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Dr. GINDI'S IAS ACADEMY

DAILY CURRENT AFFAIRS

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Dr. GINDI'S I.A.S. ACADEMY
Civils & Competitive Careers
TRANSFORMING ASPIRANTS INTO ACHIEVERS

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A/C CAMPUS

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DAILY CURRENT AFFAIRS

1. Cybersecurity and Critical Infrastructure: NPCIL Kudankulam Data Breach

Key Highlights & Summary

- **NPCIL Clarification:** The Nuclear Power Corporation of India Limited (NPCIL) clarified that the reported data breach at the Kudankulam Nuclear Power Plant (KKNPP) did not impact any nuclear safety or strategic security systems.
- **Affected Segment:** The compromised data relates strictly to the conventional Balance of Plant (BoP) common service facilities, managed via a 2018 contract awarded to Reliance Infrastructure Ltd.
- **Targeted Units:** The data breach specifically targets Units 3 and 4 of the facility, which are currently under construction and slated to become operational by 2027.
- **Plant Architecture:** KKNPP, located in the Tirunelveli district of Tamil Nadu, features six Pressurised Water Reactors of VVER design developed in technical collaboration with Russia.
- **Operational Status:** Units 1 and 2 are fully operational, whereas the remaining units (3 to 6) are in various stages of construction and commissioning.
- **National Security Implications:** While the core control systems remain isolated, the breach highlights the vulnerability of peripheral supply chains linked to India's critical information infrastructure.

Essential Definitions

- **Balance of Plant (BoP):** Supporting components and auxiliary systems of a power plant required to deliver energy, excluding the primary generating unit (e.g., nuclear reactor).

- **VVER (Water-Water Energetic Reactor):** A series of pressurized water reactors originally developed by the Soviet Union (now Russia), utilizing light water as both a coolant and a neutron moderator.
- **Critical Information Infrastructure (CII):** Computer resources whose destruction or incapacitation has a debilitating impact on national security, economy, public health, or safety.

Legal and Constitutional Framework

- **Constitutional Domain:** Atomic energy and nuclear mineral resources fall strictly under Entry 6 of the Union List (List I) of the Seventh Schedule of the Constitution of India.
- **Atomic Energy Act, 1962:** Provides the legal framework for the development, control, and use of atomic energy for peaceful purposes, placing nuclear safety under state regulation.
- **Information Technology Act, 2000 (Section 70):** Empowers the government to declare any computer resource as Critical Information Infrastructure (CII) and protects it against unauthorized access.
- **National Cyber Security Policy:** Sets guidelines for protecting critical infrastructure through agencies like the National Critical Information Infrastructure Protection Centre (NCIIPC) and CERT-In.



Conclusion

The Kudankulam incident underscores that while air-gapped nuclear core systems remain resilient against direct cyberattacks, secondary networks and third-party vendors represent significant vectors of vulnerability. Ensuring the holistic security of India's clean energy transition demands stringent cybersecurity protocols, comprehensive audit mechanisms for private contractors, and the continuous fortification of peripheral infrastructure to neutralize sophisticated cross-border cyber threats.

UPSC Relevance

- **GS Paper II:** Statutory, regulatory, and various quasi-judicial bodies; Government policies and interventions for development in crucial sectors.
- **GS Paper III:** Infrastructure (Energy); Science and Technology developments; Security challenges and their management in border areas; Cyber security and protection of critical national infrastructure.

2. Geopolitics and Economy: India-UK Comprehensive Economic and Trade Agreement (CETA)

Key Highlights & Summary

- **Agreement Operationalisation:** The India-UK Comprehensive Economic and Trade Agreement (CETA) has officially come into force, marking a landmark moment in bilateral economic relations.

- **Tariff Liberalisation:** Under the pact, 99% of Indian goods entering the UK and 90% of UK goods entering India will either be duty-free or subject to significantly reduced tariffs.
- **Domestic Sectoral Boost:** Prime Minister Narendra Modi highlighted that the agreement will provide a substantial boost to Indian farmers and Micro, Small, and Medium Enterprises (MSMEs).
- **Diplomatic Endorsement:** British High Commissioner to India, Lindy Cameron, described the operationalisation of the deal as the "new gold standard" for international trade partnerships.
- **Bilateral Milestone:** The deal represents a deeper strategic convergence between the two nations, opening new avenues for industrial, consumer, and supply chain integration.
- **Economic Outreach:** CETA addresses long-standing trade barriers, enhancing market access for labor-intensive Indian sectors while opening up Indian markets to high-value British products.

Essential Definitions

- **Comprehensive Economic and Trade Agreement (CETA):** A deep integration trade pact that extends beyond traditional tariff reductions to cover services, investments, intellectual property rights, and regulatory cooperation.
- **Rules of Origin:** Rules used to determine the national source of a product, ensuring that tariff concessions under a trade agreement apply only to goods produced within the signatory countries.
- **MSMEs (Micro, Small, and Medium Enterprises):** Small-scale businesses categorized by specific investment and turnover thresholds, forming the backbone of employment and manufacturing in the Indian economy.

Legal and Constitutional Framework

- **Constitutional Jurisdiction:** International treaties, trade agreements, and foreign relations fall exclusively under the Union List (List I) of the Seventh Schedule, under Entry 10 and Entry 13 of the Constitution of India.
- **Article 73:** Specifies the executive power of the Union, which extends to matters with respect to which Parliament has power to make laws, including the conclusion and implementation of international treaties.
- **Article 253:** Empowers the Parliament of India to make any law for the whole or any part of the territory of India for implementing any treaty, agreement, or convention with any other country.
- **Foreign Trade (Development and Regulation) Act, 1992:** Provides the statutory framework for the development and regulation of foreign trade by facilitating imports into and augmenting exports from India.

