members except China**
- Outcome:
  - **Market access parity** across the Asia–Pacific
  - **Retention of tariff sovereignty** vis-à-vis China

🔹 **Selective Liberalisation with Safeguards**

- Bilateral FTAs allow:
  - **Exclusion of sensitive sectors** (dairy, agriculture)
  - Tailored **rules of origin** and safeguard clauses
- Enables **sequenced liberalisation** rather than blanket commitments

🔹 **Preventing Indirect Entry of Chinese Goods**

- Staying outside RCEP reduces risks of:
  - **Third-country routing**
  - Value addition manipulation to bypass tariffs
- Enhances **enforcement and compliance** capacity

Strategic and Economic Implications

🔸 **Trade Diversification**

- Deeper integration with **ASEAN, Japan, South Korea, Australia, New Zealand**
- Reduces over-dependence on any single market

🔸 **Supply Chain Resilience**

- Supports "China+1" strategies
- Aligns with regional efforts on **resilient and trusted supply chains**

🔸 **Policy Space Preservation**

- Maintains flexibility for:
  - Industrial policy
  - Tariff calibration
  - Domestic capability building

Assessment: Strengths and Limitations

Strengths

- Balanced openness with safeguards
- Avoided systemic vulnerabilities linked to China exposure
- Enhanced negotiating leverage via bilaterals

Limitations

- Higher transaction costs than a single mega-FTA
- Need for stronger utilisation by MSMEs
- Continuous monitoring to prevent trade deflection

Conclusion

India's choice to remain outside RCEP while building **comprehensive bilateral FTAs with all RCEP members except China** reflects a **pragmatic, security-conscious trade strategy**. The "**RCEP minus China**" approach demonstrates that **deep regional integration can coexist with strategic**

autonomy, protecting sensitive sectors, preserving tariff sovereignty, and mitigating systemic risks—without sacrificing access to dynamic Asia–Pacific markets.

Mains Practice Question

"India's approach of securing RCEP-like market access without joining the agreement reflects a calibrated trade strategy." Analyse the rationale behind India's decision to stay out of RCEP and assess how the 'RCEP minus China' approach balances economic integration with strategic autonomy.

Geo-economics and Global Power

📌 **Syllabus Mapping:**
✅ **GS Paper II – International Relations, Global Power Dynamics**
✅ **GS Paper III – External Trade, Technology, Resources & Strategic Economy**

Introduction (Contextual Background)

Contemporary international politics is witnessing a decisive shift where **economic instruments increasingly shape geopolitical outcomes**. For India, this transition—from classical geopolitics to **geo-economics**—poses both **strategic challenges and new opportunities**. Power today is exercised not only through territory and military force, but also through **trade rules, supply chains, finance, technology, and standards**.

Conceptual Clarity

🔷 **Geopolitics**

- Exercise of power through:
  - Geography
  - Military strength
  - Strategic locations
- Traditionally centred on **territorial control and hard power**

🔷 **Geo-economics**

- Strategic use of **economic tools** to achieve geopolitical objectives:
  - Trade policy
  - Sanctions
  - Supply chain control
  - Technology standards
- As Edward Luttwak argues, geo-economics is the **"logic of conflict with the grammar of commerce."**

How Geo-economics Is Reshaping Geopolitics

1️⃣ **Energy and Resource Diplomacy**

- States are competing to secure **critical inputs** such as:
  - Semiconductors
  - AI hardware
  - Rare earths and critical minerals
- Example: The US-led **"Pax Silica"** initiative aims to control semiconductor and AI supply chains; India's exclusion highlights **technology-access asymmetries**.

2️⃣ **Weaponisation of Interdependence**

- Financial and payment networks are used as coercive tools
- Example: US-led sanctions cutting Russian banks off from **SWIFT**
- Demonstrates how **globalisation can be leveraged for strategic pressure**

3️⃣ **Trade Policy as a Strategic Weapon**

- Trade disputes increasingly reflect **technological and strategic rivalry**
- Example: US–China trade and technology war, especially in:
  - Semiconductors
  - 5G
  - Advanced manufacturing
- Trade is no longer neutral—it is **strategically selective**

4️⃣ **Geo-economic Fragmentation**

- Emergence of regulatory barriers aligned with strategic interests
- Example: **European Union**'s **Carbon Border Adjustment Mechanism (CBAM)**:
  - Shifts emission-reduction costs to exporters
  - Disproportionately impacts the **Global South**
- Reflects norm-setting as a form of power projection

India's Key Challenges in the Geo-economic Arena

1️⃣ **Critical Mineral and Technology Deficit**

- Despite geological potential comparable to Australia, India has explored only **25–30%** of its mineral resources
- **100% import dependence** for key minerals like lithium
- Exposes India to **supply chain coercion**

2️⃣ **Low R&D and Innovation Capacity**

- India spends only **0.6–0.7% of GDP** on R&D
- In contrast:
  - China and the US spend **2.5–3% of GDP**
- Limits India's ability to:
  - Set notechnological standards
  - Compete in frontier technologies

3️⃣ **Policy and Governance Bottlenecks**

- Bureaucratic red-tapism
- Regulatory uncertainty in mining and technology sectors
- Constrains:
  - Private sector participation
  - Foreign investment
  - Speed of strategic projects

Way Ahead: India's Geo-economic Strategy

🔷 **Forging Geo-economic Coalitions**

- Deepen partnerships such as:
  - **Supply Chain Resilience Initiative (SCRI)** with Japan, Australia, and the US
  - **Global Biofuels Alliance** as an alternative to fossil-fuel-centric groupings like OPEC
- Aim: Build **trusted, diversified economic networks**

🔷 **Ramping Up Innovation and R&D**

- Implement the **Research Development and Innovation (RDI) Scheme**
- Encourage:
  - Industry-academia collaboration
  - Mission-mode funding in semiconductors, AI, and clean tech
- Essential for **technological sovereignty**

🔷 **Strategic Connectivity and Infrastructure**

- Fast-track the **India–Middle East–Europe Economic Corridor (IMEC)**
- Acts as a:
  - Geo-economic bridge
  - Secure trade and energy route
- Enhances India's role as a **connectivity hub**

Broader Strategic Implications

- Geo-economics blurs the line between **economics and security**
- Requires:
  - Whole-of-government coordination
  - State–private sector synergy
  - Alignment of trade, technology, and foreign policy

Conclusion

Geo-economics has emerged as the **new currency of power** in international politics. For India, the challenge lies in transitioning from being a **rule-taker to a rule-shaper** in global economic governance. By strengthening **resource security, innovation capacity, and strategic partnerships**, India can navigate geo-economic competition while safeguarding **strategic autonomy and long-term national interest**.

Mains Practice Question

"Geo-economics has become a central instrument of power in contemporary international relations." Analyse how geo-economics is reshaping global politics and discuss the key challenges and strategic responses required for India in this evolving landscape.

India–Pakistan Nuclear Non-Attack Pact

📌 **Syllabus Mapping:**
✅ **GS Paper II – International Relations, Bilateral Relations & Confidence-Building Measures**
✅ **GS Paper III – Internal Security, Nuclear Security & Strategic Stability**

Introduction (Contextual Background)

India and Pakistan have once again **exchanged lists of nuclear installations and facilities** under the **Agreement on Prohibition of Attacks against Nuclear Installations and Facilities**, commonly known as the **India–Pakistan Non-Attack Agreement**. The annual exchange, carried out on **1 January**, underscores the continued relevance of **confidence-building measures (CBMs)** in managing nuclear risks between two nuclear-armed neighbours.

India–Pakistan Non-Attack Agreement: Key Features

🔹 **Historical Background**

- **Signed:** 31 December 1988
- **Entered into Force:** 27 January 1991
- Concluded during a period of heightened regional tensions, reflecting early recognition of **nuclear risk management**.

🔹 **Core Provisions**

- Mandatory **annual exchange of lists** detailing the locations of:
  - Nuclear installations
  - Nuclear facilities
- Exchange takes place every year on **1 January**.

🔹 **Substantive Obligation**

- Both parties undertake to **refrain from directly or indirectly attacking** or causing damage to:
  - Nuclear installations
  - Nuclear facilities
  in the territory of the other country.

Strategic and Diplomatic Significance

1️⃣ **Nuclear Risk Reduction**

- Prevents deliberate or accidental targeting of sensitive nuclear facilities.
- Reduces the probability of **escalation to nuclear conflict** during crises.

2️⃣ **Institutionalised Confidence-Building Measure**

- One of the **oldest and most enduring CBMs** between **India** and **Pakistan**.
- Continues to function even during periods of diplomatic strain, indicating **minimum strategic trust**.

3️⃣ **Crisis Stability**

- By clearly identifying protected sites, the agreement:
  - Limits misperception
  - Reduces incentives for pre-emptive actions
- Enhances **crisis predictability** in a volatile bilateral relationship.

4️⃣ **Normative Value in Nuclear Governance**

- Reflects adherence to **international norms of nuclear restraint**, despite both countries remaining outside the NPT.
- Demonstrates commitment to **responsible nuclear behaviour**.

Limitations and Concerns

- Does **not cover conventional military escalation** or emerging domains like cyber warfare.
- Absence of:
  - Verification mechanisms
  - Penalty clauses for violations
- Cannot substitute for broader **strategic dialogue** or arms control arrangements.

Way Forward

- Strengthen nuclear CBMs through:
  - Expansion to include **cyber and space-related threats** to nuclear systems
  - Regular strategic-level dialogue on nuclear doctrines
- Integrate the agreement with broader **risk-reduction and communication mechanisms** such as hotlines and military-to-military contacts.

Conclusion

The **India–Pakistan Non-Attack Agreement** remains a **cornerstone of bilateral nuclear risk management**, providing a minimal yet crucial safety net against catastrophic escalation. While limited in scope, its continued implementation reflects the enduring importance of **institutionalised restraint and communication** in South Asia's fragile nuclear environment.

Mains Practice Question

"The India–Pakistan Non-Attack Agreement on nuclear installations represents an important confidence-building measure in South Asia." Examine its significance in reducing nuclear risks and discuss its limitations in the contemporary security environment.

UNCAC and Global Anti-Corruption

📌 **Syllabus Mapping:**
✅ **GS Paper II – International Relations, Global Governance & Institutions**
✅ **GS Paper IV – Ethics, Integrity, Accountability & Anti-Corruption Measures**

Introduction (Contextual Background)

The **11th Conference of the States Parties (COSP-11)** to the **United Nations Convention against Corruption**concluded with the adoption of the **Doha Declaration 2025**, reinforcing global commitment to combating corruption through **international cooperation and technology-enabled enforcement**. The Declaration notably urges States to leverage **digital technologies, including Artificial Intelligence**, to address **cross-border corruption**, marking a shift towards **tech-driven integrity systems**.

