

Prelims Exam Topics

EARTHQUAKE LIGHTS (EQLS)

Context

Researchers are using geological physics to explain "Earthquake Lights" (EQL), the mysterious bluish flashes seen during the Turkey-Syria tremors.

About Earthquake Lights (EQLs)

- Earthquake lights are luminous aerial phenomena that appear in the sky in areas of tectonic stress, seismic activity, or volcanic eruptions. They can manifest as:
 - **Stationary Glows:** Similar to the Aurora Borealis but hovering near the ground.
 - **Flashes:** Quick, lightning-like bursts that appear to emerge from the earth rather than the clouds.
 - **Floating Orbs:** Luminous spheres that can persist for several minutes.
- **Scientific Theories behind EQLs**
 - **P-Type Semiconductor Effect:** Extreme pressure on rocks like **basalt** breaks their chemical bonds. This releases "holes" of positive electrical charge that rush to the surface, ionizing the air and creating a visible glow.
 - **Triboluminescence:** This is light created by friction. As tectonic plates grind, pull apart, or crush together, the energy from breaking mineral bonds is released as flashes of light.
 - **Piezoelectric Effect:** When **quartz crystals** are compressed by seismic stress, they generate high-voltage electric fields. Scientists believe this electricity might be strong enough to light up the sky.
 - **Atmospheric Ionization:** Earthquakes can squeeze **radon gas** out of the crust. This gas ionizes the surrounding air, which can form floating "plasma balls" or glowing orbs near the ground.

THE CAG REPORT ON JAMMU & KASHMIR'S VANISHING LAKES

Context

A recent report by the Comptroller and Auditor General (CAG) of India has sounded a dire alarm regarding the aquatic health of Jammu & Kashmir.

Key Highlights

- 315 lakes (45% of the total) have vanished entirely, erasing 1,537 hectares of water area.
- 203 lakes (29%) saw their water area decrease by over 1,314 hectares.
- In 63 lakes, the water area has shriveled by 50% or more, placing them at immediate risk of total extinction.
- **Major threats:** Encroachment, construction works, and shifting land-use patterns have led to increased aquatic vegetation and a loss of open water area.
- **Impact:** Lakes act as "flood balancing reservoirs." Their shrinkage was cited as a major cause for the catastrophic September 2014 floods in J&K

Lakes in Jammu and Kashmir

Lakes	Details
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<p>Wular Lake (Bandipora)</p>	<ul style="list-style-type: none"> ● One of the largest freshwater lakes in Asia; formed by tectonic activity. ● Status: A designated Ramsar Site (Wetland of International Importance). ● Hydro-Role: Fed by the Jhelum River and acts as a massive natural sponge for the valley. ● Livelihood: Provides nearly 60% of J&K's fish yield and is a major source of water chestnuts (<i>singhara</i>).
<p>Dal Lake (Srinagar)</p>	<ul style="list-style-type: none"> ● Known as the "Jewel in the Crown of Kashmir"; a post-glacial lake with four main basins-Gagribal, Lokut Dal, Bod Dal, and Nagin. ● Unique Feature: Famous for its Houseboats, Shikaras, and the Floating Vegetable Market. ● Floating Gardens: Local communities create "Radh" (floating gardens) made of matted weeds and silt to grow vegetables. ● Crisis: Faces severe eutrophication (nutrient overload) due to urban sewage and runoff.
<p>Hokersar (Srinagar outskirts)</p>	<ul style="list-style-type: none"> ● A world-renowned bird sanctuary and a critical wetland. ● A vital stop on the Central Asian Flyway for millions of birds from Siberia and Europe. ● Hydrology: Serves as the primary flood-absorption basin for the Doodhganga flood channel. ● Threat: Rapidly shrinking due to siltation and encroachment by paddy fields.
<p>Manasbal Lake (Ganderbal)</p>	<ul style="list-style-type: none"> ● Considered the deepest lake in Kashmir (approx. 13 meters). ● Famous for the abundance of Lotus (<i>Nelumbo nucifera</i>) flowers during July and August. ● Heritage: Located near the remains of Darogabagh, a 17th-century Mughal fort (Jharokha Bagh). ● A major haunt for aquatic birds; it has no major outgoing stream, being primarily fed by internal springs.
<p>Surinsar Lake (Jammu)</p>	<ul style="list-style-type: none"> ● Often grouped with Mansar; it is located about 24 km from Jammu city. ● Legend says it was created by an arrow shot by the Mahabharata warrior Arjun. ● Environment: Surrounded by thick mangrove and pine forests; it is a protected sanctuary for freshwater turtles. ● Status: Together with Mansar, it is a designated Ramsar Site (Surinsar-Mansar Lakes).
<p>Mansar Lake (Jammu)</p>	<ul style="list-style-type: none"> ● A high-altitude freshwater lake situated on the forest-covered hills of the Shivalik range. ● Religious Site: A major pilgrimage spot; a temple dedicated to Sheshnag

(the Lord of Serpents) is located on its eastern bank.

- **Biodiversity:** Home to seasonal migratory birds, various fish species, and the **spotted pond turtle**.