Conclusion

The operationalisation of the India-UK CETA signifies a paradigm shift in India's external trade strategy, pivoting towards deep, comprehensive institutional arrangements with advanced Western economies. While the tariff cuts present immense opportunities for Indian MSMEs, textiles, and agricultural sectors, the ultimate success of the deal will depend on India's ability to navigate non-

tariff barriers, enhance domestic manufacturing competitiveness, and optimize service-sector mobility to achieve balanced trade growth.

UPSC Relevance

- **GS Paper II:** Bilateral, regional, and global groupings and agreements involving India and/or affecting India's interests; Effect of policies and politics of developed and developing countries on India's interests.
- **GS Paper III:** Indian Economy and issues relating to planning, mobilization of resources, growth, development, and employment; Effects of liberalization on the economy, changes in industrial policy, and their effects on industrial growth.

Electoral Governance: Special Intensive Revision and Digitisation of Electoral Rolls

Key Highlights & Summary

- **Schedule Revision:** The Election Commission of India announced a revised schedule for the Special Intensive Revision (SIR) of the electoral roll in Delhi due to slow progress in data entry.
- **Low Digitisation Rate:** Out of Delhi's 1.45 crore voters, enumeration forms have been distributed to over 99% of electors, but only 14.99% (around 21.75 lakh) have been digitised so far.
- **Deadline Extensions:** The house-to-house visits by Booth Level Officers (BLOs) have been extended to August 8, and the final electoral roll publication is deferred from October 10 to October 19.
- **Laggard Districts:** Old Delhi (9.09%), East Delhi (9.21%), and Southeast Delhi (9.47%) emerged as the worst-performing districts, failing to cross even the 10% digitisation threshold.
- **Administrative Bottlenecks:** The delay stems from public unfamiliarity with the process, the time-consuming nature of correcting errors, and the dual burden on BLOs who fill forms on behalf of citizens.
- **Inclusion Strategy:** The Chief Electoral Office extended the timelines deliberately to minimize data mismatches, ensure error-free verification, and prevent the exclusion of eligible voters from draft rolls.

Essential Definitions

- **Special Intensive Revision (SIR):** A comprehensive process involving house-to-house verification by designated officials to update, correct, and de-duplicate the electoral roll.
- **Electoral Roll:** An official, comprehensive list of all citizens in a specific constituency who are registered and eligible to vote in an election.
- **Booth Level Officer (BLO):** A grass-roots level government functionary, usually a local teacher or government employee, appointed by the Electoral Registration Officer for civic updates.

Legal and Constitutional Framework

- **Article 324:** Vests the superintendence, direction, and control of the preparation of electoral rolls, and the conduct of all elections, in the Election Commission of India.
- **Article 326:** Guarantees universal adult suffrage, establishing that elections to the House of the People and Legislative Assemblies shall be on the basis of adult suffrage.
- **Representation of the People Act, 1950 (Part III):** Governs the allocation of seats and the registration of electors for Parliamentary and Assembly constituencies, including roll maintenance.
- **Registration of Electors Rules, 1960:** Outlines the statutory procedural mechanics for preparing, revising, and publishing electoral rolls, alongside the mechanism for handling claims and objections.

• Worst performing districts

District Name	Enumeration forms distributed	Enumeration forms digitised
Old Delhi	100%	9.09% 
East	99.66%	9.21% 
South East	99.24%	9.47% 
Central	99.75%	11.19% 
North East	100%	11.71% 

1.45 cr Electors in Delhi | Only 14.99% Enumeration forms digitised

Conclusion

The sluggish pace of electoral roll digitisation in the national capital emphasizes structural vulnerabilities within India's ground-level democratic machinery. While administrative extensions prevent the immediate disenfranchisement of citizens, they expose a critical reliance on overburdened grass-roots personnel. Resolving these bottlenecks requires migrating toward intuitive, self-service digital platforms for citizens and building institutional capacity to ensure that error-free, inclusive, and modern databases back democratic exercises.

UPSC Relevance

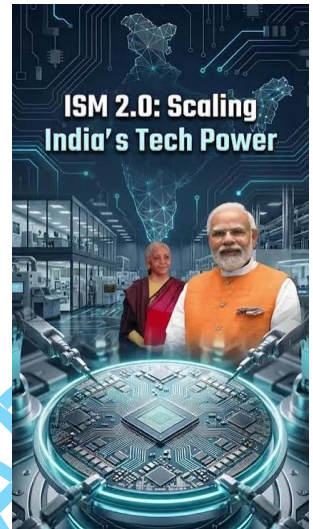
- **GS Paper II:** Appointment to various Constitutional posts, powers, functions, and responsibilities of various Constitutional Bodies; Salient features of the Representation of the People Act.
- **GS Paper III:** Role of media and social-networking sites in internal security challenges, basics of cyber security; Technology missions; Governance applications through digital public infrastructure.

3. Industrial Policy and Strategic Autonomy: India Semiconductor Mission 2.0 and Mobile PLI Expansion

Key Highlights & Summary

- **ISM 2.0 Approval:** The Union Cabinet has approved the second iteration of the India Semiconductor Mission (ISM 2.0) with an enhanced outlay of Rs 1.27 lakh crore to build a comprehensive, full-stack domestic chip ecosystem.
- **Supply Chain Subsidies:** Unlike the uniform capex subsidies of ISM 1.0, ISM 2.0 pivots toward subsidizing the foundational supply chain, targeting ancillary commodities like specialized gases and manufacturing chemicals.

