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The background of the top half of the poster features a large, golden-brown Lion Capital of Ashoka. The capital is composed of four Asiatic lions standing back-to-back on a circular abacus. The lions are intricately carved, with detailed manes and facial features. The abacus is decorated with a frieze of animals. The entire capital is set against a solid red background.

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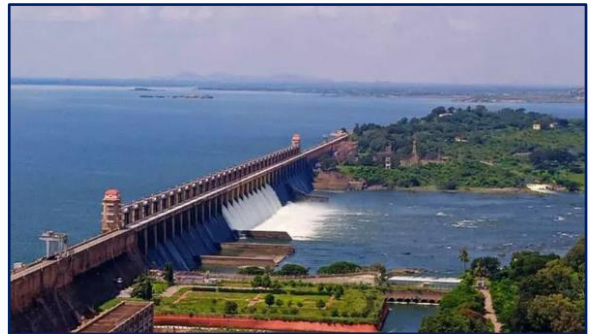
Prelims Test Series

1.1. POLITY & GOVERNANCE

1.1.1. TUNGABHADRA DAM AND THE NEED FOR COOPERATIVE WATER GOVERNANCE

Why in News?

The Chief Ministers of **Karnataka, Andhra Pradesh, and Telangana**, along with the Union Jal Shakti Minister, jointly inaugurated **33 newly installed spillway gates** of the **Tungabhadra Dam** on **25 June 2026**, reaffirming their commitment to inter-State cooperation in water management.



About the Tungabhadra Dam

- Built across the **Tungabhadra River**, a major tributary of the Krishna River.
- Located in **Koppal district, Karnataka**.
- Serves **Karnataka, Andhra Pradesh, and Telangana**.
- Regulated by the **Tungabhadra Board** under an agreed water-sharing arrangement.
- Irrigates nearly **16.4 lakh acres**:
 - Karnataka – **9.26 lakh acres**
 - Andhra Pradesh – **6.25 lakh acres**
 - Telangana – **87,000 acres**
- Supports agriculture, drinking water supply, and regional livelihoods.

Background

In **August 2024**, a crest gate of the **Tungabhadra Dam** was washed away during heavy inflows at full reservoir capacity (105 TMC), exposing concerns over ageing dam infrastructure and prompting the replacement of all **33 spillway gates** with high-grade steel gates (₹51 crore; **60-year lifespan**).

Constitutional & Institutional Perspective

A. Constitutional Provisions

1. **Article 262** – Empowers Parliament to enact laws for the adjudication of inter-State river water disputes and exclude the jurisdiction of courts over such disputes.
2. **Entry 17, State List (List II)** – Places water, irrigation, canals, drainage, embankments and water storage primarily under the legislative domain of States, subject to Union provisions.
3. **Entry 56, Union List (List I)** – Authorises the Union Government to regulate and develop inter-State rivers and river valleys in the larger public interest.

B. Institutional Mechanisms

1. **River Boards** – Established under the River Boards Act, 1956, to promote coordinated development and management of inter-State river basins, though rarely operationalised.

- 2. Inter-State River Water Disputes Tribunals** – Constituted under the Inter-State River Water Disputes Act, 1956, to adjudicate disputes over sharing of inter-State river waters.
- 3. Central Water Commission (CWC)** – Provides technical expertise on water resources planning, river basin management, flood control, and dam safety.
- 4. National Dam Safety Authority (NDSA)** – Established under the Dam Safety Act, 2021, to oversee dam safety standards, surveillance, inspection, and emergency preparedness across India.
- 5. Tungabhadra Board** – Regulates reservoir operations and water releases to ensure equitable distribution among Karnataka, Andhra Pradesh, and Telangana in accordance with the agreed water-sharing arrangement.

Significance of the Recent Development

1. **Strengthening Cooperative Federalism:** The joint participation of the three riparian States reflects collaborative decision-making and reinforces trust-based inter-State cooperation in water resource management.
2. **Efficient Inter-State Water Governance:** A well-established water-sharing formula and the Tungabhadra Board's regulatory framework have ensured equitable water distribution while minimising inter-State disputes.
3. **Dam Safety and Modernisation:** The replacement of ageing spillway gates enhances structural safety, improves operational efficiency, and strengthens resilience against extreme hydrological events.
4. **Agricultural Security:** Improved dam infrastructure ensures reliable irrigation for nearly 16.4 lakh acres, thereby supporting agricultural productivity and rural livelihoods across Karnataka, Andhra Pradesh, and Telangana.

Emerging Challenges associated with Water Governance

1. **Inter-State Water Sharing Disputes:** The Upper Bhadra Project has intensified concerns over equitable water distribution, with downstream States fearing reduced water availability due to upstream diversion.
2. **Reservoir Siltation:** Excessive silt accumulation has reduced the dam's storage capacity from 133 TMC to nearly 106 TMC, affecting irrigation efficiency, water availability, and flood moderation.
3. **Ageing Dam Infrastructure:** The ageing structure and spillway systems necessitate continuous rehabilitation to ensure dam safety and prevent catastrophic failures.
4. **Climate Change and Hydrological Extremes:** Increasing incidents of extreme rainfall, floods, droughts, and erratic monsoons have made reservoir operations more complex and unpredictable.
5. **Need for Scientific Reservoir Management:** Limited adoption of real-time monitoring, desiltation, and modern reservoir operation techniques affects efficient water utilisation and disaster preparedness.

