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PRELIMS BOOSTER & PIB COMPILATION (The Hindu & Indian Express)

1. India's HDI Rank Improves, Yet Inequality Persists

Prelims Focus

- Human Development Index (HDI) – UNDP
- HDI indicators: Life expectancy, education, and GNI per capita
- India's HDI rank: 130 in 2022 (up from 133 in 2021)
- Key schemes: Ayushman Bharat, NEP 2020, Poshan Abhiyaan

Mains Relevance (GS II & III):

- Developmental issues and welfare schemes
- Inclusive growth and social development indicators

Key Points:

- India's HDI score rose to 0.7185 (2022), maintaining its position in the 'medium' category.
- GNI per capita has risen significantly since 1990.
- 130 million exited multidimensional poverty between 2015-16 and 2019-21.
- Life expectancy reached 72 years, showing post-pandemic recovery.
- Despite progress, inequality reduces India's HDI by over 30%.
- Gender inequality remains stark – low female workforce participation and political representation.
- The UNDP's 2020 report also emphasized AI as a key driver of future development, with India showing strong AI-skilling potential.

Analytical Insight:

India has shown improvements in health and income, but inequality and educational quality remain critical hurdles. The future depends on integrating digital skills, better governance, and targeted welfare.

2. Growing Disunity in Global Anti-Terror Framework

Prelims Focus

- UNSC and terrorism-related diplomacy
- India's foreign policy and global counter-terrorism narrative

Mains Relevance (GS II & III):

- India's role in global institutions
- Internal security challenges due to external actors

Key Points:

- Despite condemnation of the Pahalgam terror attack (April 22), global powers avoided confronting Pakistan directly.
- UNSC's inaction—linked to Pakistan's seat on the Council—illustrates political deadlock.
- Global focus has shifted to Ukraine and Gaza, weakening the international terrorism response.
- Selective condemnation of terrorism is growing—"your terrorists vs my terrorists."
- Identity politics and geopolitical interests are undermining universal standards.

Analytical Insight:

India must recalibrate its global strategy, build regional alliances, and enhance its soft power. Global counter-terrorism needs reform and consistent accountability. UNSC reforms are crucial for India's strategic interests.

3. Civil Defence Drill Conducted to Test Emergency Readiness

Prelims Focus

- Civil Defence Act, 1938
- Ministry of Home Affairs
- Classification of Civil Defence Districts

Mains Relevance (GS II & III):

- Disaster preparedness and internal security
- Center-state coordination during emergencies

Key Points:

- Nationwide mock drills held on May 7, 2020, to simulate hostile attacks.
- Drills included blackouts, air raid sirens, and coordinated response mechanisms.
- Based on district-level threat perception, implementation varied from Category I to III.
- Exercises aimed to test community participation, infrastructure protection, and inter-agency coordination.

Analytical Insight:

India is adopting a proactive approach to hybrid threats, including drones and cyberattacks. Civil defence must adapt to modern warfare challenges, with a strong legal and institutional foundation.

ε. Navigating the Power and Risks of Digital Influence

Prelims Focus

- Article 19(1)(a), IT Act, Consumer Protection Act
- SEBI/ASCI regulations for influencer content

Mains Relevance (GS II, III, IV):

- Governance and regulation of digital spaces
- Ethics and misinformation in digital media

Key Points:

- India faces a rising tide of digital misinformation, particularly in health and finance.
- Influencers often promote content with little regard for accuracy or ethics.
- Legal safeguards exist but enforcement remains weak.
- Courts and regulators (SEBI, ASCI) have stepped in to promote accountability.

Analytical Insight:

Digital freedom must be balanced with safeguards. Ethical norms and legal reforms are essential to curb misleading content. Registration and monitoring of digital influencers—especially in health—can protect public trust.

ο. Maternal Mortality Declines, But Regional Gaps Persist

Prelims Focus

- Maternal Mortality Ratio (MMR)
- SDG 3.6, SRS data
- WHO standards on maternal health

Mains Relevance (GS II & III):

- Health indicators and government schemes
- Inter-state disparities in healthcare outcomes

Key Points:

- MMR dropped to 93 (2019-21) from 103 in 2017-19.
- Most deaths occur in reproductive age group (20-34).
- High MMR states: MP, Assam, UP, Odisha, Chhattisgarh.
- Programs like JSY and PMMVY have contributed to progress.

Analytical Insight:

While India is progressing towards SDG targets, persistent inequalities call for focused interventions in lagging states. Investments in maternal healthcare, education, and nutrition are essential for sustained progress.

ϰ. Public Health Governance in India Faces Structural Challenges

Prelims Focus

- 11th Schedule: Health in State List
- Public health education and MPH courses

Mains Relevance (GS II & III):

- Public health systems and human resources
- Inter-sectoral coordination and governance gaps

Key Points:

- India lacks a coherent public health framework.
- MPH education is fragmented and lacks national standards.
- Key domains like epidemiology, behavioural science, and engineering are underrepresented.
- Absence of a national public health cadre affects workforce deployment and coordination.

Analytical Insight:

India needs a multidisciplinary, skilled public health workforce. Proposals for an Indian Health Service and a unified MPH framework could bridge policy and implementation gaps. Addressing governance fragmentation is key to health resilience.

v. Is Social Media Reshaping Self-Worth?