THE CHAMBAL CRISIS: SAND MINING AND THE THREAT TO A LOTIC ECOSYSTEM

Context

The Supreme Court of India recently took suo motu cognizance of the sand mining crisis in the National Chambal Gharial Sanctuary, labeling the mining mafia as "modern dacoits."

Ecological Profile of National Chambal Gharial Sanctuary

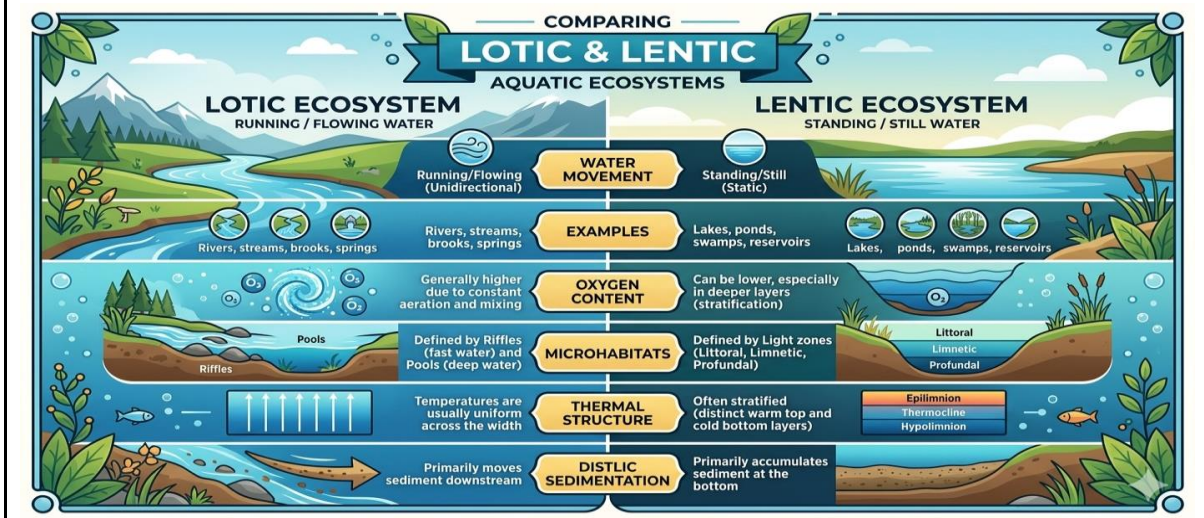
- The National Chambal Sanctuary is a protected riverine (lotic) ecosystem spanning three states: Rajasthan, Madhya Pradesh, and Uttar Pradesh.
- It is a critical habitat for three "flagship" species that depend on sandbars and sandbanks for nesting and basking: Gharial: Critically Endangered, Red-crowned Roofed Turtle: Critically Endangered and Ganges River Dolphin: Endangered.

LOTIC ECOSYSTEMS

A lotic ecosystem refers to a freshwater habitat with continuously moving water flowing in a single direction, such as rivers, streams, and springs.

Key Characteristics

- **High Oxygen Levels:** Because the water is constantly moving and mixing with the air (turbulence), lotic systems are generally better oxygenated than still water.
- **Physical Zonation:** They change physically along their length, moving from narrow, fast, and cold "headwaters" to wide, slow, and warmer "floodplains."
- **Unique Adaptations:** Organisms often have specialized features to resist being washed away, such as the streamlined bodies of trout or the suction-cup-like undersides of certain insect larvae.



Key Challenges

- **Jurisdictional Gaps:** The sanctuary's tri-state border allows mining syndicates to exploit administrative silos. When one state cracks down, miners slip across the border into another jurisdiction.
- **Technological Warfare:** Mining groups have evolved from local gangs into sophisticated syndicates using **GPS, mobile tracking apps**, and villagers as informants to monitor patrol movements.
- **State Paralysis & Violence:** Between 2017 and 2024, the region witnessed extreme violence, including the killing of forest guards and police. Syndicates are often better armed (using semi-automatic weapons) than local forest departments.
- **The Legalization Gambit:** In a move reflecting administrative frustration, Madhya Pradesh and Rajasthan recently attempted to **legalize sand mining** in certain districts within the sanctuary to regulate it. However, the **National Green Tribunal (NGT)** and the Supreme Court blocked these proposals to prevent ecological collapse.
- **Socio-Economic Roots:** The harsh geography of the Chambal ravines makes traditional agriculture difficult. Lack of alternate livelihoods pushes local youth to become "foot soldiers" for the sand mafia.

Way Forward

- **Restoring Lawful Livelihoods:** Lasting change requires providing the youth in the Gwalior-Chambal region with viable, legal employment alternatives to break the mafia's recruitment cycle.
- **Strengthening the Regulator:** The Supreme Court's role should focus on **disciplining the existing regulators** (State Forest Departments and the NGT) rather than replacing them. Ensuring these bodies have the equipment, personnel, and legal backing is crucial.
- **Inter-State Coordination:** Establishing a **Unified Chambal Task Force** involving Rajasthan, MP, and UP to synchronize patrols and intelligence sharing.
- **Strict Legal Enforcement:** Utilizing stringent laws like the **National Security Act (NSA)** and state-specific **Goonda Acts** against kingpins, as suggested by the Supreme Court, to dismantle the syndicate hierarchy.

DELHI'S AIR POLLUTION MITIGATION ACTION PLAN 2026: A SCIENTIFIC PIVOT?