- **Calibrated Financial Incentives:** Under the new structure, silicon fabrication plants will receive a 40% capex subsidy, while other specialized units and advanced packaging facilities will receive 35%, and conventional versions 25%.
- **Strategic Growth Timelines:** The program positions India to achieve domestic design and manufacturing capability for 70-75% of its internal chip requirements by 2029, aiming for top-tier global status by 2035.
- **Mobile Manufacturing Push:** The Cabinet simultaneously cleared a Rs 62,500-crore, five-year follow-on Production Linked Incentive (PLI) scheme for smartphones, offering differentiated incentives between 2.25% to 5% to boost local value addition and domestic R&D.
- **Fertiliser Self-Reliance:** Alongside electronic manufacturing, the Cabinet approved the National Investment Policy (NIP) for Urea-2026 to encourage gas-based manufacturing units and achieve complete self-reliance in fertilizer production.



Essential Definitions

- **Semiconductor Fabrication Plant (Fab):** A highly specialized manufacturing facility where raw silicon wafers are processed and transformed into integrated circuits or microchips.
- **Advanced Packaging (ATMP/OSAT):** Assembly, Testing, Marking, and Packaging (ATMP) or Outsourced Semiconductor Assembly and Test (OSAT) systems that protect chips and ensure their interconnection to device circuit boards.
- **Production Linked Incentive (PLI):** A performance-linked fiscal policy instrument that offers direct financial incentives to companies based on incremental domestic sales of products manufactured within the country.

Legal and Constitutional Framework

- **Constitutional Domain:** Industries, trade, and commerce fall under the Seventh Schedule of the Constitution, governed primarily via Entry 52 of the Union List (Industries under Central control) and Entry 33 of the Concurrent List.
- **Cabinet Committee on Economic Affairs (CCEA):** A top-tier executive body chaired by the Prime Minister that reviews, directs, and finalizes major economic policies, national investments, and industrial financial frameworks.
- **Foreign Trade (Development and Regulation) Act, 1992:** Empowers the central government to formulate development policies and financial frameworks aimed at enhancing India's export competitiveness and high-technology manufacturing.

Conclusion

The rollout of ISM 2.0 and the renewed mobile PLI framework reflect a transition from basic product assembly to complex, high-value component manufacturing. By targeting the raw chemical supply chain and incentivizing local R&D, India aims to reduce its reliance on volatile global supply chains. Achieving true technological sovereignty will require sustained capital inputs, resolving high industrial water and power needs, and generating a highly specialized workforce to support these advanced facilities.

UPSC Relevance

- **GS Paper II:** Government policies and interventions for development in various sectors and issues arising out of their design and implementation.
- **GS Paper III:** Indian Economy and issues relating to planning, mobilization of resources, growth, development, and employment; Effects of liberalization on the economy; Changes in industrial policy and their effects on industrial growth.

4. Infrastructure and Development: The Kerala High-Speed Rail Corridor Debate

Key Highlights & Summary

- **Project Red-Flagged:** The Kerala government has raised significant concerns over E Sreedharan's proposal for a Rs 60,000-crore solar-powered high-speed rail corridor, citing economic and environmental unfeasibility.
- **Feasibility Issues:** An expert committee appointed by the state government noted that the Delhi Metro Rail Corporation's (DMRC) interim report does not present a sustainable economic model.
- **Lack of Freight Component:** The committee highlighted that the corridor relies entirely on passenger traffic without provisions for logistics or freight movement, undermining its financial viability.
- **Resource Constraints:** The expert panel also pointed out that Kerala faces severe limitations in financial resources, making it difficult to sustain a mega-infrastructure project of this scale.
- **Project Specifications:** The proposed Kerala High-Speed Rail (KHSR) is a 473.20-km double-line network with 23 stations connecting Thiruvananthapuram to Kannur, reducing travel time to 3 hours and 30 minutes.
- **Policy Shift:** The current administration has decided to review this proposal after explicitly shelving the controversial SilverLine (K-Rail) project of the previous regime due to persistent environmental concerns.



Essential Definitions

- **High-Speed Rail (HSR):** A type of passenger rail transport that operates significantly faster than traditional rail traffic, utilizing specialized integrated systems of rolling stock and dedicated tracks.
- **Economic Viability:** An assessment of whether the financial returns and broader socioeconomic benefits of a project justify its total capital and operational expenditures.
- **SilverLine (K-Rail) Project:** A previously proposed semi-high-speed rail corridor in Kerala aimed at connecting Kasaragod and Thiruvananthapuram, which faced intense public resistance over land acquisition and ecological impact.

Legal and Constitutional Framework

- **Constitutional Jurisdiction:** Railways fall under Entry 22 of the Union List (List I) of the Seventh Schedule of the Constitution of India, making it a federal subject, though execution often requires state cooperation.
- **State List Intersections:** Land acquisition and economic development fall under Entry 18 of the State List (List II) and Entry 20 of the Concurrent List (List III) respectively, necessitating center-state alignment.
- **Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013:** The statutory framework governing land acquisition, rehabilitation, and resettlement for public infrastructure projects in India.
- **Environment Protection Act, 1986:** Mandates comprehensive Environmental Impact Assessments (EIA) for large-scale infrastructure projects to quantify ecological degradation before granting clearance.

Conclusion

The impasse over Kerala's high-speed rail corridor highlights the classic development-versus-environment dilemma in public policy. Large-scale infrastructure projects in ecologically sensitive regions like the Western Ghats require robust economic structures that balance passenger utility with freight revenue. To move forward, future projects must integrate comprehensive environmental impact assessments and sustainable financing models to avoid long-term fiscal distress and public resistance.

UPSC Relevance

- **GS Paper II:** Government policies and interventions for development in various sectors and issues arising out of their design and implementation; Center-state relations and cooperative federalism in infrastructure.
- **GS Paper III:** Infrastructure: Energy, Ports, Roads, Airports, Railways etc.; Growth, development, and employment; Environmental impact assessment and sustainable development.