UPSC Relevance

● Prelims:

- Syllabus: Current events: Social development challenges
- Focus: Youth psychology, digital culture, mental health impact

● Mains:

- GS Paper I (Society): Social change, impact of globalization
- GS Paper II (Governance): Digital mental health policy, adolescent well-being
- GS Paper IV (Ethics): Media influence on values, technology and ethics

Key Insights:

- Social media platforms have evolved into powerful arenas where identity is validated via external metrics—likes, comments, shares—leading to dependency on digital validation.
- Teenagers face immense pressure to maintain a curated online persona, fostering anxiety, distorted body image, and identity confusion.
- Algorithms intensify exposure to unrealistic standards, creating emotional distress and exclusionary experiences.
- Even child influencers are drawn into this ecosystem of content performance, which may hamper natural development.
- Experts argue that it is not just individual influencers, but the very design of digital platforms that incentivizes comparison and emotional manipulation.
- Parents and educators play a vital role in equipping teens with resilience and critical awareness to decouple self-worth from online feedback.
- Shows like *Adolescence* and documentaries like *Bad Influence* highlight the mounting psychological burden of constant digital presence.

Mains Takeaways:

- Digital dependence is a mounting public health challenge, especially among youth.
- India must promote emotional and digital literacy as part of school curricula.
- Regulatory frameworks should include protections for children and ethical obligations for tech companies.
- Ethical innovation in platform design must prioritize healthy digital interaction and inclusive engagement.

Λ. IAI HAROP – India's Tactical 'Suicide Drone'

UPSC Relevance

● Prelims:

- Defence Technology, UAVs, Indo-Israeli defence cooperation

● Mains (GS Paper III – Security):

- Defence modernisation, ethics of autonomous weaponry

Key Points:

- The IAI HAROP, an advanced loitering munition by Israel Aerospace Industries, functions like a UAV armed with explosives, capable of identifying and crashing into targets.
- With a loiter time exceeding 4 hours, it is highly suited for engaging mobile and high-value enemy assets.
- It utilizes electro-optical targeting for autonomous or remotely controlled operations and resists electronic warfare jamming.
- With deployment options from land or sea, it effectively targets radar systems, command posts, and tanks.
- Derived from the HARP system, HAROP boasts a combat success rate of 98%, making it a potent asset in India's evolving war doctrine.

Mains Takeaways:

- Reflects India's increasing reliance on autonomous defence technologies in partnership with Israel.
- Enhances India's strategic flexibility in fast-changing combat scenarios.
- Raises significant questions on accountability and legality of AI-driven warfare under international law.

¶. Total Fertility Rate (TFR) in India Steady at 2.1

UPSC Relevance

● Prelims:

- Indian Demography, SRS 2011 Data

● Mains: Population dynamics

- GS I:
- GS II: Health sector policies
- GS III: Demographic dividend, inclusive growth

Key Facts:

- As per SRS 2011, India's TFR holds steady at 2.1—just below the replacement level of 2.1.

- Bihar reported the highest TFR (२.०), while Delhi and West Bengal the lowest (१.६).
- Share of the ०–१६ age group fell from ६१.२% (१९९१) to ५६.८% (२०२१), while the elderly population is growing steadily.
- Female mean marriage age rose to २२.० years in २०२१.
- Despite public concerns, data shows that India's population growth is stabilizing.

Mains Takeaways:

- India is entering an aging phase, creating potential stress on pensions, healthcare, and the labour market.
- Uneven fertility trends demand tailored state-level interventions.
- The narrowing window of demographic dividend necessitates urgent investment in youth education and skilling.

१०. The Case for a Caste Census

UPSC Relevance

- Prelims:
 - Articles on equality, SECC २०११, Justice Rohini Commission
- Mains:
 - GSI: Social justice and inequality
 - GS II: Policy effectiveness, welfare targeting
 - GS III: Inclusive growth

Key Points:

- India's contradictory stance on caste—abolishing it in principle while using it in policy—has made data collection a political minefield.
- The SECC २०११ was largely ineffective; only a fraction of the caste data was usable.
- The Rohini Commission revealed that a handful of dominant OBCs monopolized welfare benefits.
- A scientifically designed caste census is necessary to enable equitable and evidence-based policymaking.

Mains Takeaways:

- Accurate caste data is essential for targeted affirmative action and to prevent elite capture.
- Transparent processes with expert oversight and digital tools can ensure credibility.
- A caste census can enhance public trust and strengthen social justice mechanisms.

११. Revamping India's Manufacturing Ecosystem

UPSC Relevance

- Prelims:
 - Economy: Industrial indicators
- Mains (GS III):
 - Manufacturing growth, innovation, industrial strategy

Key Highlights:

- Despite flagship schemes like Make in India, India's manufacturing sector remains stagnant in productivity and global competitiveness.
- There's a pressing need to revamp engineering education and R&D to align with industrial requirements.
- Strategic investment in sunrise sectors like semiconductors, AI, and green tech is critical.
- A Silicon Valley-style innovation ecosystem is needed to anchor global production networks.

Mains Takeaways:

- Structural reforms in manufacturing require education, infrastructure, and industry linkages.
- Building demand-driven, innovation-led manufacturing ecosystems is key to long-term growth.
- India must be prepared for global supply chain shifts and protectionist shocks.

१२. Indo-Pak Relations – Beneath a Fragile Calm

UPSC Relevance

- Prelims:
 - Ceasefire agreements, cross-border tensions
- Mains:
 - GS II: Neighbourhood policy
 - GS III: Terrorism and regional security
 - Essay: India's regional diplomacy

Key Reflections:

- India-Pakistan relations remain strained despite ceasefire agreements.
- A military-only strategy cannot resolve deeper political and ideological rifts.
- The changing global balance of power may force India to recalibrate its approach.

Mains Takeaways:

- Lasting peace with Pakistan requires sustained political engagement.
- Strategic assertiveness should not push the region into broader geopolitical confrontations.
- Regional stability hinges on a mix of security realism and diplomatic outreach.

१३. India's Textile Export Opportunity

UPSC Relevance

- Prelims:
 - Textile sector, FTA with the UK
- Mains:
 - GS II: International trade
 - GS III: Industry and economic growth

Key Points:

- India's apparel exports are set to grow with tariff cuts under the FTA with the UK.
- However, disjointed production hubs and poor logistics remain major challenges.
- Sustainability standards such as CSDD and EU norms will be critical for market access.