6. Institutional and Governance Challenges: Effective water governance requires stronger Centre-State coordination, timely implementation of rehabilitation projects, and basin-level planning to address emerging water security issues.

Best Practices & Expert Recommendations

1. Mihir Shah Committee (2016)

Recommended a paradigm shift in water governance by moving from an engineering- and construction-centric approach to Integrated Water Resources Management (IWRM), including the creation of a National Water Commission (NWC) to replace the Central Water Commission (CWC) and Central Ground Water Board (CGWB).

2. Murray–Darling Basin Authority (Australia)

A globally recognised model of Integrated River Basin Management (IRBM), where a single federal authority manages a river basin across five jurisdictions through a legally binding Basin Plan, ensuring equitable water allocation and ecological sustainability.

3. Mekong River Commission

Demonstrates successful transboundary water governance through collaborative data-sharing, joint flood forecasting, coordinated basin planning, and consensus-based decision-making among member countries.

Way Forward for Water Governance

1. **Promote Cooperative Federalism** – Strengthen institutional dialogue and consensus-based decision-making among riparian States to ensure equitable and sustainable sharing of water resources.
2. **Adopt Integrated River Basin Management (IRBM)** – Shift from State-centric approaches to basin-level planning by integrating surface water, groundwater, ecological conservation, and equitable allocation.
3. **Scientific Reservoir Management** – Leverage periodic desiltation, real-time hydrological monitoring, and technology-driven reservoir operations to optimise water storage and flood management.
4. **Strengthen Dam Safety** – Ensure regular structural audits, modernisation of ageing infrastructure, and timely implementation of Dam Rehabilitation and Improvement Projects (DRIP) to minimise disaster risks.
5. **Enhance Centre–State Coordination** – Strengthen cooperative governance through financial support, technical assistance, effective monitoring, and timely resolution of inter-State water issues.
6. **Promote Climate-Resilient Water Governance** – Develop adaptive water management strategies by improving flood forecasting, enhancing irrigation efficiency, promoting water conservation, and adopting climate-responsive reservoir operation protocols.

Conclusion

The focus of India's water governance must shift from dispute resolution to dispute prevention by strengthening cooperative federalism, scientific management, and sustainable utilisation of shared water resources.

Q. "Inter-State river water management in India requires a balance between cooperative federalism, equitable resource sharing, and dam safety. Discuss in the context of the Tungabhadra Dam." 15 Marks

1.1.2. MANUFACTURING JUSTICE: AI HALLUCINATIONS IN THE JUDICIARY

Why in News?

The **Supreme Court of India** set aside orders of the **National Company Law Tribunal (NCLT)** and the **National Company Law Appellate Tribunal (NCLAT)** after finding that the tribunal relied upon **AI-generated fictitious judicial precedents (hallucinations)** while deciding an insolvency case.



The Court described AI hallucinations as being like the methyl isocyanate gas of the Bhopal tragedy—"invisible, insidious and catastrophic by the time anyone notices."

What are AI Hallucinations?

AI hallucinations refer to **false, fabricated or misleading outputs generated by Artificial Intelligence systems that appear authentic but have no factual or legal basis.**

In judicial context: They may include:

- Fabricated Supreme Court judgments
- Non-existent constitutional provisions
- False legal citations
- Imaginary precedents
- Incorrect interpretation of statutes

Thus, AI may generate **convincing but legally false information**, making verification indispensable.

Constitutional Principles Involved

1. Rule of Law: Judicial decisions must be based on verified facts, authentic legal precedents, and established law, not on fabricated or hallucinated AI-generated content.
2. Principles of Natural Justice: Every litigant is entitled to a fair hearing, unbiased consideration, and a reasoned judgment, which requires meaningful human application of mind rather than automated decision-making.

3. **Judicial Independence:** The constitutional responsibility of adjudication must remain exclusively with independent judges, ensuring that AI serves only as an assistive tool and not as a substitute for judicial discretion.
4. **Due Process of Law (Article 21):** The right to life and personal liberty includes fair, transparent, and reasoned legal procedures, making human oversight essential in every stage of judicial decision-making.
5. **Equality Before Law (Article 14):** AI systems must not perpetuate algorithmic bias or discrimination, as every individual is entitled to equal protection of the laws and impartial administration of justice.

Supreme Court's Stand on AI in Judiciary

1. **AI is an Assistive Tool, Not a Decision-Maker:** AI may enhance efficiency in legal research and court administration, but it cannot replace judicial discretion, human reasoning, constitutional interpretation, or moral judgment in adjudication.
2. **AI-Generated Fake Precedents Constitute Misconduct:** The Court held that citing fabricated AI-generated case laws amounts to professional misconduct for advocates and judicial misconduct for judges, as it undermines the integrity of the justice system.
3. **Human Verification is Mandatory:** Every AI-generated output must be independently verified by judges and lawyers, as ultimate legal responsibility and accountability cannot be delegated to algorithms.
4. **Judgments Based on AI Hallucinations Have No Legal Sanctity:** The Supreme Court ruled that any judicial decision influenced even by an "iota" of AI-generated fictitious material is legally unsustainable and is "no decision in the eyes of law."

Why is AI Being Used in the Judiciary?