UN Convention against Corruption (UNCAC): An Overview

🔹 **Genesis and Legal Status**

- **Adopted:** 2003 by the UN General Assembly (New York)
- **Entered into Force:** 2005
- **Nature: Only legally binding, universal anti-corruption instrument**

🔹 **Membership**

- **Signatories:** 140
- **Parties: 192** (as of September 2025)
- **India: Party to UNCAC**

🔹 **Secretariat**

- The **United Nations Office on Drugs and Crime (UNODC)** acts as the **secretariat** to the Conference of the States Parties, providing technical assistance, research, and implementation support.

Objectives of UNCAC

UNCAC aims to:

- **Prevent and combat corruption** in public and private sectors
- **Promote integrity, transparency, and accountability**
- **Facilitate international cooperation** in investigation and prosecution
- **Enable asset recovery** obtained through corrupt practices

➡️ These objectives reflect a **comprehensive life-cycle approach**—from prevention to punishment and restitution.

Core Pillars of UNCAC

1️⃣ Preventive Measures

- Anti-corruption bodies and policies
- Codes of conduct for public officials
- Transparent public procurement and financial management
- Participation of civil society

2️⃣ Criminalisation and Law Enforcement

- Mandatory criminalisation of:
  - Bribery
  - Embezzlement
  - Trading in influence
- Measures to strengthen investigation and prosecution capacities

3️⃣ International Cooperation

- Mutual legal assistance (MLA)
- Extradition and joint investigations
- Information sharing across jurisdictions

4️⃣ Asset Recovery

- **A landmark feature of UNCAC**
- Enables:
  - Tracing
  - Freezing
  - Confiscation
  - Return of stolen assets to countries of origin

COSP-11 and Doha Declaration 2025: Key Significance

🔹 Technology-Enabled Anti-Corruption

- Calls for use of:
  - **AI and data analytics**
  - Digital forensics
  - E-governance tools
- To strengthen **cross-border cooperation** and detect complex financial crimes

🔹 Addressing Transnational Corruption

- Recognises corruption as:
  - Networked
  - Financially sophisticated
  - Often jurisdiction-hopping
- Emphasises **collective action** over isolated national efforts

Relevance for India

🔸 Domestic Governance Alignment

- UNCAC complements India's anti-corruption framework, including:
  - Prevention
  - Prosecution

    - Transparency initiatives
- Supports India's focus on **digital governance** and **financial accountability**

🔸 **International Cooperation**

- Facilitates India's engagement in:
    - Asset recovery cases
    - Cross-border investigations
- Enhances credibility as a **rule-abiding global actor**

🔸 **Ethical Governance**

- Reinforces constitutional values of:
    - **Probity**
    - **Integrity in public life**
- Aligns with SDG-16 (Peace, Justice and Strong Institutions)

Challenges in UNCAC Implementation

- Uneven enforcement across countries
- Political interference and weak institutions
- Limited success in asset recovery due to legal complexities
- Capacity gaps in developing countries

Way Forward

- Strengthen **peer review mechanisms** under UNCAC
- Enhance technical assistance via UNODC
- Promote interoperability of digital tools for financial intelligence
- Ensure safeguards to prevent misuse of AI while enhancing accountability

Conclusion

The **UN Convention against Corruption** remains the **cornerstone of global anti-corruption governance**, offering a legally binding and comprehensive framework. The **Doha Declaration 2025** signals a forward-looking shift towards **technology-enabled integrity systems** and deeper international cooperation. For countries like India, effective implementation of UNCAC is vital not only for curbing corruption but also for strengthening **democratic legitimacy, economic efficiency, and global trust**.

Mains Practice Question

"The UN Convention against Corruption (UNCAC) provides a comprehensive framework to combat corruption at the global level." Discuss its key features and examine the significance of the Doha Declaration 2025 in addressing cross-border corruption in the digital age.

INTERNAL SECURITY

₹79,000-Crore Defence Procurement

📌 **Syllabus Mapping:**
✅ **GS Paper III – Defence, Internal Security, Indigenisation & Technology**
✅ **GS Paper II – Governance, Policy Making & Strategic Affairs**

Introduction (Contextual Background)

The **Defence Acquisition Council (DAC)** has approved defence procurement proposals worth **₹79,000 crore**, signalling a decisive push towards **indigenous defence manufacturing** and **enhanced operational preparedness** of the armed forces. The approvals align with India's long-term objective of **strategic autonomy** and **self-reliance in defence production** under the broader vision of *Atmanirbhar Bharat*.

Key Defence Systems Approved: Strategic Significance

1️⃣ **Astra Mk-II Air-to-Air Missile**

- **Beyond Visual Range Air-to-Air Missile (BVRAAM)** with a range exceeding **100 km**

- **Indigenously developed by DRDO**
- Enhances:
  - **Precision strike capability** of the Indian Air Force
  - Air superiority in contested airspace
- Reflects India's growing competence in **advanced missile technologies**

2️⃣ Long-Range Guided Rocket Ammunition for Pinaka MLRS

- Designed for the Army's **Pinaka Multiple Launch Rocket System**
- Improves:
  - **Stand-off firepower**
  - Accuracy and deep-strike capability
- Strengthens conventional deterrence along land borders

3️⃣ Integrated Drone Detection and Interdiction System (IDD&IS) Mk-II

- Enhanced range and targeting capacity
- Protects:
  - Critical military and civilian infrastructure
  - Sensitive installations against drone-based threats
- Addresses emerging **asymmetric and hybrid warfare challenges**

4️⃣ SPICE-1000 Long-Range Guidance System

- Precision-guided air-to-ground weapon
- Designed by **Rafael Advanced Defense Systems**
- Enables:
  - High-accuracy strikes across long distances
  - Reduced collateral damage
- Strengthens India's **deep-strike and deterrence posture**

5️⃣ High Altitude Long Endurance (HALE) RPAS

- Ensures continuous:
  - **Intelligence**
  - **Surveillance**
  - **Maritime Domain Awareness**
- Critical for monitoring the **Indian Ocean Region (IOR)** amid increasing strategic competition

6️⃣ Indigenous Loitering Munitions

- Also known as **kamikaze or suicide drones**
- Capable of:
  - Hovering over target areas
  - Conducting precision strikes on detection
- Adds a new dimension to **tactical battlefield dominance**

Defence Acquisition Council: Institutional Framework

🔹 About DAC

- **Established:** 2001
- **Chairperson:** Union Minister of Defence
- Functions as the **apex body** for defence procurement planning and oversight

🔹 Core Functions

- Grant **Acceptance of Necessity (AoN)** for capital acquisitions
- Provide *in-principle* approval for projects under the **Long-Term Perspective Plan**
- Monitor progress of major defence acquisition programmes

Broader Strategic and Economic Implications

🔸 Strengthening Indigenisation

- Encourages domestic defence manufacturing
- Reduces import dependency
- Supports MSMEs and defence start-ups

🔸 **Enhancing Military Readiness**

- Addresses modern warfare domains:
  - Air dominance
  - Drone warfare
  - Precision strikes
  - Maritime surveillance

🔸 **Geopolitical Significance**

- Improves deterrence posture amid:
  - Border tensions
  - Indo-Pacific strategic churn
- Reinforces India's role as a **net security provider** in the region

Challenges to Address

- Timely execution of approved projects
- Cost overruns and technology absorption
- Balancing foreign collaboration with indigenous capability building

Way Forward

- Strengthen **public-private partnerships** in defence manufacturing
- Accelerate R&D ecosystem led by DRDO and private innovators
- Ensure transparency and accountability in procurement processes
- Integrate defence planning with long-term strategic doctrines

Conclusion

The **₹79,000-crore defence acquisition clearance** marks a significant step in modernising India's armed forces while reinforcing **defence indigenisation and strategic autonomy**. By focusing on **precision warfare, drone defence, and surveillance capabilities**, India is adapting to contemporary security challenges and laying the foundation for a **robust, self-reliant defence ecosystem**.

Mains Practice Question

"Examine how recent defence procurement approvals by the Defence Acquisition Council contribute to India's combat readiness and defence indigenisation. Discuss the strategic and economic implications of such acquisitions."

AI in Predictive Policing: MahaCrimeOS

📌 **Syllabus Mapping:**
✅ **GS Paper III – Internal Security, Technology & Policing Reforms**
✅ **GS Paper II – Governance, Public Administration & Digital Institutions**
✅ **GS Paper IV – Ethics, Accountability & Use of Technology in Public Services**

Introduction (Contextual Background)

A predictive Artificial Intelligence platform named **MahaCrimeOS AI** is being deployed by the **Maharashtra Police**, with technical support from **Microsoft**, to enhance criminal investigations and threat response. The initiative signals India's gradual shift towards **data-driven, technology-enabled policing**, aimed at improving efficiency in an era of complex and digitally mediated crimes.

About MahaCrimeOS AI

🔹 **Technology Architecture**

- Built on:
  - **Microsoft Azure OpenAI Service**
  - **Microsoft Foundry**
- Integrates:
  - AI assistants
  - Automated investigative workflows
  - Secure cloud infrastructure

🔹 **Core Functional Capabilities**

- **AI-powered legal intelligence**
  - Built-in access to **India's criminal laws**
  - Uses **AI-based Retrieval-Augmented Generation (RAG)** for contextual legal referencing
- **Open-Source Intelligence (OSINT) Integration**
  - Enables correlation of publicly available digital information
- **Advanced Investigative Support**
  - Links related cases across jurisdictions
  - Analyses large volumes of digital evidence (texts, images, metadata)
  - Accelerates response to emerging threats
- **Real-time Suspect Profiling**
  - Assists investigators by identifying behavioural and relational patterns

Significance of MahaCrimeOS AI

1️⃣ Enhancing Policing Efficiency

- Reduces time spent on manual data collation
- Enables **faster case resolution** and prioritisation
- Supports evidence-based decision-making

2️⃣ Addressing Modern Crime Challenges

- Effective against:
  - Cybercrime
  - Organised crime networks
  - Inter-state and digital offences
- Aligns policing with **technology-driven criminal ecosystems**

3️⃣ Institutional Modernisation

- Reflects the shift from **reactive policing to predictive policing**
- Supports police reforms recommended by various committees advocating:
  - Use of technology
  - Intelligence-led policing
  - Professionalisation of law enforcement

Governance and Ethical Concerns

🔶 Privacy and Data Protection

- Real-time profiling raises concerns related to:
  - Privacy
  - Surveillance overreach
- Necessitates strict compliance with:
  - **Article 21 (Right to Life and Personal Liberty)**
  - Emerging data protection norms

🔶 Algorithmic Bias and Accountability

- Risk of:
  - Bias in data inputs
  - Discriminatory profiling
- Importance of:
  - Human oversight
  - Transparent audit mechanisms

🔶 Due Process and Rule of Law

- AI outputs must remain **decision-support tools**, not substitutes for:
  - Judicial reasoning
  - Investigative discretion
- Upholding the principle that **technology assists but does not replace human judgment**

Way Forward

- Establish clear **Standard Operating Procedures (SOPs)** for AI use in policing
- Independent audits to detect algorithmic bias
- Capacity building of police personnel in ethical AI use

- Legal frameworks governing:
  - Predictive policing
  - Data retention
  - Accountability mechanisms
- Citizen awareness and grievance redressal systems

Conclusion

MahaCrimeOS AI represents a significant step in integrating **Artificial Intelligence into India's law enforcement ecosystem**, offering speed, scale, and analytical depth to policing. However, its long-term legitimacy will depend on **ethical deployment, legal safeguards, transparency, and human oversight**. Balancing **technological efficiency with constitutional rights** will be central to ensuring that AI-driven policing strengthens—not undermines—public trust and the rule of law.