Mains Takeaways:

- India must adopt green and ethical production standards to sustain export growth.
- Infrastructure and policy support are crucial for textile industry expansion.
- Positioning India in global fashion supply chains requires quality, reliability, and sustainability.

१४. Why Indian Farmers Prefer Rice and Wheat

UPSC Relevance

- Prelims:
 - MSP, agricultural trends
- Mains(GSIII):
 - Agriculture, crop diversification, R&D in farming

Key Takeaways:

- MSP guarantees and better yields make rice and wheat more attractive to farmers.
- These crops benefit from decades of research and policy support unlike others like cotton.
- The Green Revolution has made rice and wheat more resilient and predictable.

Mains Takeaways:

- India needs to diversify cropping patterns to conserve water and improve income security.
- Investment in research for pulses, oilseeds, and coarse cereals is vital for sustainable farming.

१५. Himalayan Plastic Waste Crisis

UPSC Relevance

- Prelims:
 - Pollution, mountain ecology
- Mains:
 - GS III: Waste management, environmental degradation
 - GS II: Role of civil society

Key Findings:

- A staggering १४% of collected Himalayan waste is single-use plastic from food packaging.
- Non-recyclable waste clogs rivers and soil in sensitive mountain ecosystems.
- Grassroots groups like Zero Waste Himalaya are driving cleanup and awareness efforts.

Mains Takeaways:

- Standard waste policies fail in fragile mountain regions—localized strategies are needed.
- Extended producer responsibility (EPR) must cover multi-layer plastics.
- Community-led monitoring and eco-friendly packaging alternatives are key solutions.

१६. Tackling India's E-Waste Problem

UPSC Relevance

- Prelims:
 - E-waste, pollution, EPR
- Mains(GSIII):
 - Environmental governance, industrial policy, circular economy

Key Data:

- E-waste in India rose by १०% in just १ years, making it a global leader in toxic waste.
- Informal recycling dominates, using unsafe methods harmful to health and environment.
- EPR rules of २०२२ aim to stabilize the recycling market with minimum pricing mechanisms.

Mains Takeaways:

- Poorly enforced EPR norms hamper formal recycling and circular economy innovation.
- A predictable pricing system is vital to draw investors into sustainable waste management.
- India's informal e-waste sector must be formalized to reduce pollution and unlock

economic potential.

17. Maritime Emissions and Global Regulation

Relevance:

- Prelims: Environment, Climate Policies, IMO
- Mains: GS – International Institutions & Policies | GS – Climate Change & Sustainable Development

Summary:

At the IMO's 73rd MEPC meeting, global stakeholders deliberated over market-based mechanisms (MBMs) to reduce GHG emissions from ships. Key proposals included a flat carbon tax, fuel quality standards, and a hybrid Singapore model blending pricing and regulation. A draft MBM framework—aligning with IMO's 2023 Revised GHG Strategy—is set for finalisation by 2026 and enforcement by 2027.

India's stand: Supports equitable carbon pricing rooted in Common But Differentiated Responsibilities (CBDR-RC), while advocating investments in green hydrogen and maritime decarbonisation.

Challenges: Developing nations fear increased logistics costs (ca. 8.6% by 2030). Equity, climate finance, and tech transfer remain core hurdles.

Key Insight: Balancing global climate commitments with economic justice remains the crux of maritime decarbonisation efforts.

18. Judicial Transparency: Judges Disclose Assets

Relevance:

- Mains: GS – Judiciary, Transparency & Accountability

Summary:

In a move led by CJI Sanjiv Khanna, 31 SC judges voluntarily disclosed their assets. This marks a shift toward transparency amid rising concerns over judicial corruption and lack of institutional accountability. While laws like the Judges (Protection) Act offer immunity for actions in office, mechanisms for misconduct redress remain weak.

Concerns: India lacks a mandatory judicial accountability framework. Voluntary disclosures, without enforcement, have limited impact.

Global Practice: Countries like the UK and South Korea have codified systems to address judicial misconduct.

Way Forward:

- Establish statutory bodies like a Judicial Complaints Council.
- Enforce conflict-of-interest disclosures.
- Clarify applicability of Lokpal and RTI laws to the judiciary.

19. Education without Employment in India

Relevance:

- Prelims: Education Policies (NEP 2020)
- Mains: GS – Education Reforms | GS – Employment & Economy

Summary:

Despite NEP 2020's ambitious goals, India's education system continues to produce unemployable graduates. Degrees dominate over skills, and curriculum lacks industry relevance. While global university rankings improve, real-world employability remains stagnant.

Key Critique:

- Little innovation or deep-tech in start-ups; most replicate services.
- Research often misaligned with local development needs.

Solutions:

- Industry-academia synergy for curriculum design
- Focus on interdisciplinary and soft skills
- Autonomy in higher education institutions, away from bureaucratic control

20. Ecology: The Real Economy

Relevance:

- Prelims: Environment, Conservation
- Mains: GS – Environmental Geography | GS – Climate & Biodiversity | GS – Ethics and Environment

Summary:

Inspired by Sundarlal Bahuguna's assertion—"Ecology is the permanent economy"—the article critiques exploitative development models that ignore environmental costs. Climate change and biodiversity loss expose the flawed premise of growth at nature's expense.

Core Ideas:

- Nature-based solutions must not become exploitation tools.
- Ethical stewardship, not just techno-economic fixes, is needed.
- Conservation should be embedded in daily life, not treated as an externality.

UPSC Insight: A shift toward biocentric, not anthropocentric, policy-making is essential for long-term sustainability.