Context

The Delhi government has announced its Air Pollution Mitigation Action Plan 2026.

Key Pillars of the 2026 Plan

The plan shifts away from "band-aid" measures (like smog towers or mist sprays) toward tackling pollution at its origin:

- **Transport & Mobility:** * Targeting a bus fleet of **13,760 by 2028-29**, primarily electric.
 - Installing **32,000 EV charging points** over the next four years.
 - Restricting entry to low-emission **BS6/CNG** goods vehicles and EVs from November 1.
 - Strict enforcement of **Pollution Under Control (PUC)** certificates for fuel access.
- **Infrastructure & Dust Control:** Redeveloping **3,500 km of roads** with paved surfaces and green buffers to mitigate road dust.
 - Implementing a scientific **Road Asset Management System** for time-bound pothole repairs.

- **Waste Management:** Setting deadlines to clear legacy landfills: **Okhla (July 2026)**, **Bhalswa (December 2026)**, and **Ghazipur (December 2027)**.
- **Industrial Monitoring:** Deploying **Online Emission Monitoring Systems (OCEMS)** for industrial units to track discharge in real-time.

UNDERSTANDING GRAP: DELHI NCR AIR QUALITY ACTION PLAN

STAGE / POLLUTION LEVEL	KEY STEPS TAKEN			
GRAP OVERVIEW GRAP: GRADED RESPONSE ACTION PLAN INTRODUCED: 2017 HOLISTIC & AQI-BASED CURBS AIR POLLUTION IN DELHI NCR	KEY HISTORY 2016 SC ORDER (M. C. MEHTA) UNTIL 2020: EPCA (SC-APPOINTED) SINCE 2020: CAQM (STATUTORY BODY)			
1. MODERATE TO POOR PM _{2.5} (61-120 µg/m ³) PM ₁₀ (101-350 µg/m ³)	EDUCATE & AWARE (Social Media, Apps)	STRICT VIGILANCE (Thermal Power Plants)	MECHANIZED SWEEPING	FIRECRACKER BAN
2. VERY POOR PM _{2.5} (121-250 µg/m ³) PM ₁₀ (351-430 µg/m ³)	STOP DIESEL GENSETS	ENHANCE PARKING FEES (3-4x)	INCREASE BUS & METRO	STOP COAL/FIREWOOD IN EATERIES
3. SEVERE PM _{2.5} (>250 µg/m ³) or PM ₁₀ (>430 µg/m ³)	CLOSE KILNS & PLANTS (Brick, Hot Mix, Stone Crushers)	INCREASE MECHANIZED SWEEPING FREQUENCY	WATER SPRINKLING ON ROADS	ENCOURAGE PUBLIC TRANSPORT
4. SEVERE+ OR EMERGENCY PM _{2.5} (>300, >300 µg/m ³) PM ₁₀ (>500, 48+ HOURS)	STOP TRUCK ENTRY TO DELHI	STOP CONSTRUCTION	INTRODUCE ODD-EVEN SCHEME (Private Vehicles)	TASKFORCE FOR ADDITIONAL STEPS

Critical Challenges

- **The Firecracker Silence:** A significant omission is the lack of a clear, long-term ban on firecrackers from October to March. Experts argue that without this, winter pollution peaks remain unavoidable.
- **Landfill Displacement:** Critics point out that "clearing" landfills currently involves ferrying waste to other sensitive zones, such as the **Yamuna floodplain**, rather than true scientific flattening and processing.
- **Enforcement vs. Corruption:** While geo-tagging and automated monitoring are proposed for construction sites, the system's success depends on bypassing local-level corruption and ensuring "no exceptions" for violators.
- **Lack of Specific Targets:** The plan currently lacks a **public dashboard** with quarterly emission targets and measurable year-on-year reduction goals from a stated baseline.

Way Forward

- **Transparency:** Shifting to an **open-source dashboard** to track emissions and implementation progress in real-time.
- **Last-Mile Connectivity:** Integrating the **Delhi Metro** and **RRTS** with e-autos and shared mobility to make public transport a viable alternative to private vehicles.
- **Public Cooperation:** Scientific plans require social compliance. The government must foster a sense of "systemic belief" to ensure citizens adhere to tough measures like the PUC mandates and construction bans.

PROSPECTS OF A U.S.–ISRAEL MILITARY VICTORY ARE WEAK

Context

- Despite heavy bombardment and infrastructure damage in the U.S.–Israel strikes , **Iran retains military capacity and strategic leverage**, raising doubts about a decisive military victory.