5. Accountability and Governance: CAG Report on District Mineral Foundation Trust (DMFT) Deviations

Key Highlights & Summary

- **Systemic Lapses Exposed:** A Comptroller and Auditor General (CAG) audit flagged extensive governance failures, tender violations, and transparency gaps in implementing the Pradhan Mantri Khanij Kshetra Kalyan Yojana (PMKKKY) in Chhattisgarh.
- **Massive Fund Diversion:** Between 2015-16 and 2023-24, Chhattisgarh's DMFT received Rs 13,101 crore, but the audit revealed that the state strayed significantly from its core welfare purpose.
- **Diluted Target Base:** The state rules were deviated from by expanding the definition of "Affected People" to include anyone living or working in mining districts, thereby diluting the benefits intended strictly for vulnerable mining-affected communities.

- **Exclusion of Core Villages:** Despite utilizing Rs 4,536.58 crore (81% of available funds), 754 (44%) of the 1,734 directly affected villages across 11 sampled districts remained entirely uncovered.
- **Non-Eligible Expenditures:** Large sums were irregularly spent on non-welfare items, including welcome gates, collectorate gardens, government office renovations, official vehicles, and grants to private entities.
- **Planning Deficit:** The trust funds were deployed haphazardly without formulating mandatory master plans, vision documents, or annual plans necessary to secure sustainable long-term livelihoods.

Essential Definitions

- **District Mineral Foundation Trust (DMFT):** A statutory non-profit trust set up in mining districts to work for the interest and benefit of persons and areas affected by mining-related operations.
- **Pradhan Mantri Khanij Kshetra Kalyan Yojana (PMKKKY):** A comprehensive welfare scheme launched in 2015 aimed at implementing development programmes in mining-affected areas using DMFT funds.
- **Performance Audit:** An independent assessment conducted by the CAG to evaluate whether government programmes, schemes, or organizations are operating economically, efficiently, and effectively.

Sl. No.	Name of the DMFT	Date of identification of affected areas	Year of identification	Delay* (in months)	Value of works sanctioned before identification of affected areas (₹ in crore)
1	Durg	December 2018	2018-19	34	54.18
2	Mungeli	July 2018	2018-19	29	7.07
3	Kawardha	January 2019	2018-19	35	21.04
4	Raipur	September 2019	2019-20	43	90.57
5	Balodabazar	July 2018	2018-19	29	120.14
6	Bilaspur	July 2017	2017-18	17	98.20
7	Janjgir-Champa	August 2019	2019-20	42	292.30
8	Kanker	April 2020	2020-21	50	116.96
9	Ambikapur	September 2019	2019-20	43	91.21
Total					891.67

(Source: Compiled from the information furnished by DMFTs) * Delay calculated from January 2016 i.e. the date State Government declared 22 districts as mining affected areas.

Legal and Constitutional Framework

- **Article 148-151:** Establishes the constitutional position of the CAG of India, empowering it to audit all receipts and expenditures of the Government of India and the States to ensure public accountability.
- **Mines and Minerals (Development and Regulation) Amendment Act, 2015:** The statutory parent framework that mandated the establishment of District Mineral Foundations (DMFs) across all mining-affected regions in India.
- **Panchayats (Extension to the Scheduled Areas) Act (PESA), 1996:** Mandates that local Gram Sabhas in Schedule V areas must be consulted and empowered to approve socio-economic development plans, directly intersecting with DMFT governance.

Conclusion

The CAG report on Chhattisgarh's DMFT highlights a profound breakdown in the democratic decentralization of natural resource revenue. By diverting resources to administrative infrastructure and expanding beneficiary definitions, the state administration has undermined the core vision of inclusive development for marginalized tribal populations. Rectifying these institutional distortions requires enforcing mandatory social audits, executing legally binding village-level master plans, and imposing strict penalties for any diversion of specialized welfare funds.

UPSC Relevance

- **GS Paper II:** Appointment to various Constitutional posts, powers, functions, and responsibilities of various Constitutional Bodies (CAG); Welfare schemes for vulnerable sections of the population by the Centre and States.
- **GS Paper III:** Government budgeting; Resource mobilization; Inclusive growth and issues arising from it; Environmental and social challenges associated with extractive industries and mining governance.

6. Judicial Administration: SOP for After-Hours Hearing of Urgent Life and Liberty Cases

Key Highlights & Summary

- **SOP for Urgent Matters:** The Supreme Court of India agreed to consider implementing a Standard Operating Procedure (SOP) to facilitate systematic access to constitutional courts during off-duty hours for urgent cases involving life and personal liberty.
- **Judicial Notice Issued:** A three-judge bench presided over by the Chief Justice of India issued notices to High Courts on a plea highlighting the hurdles ordinary litigants face when attempting to access the judiciary at night.
- **Graded Access vs. Denial:** The bench noted that while the court has historically convened at night for extraordinary situations, a structured, graded access system must be defined rather than treating official and unofficial hours identically.
- **Filter Against Vague Pleas:** The judiciary highlighted the administrative challenge of handling vague or non-urgent applications filed by counsels, emphasizing the need for strict filtering mechanisms to determine genuine urgency.
- **Institutional 24x7 Model:** The bench recalled previous requests made to High Courts to explore operating continuously like emergency government hospitals, emphasizing that ground-level implementation blueprints are crucial.
- **Administrative Evaluation:** The Solicitor General suggested that the apex court examine the operationalization of such an after-hours mechanism on administrative grounds rather than immediately directing High Courts to do so.



Supreme Court considers SOP to hear urgent life and liberty cases after working hours



Essential Definitions

- **Standard Operating Procedure (SOP):** A set of step-by-step instructions compiled by an organization to help workers carry out complex routine operations efficiently and uniformly.
- **Constitutional Courts:** Courts explicitly established and empowered by a nation's constitution, which in India includes the Supreme Court and the various state High Courts.
- **Litigant:** A person or entity actively involved in a lawsuit or legal proceedings before a court of law.