Mains Practice Question

"The use of Artificial Intelligence in policing has the potential to enhance efficiency but also raises serious ethical and governance concerns." Discuss this statement in the context of predictive policing tools such as MahaCrimeOS AI in India.

ECONOMY

NBFC Regulation and SBR Review

📌 **Syllabus Mapping:**
✅ **GS Paper III – Indian Economy, Financial Sector & Banking Regulation**
✅ **GS Paper II – Governance, Regulatory Institutions & Policy Framework**

Introduction (Contextual Background)

The **Reserve Bank of India (RBI)** has initiated a review of the **Scale-Based Regulation (SBR) framework for Non-Banking Financial Companies (NBFCs)**, reflecting growing concerns over their **expanding role in credit delivery**, rising **unsecured lending**, and increasing **interconnectedness with the banking system**. NBFCs today account for nearly **15% of India's GDP-linked lending**, making their stability crucial for overall **financial system resilience**.

Why RBI Is Reviewing the SBR Framework

🔷 **Rising Systemic Importance of NBFCs**

- NBFCs have emerged as key lenders in:
  - Retail credit
  - MSMEs
  - Infrastructure financing
- Their failure can transmit stress to banks due to **co-lending, refinancing, and securitisation linkages**

🔷 **Concerns Over Asset Quality**

- Rapid growth in **unsecured loans**
- Potential build-up of **credit risk** in a high-interest-rate environment
- Need for proactive regulation to avoid repeat of past NBFC stress episodes (e.g., IL&FS crisis)

🔷 **Financial Stability Perspective**

- RBI aims to balance:
  - **Credit growth**
  - **Consumer protection**
  - **Systemic risk containment**
- The review aligns with the central bank's **macroprudential regulatory approach**

Scale-Based Regulation (SBR) Framework: An Overview

Implemented in **2022**, the SBR framework classifies NBFCs into **four regulatory layers** based on **size, systemic importance, and risk perception**.

1️⃣ Base Layer (NBFC-BL)

- **Composition:**
  - Non-deposit-taking NBFCs with assets **below ₹1,000 crore**
  - Includes:
    - Peer-to-Peer (P2P) Lending Platforms
    - Account Aggregators (AA)
    - Non-Operative Financial Holding Companies (NOFHC)
- **Asset Share: 5.2%** of total NBFC assets
- **Regulatory Intensity:** Lowest, proportionate to limited systemic risk

2️⃣ Middle Layer (NBFC-ML)

- **Includes:**
  - All deposit-taking NBFCs (NBFC-D), irrespective of asset size
  - Non-deposit-taking NBFCs with assets of **₹1,000 crore and above**
- **Asset Share: 64.6%** (largest segment)
- **Significance:** Core of NBFC credit intermediation

3️⃣ Upper Layer (NBFC-UL)

- **Selection Criteria:**
  - Identified by RBI using a **scoring methodology** based on size, leverage, complexity, and interconnectedness
- **Asset Share: 30.2%**
- **Regulation:** Enhanced prudential norms, closer supervision, tighter governance standards

4️⃣ Top Layer

- Reserved for NBFCs with **extreme supervisory risk**
- Subject to:
  - Intensive regulatory oversight
  - Continuous supervisory engagement
- **Ideally remains empty**, serving as a deterrent layer

Understanding NBFCs: Institutional Context

🔷 Definition

- NBFCs are companies registered under the **Companies Act, 1956 or 2013**
- Primarily engaged in:
  - Lending
  - Investment in securities
  - Leasing and hire-purchase

🔷 Key Differences Between NBFCs and Banks

Aspect	NBFCs	Banks
Demand Deposits	❌ Not permitted	✅ Permitted
Cheque Issuance	❌ Not allowed	✅ Allowed
Payment System	❌ Not part of it	✅ Integral
Deposit Insurance	❌ Not covered by DICGC	✅ Covered

Implications of the SBR Review

🔶 Positive Outcomes

- Improved **risk-sensitive regulation**
- Early identification of systemically risky NBFCs
- Strengthened **financial stability**

🔶 Potential Challenges

- Higher compliance burden for large NBFCs
- Risk of credit tightening if regulation becomes overly restrictive
- Need to preserve NBFCs' role in **last-mile credit delivery**

Way Forward

- Periodic recalibration of regulatory thresholds
- Enhanced stress testing and disclosure norms
- Stronger supervision of unsecured retail credit
- Balanced regulation ensuring **growth with stability**

Conclusion

The RBI's review of the **Scale-Based Regulation framework** reflects the evolving role of NBFCs in India's financial architecture. As NBFCs become increasingly systemically important, **proportionate, risk-based, and dynamic regulation** is essential to safeguard **financial stability** without undermining their contribution to **inclusive credit growth**. The success of SBR will lie in maintaining this delicate balance.

Mains Practice Question

"Discuss the rationale behind the RBI's scale-based regulatory framework for NBFCs. In the context of its ongoing review, examine the challenges NBFCs pose to financial stability and suggest measures to strengthen regulatory oversight without constraining credit growth."

Duopolies in Indian Markets

📌 **Syllabus Mapping:**
✅ **GS Paper III – Indian Economy, Competition, Infrastructure & Services**
✅ **GS Paper II – Governance, Regulation & Institutional Frameworks**

Introduction (Contextual Background)

Recent disruptions in the aviation sector—highlighted by operational challenges involving **IndiGo**—have renewed attention on the risks posed by **duopolistic market structures** in India. Similar concentration trends are visible across **telecom, food delivery, cab aggregation, and aviation**, raising concerns over **consumer welfare, innovation, and systemic resilience**.

What is a Duopoly? (Conceptual Clarity)

A **duopoly** exists when **two firms dominate the supply** of a commodity or service, exercising significant influence over prices, quality, and market access.

- Indian examples include:
  - Cab aggregation: **Ola–Uber**
  - Telecom services
  - Food delivery platforms
  - Civil aviation

Why Duopolies Are Rising in India

1️⃣ High Capital Requirements

- Sectors like aviation and telecom demand **large upfront investments** and sustained operating capital
- High entry barriers deter new players and accelerate consolidation

2️⃣ Network Effects

- Early movers acquire users rapidly, creating **self-reinforcing advantages**
- Large platforms leverage scale to:
  - Undercut prices initially
  - Crowd out smaller competitors
- Prominent in **telecom and digital platform markets**

3️⃣ Regulatory Gaps

- Fragmented oversight and delayed interventions allow:
  - Market power to entrench
  - Anti-competitive conduct to persist undetected

Key Challenges Posed by Duopolistic Markets

🔹 **Inflated Prices and Reduced Affordability**

- Limited competition weakens price discipline
- Consumers face higher costs with few alternatives
- Evident in **food delivery services**

🔹 **Restricted Consumer Choice**

- Exit of smaller firms narrows options
- Reduces service diversity and regional responsiveness

🔹 **Innovation Stagnation**

- Innovation focuses on **incremental advantage over the sole rival**, not disruptive breakthroughs
- Observed in **telecom services**, where competition stabilised after consolidation

🔹 **Excessive Lobbying Power**

- Dominant firms exert disproportionate influence on policy and regulation
- Can delay adoption of new technologies and market entrants, as seen in **e-commerce ecosystems**

🔹 **Systemic Vulnerability**

- Failure or disruption of one firm can create **economy-wide shocks**
- The aviation sector illustrates how capacity constraints or operational lapses in a duopoly can **disrupt travel and supply chains**

Existing Regulatory Architecture

🔹 **The Competition Act, 2002**

- Prohibits:
  - Anti-competitive agreements
  - Abuse of dominant position
- Provides the legal backbone for market competition

🔹 **Competition Commission of India (CCI)**

- Statutory authority to:
  - Investigate market concentration
  - Penalise anti-competitive conduct
- Predominantly **ex-post** in nature

🔹 **Role of Sectoral Regulators**

- **Telecom Regulatory Authority of India (TRAI)** – Telecom
- **Directorate General of Civil Aviation (DGCA)** – Aviation
- Coordination gaps persist between sectoral regulators and the CCI

Way Forward: From Reactive to Proactive Competition Policy

🔸 **Strengthen Ex-Ante Powers**

- Empower the CCI to **prevent concentration before harm occurs**
- Pre-emptive scrutiny of mergers and pricing practices

🔸 **Improve Regulatory Coordination**

- Institutionalise coordination between:
  - CCI
  - Sectoral regulators
- Avoid regulatory arbitrage and overlaps

🔸 **Lower Entry Barriers**

- Introduce **regulatory sandboxes**
- Enable **shared infrastructure models** in capital-intensive sectors

🔸 **Enhance Consumer Empowerment**

- Ensure:
  - **Transparent pricing**
  - **Data portability**
  - Interoperability to reduce switching costs

Conclusion

The rise of duopolies in India reflects structural realities of modern markets but also exposes **regulatory and governance deficits**. While scale and efficiency have benefits, unchecked duopolistic dominance can undermine **competition, innovation, and consumer welfare**. Addressing this challenge requires a shift towards **proactive market design, stronger competition oversight, and coordinated regulation**, ensuring that economic concentration does not erode the foundations of a **competitive and resilient Indian economy**.

Mains Practice Question

"The increasing prevalence of duopolies in key sectors of the Indian economy poses challenges to competition, consumer welfare, and systemic stability." Analyse the causes behind this trend and evaluate the adequacy of India's regulatory framework in addressing market concentration.

Financial Stability Report 2026

📌 **Syllabus Mapping:**
✅ **GS Paper III – Indian Economy, Banking & Financial Stability**
✅ **GS Paper II – Governance, Regulatory Institutions & Economic Policy**

Introduction (Contextual Background)

The **Reserve Bank of India (RBI)** has released its **biannual Financial Stability Report (FSR)** (June & December), incorporating inputs from the **Financial Stability and Development Council (FSDC) Sub-Committee**. The report evaluates **current and emerging systemic risks**, assessing the resilience of India's financial system amid global uncertainties, technological shifts, and evolving credit patterns.

What is the Financial Stability Report (FSR)?

- A **biannual diagnostic** of systemic risks and buffers in the Indian financial system
- Integrates **macro-financial surveillance**, stress tests, and policy assessment
- Serves as an **early-warning framework** for regulators and policymakers

Key Highlights of the FSR (January 2026)

1️⃣ **Fiscal Health and Sovereign Risk**

- **Sovereign debt remains sustainable**, aided by:
  - **S&P rating upgrade to 'BBB'**
  - **Favourable interest rate–growth differential**
  - **Low foreign-currency-denominated liabilities**
- Indicates **macro-fiscal credibility** and reduced rollover risks

2️⃣ **Market Optimism and AI-Driven Valuations**

- Equity markets buoyed by **Artificial Intelligence (AI) prospects**
- RBI cautions that **tech-led exuberance** may:
  - Obscure underlying balance-sheet vulnerabilities
  - Heighten exposure to **global spillovers** and sudden repricing

➡️ Reflects classic **financial cycle risks** where optimism precedes volatility.