1. **Efficient Case Management:** AI streamlines administrative functions by automating file classification, case listing, scheduling of hearings, and workflow management, thereby reducing delays in court processes.
2. **Faster and Accurate Legal Research:** AI enables judges and lawyers to quickly search through judgments, statutes, case laws, and international precedents, saving time and improving the quality of legal research.
3. **Multilingual Translation and Accessibility:** AI facilitates the translation of court records, judgments, and legal documents into regional languages, making the justice system more accessible and inclusive.
4. **Document Summarization:** AI can summarize lengthy pleadings, affidavits, and evidence, allowing judges and legal professionals to identify key issues more efficiently without replacing detailed judicial examinations.
5. **Enhancing Judicial Efficiency:** By automating routine administrative tasks and supporting faster research, AI helps reduce case pendency, optimizes court resources, and improves the overall efficiency of the justice delivery system.

Challenges of Using AI in the Judiciary

1. **AI Hallucinations and Fabricated Legal Content:** AI may generate fake judgments, imaginary precedents, and incorrect legal reasoning, which can mislead courts and result in serious miscarriages of justice.
2. **Threat to the Rule of Law:** Judicial decisions must be based on verified evidence, authentic precedents, and established legal principles; reliance on AI-generated fictitious citations undermines legal certainty and public confidence.
3. **Erosion of Judicial Accountability:** Since AI cannot be held legally or constitutionally accountable, judges must retain full responsibility for every decision, making human oversight indispensable.
4. **Algorithmic Bias and Discrimination:** AI systems trained on historical data may reproduce societal biases based on gender, caste, religion, or socio-economic status, thereby affecting fairness and equality before law.
5. **Privacy and Data Security Risks:** The use of AI in processing sensitive court records raises concerns about data protection, confidentiality, cybersecurity, and the potential misuse of personal information.
6. **Constitutional and Legal Concerns:** Unchecked reliance on AI may violate constitutional guarantees such as **Article 14 (Equality before Law)**, **Article 21 (Right to Fair Procedure)**, and the principles of natural justice.
7. **Ethical Limitations of AI:** Justice requires empathy, contextual understanding, and moral judgment—qualities that AI lacks—making it unsuitable for core judicial decision-making.
8. **Decline in Professional Standards:** Excessive dependence on AI may discourage independent legal research, critical thinking, and professional diligence among judges and advocates, weakening the quality of justice delivery.

Draft Regulations for Use of AI in Courts, 2026

The Draft Regulations establish a **responsible and human-centric framework** for AI in the judiciary, ensuring AI assists but does not replace judicial decision-making.

1. **Ban on Core Judicial Functions:** AI is prohibited from adjudication, sentencing, bail decisions, and assessing witness or party credibility, as these require human judgment and constitutional accountability.
2. **AI for Assistive Functions:** AI may be used for legal research, translation, document summarization, administrative support, and workflow management to improve court efficiency.
3. **Human Oversight:** Judges remain solely responsible for evaluating evidence, interpreting the law, and delivering reasoned judgments, with AI serving only as a support tool.
4. **Protecting Judicial Integrity:** The framework safeguards judicial independence, due process, and public trust by limiting AI to non-adjudicatory functions.

Directions to the Bar Council of India (BCI)

The Supreme Court directed the **Bar Council of India (BCI)** to strengthen professional accountability in the use of AI by legal practitioners.

1. **Frame Ethical Guidelines:** Develop comprehensive ethical standards governing the responsible use of AI by advocates in legal research and court proceedings.
2. **Establish Disciplinary Framework:** Prescribe clear disciplinary norms and penalties for lawyers who rely on or submit unverified AI-generated legal material before courts.
3. **Prevent AI-Generated Misconduct:** Ensure that fabricated AI-generated judgments or citations are treated as professional misconduct, thereby protecting the integrity of judicial proceedings.
4. **Promote Responsible AI Adoption:** Encourage AI literacy, verification practices, and responsible use of AI tools among legal professionals while preserving professional diligence and accountability.

Way Forward

1. **Adopt a Human-in-the-Loop Approach:** Mandate human verification of all AI-generated outputs to ensure that judges retain ultimate responsibility for judicial decisions.
2. **Develop AI-Specific Judicial Protocols:** Frame standard operating procedures (SOPs) for verifying AI-generated citations, authenticating legal sources, and regulating AI-assisted legal research.
3. **Build AI Capacity in the Judiciary:** Conduct regular AI literacy and digital training programmes for judges, lawyers, and court staff to promote responsible and informed use of AI.
4. **Promote Explainable AI:** Adopt transparent and auditable AI systems whose reasoning and outputs can be independently examined and verified.
5. **Establish an Ethical AI Governance Framework:** Develop AI regulations based on the principles of fairness, transparency, accountability, privacy, and constitutional morality.
6. **Strengthen Professional Accountability:** Introduce strict disciplinary mechanisms against fabricated AI citations, professional negligence, and misuse of AI by legal professionals.
7. **Ensure Secure AI Infrastructure:** Strengthen data protection through robust cybersecurity measures, encryption, privacy safeguards, and compliance with data protection laws.
8. **Enact a Comprehensive Legal Framework:** Formulate clear legal and regulatory standards governing the use of AI in the judiciary, with periodic audits and independent oversight to ensure responsible adoption.

Conclusion

Artificial Intelligence should remain an **aid to justice, not its arbiter**. While AI can improve judicial efficiency, the constitutional responsibility for delivering fair and reasoned justice must always rest with human judges. India must adopt a **Human-Centred AI** approach that upholds the **Rule of Law, Natural Justice, and Judicial Independence**, ensuring that **justice is guided by human wisdom—not AI hallucinations**.