Why Prospects of a U.S.–Israel Military Victory Are Weak

- **Resilient Missile Arsenal:** Iran retains **dispersed missile and drone stockpiles**, enabling sustained retaliation despite strikes (\approx **50% launch systems reportedly intact**).
- **Asymmetric Warfare:** Iran deploys **low-cost drones/missiles vs expensive missile defence systems**, creating an economic imbalance (interceptors often **>\$1 million each**).
- **Strategic chokepoints:** Iran can threaten the **Strait of Hormuz (~20% global oil trade)** and influence **Bab-el-Mandeb**, raising global economic costs.
- **Anti-Access / Area-Denial Capabilities:** Iran’s **coastal missiles, naval mines, drones, and fast boats** create anti-access zones across the Persian Gulf.
- **Institutional Resilience:** Strong institutions (**Islamic Revolutionary Guard Corps, clerical leadership**) ensure regime survival despite external pressure.
- **National Cohesion:** Iran’s **civilisational identity and nationalism** often strengthen domestic unity during foreign attacks.
- **Limited Internal Revolt:** Ethnic minorities (**Kurds, Baloch, Sunnis**) remain largely integrated; external intervention has not triggered major uprisings.
- **Need for Ground Invasion:** Airstrikes rarely collapse regimes; decisive victory would require **large-scale ground invasion (~90 million population)**.
- **Proxy Escalation:** Iran can widen conflict through **regional networks (Hezbollah, Houthis, militias)**, prolonging war.

PROTOTYPE FAST BREEDER REACTOR (PFBR) ACHIEVES CRITICALITY

Context

- India’s **500 MWe Prototype Fast Breeder Reactor (PFBR)** at Kalpakkam, Tamil Nadu achieved **first criticality**

About Prototype Fast Breeder Reactor (PFBR)

- **Development:** Indigenously designed by **Indira Gandhi Centre for Atomic Research (IGCAR)** and constructed by **Bharatiya Nabhikiya Vidyut Nigam Limited (BHAVINI)** under the **Department of Atomic Energy**.
- **Type:** **Sodium-cooled Fast Breeder Reactor (FBR)** that uses **fast neutrons** rather than moderated neutrons (unlike thermal reactors).
- **Fuel:** **Mixed Oxide Fuel (MOX)** – combination of **Plutonium-239 and Uranium-238**.
- **Breeding Principle:** Fast neutrons convert **fertile U-238 into fissile Pu-239**, allowing the reactor to **produce more fuel than it consumes (“breeding”)**.
- **Thorium Integration:** Future blanket may include **Thorium-232** supporting **Stage-III thorium reactors**.

- **Coolant:** Uses **liquid sodium** (high thermal conductivity, wide temperature range, maintains fast neutron spectrum).
- **Design:** **Pool-type sodium reactor** with **closed fuel cycle** allowing **reprocessing and reuse of nuclear materials**.

Significance of PFBR for India's Three-Stage Nuclear Programme

- **Higher Fuel Efficiency:** Breeder reactors can extract **80–100 times more energy from uranium** compared to conventional reactors.
- **Thorium Utilisation:** India holds **one of the world's largest thorium reserves (~25% global share)**, making Stage III strategically important.
- **Energy Security:** Reduces dependence on **imported enriched uranium**.
- **Low-Carbon Base-Load Power:** Provides **continuous clean electricity** supporting India's climate goals.
- **Strategic Nuclear Capability:** Strengthens expertise in **fuel cycle technologies, reactor physics, advanced materials, and large-scale engineering**.

India's Three-Stage Nuclear Power Programme

Stage	Reactor Type	Fuel Used	Output / By-Product	Role in Programme
Stage I	Pressurised Heavy Water Reactor (PHWR)	Natural Uranium (U-235)	Produces Plutonium-239 in spent fuel	Current operational reactors (≈23 units; ~7.48 GWe capacity)
Stage II	Fast Breeder Reactor (FBR)	Pu-239 + U-238 (MOX fuel)	Breeds more Pu-239 and converts Thorium-232 → U-233	PFBR forms the bridge stage
Stage III	Advanced Thorium Reactors (e.g., AHWR)	Uranium-233 + Thorium-232	Large-scale thorium energy generation	Long-term energy independence

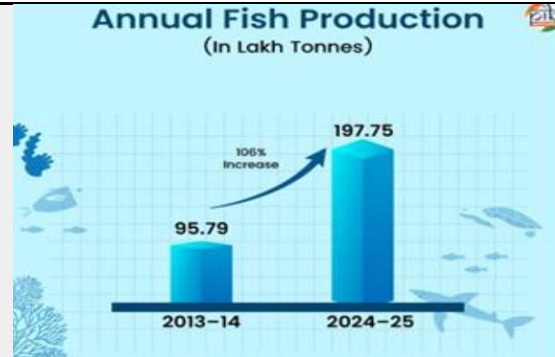
ADVANCING INDIA'S FISHERIES SECTOR

Context

- The Ministry of Fisheries, Animal Husbandry & Dairying highlighted the sector's transformation, supported by a record budgetary allocation of **₹2,761.80 crore in the Union Budget 2026-27**.
- This funding aims to consolidate gains from the **PMMSY and Blue Revolution**, focusing on technology-driven aquaculture, digital governance, and the socio-economic inclusion of over **3 crore fishers**.

Factsheet on Fishery Sector

- **Global Standing:** India is the world's second-largest fish-producing nation, accounting for approximately 8% of global output.
- **Production Growth:** Fish production rose by 106% over the last decade, reaching 197.75 lakh tonnes in FY 2024-25 compared to 95.79 lakh tonnes in FY 2013-14.
- **Economic Contribution:** Fisheries account for 7.43% of Agricultural GVA, the highest share among all agriculture and allied sectors.
- **Export Value:** Seafood exports reached a record ₹62,408 crore in FY 2024-25, with frozen shrimp being the primary export commodity.