3️⃣ **Fintech Credit Expansion and Household Risk**

- **Fintech lending grew by 36.1%**
- Concern flagged over **elevated impairment** among borrowers with:
  - **Multiple unsecured loans** (five or more lenders)
- Signals risks of **over-leverage**, data asymmetry, and weak underwriting standards

4 Stablecoins and Monetary Sovereignty

- Widespread adoption of **foreign-currency-denominated stablecoins** could:
  - Undermine **monetary sovereignty**
  - Weaken **policy transmission**
  - Facilitate **money laundering and illicit flows**
- Reinforces the need for **regulatory clarity** and domestic digital currency frameworks

5 Currency Dynamics

- **Indian rupee depreciation** against the US dollar attributed to:
  - **Deterioration in terms of trade**
  - **Higher tariffs** relative to trading partners
  - **Moderation in capital inflows**
- Underscores vulnerability to **external sector shocks**

6 Banking Sector Soundness

- **Scheduled Commercial Banks (SCBs)** maintain **robust capital buffers**
- **Gross Non-Performing Assets (GNPA)** declined to a **multi-decadal low of 2.2%** (September 2025)
- Reflects:
  - Improved asset quality
  - Better risk management
  - Post-pandemic balance-sheet repair

Institutional Framework: Financial Stability and Development Council (FSDC)

🔷 Nature and Composition

- Apex **non-statutory council** (established in 2010) under the Ministry of Finance
- Chaired by the **Union Finance Minister**
- Members include:
  - RBI Governor
  - Heads of **SEBI**, **IRDAI**, **PFRDA**, **IBBI**
  - Senior government secretaries and **Chief Economic Adviser**

🔷 Functions

- Coordinate **macro-prudential supervision**
- Promote **inter-regulatory coordination**
- Advance **financial sector development, inclusion, and literacy**

🔷 FSDC Sub-Committee

- Chaired by the **RBI Governor**
- Provides analytical inputs to the FSR
- Deliberates on **systemic and cross-sectoral risks**

Assessment: Strengths and Concerns

Strengths

- Strong banking buffers and asset quality
- Improved sovereign risk profile
- Institutionalised macroprudential oversight

Emerging Risks

- Unsecured retail credit concentration
- Fintech-led leverage
- AI-fuelled market exuberance
- Stablecoin-related monetary risks
- External shocks impacting currency stability

Way Forward

- Tighten **macroprudential norms** for unsecured lending
- Enhance **fintech supervision** and data-sharing standards

- Develop a clear regulatory framework for **stablecoins and digital assets**
- Strengthen stress-testing for **market and external sector shocks**
- Deepen inter-regulatory coordination under the FSDC

Conclusion

The **Financial Stability Report 2026** portrays an Indian financial system that is **resilient yet exposed to new-age risks**. While strong banks and sustainable public finances provide a solid foundation, **technological disruption, credit concentration, and global spillovers** demand vigilant regulation and proactive macroprudential policy. Sustained stability will hinge on **anticipatory governance, regulatory agility, and coordinated oversight**.

Mains Practice Question

"The Financial Stability Report highlights a resilient banking system alongside emerging risks from fintech expansion, market exuberance, and digital assets." Critically examine the key findings of the RBI's FSR and discuss policy measures required to safeguard India's financial stability."

Export Promotion Mission: Credit Support

📌 **Syllabus Mapping:**
✅ **GS Paper III – Indian Economy, External Trade & MSME Sector**
✅ **GS Paper II – Governance, Policy Design & Implementation**

Introduction (Contextual Background)

The Government of India has launched **two credit-linked sub-schemes** under the **Niryat Protsahan** component of the **Export Promotion Mission (EPM)**, aimed at easing **trade finance constraints faced by exporters**, particularly **MSMEs and labour-intensive sectors**. These pilot interventions reflect a shift from generic export incentives to **targeted, credit-enabled export promotion**, aligned with WTO-compliant support mechanisms.

Overview of the New Credit-Linked Sub-Schemes

1️⃣ Interest Subvention for Pre- and Post-Shipment Export Credit

- **Objective:** Reduce the cost of export credit and improve liquidity for exporters
- **Interest Subvention: 2.75% (base rate)** on rupee-denominated export credit
- **Market Diversification Incentive:**
  - Additional support for exports to **notified under-represented or emerging markets**
- **Annual Cap: ₹50 lakh per exporter** for FY **2025–26**
- **Eligibility Criteria:**
  - Restricted to exports under a **notified positive list of tariff lines**
  - Coverage at **HS 6-digit level**, encompassing nearly **75% of India's tariff lines**

➡️ This scheme directly addresses the **high cost of capital**, a key structural disadvantage for Indian exporters.

2️⃣ Collateral Support for Export Credit

- **Implementing Agency:** In partnership with **Credit Guarantee Fund Trust for Micro and Small Enterprises(CGTMSE)**
- **Objective:** Improve access to institutional credit by mitigating lender risk
- **Guarantee Coverage:**
  - **Up to 85%** for **Micro and Small exporters**
  - **Up to 65%** for **Medium exporters**
- **Maximum Limit:**
  - **₹10 crore** outstanding guaranteed exposure per exporter per financial year
- **Eligibility:**
  - Same **positive list-based eligibility** as the interest subvention scheme

➡️ The scheme tackles **collateral constraints**, a major bottleneck for MSME exporters.

Export Promotion Mission (EPM): Institutional Framework

🔷 Key Features

- **Launch:** November 2025
- **Duration: 6 years** (FY 2025–26 to FY 2030–31)
- **Total Financial Outlay: ₹25,060 crore**

- **Core Objective:**
  - Provide **affordable trade finance**
  - Support **MSMEs, first-time exporters, and labour-intensive sectors** such as textiles

🔷 **Mission Architecture: Two-Pillar Structure**

1. Niryat Protsahan – Financial Support

- Interest subvention on export credit
- Collateral guarantees
- Credit cards for **e-commerce exporters**

2. Niryat Disha – Non-Financial Support

- Export quality and standards compliance
- Certification and branding
- Logistics and market access facilitation

➡️ This dual approach recognises that **finance alone is insufficient without capability and compliance support**.

Economic Significance of the Export Promotion Mission

🔸 **Enhancing Export Competitiveness**

- Lowers cost of exporting
- Expands access to institutional finance
- Improves price competitiveness in global markets

🔸 **Export Diversification**

- Incentivises entry into **new and under-penetrated markets**
- Reduces dependence on a narrow set of destinations and products

🔸 **Employment and MSME Growth**

- Supports **labour-intensive industries**
- Encourages **first-time exporters**
- Contributes to job creation and inclusive growth

Governance and Policy Perspective

- Aligns with **WTO-consistent export support norms**
- Demonstrates shift from **broad subsidies to targeted financial instruments**
- Reflects outcome-oriented industrial and trade policy design

Challenges and Safeguards

- Need for effective targeting to avoid credit misuse
- Timely disbursal and banking coordination critical
- Monitoring required to ensure MSME-centric benefits

Conclusion

The introduction of **credit-linked sub-schemes under the Export Promotion Mission** represents a **strategic recalibration of India's export policy**—from incentive-heavy approaches to **finance-enabled competitiveness**. By lowering credit costs, easing collateral constraints, and integrating financial with non-financial support, the Mission strengthens India's export ecosystem while advancing **MSME-led, employment-intensive growth**.

Mains Practice Question

"The Export Promotion Mission marks a shift towards credit-enabled export competitiveness." Discuss the role of the newly launched credit-linked sub-schemes in addressing structural constraints faced by Indian exporters, particularly MSMEs.

Electronics Manufacturing and ECMS

📌 **Syllabus Mapping:**
✅ **GS Paper III – Indian Economy, Manufacturing, Industrial Policy & Technology**
✅ **GS Paper II – Governance, Policy Implementation & Institutional Frameworks**

Introduction (Contextual Background)

The **Ministry of Electronics and Information Technology (MeitY)** has approved **22 proposals under the Electronics Component Manufacturing Scheme (ECMS)**, marking a decisive step towards **strengthening India's electronics manufacturing ecosystem**. The approved proposals span **cross-sectoral components** catering to mobile phones, telecom, consumer electronics, strategic electronics, automotive electronics, and IT hardware—addressing a long-standing gap in **component-level manufacturing**.

Electronics Component Manufacturing Scheme (ECMS): Overview

🔹 **Genesis and Design**

- **Notified:** April 2025
- **Total Outlay: ₹22,919 crore**
- **Tenure: 6 years** with an optional **1-year gestation period**
- **Core Objective:**
  - Build a **robust domestic electronics component base**
  - Attract **global and domestic investments** across the value chain
  - Integrate Indian industry with **Global Value Chains (GVCs)**

Target Segments under ECMS

Segment A – Sub-Assemblies

- Display Modules
- Camera Modules

Segment B – Bare Components

- Electro-mechanicals
- Printed Circuit Boards (PCBs)
- Lithium-ion Cells

Segment C – Selected Bare Components

- High Density Interconnect (HDI) PCBs
- Flexible PCBs

Segment D – Supply Chain Ecosystem & Capital Equipment

- Tooling, testing, and manufacturing equipment

Segment E – Sub-Assembly (Telecom)

- Telecom-specific electronic sub-systems

➡️ The segmentation ensures **targeted intervention across critical choke points** in electronics manufacturing.

Incentive Structure under ECMS

🔹 **Turnover-Linked Incentive**

- Applicable to **Segments A, B, and E**
- Based on **incremental turnover/sales**
- **Tenure:** 6 years (+ optional 1-year gestation)

🔹 **Capex-Based Incentive**

- Applicable to **Segment D**
- Linked to **eligible capital investment**
- **Tenure:** 5 years

🔹 **Hybrid Incentive Model**

- Applicable to **Segment C**
- Combines **turnover-linked and capex incentives**
- Tailored to **technology-intensive components**

➡️ This **differentiated incentive design** reflects sector-specific cost structures and technological intensity.