Q. *Artificial Intelligence can improve judicial efficiency, but its unregulated use poses serious risks to the administration of justice. Examine the challenges associated with the use of AI in the Indian judiciary and suggest measures to ensure responsible AI-assisted justice delivery.*

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Prelims Test Series

2.1. ECONOMY

2.1.1. RBI'S NEW FRAMEWORK FOR SCAM COMPENSATION

Why in News?

The **Reserve Bank of India (RBI)** has issued a **pilot framework (effective from 1 January 2027)** to compensate victims of certain digital financial frauds. The framework amends the **2017 RBI Circular on Limiting Liability of Customers in Unauthorised Electronic Banking Transactions** and broadens protection to include victims of **social engineering scams** under specified conditions.



Introduction

India's rapid expansion of digital payments has been accompanied by a rise in cyber frauds such as phishing, OTP theft, and digital arrest scams. While the earlier RBI framework covered only unauthorised transactions, the new framework extends limited protection to victims of fraud-induced transactions, aiming to enhance consumer confidence and trust in digital banking.

Evolution of RBI's Liability Framework

2017 Framework	2026 Amendment (Pilot)
Protection mainly against unauthorised electronic transactions	Extends protection to certain fraud-induced authorised transactions
Covered hacking or bank negligence	Covers coercion-based and fraudulent credential theft
Reporting within 3 working days	Reporting within 5 calendar days
Limited scope	Broader consumer protection

Features of the RBI's New Framework on Compensation for Digital Fraud Victims

1. Expanded Scope: Fraudulent Electronic Banking Transactions (EBTs)

- **Broader Coverage:** Extends protection beyond unauthorised transactions to include fraud-induced authorised transactions.
- **Types Covered:** Includes OTP theft, phishing, fake customer care, digital arrest scams, coercion, and cyber hacking.

2. Compensation Mechanism

- **Compensation Limit:** Covers losses up to **₹50,000**, with reimbursement of **85% of the loss** (maximum ₹25,000).
- **One-Time Benefit:** Compensation can be claimed **only once** during a customer's lifetime.
- **Shared Liability:** Compensation is jointly borne by the **RBI, beneficiary bank, and customer**.

3. Eligibility and Customer Responsibility

- **Timely Reporting:** Fraud must be reported within **5 calendar days** through the **1930 Cyber Helpline**.
- **Due Diligence:** Customers must cooperate with investigations and follow fraud alerts.
- **No Compensation for Negligence:** Claims may be rejected for delayed reporting, ignoring warnings, or sharing banking credentials.

4. Coverage and Limitations

- **Frauds Covered:** Includes digital arrest scams, OTP fraud, phishing, fake bank executives, and credential theft.
- **Pilot Nature:** The framework is implemented as a **pilot from 1 January to 31 December 2027**.

Significance of the RBI's New Scam Compensation Framework

1. Strengthens Consumer Protection

Recognises that victims of fraud through coercion or deception deserve protection, not just those affected by technical hacking.

2. Enhances Trust in Digital Payments

Improves public confidence in UPI and digital banking, encouraging greater adoption of cashless transactions.

3. Promotes Financial Inclusion

Provides a safety net for digital users, particularly first-time and vulnerable customers, fostering inclusive digital finance.

4. Reflects a Behavioural and Legal Shift

Moves beyond the concept of "authorised transactions" to recognise that consent obtained through fraud or coercion is not genuine consent.

5. Encourages Shared Responsibility

Establishes a collaborative framework where the **RBI, banks, and customers** collectively contribute to preventing and mitigating cyber fraud.

Concerns and Limitations of the Framework

1. Limited Compensation

The compensation ceiling of **₹25,000** may be insufficient to adequately cover the financial losses suffered by many victims.

2. Limited Coverage

The framework excludes frauds involving **losses above ₹50,000**, leaving victims of high-value scams without protection.

3. Restrictive Eligibility

The **one-time lifetime compensation** provision may disadvantage customers who fall victim to multiple sophisticated frauds.

4. Subjective Determination of Negligence

Assessment of customer negligence (e.g., ignoring warnings, sharing credentials, or delayed reporting) may lead to disputes and inconsistent decisions.

5. Delayed Grievance Redressal

The **45–60 day complaint resolution period** may delay financial relief and reduce the effectiveness of the compensation mechanism.

Way Forward

1. Expand the Scope of Compensation

Extend the framework to cover **high-value frauds** by increasing the compensation limit beyond the current ₹50,000 threshold.

2. Protect Vulnerable Customers

Introduce **special safeguards** for senior citizens, digitally illiterate users, and rural customers through a risk-based protection framework.

3. Leverage Advanced Technology

Strengthen **AI-driven fraud detection**, behavioural analytics, and real-time transaction monitoring to identify suspicious activities proactively.

4. Improve Grievance Redressal

Reduce complaint settlement timelines and establish **fast-track dispute resolution** for quicker compensation and enhanced consumer confidence.

5. Promote Cyber Awareness and Regulatory Review

Conduct nationwide digital literacy campaigns and periodically review the framework to address evolving cyber fraud techniques and emerging risks

Conclusion

The RBI's new framework marks a significant shift towards **consumer-centric digital financial regulation** by recognising fraud through coercion and deception. While its scope remains limited, it is an important step in strengthening **consumer trust, digital resilience, and confidence in India's digital economy**.