Legal and Constitutional Framework

- **Article 21:** Guarantees the protection of life and personal liberty, declaring that no person shall be deprived of their life or personal liberty except according to procedure established by law.
- **Article 32:** Grants the right to move the Supreme Court by appropriate proceedings for the enforcement of Fundamental Rights, acting as the guarantor and protector of these rights.
- **Article 145:** Empowers the Supreme Court, with the approval of the President, to make rules for regulating generally the practice and procedure of the court.
- **Article 226:** Vests discretionary powers in the High Courts to issue directions, orders, or writs for the enforcement of Fundamental Rights and for any other purpose.

Conclusion

The Supreme Court's willingness to institutionalize an after-hours hearing framework marks a progressive step toward absolute judicial accessibility. While protecting life and personal liberty requires the highest level of institutional responsiveness, the judiciary must balance this imperative against administrative overreach and the threat of frivolous litigation. A well-defined, technology-driven SOP that clearly outlines the thresholds of "urgency" will ensure that the gates of justice remain open to vulnerable citizens during emergencies without crippling the administrative capacity of the constitutional courts.

UPSC Relevance

- **GS Paper II:** Structure, organization, and functioning of the Executive and the Judiciary; Ministries and Departments of the Government; Judicial reforms and access to justice; Functions and responsibilities of Constitutional Bodies.

7. Science and Technology: Advanced Synthetic Chemistry and Sustainable Drug Discovery

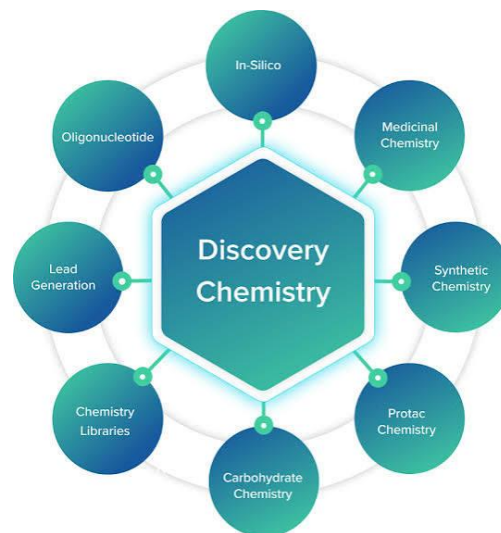
Key Highlights & Summary

- **Breakthrough Discovery:** Scientists at IIT Bombay, in collaboration with the Bhabha Atomic Research Centre, have discovered a novel and efficient method to convert simple, abundantly available straight-chain carbon compounds into complex ring-shaped molecules.
- **Overcoming Long-standing Hurdles:** The newly developed chemical method solves a major problem in synthetic chemistry by eliminating the highly expensive, time-consuming, and multi-step processes traditionally required to alter straight-chain carbon architectures.
- **Precise Chemical Targeting:** The innovation introduces a novel chemical entity capable of selectively targeting a specific carbon atom within a long chain, thereby reducing chemical wastage and minimizing intermediate synthetic steps.
- **Industrial and Pharmaceutical Application:** Researchers successfully utilized the platform to synthesize over 10 biologically relevant molecules used across medicinal chemistry, chemical biology, perfumes, and flavor industries.
- **Lab Synthesis of Rare Compounds:** The method successfully synthesized "muricatacin", a rare molecule with potential anti-cancer properties found naturally in Laxman phal, avoiding the inefficient extraction ratio of just 15mg from 15kg of plant matter.

- **Traditional Medicine Modernisation:** The process acts as a versatile platform that can accelerate the validation, isolation, and cost-effective advancement of active compounds found in traditional medicine systems like Ayurveda into modern mainstream pharmaceuticals.

Essential Definitions

- **Synthetic Chemistry:** A branch of chemical science that focuses on the deliberate design, replication, and construction of complex organic or inorganic molecular structures from simpler chemical building blocks.
- **Straight-Chain Carbon Compounds:** Hydrocarbons, such as fatty acids, in which all the carbon atoms are bonded sequentially to one another in a single continuous linear chain without any side branches.
- **Bioactive Molecules:** Chemical substances or compounds that interact directly with living tissue or cellular components to produce a distinct, measurable biological effect.



Legal and Constitutional Framework

- **Constitutional Jurisdiction:** Development of science, industrial research, and scientific institutions of national importance fall under Entry 63, 64, and 66 of the Union List (List I) of the Seventh Schedule of the Constitution of India.
- **Article 51A(h):** Establishes the Fundamental Duty of every Indian citizen to develop a scientific temper, humanism, and the spirit of inquiry and reform.
- **National Intellectual Property Rights (IPR) Policy, 2016:** Provides the institutional blueprint to promote innovation, accelerate indigenous research, and safeguard patent architectures arising from academic innovations.
- **National Research Foundation (Anusandhan NRF):** Formulated under statutory guidelines to seed, grow, and facilitate high-level research infrastructure across premier Indian academic institutions.

Conclusion

The breakthrough by IIT Bombay marks a pivotal advancement toward green chemistry and self-reliance in high-end pharmaceutical manufacturing. By streamlining the structural modification of basic organic inputs into rare bioactive drugs, the method mitigates industrial reliance on resource-intensive, wasteful manufacturing loops. Scaling this synthetic platform will be vital to decreasing active pharmaceutical ingredient (API) import dependencies and making critical drug discovery more affordable, rapid, and ecologically sustainable.

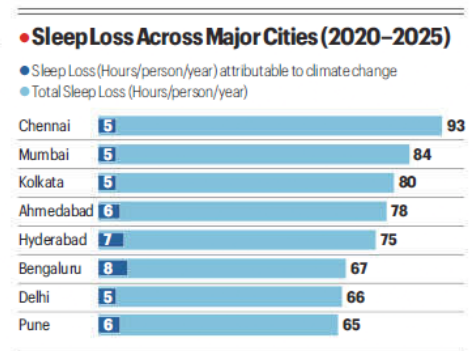
UPSC Relevance

- **GS Paper II:** Government policies and interventions for development in crucial science and health sectors; Issues arising from institutional research frameworks.
- **GS Paper III:** Science and Technology: Developments and their applications in everyday life; Indigenization of technology and development of new technology; Achievements of Indians in science and technology.