India's Electronics Industry: Current Status

🔹 **Production Growth**

- Expanded from **₹1.9 lakh crore (2014–15)** to **₹11.3 lakh crore (2024–25)**
- Represents a **six-fold increase** in a decade
- India is now the **world's second-largest mobile phone manufacturer**

🔹 **Export Performance**

- Electronics emerged as **India's third-largest and fastest-growing export category** (2024–25)
- Exports rose from **₹38,000 crore (2014–15)** to **₹3.27 lakh crore (2024–25)**

🔹 **Long-Term Vision**

- Target of building a **$500 billion domestic electronics manufacturing ecosystem by 2030–31**

Strategic Significance of ECMS

🔸 **Moving Up the Value Chain**

- Shifts focus from **final assembly** to **components and sub-assemblies**
- Reduces import dependence, especially on East Asian suppliers

🔸 **GVC Integration**

- Positions India as a reliable node in **global electronics supply chains**
- Complements the **China+1 diversification strategy**

🔸 **Technology and Strategic Autonomy**

- Strengthens domestic capacity in **strategic and automotive electronics**
- Enhances **national security and technological sovereignty**

🔸 **Employment and MSME Participation**

- Component manufacturing is **labour- and skill-intensive**
- Creates opportunities for **MSMEs, ancillary units, and start-ups**

Governance and Implementation Challenges

- Ensuring timely investment execution
- Technology absorption and skill availability
- Preventing mere assembly without deep value addition
- Coordination between Centre, States, and industry

Way Forward

- Align ECMS with skilling initiatives and R&D incentives
- Encourage cluster-based manufacturing ecosystems
- Strengthen testing, certification, and quality infrastructure
- Monitor value addition and export outcomes closely

Conclusion

The approval of proposals under the **Electronics Component Manufacturing Scheme** marks a **strategic shift in India's industrial policy**—from assembly-led growth to **component-driven manufacturing depth**. By targeting critical segments, offering differentiated incentives, and integrating with GVCs, ECMS strengthens India's ambition to emerge as a **global electronics manufacturing hub**, supporting economic growth, exports, and technological self-reliance.

Mains Practice Question

"The Electronics Component Manufacturing Scheme (ECMS) represents a shift from assembly-centric electronics manufacturing to value-chain deepening." Examine the design of ECMS and assess its role in strengthening India's electronics manufacturing ecosystem and global competitiveness.

AGRICULTURE

AWD: Climate-Smart Rice Cultivation

📌 **Syllabus Mapping:**
✅ **GS Paper III – Agriculture, Environment & Climate Change**
✅ **GS Paper II – Governance, Sustainable Development & Resource Management**

Introduction (Contextual Background)

Recent studies indicate that **Alternate Wetting and Drying (AWD)** can significantly **enhance water productivity**, **maintain high rice yields**, and **reduce methane emissions** in paddy cultivation. As rice farming is both **water-intensive**and a major source of **agricultural methane**, AWD is increasingly viewed as a **climate-smart agronomic practice**aligned with India's goals of **sustainable agriculture and climate mitigation**.

What is Alternate Wetting and Drying (AWD)?

🔹 **Concept**

- AWD is a **water management technique** for **irrigated lowland rice**
- Unlike traditional continuous flooding, fields are **periodically allowed to dry** before being re-flooded

🔹 **Operational Mechanism**

- After irrigation, water is allowed to **recede naturally**
- The field is re-irrigated only when the water level drops to a **pre-defined threshold** (often measured using a perforated field tube)
- Ensures rice roots are not stressed while **avoiding constant waterlogging**

How AWD Reduces Greenhouse Gas (GHG) Emissions

🔹 **Methane Formation in Paddy Fields**

- In continuously flooded rice fields:
  - Soils remain **anaerobic**
  - Organic matter decomposes without oxygen
  - This leads to **methane (CH_4) production** by methanogenic bacteria

🔹 **Impact of AWD on Methane Emissions**

- Periodic drying:
  - Introduces **oxygen into the soil**
  - Disrupts anaerobic conditions
  - **Suppresses methanogenesis**
- Result: **Substantial reduction in methane emissions** without yield penalties

➡️ This directly contributes to **climate mitigation**, as methane has a **much higher global warming potential** than carbon dioxide.

Agronomic and Environmental Benefits of AWD

🔸 **Water Conservation**

- Reduces irrigation water use by **15–30%** compared to continuous flooding
- Enhances **water productivity**, critical in water-stressed regions

🔸 **Sustained Crop Yields**

- When properly implemented:

  - Rice yields remain **comparable to conventional methods**
  - In some cases, improved root health enhances resilience

🔸 **Climate-Smart Agriculture**

- Lowers methane emissions from rice paddies
- Aligns with India's commitments under:
  - **Nationally Determined Contributions (NDCs)**
  - **Sustainable Development Goals (SDG 6 & SDG 13)**

🔸 **Reduced Input Costs**

- Lower water and pumping requirements
- Potential reduction in energy use for irrigation

Challenges in Adoption

- Requires **precise irrigation control**
- Needs **farmer awareness and training**
- Less effective in:
  - Poorly levelled fields
  - Areas without assured irrigation
- Risk of yield loss if drying exceeds safe thresholds

Policy and Governance Perspective

- AWD complements:
  - **Water-use efficiency goals**
  - **Methane mitigation strategies in agriculture**
- Requires convergence with:
  - Extension services
  - Micro-irrigation and water-saving initiatives
- Incentivisation through carbon markets and climate finance can accelerate adoption

Way Forward

- Integrate AWD into **national rice extension programmes**
- Promote through **farmer field schools and demonstrations**
- Support with:
  - Field-level water monitoring tools
  - Crop insurance safeguards
- Link AWD adoption to **climate-smart agriculture incentives**

Conclusion

Alternate Wetting and Drying (AWD) represents a **low-cost, high-impact intervention** at the intersection of **water conservation, climate mitigation, and agricultural productivity**. By reducing methane emissions while maintaining yields, AWD offers India a practical pathway to make rice cultivation **environmentally sustainable and climate-resilient**, especially in the face of growing water stress and climate commitments.

Mains Practice Question

"Alternate Wetting and Drying (AWD) has emerged as a climate-smart practice in rice cultivation." Explain the working of AWD and examine its role in improving water-use efficiency and reducing greenhouse gas emissions in Indian agriculture.

SOCIETY AND SOCIAL ISSUES

Gig Workers' Strikes: Labour Rights in Platform Economy

📌 **Syllabus Mapping:**
✅ **GS Paper II – Governance, Social Justice & Welfare Schemes**
✅ **GS Paper III – Indian Economy, Labour Reforms & Inclusive Growth**
✅ **GS Paper IV – Ethics, Human Values & Corporate Responsibility**

Introduction (Contextual Background)

On **New Year's Eve 2026**, delivery workers associated with major digital platforms such as **Swiggy**, **Zomato**, **Blinkit**, and **Zepto** organised **nationwide strikes**, demanding a **ban on 10-minute delivery models**. The protests brought renewed focus on **precarious working conditions, algorithm-driven work pressure, and social security gaps** in India's rapidly expanding **gig economy**.

Gig Economy in India: Concept and Scale

🔹 **Definition**

As per the **Code on Social Security, 2020**, a **gig worker** is one who performs work or participates in a work arrangement **outside the traditional employer–employee relationship**, earning livelihood through task-based engagements.

🔹 **Types of Gig Work**

- **Platform-based gig workers**
  - Work mediated through digital platforms and apps
  - Example: food delivery riders, cab drivers
- **Non-platform-based gig workers**
  - Casual or contractual workers in conventional sectors
  - Example: domestic workers, part-time labourers

🔹 **Scale and Growth**

- Present size: **~10 million gig and platform workers**
- Projected to rise to **23.5 million by 2029–30**
- Indicates a structural shift in India's labour market towards **flexible but informal employment**

Drivers of Gig Economy Expansion

🔸 **Demand-Side Factors**

- Rapid urbanisation and lifestyle changes
- Growth of **quick commerce and on-demand services**
- Digital penetration and smartphone adoption

🔸 **Supply-Side Factors**

- Flexible work arrangements
- Low entry barriers
- Perceived short-term income opportunities

Key Challenges Highlighted by the Strikes

1️⃣ **Income Volatility**

- Declining per-order payouts
- Absence of guaranteed minimum wages
- High dependence on incentives leading to unstable earnings

2️⃣ **Occupational and Safety Risks**

- **Ultra-fast delivery timelines** increase:
  - Road accidents

    - Physical fatigue
    - Psychological stress
- Raises concerns over **dignity of labour and workplace safety**

3️⃣ **Social Security Deficit**

- No assured:
    - Health insurance
    - Accident compensation
    - Old-age pensions
- Gig workers remain vulnerable to economic shocks

4️⃣ **Coverage and Eligibility Gaps**

- The **90-day eligibility rule** under social security frameworks is criticised for:
    - Excluding intermittent workers
    - Ignoring platform-driven work variability

5️⃣ **Algorithmic Management and Power Asymmetry**

- **Opaque algorithms** determine:
    - Order allocation
    - Incentives
    - De-platforming decisions
- Limited scope for:
    - Collective bargaining
    - Grievance redressal

➡️ This reflects what scholars describe as **"digital Taylorism"**, where control is embedded in algorithms rather than human supervisors.

Steps Taken for Gig Worker Welfare

🔹 **Code on Social Security, 2020**

- Provides formal recognition to gig and platform workers
- Enables formulation of welfare schemes for:
    - Health
    - Accident insurance
    - Old-age protection

🔹 **Inclusion through e-Shram Portal**

- Workers engaged for:
    - **90 days in a year**, or
    - **120 days across platforms**
- Eligible for social security benefits under government schemes

🔹 **Pradhan Mantri Suraksha Bima Yojana (PMSBY)**

- Accidental insurance cover of **₹2 lakh per year**
- Available to registered unorganised and gig workers

🔹 **State-Level Legal Innovations**

- **Rajasthan Platform-Based Gig Workers Act, 2023**
    - Establishes welfare boards
    - Mandates platform contributions
    - Introduces grievance redressal mechanisms

Governance and Ethical Dimensions

- Raises questions of:
    - **Fair wages**
    - **Worker dignity**
    - **Corporate accountability**
- Aligns with constitutional values of:
    - **Social justice**
    - **Right to livelihood**
- Highlights need to balance **innovation with inclusivity**

Way Forward

- Regulate ultra-fast delivery timelines prioritising worker safety
- Mandate minimum earnings and transparent incentive structures
- Strengthen portability and universality of social security
- Ensure algorithmic transparency and grievance mechanisms
- Promote tripartite dialogue among government, platforms, and workers

Conclusion

The New Year's Eve strikes by gig workers underline a **structural tension** within India's platform economy—rapid growth without commensurate labour protections. As gig work becomes a permanent feature of India's employment landscape, policy must evolve from **recognition to robust regulation**, ensuring that **technological efficiency does not come at the cost of worker safety, dignity, and social security**.

Mains Practice Question

"The recent nationwide strikes by gig workers highlight deep structural challenges in India's platform-based employment model." Examine the issues faced by gig workers in India and assess the adequacy of existing policy measures in ensuring their social and economic security.

PMMVY: Maternal Welfare at Nine

📌 **Syllabus Mapping:**
✅ **GS Paper II – Social Justice, Welfare Schemes & Women Empowerment**
✅ **GS Paper I – Society, Population & Health (Maternal and Child Health)**

Introduction (Contextual Background)

The **Pradhan Mantri Matru Vandana Yojana (PMMVY)** has completed **nine years of implementation**, marking a significant milestone in India's efforts to improve **maternal health, nutrition, and income security** among vulnerable women. The scheme reflects a shift towards **rights-based maternity benefits**, particularly for women engaged in the **informal and unorganised sectors**, who otherwise lack social security coverage.