***Q.** The rapid growth of digital financial services has transformed cyber fraud from a technological challenge to a behavioural one. In this context, critically examine the significance and limitations of the RBI's new framework on compensation for digital fraud victims. 15 Marks*

2.1.2. REFORMING INDIA'S ENERGY LANDSCAPE THROUGH THE INSA FRAMEWORK

Context

Managing India's growing energy demand alongside persistent import dependencies necessitates an integrated planning mechanism. In response, a May 2026 INSA policy brief proposes a unified national energy framework to balance sustainable development, energy security, and continuous economic growth.



Introduction

The INSA framework addresses the sheer scale and complexity of India's energy system by synergizing conventional fuels with emerging clean technologies. It underscores the urgent need for deep cross-sectoral coordination to balance rapid domestic renewable expansion, surging industrial demand, economic affordability, and long-term sustainability.

What is the INSA Framework?

- The framework is an integrated planning mechanism that treats India's energy system as an interconnected whole rather than isolated sectors.
- It aims to align diverse energy resources, technologies, and institutions toward common national objectives like net-zero by 2070.
- The mechanism focuses on a four-pillared approach: adequacy, access, affordability, and appropriate sustainability.

Policy Basis

- The framework builds upon the strong foundations laid by successful initiatives like the Saubhagya Scheme and the Pradhan Mantri Ujjwala Yojana.
- It is necessitated by the rapid scaling of renewable energy installed capacity, which grew from approximately 40 GW in 2015 to roughly 260 GW by 2025.
- It was introduced to strategically manage the paradox of expanding domestic production while remaining heavily dependent on imported oil and natural gas.

Significance of the INSA Framework

1. Ensuring Energy Adequacy

- It promotes a reliable and diversified energy supply through a balanced portfolio of conventional and emerging sources.
- This strengthens energy resilience and reduces long-term vulnerabilities through modern infrastructure and digital technologies.

2. Expanding Equitable Access

- The framework emphasizes reliable and equitable energy services for all citizens.
- It advocates strengthening last-mile delivery, improving service quality, and expanding decentralized energy solutions where appropriate.

3. Maintaining Economic Affordability

- It ensures the energy transition remains economically viable for households, businesses, and heavy industries.
- This is supported by innovative financing mechanisms, efficient markets, and consumer-focused safeguards.

4. Appropriate Sustainability

- It pursues sustainability in alignment with India's unique developmental priorities and resource endowments, rejecting a one-size-fits-all approach.
- This localized approach supports workforce development, protects local communities, and creates region-specific transition pathways.

5. Viewing Energy as a Whole

- It highlights the value of treating coal, renewables, biomass, natural gas, and clean technologies as a synergistic ecosystem.
- This coordinated approach enhances the effectiveness of long-term strategic planning and capability building.

Key Technological Enablers

1. Circular Economy Integration

- Integrating circular economy principles across sectors complements renewable energy deployment.
- It minimizes resource waste and maximizes the lifecycle value of existing industrial infrastructure.

2. Carbon Capture, Utilisation and Storage (CCUS)

- Scaling up CCUS technologies is crucial for decarbonizing hard-to-abate industrial sectors.
- It allows for continued economic growth while actively reducing national carbon emissions.

Challenges Associated with the Energy Transition

1. Heavy Import Dependence

- Despite expanding domestic production, India remains significantly dependent on imports for oil and natural gas, creating vulnerabilities amidst global geopolitical uncertainties.

2. Surging Energy Demand

- Meeting the steadily growing energy demand driven by continuous economic development and urbanization requires massive, sustained capacity additions.

3. Complex Grid Integration

- Coordinating generation, transmission, and storage becomes technically demanding; integrating 260 GW of variable renewable energy requires advanced grid modernization.

4. Socio-Economic Disruptions

- Transitioning away from legacy fossil-fuel ecosystems can disrupt local economies and workforces, making a "just transition" highly complex to execute.

5. Financing the Transition

- The shift towards modern renewable infrastructure, grid expansion, and clean technologies demands massive capital investments that challenge current domestic financial capacities.

Way Forward

1. Adopt a Phased Implementation Approach

- Near-term priorities must focus on strengthening foundational infrastructure and accelerating renewable deployment before shifting toward the deeper integration of complex low-carbon technologies.

2. Support Emerging Technologies

- Provide dedicated policy and financial backing for scalable alternative fuels, particularly green hydrogen, to create a future-proof energy ecosystem.

3. Develop Institutional Mechanisms

- Establish empowered, cross-sectoral institutions capable of facilitating long-term coordination to eliminate policy silos between ministries handling power, coal, and renewables.

4. Tailor Regional Pathways

- Develop state-specific transition roadmaps that leverage regional geographical advantages and ensure the transition is inclusive of local socio-economic realities.

5. Expand Last-Mile Connectivity

- Continuously invest in decentralized and off-grid energy solutions to ensure uninterrupted, equitable access for remote and marginalized populations.

6. Enhance Consumer Safeguards

- Implement robust market mechanisms and subsidies to protect households and small businesses from the high initial capital costs associated with adopting green technologies.

Conclusion India's energy transition is not only about expanding capacity; it is about creating a resilient, affordable, and sustainable energy system capable of supporting future growth. By providing a common framework for aligning diverse energy pathways, the INSA approach offers a constructive roadmap for advancing national priorities while strengthening energy security for generations to come.