२१. Irrigation Woes and Agrarian Crisis

Relevance:

- Prelims: Agriculture, Water Resources
- Mains: GSⅠ – Welfare and Governance | GSⅡ – Agriculture & Water Management

Summary:

The suicide of a young Maharashtra farmer exposes India's chronic irrigation crisis. While agriculture guzzles 80% of India's water, inequitable distribution, unsustainable cropping (e.g., sugarcane in dry zones), and groundwater overuse intensify distress.

Concerns:

- Water access reflects caste and class inequalities.
 - Groundwater depletion increases vulnerability.
- Policy Directions:
- Shift to water-efficient irrigation (drip /sprinklers)
 - Crop diversification and participatory water governance
 - Solar-powered pumps with strict resource monitoring

२२. Strategic Focus: Beyond the Pakistan Lens

Relevance:

- Mains: GSⅡ – International Relations & Global Strategy

Summary:

India's security strategy remains overly Pakistan-centric, even as the global order shifts. Events like the Russia-China summit and U.S. Middle East re-alignments reveal a multipolar world in flux.

Core Argument:

- Bilateral obsessions limit India's broader diplomatic engagement.
- US-led unipolarity is waning; new power blocs (China-Russia) are rising.

Way Forward:

- Embrace multipolar diplomacy
- Deepen engagement in West Asia, Indo-Pacific, and Africa
- Diversify strategic partnerships beyond regional rivalries

२३. Caste Census: Between Data and Justice

Relevance:

- Prelims: Census, Social Justice
- Mains: GSⅠ – Indian Society | GSⅡ – Welfare and Governance | GSⅢ – Inclusive Growth

Summary:

The proposed caste census raises hopes for more data-driven affirmative action. However, the article warns against viewing it as a panacea.

Key Arguments:

- Past surveys (SECC, NSSO) already reveal caste-based deprivation.
- Political will, not just data, drives reform (e.g., Mandal Commission).
- Risk of politicisation in polarised settings

Way Ahead:

- Focus on implementation, not just enumeration
- Use data to correct intra-group disparities (e.g., Extremely Backward Classes within OBCs)

२४. Copyright vs. Generative AI

Relevance:

- Prelims: IPR, AI
- Mains: GSⅡ – Governance & IPR | GSⅢ – Tech & Innovation

Summary:

AI models, including those from OpenAI, rely on training datasets that may include copyrighted material. This raises legal and ethical dilemmas, especially in countries like India where copyright law lacks a flexible 'fair use' doctrine.

Legal Grey Areas:

- Does training LLMs on copyrighted content count as infringement?
- Indian courts yet to provide clarity

Global Context:

- U.S. allows broader 'fair use'; India's fair dealing is limited
- Policy Needs:
- Define AI-specific copyright rules
 - Ensure balance between innovation and protection of creators
 - Address monopolisation of training data by tech giants

२०. AI and the Reshaping of Indian Workplaces

Relevance:

- Prelims: AI, Digital Economy
- Mains: GS – Future of Work, Tech Disruption, Employment

Summary:

AI is altering India's employment structure from a pyramid (broad base and middle) to an "hourglass" (growth at the top and bottom but a shrinking middle).

Trends:

- Mid-level jobs automated; high-skill and low-wage jobs grow
- India lags in AI readiness (Human Capital Index: ०.४९)
- Tier-२/३ regions face digital exclusion

Required Actions:

- Reskill workers in AI-adjacent fields (AI auditing, cyber ethics)
- Create inclusive AI policies with human oversight
- Invest in digital infrastructure across regions to prevent inequality

२१. Legal Deadlock: Presidential Reference in Tamil Nadu Governor Assent Case

UPSC Relevance:

Prelims: Articles १४३, १६३, १७४

Mains GSII: Centre-State dynamics, Judicial interpretation, Governor's constitutional role

Key Insights:

- The Centre may invoke Article १४३ to seek the Supreme Court's advisory opinion on whether a Governor can delay assent to a bill indefinitely, following controversy in Tamil Nadu.
- While Article १४३ allows presidential references, its opinions are advisory and do not override previous judicial rulings.
- This strategy echoes the २०१२ G case reference, where the Court reaffirmed auction as the preferred method for natural resource allocation.
- The use of a two-judge bench to rule on such a complex constitutional issue has drawn criticism, raising demands for a Constitution Bench.
- The issue exemplifies the grey areas in the Governor's discretionary powers (Articles १६३ and १७४) and the ambiguity around the use of Article १४३.
- Concerns include 'bench hunting' and the need for clearer guidelines for the constitution of larger benches on significant constitutional matters.

२२. National Unity in Times of Crisis: A Call for Bipartisanship

UPSC Relevance:

GS II: Governance, Political Ethics

GS III: Internal Security

Key Insights:

- In light of the April २०२० Pahalgam attack, the article stresses that political unity during crises is vital for national security.
- Past experiences, like Pulwama in २०१९, highlight how crises have been politicised rather than met with collective resolve.
- Unlike the U.S. post-९/११ or New Zealand post-Christchurch, India lacks a bipartisan security response framework.
- Tharoor argues for cross-party consensus on national security, which should be above electoral rivalry.
- A depoliticised, doctrine-based national security strategy is crucial for long-term planning, regional diplomacy, and credible deterrence.

२३. Data at the Grassroots: Panchayat Performance Assessment Index (PAI)

UPSC Relevance:

GS II: Devolution of power, Local Governance

GS III: Data and Development

Key Insights:

- Although large datasets exist under the National Data Sharing Policy (२०१२), they remain inaccessible to grassroots actors due to poor usability.
- The Panchayat Performance Assessment Index evaluates over २ lakh gram panchayats on

- SDG-linked metrics using 811 data points.
- However, data gaps persist: 40% of GPs haven't submitted complete data.
- The article highlights the urgent need for simplified data tools and training of panchayat members and civil society organizations.
- Using PAI can enhance alignment with central schemes and promote data-driven, inclusive governance.