8. Climate Change and Urban Health: Rising Night-Time Temperatures and Sleep Deprivation

Key Highlights & Summary

- **Widespread Sleep Loss:** A study by Climate Central covering over 100 Indian cities reveals that residents in major urban centers are losing between 65 and 93 hours of sleep annually due to escalating night-time temperatures.
- **City-Specific Vulnerability:** Chennai recorded the highest overall sleep loss at 93 hours per person annually, followed closely by Mumbai at 84 hours and Kolkata at 80 hours.
- **Anthropogenic Climate Footprint:** At least 10% of this accumulated sleep loss is directly attributable to human-induced climate change, which is driving up night-time temperatures faster than day-time temperatures globally.
- **Regional Variations:** While Delhi and Chandigarh recorded relatively lower losses (about 67 and 62 hours respectively), Bengaluru exhibited the highest climate change footprint, accounting for 12% of its total 67 hours of annual sleep loss.
- **Physiological Impact:** High nocturnal temperatures prevent the human body from cooling down and recovering from daytime heat stress, causing irritability, profound mental and physical fatigue, and reduced daytime productivity.
- **Severe Health Risks:** Prolonged sleep deprivation acts as a major health hazard, significantly increasing the risk of strokes, cardiovascular conditions, accidents, and a reduction in overall life expectancy.



Essential Definitions

- **Urban Heat Island (UHI) Effect:** A climate phenomenon where urban areas experience significantly higher temperatures than their surrounding rural environments due to dense concrete infrastructure, lack of vegetation, and anthropogenic heat emissions.
- **Nocturnal Heat Stress:** The physiological stress experienced by the human body when ambient night-time temperatures remain too high to allow core body temperature reduction, disrupting metabolic recovery.
- **Climate Resilience:** The capacity of social, economic, and environmental systems to cope with a hazardous event, trend, or disturbance by responding or reorganizing in ways that maintain their essential function and structure.

Legal and Constitutional Framework

- **Article 21:** The Right to Life and Personal Liberty encompasses the right to a clean, healthy environment and the right to health, both of which are severely compromised by unmitigated climate hazards.
- **Article 48A:** A Directive Principle of State Policy instructing the State to endeavor to protect and improve the environment and to safeguard the forests and wildlife of the country.

- **National Action Plan on Climate Change (NAPCC):** The foundational policy framework comprising functional national missions, including the National Mission on Sustainable Habitat and the National Mission for Green India, to mitigate urban climate vulnerabilities.
- **Disaster Management Act, 2005:** The statutory framework that governs heatwave management guidelines issued by the National Disaster Management Authority (NDMA), pushing states to implement comprehensive Heat Action Plans (HAPs).

Conclusion

The escalating loss of sleep across urban India highlights that climate change is no longer a distant ecological threat but a contemporary public health crisis. The compounding effects of the urban heat island phenomenon and rising night-time temperatures demand a shift in urban planning paradigms. Mitigating these risks requires integrating thermal comfort into affordable housing, expanding urban green spaces, enforcing cool-roof technologies, and updating city-level Heat Action Plans to focus specifically on nocturnal heat vulnerabilities.

UPSC Relevance

- **GS Paper II:** Welfare schemes for vulnerable sections of the population; Issues relating to the development and management of Social Sector/Services relating to Health and Education.
- **GS Paper III:** Conservation, environmental pollution, and degradation; Environmental impact assessment; Urbanization, their problems, and their remedies; Science and Technology developments impacting human health.

9. International Relations and Energy Security: Australian Uranium Supplies and India's Nuclear Expansion

Key Highlights & Summary

- **Strategic Shift:** Australia and India have renewed efforts to operationalize commercial uranium supplies, reflecting deep bilateral consensus and shared common security concerns.
- **Policy Breakthrough:** Australia historically restricted uranium exports to signatories of the Non-Proliferation Treaty (NPT); however, India's flawless non-proliferation credentials and its 2008 Nuclear Suppliers Group (NSG) waiver facilitated an exception.
- **Safeguards Operationalised:** Following two years of intensive negotiations, consensus was reached on the Administrative Arrangement (AA) for tracking, accounting, and reporting the use of Australian Obligated Nuclear Material (AONM) under IAEA safeguards.
- **Resource Advantage:** Australia holds approximately one-third of the global uranium reserves; its high-grade fuel will supplement India's low-grade mineral reserves, lowering domestic extraction costs and tailings management.
- **Ambitious Energy Expansion:** The supply acts as a building block for India's goal to scale its installed nuclear power capacity from 8.78 GW to 100 GW by 2047 through a "fleet mode" deployment of 700 Mwe indigenous reactors and small modular reactors (SMRs).

- **Diversified Import Portfolio:** The integration of Australian uranium expands India's existing resource base, which has historically relied on imports from Canada, France, Kazakhstan, Uzbekistan, and Russia since 2008-09.

Essential Definitions

- **Additional Protocol (AP):** A legal document companion to comprehensive safeguards agreements with the International Atomic Energy Agency (IAEA) granting enhanced inspection tools to verify peaceful nuclear usage.
- **Fleet Mode Construction:** An execution strategy in nuclear engineering where multiple identical nuclear reactors are constructed simultaneously or sequentially to reduce gestation periods and lower costs.
- **Small Modular Reactors (SMRs):** Advanced nuclear reactors that have a power capacity of up to 300 MW per module, built fractionally smaller than conventional reactors for targeted industrial applications.