Q. India's transition towards energy self-reliance by 2047 and net-zero emissions by 2070 requires a highly integrated governance approach. Discuss the significance of the unified national energy framework proposed by INSA and its associated challenges. 15 Marks

2.1.3. BALANCING FISCAL PRUDENCE AND DEVELOPMENT NEEDS

Why in News?

The governments of **Kerala** and **Tamil Nadu** recently released White Papers highlighting the growing burden of State debt, reviving the debate on whether rising State borrowings reflect **fiscal irresponsibility or structural fiscal constraints within Indian fiscal federalism**.



Core Issue

The rising debt of State governments is often viewed as fiscal mismanagement. However, the larger issue is the **structural mismatch between:**

- High developmental responsibilities assigned to States
- Limited taxation powers available to them
- Increasing dependence on borrowings

Thus, State debt is not merely a financial problem but a **fiscal federalism challenge**.

Constitutional & Institutional Linkages

- **Article 280 – Finance Commission:** Provides for the constitution of the Finance Commission to recommend the distribution of tax revenues between the Union and the States.
- **Article 293 – State Borrowing:** Regulates the borrowing powers of State governments and requires Union approval if a State has outstanding loans from the Centre.
- **Article 246A – Goods and Services Tax (GST):** Empowers both Parliament and State Legislatures to levy and collect GST, creating a dual GST framework.
- **GST Council:** A constitutional body under **Article 279A** that recommends GST rates, exemptions, and policies to ensure cooperative fiscal federalism.
- **Fiscal Responsibility and Budget Management (FRBM) Framework:** Prescribes fiscal deficit and debt targets to promote fiscal discipline and long-term macroeconomic stability.
- **State Development Loans (SDLs):** Marketable securities issued by State governments to raise funds for financing fiscal deficits and developmental expenditure.

Fiscal Dilemma of Indian States

1. Greater Expenditure Responsibilities

State governments are primarily responsible for delivering essential public services such as **health, education, agriculture, irrigation, rural development, social welfare, and local infrastructure**, making them the largest providers of welfare and development.

2. Limited Revenue-Raising Powers

Despite their extensive responsibilities, States have limited taxation powers and mainly rely on **SGST, State excise, stamp duty, motor vehicle tax, and transfers from the Union Government** to finance their expenditure.

3. Vertical Fiscal Imbalance

A structural mismatch exists because **States bear a larger share of public expenditure while the Union retains most buoyant taxation powers**, resulting in dependence on fiscal transfers.

4. Emergence of Fiscal Deficits

When **government expenditure consistently exceeds its revenue receipts**, States incur fiscal deficits that must be financed through additional borrowing.

5. Rising Debt and Interest Burden

Persistent fiscal deficits lead to **higher market borrowings and growing outstanding debt**, increasing interest payments that consume a significant share of State budgets.

6. Shrinking Fiscal Space for Development

As a larger portion of revenue is spent on **salaries, pensions, and interest payments**, States have limited fiscal space for productive capital investments such as infrastructure, education, research, and public transport, constraining long-term economic growth.

Kerala: A Case Study on the Fiscal Tightrope of State Governments

1. High Social Investment and Human Development

Since the 1960s, Kerala has prioritised spending on **education, healthcare, and social welfare**, creating the "Kerala Model of Development." This has resulted in **high literacy, better health outcomes, and one of India's highest Human Development Index (HDI) scores**, demonstrating the long-term benefits of sustained social investment.

2. Strong Social Spending but Limited Fiscal Capacity

Kerala spends **30% more per capita on social sectors** than the national average and has **1.5 times higher own-tax revenue per capita**. However, its **share in Union tax devolution (1.92%) is lower than its population share (2.6%)**, highlighting the problem of **vertical fiscal imbalance**.

3. High Committed Expenditure Limits Capital Investment

A major share of Kerala's budget is spent on **salaries (20%), pensions (15.3%), and interest payments (16.5%)**, leaving only **10% for capital expenditure**. This restricts investment in infrastructure, research, higher education, and public transport needed for future growth.

4. The Fiscal Trap

Reducing spending on **salaries, pensions, and welfare** could weaken Kerala's social achievements, while maintaining high revenue expenditure limits capital investment. As a result, the State struggles to create quality jobs and diversify its economy.

5. Private Prosperity but Weak Public Investment

Despite visible private wealth and high household savings, Kerala's **Credit-Deposit Ratio (66%)** is well below the national average (76%), indicating that local savings are not adequately channelled into productive investment within the State.

Comparison with China: Lessons for State-Level Development Financing

1. Decentralised Sub-National Financing

Chinese provincial and local governments enjoy greater fiscal autonomy and play a central role in financing development projects. This flexibility enables large-scale infrastructure creation and supports rapid economic growth.

2. Diversified Sources of Finance

Local governments mobilise resources through **Local Government Bonds (LGBs), land sales, Local Government Financing Vehicles (LGFVs), and central transfers**. This diversified financing model provides stable long-term funds for development.

3. Large-Scale Public Investment

Easy access to finance allows Chinese local governments to invest heavily in **infrastructure, urban development, industrial parks, and public utilities**, boosting productivity, employment, and industrialisation.

4. Lower Cost of Borrowing

Chinese local governments borrow at around **2% interest**, compared to **6.5–7.5% for Indian States**. Lower borrowing costs reduce the interest burden and create greater fiscal space for productive capital expenditure.