29. Environmental Rule of Law Restored

UPSC Relevance:

Prelims: EIA rules, Key SC Judgments

Mains GSII&III: Judicial Activism, Environment and Development

Key Insights:

- The SC recently struck down the MoEFCC's practice of granting post-facto environmental clearances, reinstating the core of the 2017 EIA rules.
- The court criticized the government's 2017 and 2021 attempts to regularize violations, calling them harmful to environmental justice.
- Past verdicts, including Common Cause (2017) and Alembic Pharmaceuticals (2020), had also rejected post-clearance regularization.
- This judgment strengthens the precautionary principle and highlights the judiciary's role in protecting environmental rights under Article 21.
- It calls for rethinking the "ease of doing business" model in favor of environmentally responsible governance.

30. Bilingual India: Breaking the English Monopoly

UPSC Relevance:

GS I: Language and Society

GS II: Educational Policy

Essay Paper: Cultural Identity, Education

Key Insights:

- India is witnessing a silent linguistic revolution: people are increasingly reading and engaging with content in regional languages.
- This shift is driven by societal change rather than government intervention.
- Translation has emerged as a powerful tool of inclusivity, with Indian languages reclaiming intellectual and cultural space.
- The long-standing dominance of English, rooted in colonial policies like Macaulay's Minute, is being questioned.
- The article calls for a balanced language policy that respects multilingualism and democratizes knowledge without sidelining English entirely.

31. A New Global Pact: WHO's Pandemic Agreement

UPSC Relevance:

Prelims: WHO, International Pandemic Policies

Mains GSII&III: Health Governance, Global Cooperation

Key Insights:

- At the 144th World Health Assembly, WHO members adopted a historic Pandemic Agreement aimed at bolstering preparedness for future global health emergencies.
- The agreement, adopted after years of COVID-19 lessons, stresses equitable access to vaccines, treatments, and diagnostics.
- It represents a shift toward multilateral action over nationalistic responses in global health governance.
- Its success hinges on adequate implementation, financial support, and fair resource distribution, especially for low-income countries.
- The agreement could serve as a template for cooperation in climate change and biodiversity governance.

32. India's Security Doctrine: The Rise of a 'New Normal'

UPSC Relevance:

GS II: Neighbourhood Policy

GS III: Internal and Border Security

Key Insights:

- India's post-Pulwama security strategy marks a shift toward assertive deterrence, moving away from passive restraint.
- Strikes like Balakot and recent drone operations highlight a doctrine of measured, non-

- escalatory retaliation.
- Strategic messaging, especially in English, is targeted at international stakeholders to build legitimacy.
- The doctrine rejects Pakistan's "plausible deniability" and emphasizes real-time ISR-backed responses.
- This signals a shift in India's defence posture—one that is firm, calibrated, and strategically autonomous.

३३. Scheme-Based Workers: Seeking Recognition and Rights

UPSC Relevance:

GS II: Welfare Schemes, Labour Rights

GS III: Inclusive Development

Key Insights:

- Nearly 1 crore scheme-based workers (ASHAs, AWWs, etc.) serve as the backbone of India's welfare programs but lack legal worker status.
- They remain excluded from minimum wages and social protections, despite their essential role in public service delivery.
- While some court rulings have acknowledged their rights (e.g., gratuity), overall recognition remains limited.
- The push to privatize schemes like ICDS further threatens their rights and job security.
- Recognition of these workers is key to ensuring both service quality and social justice.

३४. South Asia's Strategic Triangle: India, China, and Pakistan

UPSC Relevance:

Prelims: Regional geopolitics

Mains GS II & III: Security, IR, Border Management

Key Insights:

- India's security calculations are now influenced by a growing China-Pakistan military nexus.
- China's technological and strategic support to Pakistan introduces a tripolar dimension to South Asia's security.
- India has moved away from the old US-driven "India-Pakistan hyphenation" to assert a separate strategic identity.
- Treaties like the Indus Waters Treaty are now part of India's broader deterrence narrative.
- Strategic recalibration must include new crisis management frameworks, deeper alliances, and a readiness for rapid response in a complex threat landscape.

३५. 'Trump-Proofing' India-US Relations

UPSC Relevance:

Mains GS II: Foreign Policy, US-India Relations

Key Insights:

- Trump's potential return to power poses a challenge to the US's traditional bipartisan support for India.
- His past remarks on Kashmir and engagement with Pakistan signal a deviation from the de-hyphenated approach.
- India must diversify its engagement with US institutions (Congress, private sector, civil society) beyond the executive.
- Strategic autonomy, long-term planning, and institutional diplomacy are crucial to insulating bilateral ties from individual leadership volatility.
- India's foreign policy should remain steady, leveraging its growing global clout while preparing for an unpredictable global order.

३६. Climate Change May Intensify Cyclone Impact and Expand Risk Zones

Prelims: Climate Change, Cyclones, SSP Scenarios, Mangroves

Mains: GS I (Geophysical Phenomena), GS III (Environment & Disaster Management)

ETH Zurich's research warns that under the high-emission SSP_{5-8.5} scenario, cyclones could not only become more severe but shift toward higher latitudes, affecting regions historically safe from such storms. Mangrove forests—vital for coastal protection—face significant threat, especially in Southeast Asia, where nearly 44% may be exposed under SSP_{5-8.5}. High-intensity cyclones, characterized by >100 m/s winds and sea-level rise above 100 mm/year, may hit previously untouched ecosystems. This underscores the need for climate-adaptive coastal planning and reinforced Paris Agreement commitments.

३७. Can Water Be Weaponized in Geopolitics?

Mains: GS II (India-Pakistan Relations), GS III (Water Security, Ethics in Policy)

The Indus Waters Treaty (IWT), despite hostilities between India and Pakistan, remains a model of transboundary water cooperation. While India can harness its water rights for hydropower, weaponizing river flows would violate international norms and treaty obligations. Strategic prudence and ethical considerations demand continued adherence, with cooperative institutions preferred over unilateral action. The IWT's resilience highlights the importance of diplomatic water-sharing even amid geopolitical tensions.