About Pradhan Mantri Matru Vandana Yojana (PMMVY)

🔹 **Basic Profile**

- **Launched:** 2017
- **Nature: Conditional Cash Transfer Scheme**
- **Ministry: Ministry of Women and Child Development**
- **Type: Centrally Sponsored Scheme**
- **Umbrella Scheme:** Incorporated into **Mission Shakti** in 2022

🔹 **Target Beneficiaries**

- **Pregnant Women and Lactating Mothers (PW&LM)**
- Minimum age: **19 years**
- Belonging primarily to:
  - Informal sector
  - Unorganised workforce
- Excludes women already receiving maternity benefits under formal employment.

Key Benefits under PMMVY

1️⃣ **Maternity Benefit for First Living Child**

- **₹5,000** provided in **phased installments**
- Linked to fulfilment of conditions such as:
  - Early pregnancy registration
  - Ante-natal check-ups
  - Child immunisation

2️⃣ **Convergence with Janani Suraksha Yojana (JSY)**

- Additional **institutional delivery incentive** under **Janani Suraksha Yojana**
- On average, a woman receives **₹6,000**, aligning with provisions under the **National Food Security Act, 2013**

3️⃣ **Support for Girl Child (PMMVY 2.0)**

- Introduced under **PMMVY 2.0**
- **₹6,000** provided in a **single installment** on the birth of the **second girl child**
- Aims to:
  - Promote **gender equity**
  - Address declining **Child Sex Ratio**
  - Encourage positive social norms

Significance of PMMVY

🔶 **Maternal Health and Nutrition**

- Supports better:
  - Ante-natal care
  - Nutritional intake
  - Post-natal recovery
- Helps reduce:
  - Maternal Mortality Ratio (MMR)
  - Infant Mortality Rate (IMR)

🔶 **Income Support and Wage Compensation**

- Compensates partial wage loss during pregnancy
- Particularly critical for daily wage earners and self-employed women

🔶 **Women Empowerment and Social Equity**

- Direct Benefit Transfer (DBT) to women's bank accounts
- Enhances **financial inclusion** and decision-making autonomy

🔶 **Demographic and Gender Outcomes**

- Incentivising the **second girl child** addresses entrenched son preference
- Aligns with **SDG 3 (Health)** and **SDG 5 (Gender Equality)**

Implementation Challenges

- Delays in benefit disbursal
- Exclusion errors due to documentation and digital gaps
- Limited awareness among eligible beneficiaries
- Conditionalities may disadvantage migrant and highly mobile women

Way Forward

- Simplify conditionalities without diluting objectives
- Strengthen outreach through Anganwadi and ASHA networks
- Improve real-time monitoring and grievance redressal
- Enhance convergence with nutrition and health programmes such as ICDS and POSHAN Abhiyaan

Conclusion

Nine years of **PMMVY** underline its role as a **cornerstone maternal welfare scheme** in India's social protection framework. By combining **income support, health conditionalities, and gender-sensitive incentives**, the scheme contributes to improved maternal outcomes and women's empowerment. Strengthening implementation efficiency and inclusivity will be key to realising its full transformative potential.

Mains Practice Question

"Pradhan Mantri Matru Vandana Yojana represents a targeted intervention to improve maternal health and gender outcomes in India." Evaluate its design, achievements, and challenges in the context of women-centric social welfare policies.

INDIAN HISTORY, ART & CULTURE

INSV Kaundinya and Maritime Heritage

📌 **Syllabus Mapping:**
✅ **GS Paper I – Indian History & Culture (Ancient Maritime Heritage)**
✅ **GS Paper III – Defence, Indigenous Technology & Cultural Soft Power**

Introduction (Contextual Background)

The **Indian Navy's stitched sailing vessel INSV Kaundinya** has embarked on its **maiden overseas voyage to Oman**, marking a significant moment in the revival of **India's ancient maritime traditions**. Built using the **Tankai method**, a shipbuilding technique dating back to around the **5th century CE**, the voyage symbolises India's historical seafaring prowess and its enduring cultural links with the **Indian Ocean world**.

Named after **Kaundinya**, a legendary Indian mariner associated with early voyages from India to **Southeast Asia**, the expedition blends **heritage, diplomacy, and maritime consciousness**.

INSV Kaundinya: Design, Construction and Purpose

🔹 **Historical Reconstruction**

- The vessel is **modelled on ships depicted in the Ajanta Cave Paintings (Cave No. 17)**
- As no original blueprints of ancient Indian ships survive, **iconographic and archaeological evidence** formed the basis of reconstruction
- Reflects India's advanced knowledge of **ship design and ocean navigation** in the early historic period

🔹 **Institutional Collaboration**

- Constructed under a **tripartite agreement (2023)** involving:
  - **Ministry of Culture**
  - **Indian Navy**
  - **Hodi Innovations**
- Fully **funded by the Ministry of Culture**
- Illustrates effective convergence between **heritage conservation and naval expertise**

🔹 **Nature of the Vessel**

- Owned and operated by the **Indian Navy**
- **Non-combatant vessel**
- Designed exclusively for:
  - Cultural outreach
  - Experimental archaeology
  - Maritime heritage revival
- Operates **entirely on wind power**, with **no engine**, unlike modern naval ships

Tankai Method: Indigenous Shipbuilding Technology

🔹 **Key Features**

- **No use of metal nails**
- Wooden planks **stitched together** using:
  - Coir rope
  - Coconut fibre
  - Natural resin for sealing
- Hull is stitched **before** internal ribs are added

🔹 **Structural Significance**

- High **flexibility of the hull**
- Ability to **absorb strong ocean waves** rather than cracking under pressure
- Particularly suited for **open-sea navigation** in the Indian Ocean

➡️ This method reflects **indigenous engineering ingenuity**, adapted to tropical maritime conditions.

Cultural and Symbolic Elements on the Vessel

🔷 **Gandabherunda**

- Two-headed eagle motif
- Associated with the **Kadamba dynasty**
- Symbolises **power, vigilance, and protection**

🔷 **Sun Motifs on the Sails**

- Represent:
  - Vitality
  - Divinity
  - Navigation
  - Auspicious beginnings
- Emphasise the civilisational importance of the sun in Indian maritime symbolism

🔷 **Simha Yali on the Bow**

- Mythical lion-like creature
- Symbol of **strength and guardianship**
- Common in South Indian temple architecture

🔷 **Harappan-style Stone Anchor**

- Pays tribute to:
  - **Indus Valley maritime trade networks**
  - Early anchoring technology
- Highlights India's continuity in maritime traditions from **Harappan times**

Broader Significance of the Voyage

🔶 **Maritime Heritage Revival**

- Reinforces India's identity as a **historic maritime civilisation**
- Encourages research in **experimental archaeology**

🔶 **Cultural Diplomacy**

- The voyage to Oman recalls ancient **India–West Asia trade links**
- Strengthens **soft power** and people-to-people ties in the Indian Ocean region

🔶 **Strategic Awareness**

- Aligns with India's renewed focus on the **Indian Ocean Region (IOR)**
- Complements India's contemporary maritime doctrine by rooting it in historical consciousness

Conclusion

INSV Kaundinya is not merely a sailing vessel but a **floating symbol of India's civilisational memory**, technological ingenuity, and maritime outreach. By reviving ancient shipbuilding techniques and undertaking international voyages, India is reconnecting with its **oceanic past** while projecting a **culture-driven vision of maritime power** in the present.

Mains Practice Question

"INSV Kaundinya represents a unique convergence of India's maritime heritage, indigenous technology, and cultural diplomacy." Discuss its historical significance and contemporary relevance in the context of India's engagement with the Indian Ocean region.

ENVIRONMENT & ECOLOGY

Groundwater Status in India (2025)

📌 **Syllabus Mapping:**
✅ **GS Paper III – Environment, Water Resources, Agriculture & Sustainable Development**
✅ **GS Paper II – Governance, Policy Implementation & Federal Cooperation**

Introduction (Contextual Background)

The **Dynamic Groundwater Resource Assessment Report 2025**, released by the **Ministry of Jal Shakti**, provides an updated national picture of **groundwater availability, extraction, and stress levels**. The assessment, jointly conducted by the **Central Ground Water Board (CGWB)** and State/UT governments, is critical for evidence-based **water governance**, especially in the context of climate variability, agricultural dependence, and urbanisation.

Key Findings of the Report (2025)

🔹 **Groundwater Availability and Use**

- **Total Annual Groundwater Recharge: 448.52 BCM**
  (Marginal increase from 446.9 BCM in 2024)
- **Annual Extractable Groundwater Resources: 407.75 BCM**
  (Up from 406.19 BCM in 2024)
- **Total Annual Groundwater Extraction: 247.22 BCM**

➡️ The marginal rise in recharge and extractable resources indicates **incremental gains**, but not a structural turnaround.

🔹 **Stage of Groundwater Extraction (SoE)**

- **National SoE: 60.63%**
- Indicates the ratio of **annual extraction for all uses** to **annual extractable resources**
- At the aggregate level, India remains in the **'Safe' category**, but regional disparities persist

Categorisation of Assessment Units

Out of **6,746 assessment units (Blocks/Mandals/Talukas)** across the country:

Category	Percentage of Units	Interpretation
Safe	**73.4%**	Extraction < 70% of available resources
Semi-critical	**10.5%**	Extraction between 70–90%
Critical	**3.05%**	Extraction between 90–100%
Over-exploited	**11.1%**	Extraction exceeds annual recharge
Saline	**1.8%**	Groundwater unsuitable due to salinity

Regional Concentration of Groundwater Stress

🔸 **Over-exploited Regions**

- **North-West India:** Punjab, Haryana, Delhi, Western Uttar Pradesh
- **Western India:** Rajasthan, Gujarat
- **Southern India:** Karnataka, Tamil Nadu, Telangana, Andhra Pradesh

➡️ These regions are characterised by:

- Water-intensive agriculture (paddy, sugarcane)
- Subsidised electricity for irrigation
- Rapid urban and industrial demand

Conceptual Clarity: Groundwater Categories

- **Over-exploited:** Extraction exceeds annually replenishable recharge
- **Critical:** Extraction between **90–100%** of available resources
- **Semi-critical:** Extraction between **70–90%**
- **Safe:** Extraction below **70%**

This classification is essential for **targeted regulatory and recharge interventions**.

Key Challenges Highlighted

1️⃣ Regional Inequity

- National averages mask **localised water crises**
- Safe zones coexist with severe depletion hotspots

2️⃣ Agricultural Dependence

- Over 60% irrigation reliant on groundwater
- MSP-linked cropping patterns distort water use efficiency

3️⃣ Climate Variability

- Erratic monsoons reduce predictability of recharge
- Rising temperatures increase evapotranspiration losses

4️⃣ Governance Deficits

- Groundwater remains largely **unregulated** due to its status as a **private resource linked to land ownership**

Way Forward: Policy and Governance Measures

🔹 Demand-Side Management

- Crop diversification away from water-intensive crops
- Rationalisation of power and water subsidies
- Promotion of micro-irrigation (drip and sprinkler systems)

🔹 Supply-Side Interventions

- Aquifer-based recharge planning
- Rainwater harvesting and watershed development
- Urban recharge through green infrastructure

🔹 Institutional and Regulatory Reforms

- Strengthen **aquifer mapping**
- Enforce groundwater extraction norms in critical and over-exploited blocks
- Enhance Centre–State coordination for water governance

🔹 Community Participation

- Promote participatory groundwater management
- Involve Panchayats and Water User Associations

Conclusion

The **Dynamic Groundwater Resource Assessment Report 2025** underscores a **dual reality**—moderate national-level sustainability alongside **acute regional stress**. Addressing India's groundwater challenge requires a shift from **extraction-led use to sustainability-oriented governance**, integrating **scientific assessment, policy reform, and community stewardship**. Groundwater security will be pivotal to India's **agricultural resilience, urban sustainability, and climate adaptation strategy**.