Potential of India's Fishery Sector

- **Inland Reservoir Network:** India possesses one of the world's largest inland networks (31.5 lakh hectares), offering massive untapped potential for freshwater aquaculture.
- **Extensive Coastline:** With an 11,099 km coastline and an Exclusive Economic Zone (EEZ) of 24 lakh sq. km, India has vast marine resource potential.
- **Nutritional Security:** As a low-cost source of animal protein, fisheries are vital for combating malnutrition and ensuring national food security.
- **Employment Catalyst:** The sector supports the livelihoods of approximately 30 million people, particularly providing economic stability to marginalized coastal communities.
- **Global Competitiveness:** With growing demand in US and Chinese markets, India has the potential to become the leading global hub for processed seafood and value-added fish products.

Initiatives taken by Government

- **Pradhan Mantri Matsya Sampada Yojana (PMMSY):** Launched in 2020 with an investment of ₹20,050 crore to address critical gaps in fish production, quality, and technology.
- **Kisan Credit Card (KCC) Expansion:** Since 2019, KCC benefits were extended to fishers, providing institutional credit to 4.39 lakh beneficiaries as of 2026.
- **National Fisheries Digital Platform (NFDP):** Launched in 2024 to generate digital identities for fishers and streamline access to insurance and performance-linked incentives.
- **Fisheries and Aquaculture Infrastructure Development Fund (FIDF):** Provides concessional finance for the creation of fishing harbours, cold chains, and landing centers.

Challenges

- **Post-Harvest Losses:** Inadequate cold chain logistics and processing infrastructure lead to significant wastage of the highly perishable catch.
- **Climate Change Vulnerability:** Rising sea temperatures and frequent cyclones disrupt marine ecosystems and threaten the livelihoods of traditional fishers.
- **Low Productivity:** While total production is high, the yield per hectare in many inland water bodies remains far below global benchmarks.

- **Sustainability Concerns:** Overfishing in near-shore waters and the use of non-selective gear threaten long-term resource security in the EEZ.
- **Informal Credit Dependence:** Despite KCC expansion, a large segment of traditional fishers still relies on informal moneylenders due to a lack of documentation or formal identity.

Way Ahead

- **Technology Adoption:** Scale up water-efficient models like Bio-floc and Recirculatory Aquaculture Systems (RAS) to maximize output with minimal land use.
- **Infrastructure Modernization:** Complete the modernization of fishing harbours and landing centers to meet international sanitary and phytosanitary (SPS) standards.
- **Deep-Sea Fishing:** Shift focus from near-shore to deep-sea fishing by providing subsidies for advanced vessels to tap into unutilized EEZ resources.
- **FFPO Empowerment:** Strengthen the 2,195 Fisheries Farmer Producer Organizations to improve the collective bargaining power and market access of small-scale fishers.
- **Sustainable Governance:** Strictly implement the 2025 Sustainable Fisheries Rules for the EEZ to ensure resource conservation and international compliance.

FIRST-EVER ANNUAL SURVEY OF INCORPORATED SERVICES SECTOR ENTERPRISES (ASISSE)

Context

The National Statistical Office (NSO) launched the first-ever Annual Survey of Incorporated Services Sector Enterprises (ASISSE) for the reference period 2024-25.

Background

- ASISSE is a newly established annual statistical exercise designed to collect data from the incorporated (registered) services sector in India. It covers companies registered under the Companies Act (1956/2013) and Limited Liability Partnerships (LLPs) to provide a clear picture of the formal services economy.
- **Organisation Involved:**
 - **National Statistical Office (NSO):** The primary wing responsible for conducting the survey.
- **Aim:**
 - To develop a comprehensive and granular database of the incorporated services sector.
 - To bridge the data gap in the non-agricultural economy, complementing existing surveys like the Annual Survey of Industries (ASI) for manufacturing and ASUSE for the unincorporated sector.
 - To provide policymakers with reliable operational and economic indicators for better planning and analysis.

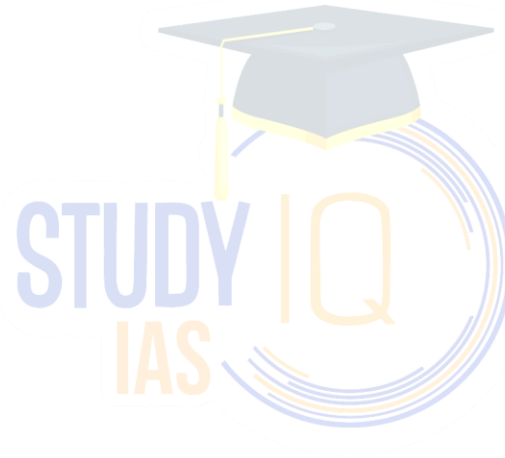
Key Facts about National Statistical Office

- It is the central statistical agency of India responsible for collecting, processing, and disseminating official statistical data.
- The NSO was formed in 2019 by merging two key statistical bodies to improve efficiency, coordination, and data quality in India's statistical system.
- It plays a crucial role in evidence-based policymaking, planning, and governance.