३८. Measuring Poverty in India: Discrepancies and Dilemmas

Mains: GS II (Welfare Policies), GS III (Poverty, Data Reliability)

India's progress in reducing poverty has stagnated post-२०११-१२. Though poverty fell sharply between २००३ and २०१२, it declined only marginally to १४% by २०२२-२३. With no official poverty line updates in over a decade, varying private estimates (ranging १०%-२०%) have created policy uncertainty. Slower GDP growth, stagnant rural wages, and jobless growth are key factors. Bridging data gaps using survey imputation techniques can help, but accuracy and transparency are critical for evidence-based policymaking.

३९. Dissent and Double Standards in Freedom of Expression

Prelims: Article १९, Free Speech

Mains: GS II (Judiciary, Rights), GS IV (Ethics of Governance)

Recent actions against individuals for voicing dissent post-Pulwama reveal a growing contradiction in the defense of free speech in India. While the Constitution guarantees FoE, political narratives and popular sentiment often stifle it through legal or social pressure. Liberalism must be consistent: protecting even unpopular or opposing views. Otherwise, the misuse of national security and hate speech laws to curb criticism sets dangerous precedents that weaken democratic foundations.

४०. New Antibiotics and the Persistent Threat of AMR

Prelims: AMR, New Antibiotics (Nafithromycin, Zosurabalpin)

Mains: GS II (Health), GS III (Biotechnology, Regulation)

Despite breakthroughs like Nafithromycin—India's first global-class antibiotic in २० years—antimicrobial resistance (AMR) remains a growing threat. India's unregulated antibiotic use, especially in outpatient care and animal farming, fuels resistance. The absence of unified surveillance weakens national response strategies. Strengthening public health systems, regulatory mechanisms, and adopting the One Health approach are critical. India's biotech potential is promising but needs policy and investment support to combat AMR comprehensively.

४१. AI, Tariffs, and the Global Tech Tug-of-War

Mains: GS II (Global Trade Policies), GS III (AI & Industrial Strategy)

Escalating U.S. tariffs on semiconductor imports from Asia risk splintering the global AI ecosystem and inflating tech production costs. As data centers migrate and global supply chains reorient, India can position itself as a neutral, cost-effective AI hub, thanks to its engineering talent and digital infrastructure. However, to capitalize, India must ramp up its semiconductor production, reduce import dependence, and promote R&D. Protectionism may temporarily shelter domestic industries but hinders global innovation and cooperation.

४२. Rediscovering Buddhism in Modern India

Prelims: Buddhist Sites, Philosophy

Mains: GS I (Culture), GS II (Religion and Social Reform), GS IV (Buddhist Ethics)

Contrary to the popular belief that Buddhism disappeared from India post-१२th century, new historical research shows it endured through the १९th century. Works like *Dust on the Throne* uncover Buddhism's continuous cultural and architectural legacy. Buddhist thought, especially its ethical and egalitarian ideals, offers timely answers to modern challenges—ranging from identity politics to consumerism. Recognizing Buddhism's historical continuity can reshape how India perceives its pluralistic past and social justice frameworks.

४३. Judiciary and Civil Liberties: A Slippery Slope

Mains: GS II (Role of Judiciary), GS II (Rights vs. State Power)

The SC's conditional bail order in Ali Khan Mahmudabad—including a writing ban—raises alarms about judicial overreach and dilution of civil liberties. Such actions, absent conviction,

blur lines between due process and punishment. When courts echo state sentiment over constitutional protections, the presumption of innocence suffers. The judiciary must remain the protector of freedoms, particularly when dissent or criticism is under fire from state or society.

३३. Liberty vs Responsibility in Free Speech Discourse

Mains: GS II (Constitutional Principles), GS IV (Ethical Public Discourse)

The First Amendment of 1951 redefined India's speech freedoms by introducing broad restrictions. Contemporary debates reflect a similar tension—between liberty and responsibility. Courts and political actors often invoke public order or morality selectively, reflecting inconsistent commitment to free speech. True democratic dialogue requires not just tolerance of differing views but equal accountability across ideological lines. Ethical discourse should uphold constitutional values, not partisan agendas.

३४. Why India's Coastline Got Longer Without Adding Land

Mains: GS I (Physical Geography), GS III (Coastal Management, Mapping Tech)

India's coastline, previously measured at ~7,500 km, now officially spans over 11,000 km—not due to land gain, but better measurement technologies. High-resolution imaging has captured finer geographical details like estuaries, inlets, and island contours, particularly in A&N and Lakshadweep. This is an example of the "coastline paradox," where measurement scale affects length. A longer coast means expanded EEZ, greater marine rights—and responsibilities—for disaster management, ecological protection, and national security.

३५. America Against America: Higher Education Under Political Siege

GS II: Governance, International Relations

GS IV: Ethics in Public Administration

Summary:

A recent U.S. federal court halted the Trump administration's attempt to curb Harvard University's admission of foreign students, following Homeland Security's accusations that Harvard's diversity, equity, and inclusion (DEI) policies fostered antisemitism and extremist sympathies. The administration had earlier frozen \$1.1 billion in federal funding—crippling key faculties like Harvard Medical School and the School of Public Health. Upon returning to power, the Trump administration escalated pressure, demanding structural changes, audits, and ideological compliance.

Harvard's resistance, led by President Alan Garber, mirrored similar defiance at Columbia University, indicating a broader conservative campaign to bring elite academic institutions under ideological control. The episode reveals deepening tensions between institutional autonomy and political interference, with implications for the U.S.'s global academic credibility.