Legal and Constitutional Framework

- **Constitutional Jurisdiction:** Atomic energy and nuclear mineral resources are placed exclusively under the legislative domain of Parliament via Entry 6 of the Union List (List I) of the Seventh Schedule.
- **Atomic Energy Act, 1962:** Provides the fundamental statutory framework for managing nuclear energy development, declaring uranium deposits as prescribed substances under state monopoly.
- **Civil Liability for Nuclear Damage Act, 2010:** Establishes a distinct civil liability regime for compensation in case of a nuclear incident, setting up risk-pooling frameworks for operators and suppliers.
- **Legislative Amending Acts:** The state has instituted critical regulatory shifts, including domestic legal frameworks like the SHANTI Act, to facilitate the expansion and private sector hand-holding in low-carbon energy segments.



Conclusion

The tracking consensus for Australian uranium marks a major milestone in India's quest for reliable, clean baseload power. By integrating foreign fuel with indigenous reactor designs, India ensures the resilience of its energy security architecture against global geopolitical shocks. As the sector opens up to private collaborations for small modular reactors, India must establish a rigorous regulatory framework that synthesizes international IAEA safety protocols with domestic technological indigenization.

UPSC Relevance

- **GS Paper II:** Bilateral, regional and global groupings and agreements involving India and/or affecting India's interests; Effect of policies and politics of developed and developing countries on India's interests.

- **GS Paper III:** Infrastructure (Energy security); Science and Technology developments and their applications; Indigenization of technology; Environmental conservation and sustainable carbon transition.

10. Electoral Reforms: The Constitutional and Structural Viability of "One Nation, One Election"

Key Highlights & Summary

- **Legislative Intervention:** The government has introduced the Constitution (One Hundred and Twenty-Ninth Amendment) Bill to establish a mechanism for synchronizing Lok Sabha and state assembly elections.
- **Core Structural Amendments:** The proposed framework introduces a new Article 82A and seeks to amend Articles 83 and 172 to facilitate the alignment of legislative tenures across states.
- **The "Remainder Term" Clause:** In the event of a premature dissolution of a house, subsequent fresh elections will be held only for the remainder of the five-year cycle, ensuring immediate resynchronization.
- **Federalism and Asymmetry:** Critics argue that enforcing simultaneous cycles necessitates extending or curtailing state terms without explicit voter mandates, potentially breaching the democratic contract.
- **Voter Convergence Risks:** Empirical research indicates that simultaneous polling creates a "wave effect," prompting voters to choose national parties at both tiers and disadvantaging regional parties.
- **Neglect of Local Tiers:** The framework faces criticism for bypassing the protections guaranteed to local self-governments (panchayats and municipalities) by the 73rd and 74th Amendments.

Essential Definitions

- **One Nation, One Election (ONOE):** A policy framework aimed at structuring the Indian electoral calendar to conduct simultaneous polls for the lower house of Parliament and all state legislative assemblies.
- **Constructive Vote of No-Confidence:** A parliamentary mechanism, borrowed from jurisdictions like Germany, where a government cannot be ousted via a no-confidence vote unless an alternative majority is simultaneously secured.
- **Basic Structure Doctrine:** A judicial principle established by the Supreme Court holding that certain fundamental features of the Constitution (such as democracy, federalism, and judicial review) cannot be abrogated by parliamentary amendments.

Legal and Constitutional Framework

- **Article 83 and 172:** Set the standard five-year duration for the House of the People and State Legislative Assemblies respectively, outlining strict parameters for their dissolution.

ONE NATION, ONE ELECTION COULD SAVE INDIA ₹7 LAKH CRORE

JPC Chairman Says Simultaneous Polls
May Boost GDP & Reduce Governance Disruptions

- Joint Parliamentary Committee (JPC) backed simultaneous Lok Sabha & Assembly elections
- India could save nearly ₹7 lakh crore through synchronized elections
- Economists estimate a potential 1.6% GDP boost from the reform
- Savings could be redirected toward infrastructure, healthcare, education & welfare
- Proposal includes conducting panchayat & municipal elections within 100 days
- Committee examining the Constitution (129th Amendment) Bill and related legislation
- Former Chief Justices reportedly said proposal does not violate the federal structure



- **The Amendment Threshold:** The implementing legislation requires passing by a two-thirds supermajority in both Houses of Parliament, alongside ratification by at least half of the State Legislatures.
- **Kesavananda Bharati Case (1973):** Serves as the ultimate constitutional guardrail, ensuring that amendments aligning legislative timelines do not dilute parliamentary democracy or the federal balance.
- **Model Code of Conduct (MCC):** Regulatory guidelines issued by the Election Commission of India (ECI) governing the conduct of political entities to prevent the misuse of official machinery during active election windows.

Conclusion

The push for simultaneous elections highlights the ongoing trade-off between administrative efficiency and constitutional federalism. While reducing frequent code-of-conduct enforcement can stabilize short-term governance, altering the democratic lifecycle across diverse states presents clear operational risks. Achieving true electoral reform requires looking beyond mere calendar adjustments. Parliament must balance fiscal prudence with institutional safeguards, focusing on deeper challenges such as unregulated campaign finance, political criminalization, and preserving the autonomy of grass-roots legislative bodies.

UPSC Relevance

- **GS Paper II:** Parliament and State Legislatures—structure, functioning, conduct of business, powers & privileges and issues arising out of these; Salient features of the Representation of the People Act; Constitutional amendments and the basic structure.
- **GS Paper III:** Indian Economy and issues relating to planning, mobilization of resources, and development; Security and administrative deployment challenges during large-scale national exercises.