Structural Issues in Indian Fiscal Federalism

1. Vertical Fiscal Imbalance

States are responsible for delivering most public services such as health, education, agriculture, and rural development, requiring substantial public expenditure. However, major taxation powers remain with the Union Government, creating a mismatch between expenditure responsibilities and revenue-generating capacity.

2. Borrowing Constraints and Limited Fiscal Flexibility

Under **Article 293 of the Constitution**, States require the Union Government's approval for borrowing if they have outstanding Union loans, limiting their financial independence. In addition, borrowing limits under FRBM norms further restrict States from raising adequate funds even for productive developmental projects.

3. High Cost of Borrowing

States mainly borrow through **State Development Loans (SDLs)**, which carry higher interest rates than Union Government securities. This increases the debt servicing burden, leaving fewer financial resources for development and welfare expenditure.

4. Limited Fiscal Autonomy

A significant portion of State finances comes from **tax devolution, Finance Commission grants, and Centrally Sponsored Schemes**, making States dependent on the Union Government. Since many of these transfers are tied to specific schemes, States have limited flexibility to design policies according to their own developmental priorities.

5. Why Higher State Borrowing Can Be Justified

Borrowing is economically beneficial when it finances productive assets such as **roads, universities, metro rail, irrigation projects, and digital infrastructure**. Such investments improve productivity, generate employment, expand the tax base, and support sustainable long-term economic growth, making them examples of **good debt**.

6. Need for Fiscal Prudence in Borrowing

Excessive borrowing can lead to rising interest payments, debt sustainability concerns, and a growing burden on future generations. Therefore, States should ensure that borrowed funds are used primarily for **capital expenditure and asset creation**, rather than financing recurring revenue expenditure or short-term populist schemes.

Way Forward: Strengthening the Fiscal Capacity of State Governments

1. Strengthen Fiscal Federalism

States should be provided with **greater fiscal autonomy** along with a more predictable and equitable system of tax devolution. A rational sharing formula that reflects expenditure responsibilities and development needs would enable States to plan and finance long-term development more effectively.

2. Reduce the Cost of Borrowing

The borrowing cost of States can be reduced by **lowering the interest spread on State Development Loans (SDLs)**, improving State credit ratings, and developing deeper and more liquid bond markets. Affordable borrowing will reduce the interest burden and create greater fiscal space for developmental expenditure.

3. Increase Capital Expenditure

States should prioritise investments in **infrastructure, public universities, research and innovation, green energy, and urban transport**, as these create productive assets and enhance long-term economic growth. Higher capital expenditure also crowds in private investment and generates employment.

4. Mobilise Domestic Savings for Development

States should develop financial mechanisms that channel **local household savings into productive public investments**, such as infrastructure bonds and development funds. Better utilisation of domestic savings can reduce dependence on expensive market borrowings while accelerating regional development.

5. Strengthen Public Financial Management

Governments should adopt **outcome-based budgeting, efficient expenditure management, timely project implementation, and transparent debt management practices**. Improved fiscal governance will ensure better utilisation of public resources, reduce wasteful expenditure, and enhance public accountability.

6. Promote Productive and Sustainable Borrowing

Borrowed funds should be directed primarily towards **asset creation, infrastructure development, and human capital formation** rather than financing recurring revenue deficits. Productive borrowing generates future economic returns, strengthens the tax base, and ensures long-term fiscal sustainability.

Conclusion

State debt should be viewed through the lens of **fiscal federalism**, not merely fiscal deficits. The need is to strengthen States' fiscal capacity through **greater autonomy, affordable borrowing, and productive investment**, ensuring that prudent debt becomes a catalyst for **inclusive and sustainable economic growth**.

Q. The fiscal stress faced by State governments reflects structural challenges in India's fiscal federalism rather than merely poor fiscal management. Discuss. 15 Marks

2.2. SCIENCE & TECHNOLOGY

2.2.1. A HOLD ON AI – BALANCING INNOVATION, REGULATION AND GLOBAL EQUITY

Why in News?

The **United Nations' Preliminary Report of the Independent International Scientific Panel on AI** highlights the urgent need for global AI governance, emphasizing widening inequalities between the Global North and the Global South and the risks posed by unregulated AI development.

Introduction

Artificial Intelligence (AI) promises transformative benefits in healthcare, education, scientific research, agriculture and governance. However, its rapid and largely unregulated expansion raises concerns over **economic concentration, technological dependence, misinformation, privacy, democracy and global inequality**.



Why AI Holds Great Promise

1. Accelerating Scientific Research

- **Faster drug discovery:** AI rapidly analyzes biological data to identify potential drug candidates, reducing research time and costs.
- **Climate modelling:** AI improves the accuracy of weather forecasting and climate simulations, enabling better adaptation and disaster preparedness.
- **Space exploration:** AI assists in autonomous spacecraft operations, satellite data analysis, and planetary exploration.
- **Material science innovations:** AI accelerates the discovery of new materials for clean energy, electronics, and advanced manufacturing.

2. Improving Governance

- **Better public service delivery:** AI enhances the efficiency and accessibility of government services through automation and data-driven decision-making.
- **Predictive governance:** AI helps governments anticipate challenges such as disease outbreaks, crime, and infrastructure failures for proactive policymaking.
- **Smart cities:** AI optimizes traffic management, energy consumption, waste management, and urban planning for sustainable cities.
- **Digital Public Infrastructure:** AI strengthens platforms like digital identity, payments, and public service delivery by making them more intelligent and user-centric.