Analytical Insights:

- **Governance Concern** Using executive power to reshape university governance violates academic autonomy and undermines democratic institutions.
- **Global Implications** The politicization of education weakens U.S. soft power and threatens its leadership in global research and innovation.
- **Ethical Governance** The move challenges principles of neutrality and institutional independence in public administration.
- **India Relevance** Raises caution for India against increasing political control in higher education, which can stifle critical thinking and intellectual freedom.

३६. Cultivating a Global Farm: India's Agricultural Trade Imperatives

GS III: Agriculture, Economic Development, Environment

Summary:

In FY20, India's overall exports touched \$102.93 billion, with agriculture accounting for \$52 billion—a 1.3% rise over the previous year. Rice led with 24% of agri-exports, followed by marine products and spices. However, a steep decline in the agri-trade surplus—from \$27.7 billion in FY18 to \$13.8 billion in FY20—highlights challenges. While non-basmati rice exports bounced back post-lifting of export bans, oilseed imports surged due to weak domestic production. Palm, soybean, and sunflower oils dominate India's edible oil imports, meeting over 50% of domestic needs. With sluggish growth in oilseed yield and poor productivity in pulses, India remains heavily import-dependent.

Analytical Insights:

- **Strategic Diversification** Boosting domestic oilseed cultivation (mustard, groundnut, sesame) is vital for reducing import reliance.

- **Policy Reform**: Rationalizing subsidies, enhancing R&D, and investing in climate-resilient agriculture can transform export potential.
- **Trade Diplomacy**: FTAs with countries like the UK open up high-value markets, but India needs an agile export strategy and infrastructure readiness.
- **Future Target**: To reach \$ 100 billion in agri-exports by 2025, annual growth must accelerate to 9–10%, necessitating a clear, long-term vision.

48. Rethinking the Indus Waters Treaty: Strategic Rebalancing
GS II: Bilateral Relations, GS III: Water Security and Environment

Summary:

The Indus Waters Treaty (1960), brokered by the World Bank, allocated 80% of the basin's waters to Pakistan, with India receiving control over the eastern rivers. India's scope on the western rivers remains limited to non-consumptive uses like hydropower. While projects like Pakal Dul have expanded India's capacity marginally, India has used only a fraction of its permissible rights. Given Pakistan's repeated attempts to obstruct Indian projects through Article IX and its ongoing support for cross-border terrorism, India is considering revisiting the treaty. Proposals include shifting from project-based approvals to basin-level planning, ensuring equitable access, and accounting for current geopolitical and environmental realities.

Analytical Insights:

- **Outdated Framework**: The treaty fails to reflect 21st-century challenges—climate change, altered hydrology, and regional hostilities.
- **Sovereignty and Security**: India must reclaim strategic leverage while remaining compliant with international norms.
- **China Factor**: As the Indus originates in Tibet, China's role in any future renegotiation becomes geopolitically significant.
- **Way Forward**: A basin-wide, cooperative water management framework can ensure sustainable and secure usage.

49. Autonomous Satellites: The Legal and Ethical Challenge in Outer Space
GS II: International Governance, GS III: Science & Technology, GS IV: Ethics

Summary:

Artificial intelligence has enabled satellites to make autonomous decisions, like evading debris or modifying orbits. However, this technological leap presents a major governance challenge: current space treaties, like the Outer Space Treaty (1967) and the Liability Convention (1972), do not address accountability in case of AI malfunctions.

If an AI-controlled satellite misinterprets an object and causes a collision or military incident, it's unclear who bears responsibility—the developer, the state, or the operator. The 2023 IISL report urges the establishment of global norms, accountability systems, and safety protocols for AI in space. Comparisons with aviation or maritime liability frameworks reveal gaps in their applicability to autonomous space operations.

Analytical Insights:

- **Ethical Dilemmas**: Can machines be held liable? If not, where does accountability lie—legally and morally?
- **Diplomatic Risks**: Misjudgments in space could trigger geopolitical confrontations or violate sovereignty.
- **Legal Vacuum**: Existing treaties are insufficient; multilateral legal reform is urgently needed.
- **Strategic Urgency**: As AI and militarization expand into space, global cooperation must keep pace to preserve peace and order.

50. Building Heat-Resilient Public Health Systems in a Warming India
GS II: Health and Governance, GS III: Climate Change and Disaster Management

Summary:

India's vulnerability to heatwaves has become more pronounced, yet public health responses remain reactive and fragmented. Insights from the 'India 2023: Building a Climate-Resilient Future' conference stress that India's primary health infrastructure—ASHAs, PHCs, and wellness centres—must be trained to detect and manage heat-related illnesses.

Ahmedabad's local innovations like WhatsApp-based early alerts, hydration kits, and targeted outreach offer scalable models. However, systemic reforms are needed to integrate heat risks into chronic disease care and urban planning. Clinical protocols must evolve with dedicated hospital heat units, standardized diagnostics, and patient follow-ups.

Analytical Insights:

- **Equity Dimension:** Heatwaves disproportionately affect the poor, elderly, informal workers, and those in poorly ventilated housing.
- **Policy Shift:** A preventive, equity-centered approach is needed—cooling centres, regulated work hours, hydration access.
- **Cross-Sectoral Coordination:** Health systems must work with city planners, meteorologists, and labor departments.
- **Urgent Imperative:** The narrowing window for adaptation demands swift, inclusive, and science-backed governance responses.

०१. Revisiting Forgotten Nationalism

GS II – Constitution, Civil Rights, Role of State; GS I – Freedom Movement; GS IV –

Ethical Governance

The article critiques the transformation of Indian nationalism from its pluralistic roots to a divisive and authoritarian form. Using the Ali Khan Mahmudabad case, it highlights how dissent is vilified as 'anti-national', shrinking democratic spaces.