Mains Practice Question

"The Dynamic Groundwater Resource Assessment Report 2025 reveals significant regional disparities in groundwater use despite a safe national average." Analyse the causes of groundwater over-exploitation in India and suggest a sustainable governance framework to address the challenge."

Urban Wastewater and Public Health

📌 **Syllabus Mapping:**
✅ **GS Paper III – Environment, Urbanisation & Public Health**
✅ **GS Paper II – Governance, Urban Local Bodies & Service Delivery**

Introduction (Contextual Background)

The recent **drinking water contamination incident in Indore, Madhya Pradesh**, caused by **sewage mixing with potable water**, triggered a public health crisis and exposed deep-rooted vulnerabilities in **Urban Wastewater Management (UWM)**. The episode underlines how infrastructure failures and governance gaps can rapidly translate into **water-borne disease outbreaks** in Indian cities.

Urban Wastewater Management (UWM) in India: Current Status

🔷 **Scale of the Challenge**

- **Urban wastewater generation: ~72,368 Million Litres per Day (MLD)** (2020–21)
  (Source: NITI Aayog)
- **Treatment gap:** About **72% of wastewater remains untreated**
- Disposal pathways:
  - Rivers and lakes
  - Groundwater aquifers

➡️ Untreated discharge compromises **drinking water sources**, urban ecosystems, and downstream users.

🔷 **Public Health Implications**

Contaminated water can cause:

- **Cholera**
- **Diarrhoea and dysentery**
- **Hepatitis A**
- **Typhoid**
- **Polio**

These diseases disproportionately affect **urban poor and informal settlements**, where piped water and sanitation systems are weakest.

Wastewater Treatment Systems in Urban India

🔶 **On-site Sanitation Systems**

- Wastewater retained near toilets in:
  - Pits
  - Septic tanks
- Periodic removal of sludge
- Common in peri-urban and unsewered areas

Limitations: Poor maintenance and unsafe sludge disposal often lead to groundwater contamination.

🔶 **Off-site (Centralised) Sewerage Systems**

- Sewage transported through networks to **Sewage Treatment Plants (STPs)**
- Suitable for dense urban cores

Limitations: High capital costs, network leakages, and operational inefficiencies.

Key Challenges in Urban Wastewater Management

1️⃣ **Institutional Fragmentation**

- Multiple government departments operate in **silos**
- Overlapping mandates and weak coordination
- **Urban Local Bodies (ULBs)**—the primary custodians—often lack:
  - Technical expertise
  - Human resources
  - Financial autonomy

2 Archaic and Inadequate Infrastructure

- Ageing sewer lines prone to leaks and cross-contamination
- Inadequate land availability for new STPs
- Poor maintenance and rehabilitation cycles

3 Economic and Financial Constraints

- High **Non-Revenue Water (NRW)**
- Unrealistic water and sewerage tariffs
- Low collection efficiency
- Inadequate cost recovery undermining service sustainability

4 Technological Gaps

- Limited adoption of **affordable, decentralised technologies**
- Inadequate mapping of sewer connectivity and drainage networks
- Weak real-time monitoring of water quality

Solutions for Sustainable Urban Wastewater Management

🔹 Decentralised Treatment Systems

- Treat wastewater **close to the source**
- Reduce load on centralised infrastructure
- Suitable for:
  - New urban layouts
  - Informal settlements
- Ecologically and economically efficient

🔹 Urban and Industrial Waste Reforms

- Enforce **Zero Liquid Discharge (ZLD)** norms for industries
- Regulate landfills and prevent leachate contamination
- Penalise illegal sewage and effluent discharges

🔹 Modernised Monitoring and Early Warning

- Integrate **water quality data** with health surveillance platforms such as:
  - **Health Management Information System (HMIS)**
- Enables **early detection of outbreaks** and rapid response

🔹 Nature-Based Solutions (NbS)

- **Constructed wetlands**
- **Waste stabilisation ponds**
- **Vermifiltration**
- **Green roofs and living walls**

➡️ These solutions are **low-energy, climate-resilient, and cost-effective**, especially for secondary and tertiary treatment.

Governance Perspective

- Aligns with **SDG 6 (Clean Water and Sanitation)** and **SDG 11 (Sustainable Cities)**
- Requires:
  - Strengthened capacity of ULBs
  - Integrated urban water management (IUWM)
  - Community awareness and participation

Conclusion

The Indore incident is a stark reminder that **urban wastewater mismanagement is not merely an infrastructure issue but a public health emergency**. Addressing it demands a **holistic approach**—combining institutional reform, financial sustainability, technological innovation, and nature-based solutions. Ensuring **safe drinking water and effective wastewater treatment** is indispensable for resilient, healthy, and liveable Indian cities.

Mains Practice Question

"Incidents of drinking water contamination in Indian cities highlight systemic weaknesses in urban wastewater management." Examine the key challenges in urban wastewater management in India and suggest sustainable solutions to prevent public health crises.

Secondary Pollutants and PM2.5

📌 **Syllabus Mapping:**
✅ **GS Paper III – Environment, Pollution, Climate Change & Public Health**
✅ **GS Paper II – Governance, Urban Management & Policy Interventions**

Introduction (Contextual Background)

A recent analysis by the **Centre for Research on Energy and Clean Air (CREA)** has revealed that **nearly one-third of the annual PM2.5 pollution in Delhi** originates from **secondary pollutants**, with **ammonium sulphate** emerging as a dominant contributor. This finding shifts the policy focus from only controlling visible emission sources to **managing complex atmospheric chemical processes**.

Understanding Secondary Pollutants

🔹 **What are Secondary Pollutants?**

- **Secondary pollutants** are **not emitted directly** from identifiable sources.
- They form when **primary pollutants** undergo **chemical reactions in the atmosphere**.
- Their formation depends on:
  - Atmospheric chemistry
  - Sunlight
  - Temperature
  - Presence of precursor gases

🔹 **Primary vs Secondary Pollutants**

Aspect	Primary Pollutants	Secondary Pollutants
Origin	Directly emitted	Formed in atmosphere
Examples	SO_2, NOx, NH_3, PM	Ammonium sulphate, ozone
Control	Source-specific	Requires multi-sector strategy

Formation of Ammonium Sulphate (Key Contributor to PM2.5)

🔹 **Chemical Pathway**

1. **Sulphur dioxide (SO_2)**—emitted from:
   - Coal-based power plants
   - Industrial combustion
2. SO_2 undergoes **atmospheric oxidation** to form **sulphate aerosols**
3. Sulphates react with **ammonia (NH_3)**—largely from:
   - Agricultural fertilisers
   - Livestock waste
4. Result: Formation of **ammonium sulphate**, a fine particulate matter contributing to **PM2.5**

➡️ These particles remain suspended longer, travel farther, and penetrate deep into human lungs.

Why Secondary Pollutants Matter for Delhi

1️⃣ **Invisible yet Dominant**

- Unlike vehicular smoke or stubble burning, secondary pollutants are **not directly visible**
- Makes them **harder to regulate and communicate** to the public

2️⃣ **Multi-sectoral Origin**

- Formation involves emissions from:
  - Power sector
  - Transport
  - Agriculture
  - Industry
- Requires **coordinated policy action across ministries and states**

3️⃣ **Seasonal and Meteorological Sensitivity**

- Winter conditions in North India:
  - Low wind speed
  - Temperature inversion
- Enhance formation and accumulation of secondary aerosols

Public Health Implications

- PM2.5 exposure linked to:
  - Respiratory diseases (asthma, bronchitis)
  - Cardiovascular disorders
  - Reduced life expectancy
- Secondary particles worsen **chronic exposure risks** due to prolonged atmospheric presence

Policy and Governance Challenges

🔹 **Current Regulatory Bias**

- Emission control policies focus largely on **primary sources**
- Insufficient regulation of **precursor gases** like SO_2, NOx, and NH_3

🔹 **Agricultural Emissions Overlooked**

- Ammonia emissions from fertiliser use remain weakly regulated
- Lack of incentives for **low-emission farming practices**

Way Forward: Managing Secondary Pollution

🔸 **Control of Precursor Emissions**

- Tighten SO_2 and NOx norms for power plants and industries
- Promote cleaner fuels and flue gas desulphurisation (FGD)

🔸 **Ammonia Management in Agriculture**

- Rationalise fertiliser use
- Promote neem-coated urea and precision farming
- Encourage alternative nutrient management practices

🔸 **Integrated Air Quality Governance**

- Shift from source-based control to **airshed-based management**
- Strengthen regional coordination beyond city boundaries

🔸 **Science-Based Policymaking**

- Use advanced atmospheric modelling
- Incorporate secondary pollution metrics into air quality action plans

Conclusion

The growing contribution of **secondary pollutants**, particularly **ammonium sulphate**, to Delhi's PM2.5 burden underscores a critical shift in India's air pollution challenge—from **visible emissions to invisible chemistry**. Addressing this requires **holistic, cross-sectoral, and science-driven strategies** focusing on precursor gases, agricultural practices, and regional cooperation. Without this transition, urban air quality goals will remain **structurally unattainable**.

Mains Practice Question

"Secondary pollutants now account for a significant share of urban air pollution in India." Explain the formation of secondary pollutants and examine the challenges they pose for air quality management, with special reference to Delhi.

CBAM: Climate and Trade Impact

📌 **Syllabus Mapping:**
✅ **GS Paper III – Environment, Climate Change & External Trade**
✅ **GS Paper II – International Relations, Global Governance & Trade Regimes**

Introduction (Contextual Background)

From **1 January 2026**, the **European Union** has begun **full enforcement** of the **Carbon Border Adjustment Mechanism (CBAM)**—the world's first **carbon-linked border tax** on imports of carbon-intensive goods. This marks a pivotal moment where **climate policy directly intersects with international trade**, raising critical implications for exporting countries like India.

What is the Carbon Border Adjustment Mechanism (CBAM)?

🔷 **Definition**

CBAM is an EU policy instrument that **imposes a carbon price on imports** of selected goods from countries with **less stringent climate regulations**, aligning import costs with the EU's internal carbon pricing under its Emissions Trading System (ETS).

🔷 **Timeline**

- **Introduced:** 2023 (Transitional Phase – reporting without financial obligation)
- **Full Enforcement: 2026 onwards** (financial levy applicable)

🔷 **Core Objective**

- **Prevent Carbon Leakage**—a situation where firms relocate production to jurisdictions with lax climate norms to avoid carbon costs.
- Ensure **competitive neutrality** between EU producers and foreign exporters.