- The NSO is headed by the **Chief Statistician of India (CSI)**, who oversees all statistical activities and ensures coordination between departments..
- It functions under the **Ministry of Statistics and Programme Implementation.**

Key Features

- **Coverage:** Includes trade, transport, hospitality, IT, education, health, and other professional services across all States and Union Territories.
- **Sampling Frame:** The survey utilizes the GSTN (Goods and Services Tax Network) database as the frame to identify and sample enterprises.
- **Sample Size:** Approximately 21 lakh enterprises will be surveyed in this inaugural round.
- **Digital Collection:** Data is collected through a secure, web-based portal to ensure accuracy and speed.
- **Legal Framework:** Conducted under the Collection of Statistics Act, 2008, and updated provisions of the Jan Vishwas Act, 2023.



Mains Exam Topics

CBSES AI PUSH TO TRANSFORM EDUCATION

Context

The Union Education Minister launched the CT & AI curriculum for Classes III–VIII under the Central Board of Secondary Education, marking the beginning of the 2026–27 academic session.

Introduction

Artificial Intelligence (AI) is reshaping education by enabling personalised learning, automating evaluation processes, and improving access to quality resources. As per NASSCOM, India's AI market is expected to grow at a CAGR of 25–35%, reaching nearly \$17 billion by 2027. However, excessive dependence on AI tools may weaken critical thinking abilities, highlighting the need for a balanced approach to integration.

Role of AI is transforming Education

- **From rote to competency based learning:** AI shifts focus to higher-order skills and AI tools (e.g., coding assistants) encourage application-based learning over memorisation.
 - **Eg: A study by OECD (PISA assessments)** show systems emphasising problem-solving outperform rote-based systems.
- **Personalised Learning:** AI tailors educational content according to students' pace, preferences, and strengths, leading to improved comprehension and retention.
 - **Eg: World Bank report** highlights that personalised ed-tech can improve learning outcomes by up to 30% in foundational skills.
- **Automation of Administrative Tasks:** AI streamlines routine tasks such as grading, attendance, and lesson planning, allowing teachers to focus more on interactive teaching.
 - **Eg: Tools like Gradescope** help educators assess assignments quickly and efficiently.
- **Improved Access to Education:** AI-powered platforms provide online learning and translation services, making quality education accessible across geographies.
 - **Eg: Microsoft's Reading Progress** supports students with dyslexia through personalised feedback.
- **AI as a Virtual Tutor:** AI-based assistants offer round-the-clock academic support by answering queries and explaining concepts.
 - **Eg: Tools like ChatGPT and IBM Watson** assist students in problem-solving and learning.
- **Future workforce readiness:** AI prepares students for changing job requirements and digital skills.
 - **Eg: The World Economic Forum Future of Jobs Report 2025** estimates 39% of core skills will change by 2030, making AI literacy essential for employability.
- **Bridging language barriers:** Diverse and multilingual vision of education while supporting NEP further provides access to technical education with AI integration.
 - **Eg: India's Bhashini initiative** enables translation across Indian languages.

Key challenges

- **Infrastructure gaps:** According to National Sample Survey Office (NSSO) data, only about 24% of Indian households have internet access, with lower penetration in rural areas, limiting AI adoption in schools.
- **Cognitive dependency:** Research in cognitive science (Harvard University) shows over-reliance on digital tools can reduce memory retention and independent problem-solving ability.
- **Assessment issues:** Traditional exams test recall, while AI can generate answers instantly and reports by UNESCO stress the need to move toward competency- and process-based evaluation in AI-integrated education.
- **Data privacy concerns:** India's Digital Personal Data Protection Act 2023 highlights risks of cross-border data flows, especially when students use global AI platforms storing data on foreign servers.
- **Bias in AI systems:** Studies by MIT show AI models trained on Western datasets may produce biased or culturally irrelevant outputs, affecting inclusivity.
- **Teacher preparedness:** A UNESCO global survey found that less than 50% of teachers feel adequately trained to use digital technologies, indicating a major capacity gap in AI pedagogy.

Key Highlights of the New CBSE Curriculum

- **Compulsory third Language from Class 6:** From the 2026–27 academic session, students will mandatorily study a third language (R3) starting in Class 6, with at least two Indian languages required. The reform will be fully implemented by Class 10 Board Exams in 2031.
 - Students can choose from all 22 Scheduled Languages, enhancing flexibility and inclusivity. However, only one foreign language (including English) can be opted for in board exams.
- **Alignment with National Education Policy 2020:** The curriculum operationalises the three-language formula, promoting multilingualism and cultural integration.
 - It emphasises mother tongue/regional language-based learning, with study material developed in collaboration with National Council of Educational Research and Training (NCERT)
- **Vocational, Art and Physical Education Made Mandatory:** From 2027–28, vocational education will become compulsory in Classes 9-10 with formal assessment. Art and physical education will also be mandatory, initially evaluated through internal assessments. The aim is to promote holistic development beyond academics.
- **Introduction of Emerging Subjects (AI & Computational Thinking):** Artificial Intelligence and computational thinking will be introduced as modules in Classes 9-10 and gradually made compulsory board subjects by 2029. These are already being introduced from Classes 3-8 to build early digital competencies.
- **Two-Level System for Mathematics and Science:** Students in Class 9 can opt for standard or advanced levels in Maths and Science. The advanced level includes additional content and a separate 25-mark exam, with performance reflected distinctly in mark sheets. This helps identify aptitude and subject strengths early.
- **Phased Implementation Timeline (2026–2031):** The reforms will be rolled out in stages:
 - **2026-27:** Third language begins in Class 6 and AI modules introduced
 - **2027-28:** Vocational education becomes compulsory