11. Administrative Reforms: The Delhi Right of Citizen to Time Bound and Ease of Delivery of Service Bill, 2026

Key Highlights & Summary

- **Cabinet Approval:** The Delhi Cabinet has officially approved the Delhi (Right of Citizen to Time Bound and Ease of Delivery of Service) Bill, 2026, aimed at revolutionizing public service delivery.
- **Stricter Penalty Structure:** The proposed legislation introduces a daily fine of Rs250, capped at a maximum of Rs5,000, for officials responsible for unjustified delays. This replaces the outdated 2011 Act's penalty of just Rs10 per day.
- **Adherence to Natural Justice:** To ensure fairness, penalties on erring officials will only be imposed after granting them a full opportunity to present an explanation for the delay.
- **Citizen Compensation:** Under the new framework, citizens are eligible to receive a "compensatory cost" of Rs200 per application in cases of delayed service.
- **Expanded Service Ambit:** The law expands the scope of time-bound delivery to cover over 500 public services, reflecting a major tech-driven integration of government departments.

- **Legislative Roadmap:** Set to be tabled in the upcoming Monsoon Session of the Delhi Assembly, this bill serves as a milestone for transparent and accountable governance.

Essential Definitions

- **Time-Bound Service Delivery:** A governance paradigm that legally binds public authorities to process citizen applications and deliver notified public services within a prescribed, non-negotiable timeframe.
- **Principles of Natural Justice:** Fundamental legal maxims ensuring fairness in administrative action, primarily *audi alteram partem* (the right to be heard before being penalized).
- **Compensatory Cost:** Financial restitution paid directly to an affected citizen by the government to mitigate the inconvenience caused by administrative delay.

Legal and Constitutional Framework

- **Article 21:** The Right to Life and Liberty has been judicially interpreted to encompass the right to hassle-free, timely, and dignified delivery of public services by the state.
- **Article 239AA:** The special constitutional provision governing the Legislative Assembly of the National Capital Territory (NCT) of Delhi, empowering it to make laws on matters in the State and Concurrent Lists (except police, land, and public order).
- **Second Administrative Reforms Commission (ARC):** The 12th Report of the 2nd ARC ("Citizen-Centric Administration") strongly recommends legislating a right to service to enforce public accountability.

Conclusion

The Delhi Service Delivery Bill, 2026, marks a major step from administrative discretion toward statutory entitlement. By escalating financial penalties and prioritizing natural justice, the law bridges the gap between bureaucratic process and citizen convenience. For its ultimate success, the government must back these legal mandates with robust digital public infrastructure, institutional capacity building, and simplified backend administrative workflows.

UPSC Relevance

- **GS Paper II:** Important aspects of governance, transparency and accountability, e-governance applications, models, successes, limitations, and potential; Citizens Charters, role of civil services in a democracy.

12. Internal Security: Inter-State Cooperative Federalism to Curb Drug Trafficking

Key Highlights & Summary

- **Inter-State Bilateral Meet:** Kerala Home Minister Ramesh Chennithala met Tamil Nadu Chief Minister C. Joseph Vijay to establish a highly coordinated mechanism among southern states to crack down on narcotics trafficking.
- **Intelligence Sharing Corridor:** Kerala and Tamil Nadu have agreed to share real-time information and intelligence on inter-state trafficking syndicates, with a focus on securing vulnerable border boundaries.

- **Operation Toofan Success:** The Kerala delegation briefed on the success of 'Operation Toofan', an anti-narcotics drive that led to the arrest of over 6,000 drug peddlers and the registration of 5,500 cases within 43 days.
- **Sub-Regional Coalition:** Kerala has actively engaged with Karnataka Chief Minister D.K. Shivakumar to expand this joint security initiative into a multi-state cooperative network across all southern states.
- **National Threat Profile:** The drug menace is officially recognized not as a localized law-and-order challenge but as a major national security and public health issue affecting the entire country.
- **Public Awareness Campaigns:** The states plan to leverage high-profile public figures, including brand ambassadors Mohanlal (Kerala) and Vijay (Tamil Nadu), to bolster youth anti-drug outreach campaigns.



Essential Definitions

- **Narcotics Trafficking:** The global illicit trade involving the cultivation, manufacture, distribution, and sale of substances subject to drug restrictive laws.
- **Cooperative Federalism:** A constitutional concept where the central government and state governments work together horizontally and vertically to solve common national problems.
- **Intelligence-Led Policing (ILP):** A modern policing model built around risk assessment and management, utilizing structured data collection and intelligence sharing to target active criminal networks.

Legal and Constitutional Framework

- **Constitutional Jurisdiction:** "Police" and "Public Order" fall under Entry 1 and 2 of the State List (List II) of the Seventh Schedule, making inter-state police cooperation essential for cross-border crimes.
- **Article 263:** Empowers the President to establish an Inter-State Council to investigate, discuss, and coordinate policy on subjects of common interest among states.
- **Narcotic Drugs and Psychotropic Substances (NDPS) Act, 1985:** The primary statutory framework in India that prohibits the manufacture, sale, use, and transport of psychotropic substances and provides for stringent punishment.
- **National Narcotics Coordination Portal (NCORD):** A central institutional mechanism launched to facilitate structured cooperation and data integration among state and central law enforcement agencies.

Conclusion

The collaborative initiative between Kerala, Tamil Nadu, and Karnataka illustrates the growing necessity of horizontal cooperative federalism in tackling sophisticated crime. Drug networks operate on highly fluid, borderless supply lines that traditional, siloed state police systems cannot effectively disrupt. By institutionalizing intelligence sharing, aligning border patrols, and using cross-border joint operations under frameworks like 'Operation Toofan', the southern states are establishing a model for cooperative internal security management.

UPSC Relevance

- **GS Paper II:** Bilateral, regional and global groupings; Issues and challenges pertaining to the federal structure; Devolution of powers and finances up to local levels and challenges therein.
- **GS Paper III:** Security challenges and their management in border areas; Linkages of organized crime with terrorism; Role of external state and non-state actors in creating internal security challenges.

Dr. GINDI'S IAS ACADEMY