3. Economic Growth

- **Higher productivity:** AI automates repetitive tasks and supports better decision-making, increasing efficiency across industries.
- **New industries:** AI drives the emergence of sectors such as autonomous vehicles, generative AI, robotics, and intelligent manufacturing.
- **Employment in the AI ecosystem:** AI creates new opportunities in AI development, data science, cybersecurity, and digital services, even as it transforms existing jobs.
- **Innovation-driven economy:** AI fosters research, entrepreneurship, and technological innovation, enhancing global competitiveness.

4. Social Development

- **Precision agriculture:** AI enables optimized irrigation, crop monitoring, and pest management, improving agricultural productivity and sustainability.
- **Personalized education:** AI tailors learning content and assessments to individual student needs, improving educational outcomes.
- **Healthcare diagnostics:** AI assists in the early detection and accurate diagnosis of diseases through medical imaging and predictive analytics.
- **Disaster prediction:** AI analyzes real-time data to forecast floods, cyclones, earthquakes, and other disasters, enabling timely response and risk reduction.

Major Challenges of Artificial Intelligence (AI)

1. Widening Global AI Divide

AI development is concentrated in a few advanced economies with superior computing infrastructure, capital, semiconductor access, skilled talent, and energy resources, leaving developing countries technologically dependent and vulnerable to digital colonialism.

2. Concentration of AI Power in a Few Corporations

A handful of technology companies dominate frontier AI, creating monopolies over foundational models, limiting transparency and competition, and allowing corporate interests to significantly influence public policy and global AI governance.

3. Weak AI Governance and Regulatory Gaps

The rapid pace of AI innovation far exceeds governments' regulatory capacity, while many developing countries lack the expertise, legal frameworks, and institutional resources needed to effectively regulate advanced AI technologies.

4. Threats to Democracy, Society, and Information Integrity

AI-powered deepfakes, misinformation, automated propaganda, and emotionally manipulative chatbots undermine democratic processes, erode public trust, distort public discourse, and pose risks to mental health and human dignity.

5. Privacy, Economic, and Ethical Concerns

AI's dependence on massive datasets raises concerns about surveillance, data misuse, algorithmic bias, and loss of privacy, while automation may lead to job displacement, wealth concentration, and financial instability driven by speculation around advanced AI.

6. Cybersecurity and National Security Risks

AI enhances the sophistication of cyberattacks through automated hacking, malware generation, phishing, and attacks on critical infrastructure, while dependence on foreign AI technologies creates strategic vulnerabilities and weakens digital sovereignty.

Challenges for India in the AI Era

1. Dependence on Foreign AI Ecosystems

India relies heavily on foreign-developed AI models, cloud infrastructure, and semiconductor technologies, creating strategic vulnerabilities and limiting technological sovereignty.

2. Inadequate AI Infrastructure

The shortage of high-performance computing resources, advanced GPUs, data centres, and semiconductor manufacturing constrains India's ability to develop globally competitive AI systems.

3. Evolving Regulatory and Governance Framework

India lacks a comprehensive AI governance framework covering liability, ethical standards, data governance, algorithmic accountability, and risk-based regulation.

4. Brain Drain and Skill Retention

The migration of highly skilled AI researchers and engineers to global technology firms weakens India's innovation ecosystem and reduces its capacity to build indigenous frontier AI.

Way Forward

1. Establish a Responsible AI Governance Framework

Adopt a risk-based regulatory framework with mandatory AI audits, transparency requirements, explainable AI, and clear liability norms to ensure that AI systems remain safe, accountable, and aligned with human rights.

2. Build an Inclusive Global AI Governance Architecture

Strengthen international cooperation through a **UN-led AI governance framework** that develops common standards for AI safety, ethical use, cross-border accountability, and ensures meaningful participation of developing countries in global decision-making.

3. Bridge the Global AI Divide

Promote equitable access to AI by expanding affordable computing infrastructure, facilitating technology transfer, supporting open-source AI models, and building technical capacity in developing countries to prevent digital inequality.

4. Strengthen India's Indigenous AI Ecosystem

Invest in domestic AI capabilities through the **IndiaAI Mission**, indigenous foundation models, semiconductor manufacturing, AI research, skilled human resources, and national computing infrastructure to enhance technological self-reliance.

5. Safeguard Democracy and Citizens' Rights

Develop robust mechanisms to detect deepfakes, curb AI-enabled misinformation, ensure platform accountability, strengthen election integrity, and improve digital literacy to protect democratic institutions and public trust.

6. Promote Ethical and Public-Interest AI

Protect journalism, intellectual property, and personal data through fair compensation for content creators, responsible data governance, copyright safeguards, and increased public investment in AI research for social and developmental outcomes.

Conclusion

Artificial Intelligence can become a powerful driver of inclusive growth and scientific progress only if innovation is balanced with ethical governance, accountability, and global cooperation. A human-centric and responsible AI framework is essential to ensure that AI serves humanity while safeguarding democracy, equity, and fundamental rights.

***Q.** Artificial Intelligence has the potential to transform economies and societies, but its rapid advancement also poses significant governance, ethical, and security challenges. Examine the major challenges associated with AI and suggest measures for building a responsible and inclusive AI governance framework. 15 Marks*

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