- **2028 onwards:** Advanced-level exams introduced
- **2029:** AI becomes a board subject
- **2031:** Full implementation of the three-language formula in Class 10
- **Special Provisions and Flexibility:** International CBSE schools need to offer only one Indian language (instead of two).
 - Schools must provide at least one Indian language as a medium of instruction up to Class 12, reinforcing linguistic inclusivity

Three A's Framework for AI in Education

- **About:** The “Three A’s” framework, namely Adoption, Absorption, and Application, offers a systematic pathway for embedding Artificial Intelligence in education.
 - It aligns with the vision of the National Education Policy 2020 by promoting a technology-enabled learning environment that prioritises critical thinking, ethical awareness, and problem-solving instead of rote memorisation.
- **Adoption (Foundation Stage):** This stage focuses on introducing AI tools into classrooms and familiarising users with them. The aim is to replace hesitation with digital confidence. Students develop basic AI literacy, learn to interact with tools like language models, understand prompt formulation, adapt to new technologies, and identify tasks that can be automated for efficiency.
- **Absorption (Conceptual Stage):** At this level, learners go beyond usage to understand how AI systems function, including their logic, limitations, and ethical concerns.
 - This stage builds critical thinking, enabling students to verify AI outputs, recognise biases, understand probabilistic reasoning, and avoid excessive reliance on technology.
- **Application (Execution Stage):** The final stage emphasises using AI for real-world problem-solving and innovation.
 - Students learn to apply AI in practical domains, engage in design thinking, analyse data, and create solutions, transforming them from passive users into active innovators.

Measures for effective implementation

- **Strengthen national educational technology forum:** Develop a sovereign AI infrastructure for education access.
- **Introduce AI citizenship education:** Teach ethics, privacy, and responsible AI use.
- **Reform evaluation systems:** Shift towards continuous and process-based assessment.
- **Enhance teacher training:** Implement large-scale capacity-building programmes focused on AI pedagogy.

INTERNET CENSORSHIP IN INDIA

Context

Over the last decade, India’s digital landscape has expanded rapidly, making it one of the world’s largest online markets. Alongside this expansion, however, a complex and often non-transparent system of internet regulation and content control has evolved.

Introduction

Access to the internet in India is influenced not only by cost and service quality but also by the Internet Service Provider (ISP), as different providers may restrict access to different websites. ISPs enforce blocking orders issued by the government or courts; however, variations in implementation result in differing lists of blocked sites across providers.

Constitutional Basis

- **Article 19(1)(a)** guarantees freedom of speech and expression, which includes online communication.
- **Article 19(2)** allows reasonable restrictions on grounds such as sovereignty, state security, public order, decency, and morality.
- Any restriction, including shutdowns or blocking, must satisfy the principles of reasonableness and proportionality.

Legal and Regulatory Framework

Information Technology Act, 2000

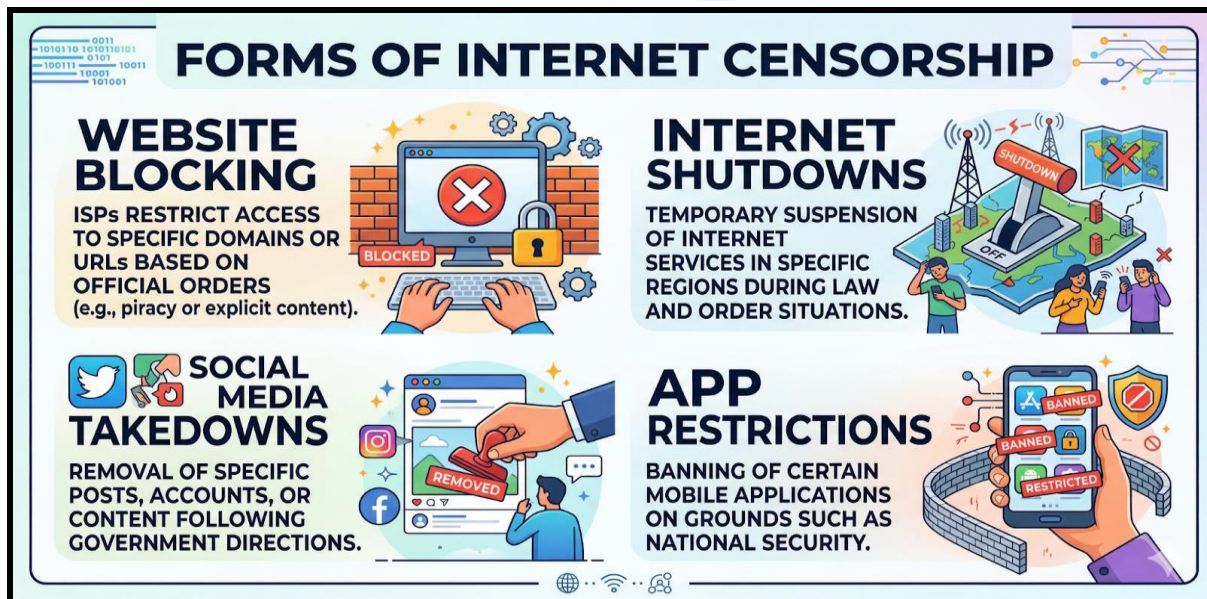
- **Section 69A:** Authorises the government to block online content in the interest of sovereignty, security, and public order.
- **Section 66A (struck down):** Earlier penalised offensive online speech; declared unconstitutional in *Shreya Singhal v. Union of India* (2015).
- **Section 79:** Provides limited liability protection to intermediaries if they follow legal directives.