Sectors Covered under CBAM

CBAM currently applies to **carbon-intensive and trade-exposed sectors**:

- **Cement**
- **Aluminium**
- **Fertilisers**
- **Iron and Steel**
- **Hydrogen**
- **Electricity**

➡️ These sectors account for a significant share of **industrial emissions** and are central to global supply chains.

How CBAM Works

- Importers must purchase **CBAM certificates** equivalent to the embedded carbon emissions in imported goods.
- If the exporting country already imposes a carbon price, the payable CBAM levy is **reduced accordingly**.
- Emissions accounting relies on **verified, product-level data**.

Implications for India

1️⃣ **Trade and Cost Competitiveness**

- Indian exports—especially **steel, aluminium, and cement**—may face **higher landed costs** in the EU market.
- Risks erosion of price competitiveness for **energy-intensive industries**.

2️⃣ **Carbon Intensity Differential**

- India's production often relies on **coal-based energy**, leading to higher embedded emissions compared to EU benchmarks.
- Absence of an explicit, economy-wide carbon pricing mechanism could amplify CBAM exposure.

3️⃣ **Compliance and Reporting Burden**

- Requires robust **Measurement, Reporting, and Verification (MRV)** systems.
- MSMEs and smaller exporters may face **disproportionate compliance costs**.

Global Governance and Equity Concerns

🔹 **Developed vs Developing Divide**

- CBAM may function as a **de facto trade barrier** for developing economies.
- Shifts the burden of decarbonisation onto exporters from the **Global South**, raising concerns of **climate justice**.

🔹 **WTO Compatibility**

- Legal debates persist on whether CBAM aligns with:
  - **Non-discrimination principles**
  - **Common but Differentiated Responsibilities (CBDR)** under the UNFCCC

India's Strategic Response: Way Forward

🔸 **Domestic Carbon Efficiency**

- Accelerate transition to **clean energy** in industry
- Promote **green steel**, energy efficiency, and electrification

🔸 **Policy and Regulatory Readiness**

- Develop credible **carbon accounting frameworks**
- Explore **domestic carbon markets** and sectoral pricing mechanisms

🔸 **Trade Diplomacy**

- Engage the EU for:
  - Transitional support
  - Recognition of India's climate efforts
  - Technology transfer and climate finance

🔸 **Export Diversification**

- Reduce over-dependence on carbon-intensive exports
- Move up the value chain toward **low-carbon and high-tech products**

Conclusion

The **Carbon Border Adjustment Mechanism** represents a **paradigm shift** where climate ambition is enforced through trade instruments. While CBAM aims to address carbon leakage and strengthen global climate action, it also raises serious concerns regarding **equity, development space, and protectionism**. For India, the challenge lies in **adapting its industrial and trade strategy** to a carbon-constrained world—balancing competitiveness with sustainability while safeguarding developmental priorities.

Mains Practice Question

"The Carbon Border Adjustment Mechanism (CBAM) marks the increasing use of trade measures to achieve climate objectives." Discuss the rationale behind CBAM and examine its implications for India's exports and climate strategy.

SCIENCE & TECHNOLOGY

NTRAF and Innovation Governance

📌 **Syllabus Mapping:**
✅ **GS Paper III – Science & Technology, Research & Development, Innovation Ecosystem**
✅ **GS Paper II – Governance, Policy Design & Institutional Frameworks**

Introduction (Contextual Background)

The **Draft National Technology Readiness Assessment Framework (NTRAF)** has been unveiled by the **Office of the Principal Scientific Adviser to the Government of India**, marking a significant step towards **standardising innovation assessment in India**. The framework seeks to

introduce **rigour, objectivity, and predictability** into public funding decisions for research and innovation, thereby strengthening India's transition from **lab-scale research to market-ready technologies**.

What is the National Technology Readiness Assessment Framework (NTRAF)?

🔹 **Core Aim**

- To act as the **operational backbone** for various **R&D funding mechanisms** launched under India's **National Missions**
- To enable **evidence-based allocation of public funds**
- To **de-risk early-stage technologies**, making them more attractive for **private sector investment**

Technology Readiness Levels (TRLs): The Backbone of NTRAF

NTRAF adopts a **globally recognised TRL-based approach**, structured across the full innovation lifecycle:

1️⃣ **Proof of Concept – TRL 1 to 3**

- Basic principles observed and reported
- Concept formulation and experimental proof
- Focus: **Scientific feasibility**

2️⃣ **Prototype Development – TRL 4 to 6**

- Validation in laboratory and relevant environments
- Development of functional prototypes
- Focus: **Technical reliability and scalability**

3️⃣ **Market / Operational Readiness – TRL 7 to 9**

- System demonstration in operational environments
- Technology proven for commercial deployment
- Focus: **Adoption, manufacturability, and deployment**

➡️ This end-to-end mapping bridges the **"valley of death"** between research and commercialisation.

Key Features of NTRAF

🔹 **Structured and Evidence-Based Assessment**

- Replaces **subjective, qualitative estimates** with:
  - Standardised checklists
  - Verifiable technical milestones
- Ensures uniform evaluation across sectors and funding agencies

🔹 **Precision in Public Funding**

- Enables funding bodies to:
  - Identify the **exact maturity stage** of a technology
  - Avoid misallocation of funds (e.g., overfunding immature technologies)
- Improves **returns on public R&D expenditure**

🔹 **Empowerment of Project Investigators**

- Helps researchers and innovators:
  - Accurately assess their technology's readiness
  - Identify **technical and translational gaps**
  - Seek **appropriate funding instruments** aligned to their TRL stage

🔹 **Catalysing Private Investment**

- By reducing uncertainty and information asymmetry:
  - Enhances investor confidence
  - Facilitates public–private partnerships
- Aligns with India's goal of **crowding-in private capital into deep-tech innovation**

Strategic Significance for India

🔸 **Strengthening the National Innovation Ecosystem**

- Promotes a **mission-mode approach** to innovation
- Aligns research outcomes with national priorities in:
  - Semiconductors
  - Clean energy
  - Defence and space
  - Biotechnology and AI

🔸 **Improving Governance of R&D**

- Introduces transparency and accountability in funding decisions
- Reduces duplication and fragmentation across ministries and agencies

🔸 **Global Competitiveness**

- Aligns India's innovation assessment with **international best practices**
- Enhances credibility of Indian technologies in **global markets and collaborations**

Implementation Challenges

- Capacity building required among funding agencies and evaluators
- Ensuring sector-specific flexibility within a standardised framework
- Avoiding procedural delays that could slow innovation cycles

Way Forward

- Pilot NTRAF across major national R&D missions
- Develop sector-specific assessment templates within the common framework
- Integrate NTRAF with:
  - Startup India
  - National Research Foundation (NRF)
- Continuous feedback and iterative refinement of the framework

Conclusion

The **National Technology Readiness Assessment Framework (NTRAF)** represents a **paradigm shift in India's R&D governance**—from intuition-driven funding to **evidence-based, stage-appropriate innovation support**. By standardising technology assessment across the innovation lifecycle, NTRAF strengthens India's ability to **translate research excellence into deployable solutions**, a critical requirement for becoming a **technology-driven, innovation-led economy**.

Mains Practice Question

"The Draft National Technology Readiness Assessment Framework (NTRAF) aims to bridge the gap between research and commercialisation in India." Examine its key features and assess its significance for improving the effectiveness of public R&D funding and private sector participation in innovation."

Maglev Technology and High-Speed Transport

📌 **Syllabus Mapping:**
✅ **GS Paper III – Science & Technology, Infrastructure & Transport Systems**
✅ **GS Paper II – Governance, Technology Adoption & Public Policy**

Introduction (Contextual Background)

China has recently set a **world record** by testing a **high-speed magnetic levitation (maglev) train** that reportedly achieved **700 kmph within two seconds**, underscoring rapid advances in **next-generation transport technologies**. This development highlights how **maglev systems** are reshaping the future of **ultra-high-speed, energy-efficient mobility**, with implications for global transport competitiveness and infrastructure planning.

What is Magnetic Levitation (Maglev) Technology?

🔷 **Core Principle**

- Maglev technology uses **electromagnetic forces** to **levitate the train above the track**
- Eliminates **wheel–rail contact**, which is the primary source of friction in conventional railways

🔷 **Propulsion Mechanism**

- Train movement is achieved through **controlled and alternating magnetic fields**
- These fields:
  - Lift the train
  - Propel it forward
  - Stabilise lateral motion
- Unlike traditional systems, there is **no reliance on mechanical engines or traction wheels**

Key Advantages of Maglev Technology

1️⃣ **Energy Efficiency**

- Absence of rolling friction significantly reduces **energy losses**
- Lower wear and tear leads to **reduced maintenance requirements**
- Particularly efficient at **very high speeds**, where conventional rail faces steep resistance

2️⃣ **Ultra-High Speed Capability**

- Capable of speeds exceeding **600 kmph**
- Bridges the gap between **aviation and rail transport**, especially for medium-distance travel

3️⃣ **Smooth and Silent Operation**

- No physical contact between train and track:
  - Minimises vibration
  - Reduces noise pollution
- Enhances passenger comfort and urban suitability

4️⃣ **Operational Reliability**

- Less mechanical stress
- Higher system stability at extreme speeds
- Lower risk of derailment due to guided levitation

Strategic and Economic Significance

🔶 **Transport Modernisation**

- Enables rapid inter-city connectivity
- Reduces travel time dramatically, boosting economic integration

🔶 **Climate and Sustainability Angle**

- When powered by clean electricity, maglev offers a **low-carbon transport alternative**
- Contributes to long-term goals of **sustainable mobility**

🔶 **Technological Leadership**

- Countries mastering maglev gain:
  - Strategic advantage in transport technology
  - Export potential for infrastructure and engineering services

Challenges and Limitations

- **High initial capital costs** for infrastructure
- Requires **dedicated tracks**, incompatible with existing rail networks
- Complex electromagnetic control systems demand advanced technical expertise
- Economic viability depends on **high passenger density and demand**

Relevance for India (Analytical Perspective)

- Maglev could complement:
  - High-Speed Rail
  - Regional Rapid Transit Systems (RRTS)
- Feasibility must be evaluated against:
  - Cost-benefit analysis
  - Energy mix

    - Urban density and travel demand
- Long-term potential in **select high-demand corridors**

Conclusion

Magnetic levitation technology represents a transformative leap in transportation—offering **unprecedented speed, efficiency, and passenger comfort**. While challenges related to cost and infrastructure persist, breakthroughs such as China's recent test demonstrate that maglev could play a critical role in the future of **sustainable, high-speed mobility**. For countries like India, maglev presents a **strategic option** that merits careful evaluation within long-term infrastructure and technology planning.

Mains Practice Question

"Magnetic levitation (maglev) technology is emerging as a disruptive innovation in high-speed transport." Explain the working principle of maglev systems and examine their advantages and challenges compared to conventional rail technologies.

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