IT Rules, 2021

- Require identification of the originator of messages, raising concerns about end-to-end encryption.
- Mandate appointment of grievance redressal officers by major social media platforms.
- Criticised for imposing significant compliance obligations.

Telecommunications Act, 2023

- Replaces the earlier Telegraph Act.
- Consolidates powers related to suspension of telecom and internet services.



Key Findings: Scale and Nature of Blocking

- **A 2025 study:** It examined around 294 million domains across six ISPs highlights major trends
 - **Total blocked domains:** 43,083
 - **Uniformly blocked domains:** Only 1,414 across all ISPs
- **Patterns observed**
 - Most blocked sites relate to piracy, file sharing, pornography, and gambling.
 - Greater consistency is seen in blocking sensitive content such as terrorism-related material.
 - Certain platforms and publications have been uniformly restricted across ISPs.
- **Issues identified**
 - **Inconsistent implementation:** ISPs do not uniformly enforce blocking orders
 - **Arbitrary practices:** Some blocking lacks clear legal backing
 - **Lack of transparency:** Blocking orders are not publicly disclosed

Need for reform

- The current system is marked by opacity and uneven enforcement. Differences in access across ISPs create an inconsistent digital environment for users. There is a growing need for:
 - Greater transparency in blocking decisions
 - Clear and uniform implementation standards
 - Improved accountability mechanisms
- Overall, while regulating harmful content is necessary, a more transparent and consistent approach is essential to ensure that internet governance aligns with constitutional values and protects digital rights.

SIXTEENTH FINANCE COMMISSION AND CONCERNS OVER FISCAL FEDERALISM

Context

The recommendations of the Sixteenth Finance Commission, accepted by the Union government, have raised concerns about the direction of fiscal federalism in India. Although the States' share in central taxes remains at 41%, underlying changes suggest a move towards greater central control and reduced fiscal autonomy for States.

Key Changes in fiscal framework

- **Decline in effective devolution:** Even though the official share of States is unchanged, their actual share has reduced due to the growing use of cesses and surcharges, which are not part of the divisible pool. This limits the funds available for distribution among States.
- **Changes in inter-state distribution formula:** The revised criteria for distributing funds among States have adversely affected several regions, especially economically weaker and northeastern States, as their specific needs are not fully reflected in the formula.
- **Discontinuation of statutory grants:** Grants earlier provided under Article 275 of the Constitution of India such as revenue deficit and sector-specific support—have been discontinued, reducing assured financial support for vulnerable regions and tribal areas.

- **Rise of discretionary transfers:** There is increased reliance on grants under Article 282 of the Constitution of India, which are conditional and less predictable, shifting from a rights-based system to a more controlled and uncertain funding mechanism.
- **Greater allocation to local bodies:** A significant portion of funds has been earmarked for panchayats and urban local bodies. While this strengthens grassroots governance, it may alter the traditional fiscal balance between the Centre and the States.

Constitutional concerns

- **Blurring of grant mechanisms:** Treating statutory grants (Article 275) and discretionary grants (Article 282) as similar weakens the constitutional distinction between mandatory support and optional assistance.
- **Impact on federal structure:** The shift from equity-based transfers to performance-based allocations may reduce the autonomy of States, which is a key feature of India's federal system.
- **Changing federal balance:** Placing local bodies at par with States in fiscal distribution risks disturbing the constitutional hierarchy, where States act as the primary link between the Centre and local governments.

Key challenges

- **Rising regional imbalances:** Reduced financial support for weaker States may widen regional disparities, especially in less developed areas.
- **Issues linked to the GST regime:** The shift to a consumption-based tax system under GST has affected revenue patterns, particularly for manufacturing States, and unresolved issues like IGST settlement continue to create challenges.
- **Increasing centralisation:** The growing use of cesses and centrally sponsored schemes limits States' flexibility in spending and increases dependence on the Centre.
- **Weakening of equalisation principle:** The reduced focus on need-based transfers undermines efforts to ensure balanced development across States, particularly for disadvantaged groups.

Way forward

- **Revive need-based grants:** Reintroduce statutory grants to support States based on factors such as poverty levels, population composition, and geographic challenges.
- **Expand the divisible pool:** Include a portion of cesses and surcharges in the divisible pool to ensure that States receive a fair share of total revenues.
- **Address GST-related concerns:** Improve coordination with the GST Council and resolve issues related to tax distribution and compensation mechanisms.
- **Maintain federal balance:** Strengthen local bodies through State governments rather than bypassing them, preserving the constitutional structure.
- **Improve transparency:** Reduce reliance on discretionary transfers and ensure clear, rule-based allocation of funds to enhance accountability.