- India's independence struggle was rooted in inclusive, moral nationalism, focused on uniting people across religion and language.
- Presently, there's a shift towards exclusionary politics echoing global ethnonationalist ideologies.
- Constitutional liberties like free speech are being sacrificed for a narrow view of national security.
- The original vision emphasized checks on power, unlike today's trend of silencing opposition.

Mains Takeaway: A vibrant democracy requires dissent and pluralism. There's a need to restore inclusive nationalism that values unity in diversity over majoritarian dominance.

०२. Understanding Early Monsoon Onset

GS I – Climatology; GS III – Environment, Climate Science

The २०२० monsoon reached Kerala on May २३—eight days early—marking the earliest onset since २००९.

Onset Criteria (as per IMD):

- १०% of stations in Kerala region must record ≥ २.० mm rainfall for two days
- Westerly winds must be dominant up to १०० hPa
- OLR must be below २०० W/m² in the target region

Why Early in २०२०?

- Elevated sea surface temperatures
- Favorable Madden-Julian Oscillation phase
- Strengthened Somali Jet and low-pressure system in Arabian Sea

Insight: Early onset doesn't imply a strong monsoon. Rainfall volume and distribution matter more for agriculture and water resource planning.

०३. The Silent Urban Epidemic: Overnutrition

GS II – Public Health; GS III – NCDs, Urbanization Effects

A Nature report on Hyderabad's IT workforce revealed ४३% had fatty liver and over १०% were obese, underscoring an urban health emergency.

- Obesity, largely driven by sedentary lifestyles and processed foods, now rivals undernutrition in urban India.
- India faces a dual nutrition burden, with WHO warning of rising NCDs in lower-income nations.
- Programs like Eat Right India are a start, but stronger regulations (e.g., food labeling, fat/sugar taxes) are needed.

Mains Insight: Urban health policy must integrate urban planning, food regulation, and physical infrastructure. A preventive, systemic response is essential.

०४. Experiential Learning in Indian Education

GS II – Education Reforms; GS IV – Pedagogical Ethics

India's education system still leans on rote learning. Experiential Learning (EL), focused on real-world application, is a more effective alternative.

- EL uses tools like role-playing, project-based learning, and flipped classrooms to improve student engagement.
- It aligns with NEP २०२०'s goal of competency-based learning and caters to diverse learning needs.

Challenges: Resource limitations, curriculum rigidity, and teacher training gaps hinder implementation.

Mains Insight: EL is vital for preparing youth for dynamic careers. Policy must support

pedagogical innovation, equity in access, and teacher empowerment.

००. Why India Needs a National Crypto Strategy

GS II– TechDiplomacy; GSIII –Digital Economy; BlockchainPolicy

A crypto alliance between Pakistan and US-based WLF indicates geopolitical realignment in the digital finance sector.

- Pakistan aims to use blockchain for remittances, asset tokenization, and economic innovation.
- India must avoid complacency; Trump's team, including figures like Elon Musk, is aggressively promoting pro-crypto ecosystems.
- India needs to guard its regional tech advantage by framing a strategic, forward-looking crypto policy.

Mains Insight: Ignoring crypto's strategic potential could be costly. India must prepare a calibrated policy integrating regulation, innovation, and global leadership.

०१. FTAs and Their Impact on Indian Agriculture

GS II–Trade Relations; GS III –Agriculture; Globalization; MSP

India's agri-trade is expanding, but FTAs with the US, UK, and EU pose both risks and opportunities.

- Export growth is being offset by rising imports (especially edible oils and pulses), narrowing the agri-trade surplus.
- FTAs can boost high-value exports (marine, spices, processed foods) but risk exposing Indian farmers to cheap, subsidized imports.

Mains Insight: FTAs must balance market access with farmer protection. Trade deals should factor in food security, sanitary standards, and subsidy frameworks.

०२. NEP २०२० – Towards Practical and Employable Education

GS II– Education; GSIII–Employment; Innovation; Essay–EducationandReforms

The NEP २०२० is a landmark policy to modernize education, promote research, and improve job-readiness.

- Offers flexible degrees, re-entry options, and industry-academia collaboration.
- India's global education rankings and patent filings have improved, indicating policy impact.
- However, youth unemployment, especially among educated women, remains high.

Mains Insight: NEP bridges academia and employment, but needs deeper labor market reforms, equitable implementation, and gender-sensitive support systems.

०३. The Missing Deputy Speaker: A Democratic Deficit

GS II– Parliament; Constitutional Accountability

Since २०१९, the Deputy Speaker's post in Lok Sabha remains unfilled, raising democratic and constitutional concerns.

- Articles ९३ and ९४ mandate early election of Speaker and Deputy Speaker to ensure institutional continuity.
- The Deputy Speaker also acts as a democratic check, often coming from the Opposition.
- Avoiding this appointment sidelines bipartisan norms and concentrates power in the ruling party.

Mains Insight: Codifying parliamentary conventions can prevent democratic erosion and protect institutional resilience.

०४. Multilateral Aid to Pakistan: A Questionable Practice

GS II–International Institutions; GSIII–Fiscal Prudence; DevelopmentAid

India questions the continued financial support to Pakistan by the IMF and World Bank despite its weak governance and rising defense spending.

- Pakistan lacks mechanisms like India's parliamentary scrutiny over foreign borrowing.
- There's concern that multilateral funds are indirectly enabling military expansion or corruption.

Mains Insight: Reform is needed in global financial oversight to ensure responsible use of aid. India's position reflects its evolving role as a fiscally responsible global player.

१०. Poverty and Inequality – India's Surprising Progress

GS II–Welfare; GSIII–Inclusive Growth; Inequality

New HCES data reveals a sharp fall in poverty and income inequality between २०११–१२ and २०२३–२४.

- Rural poverty dropped from १९.०% to १.२%, urban from १.०% to २.४%.
- Gini coefficient also declined notably, especially in urban areas.
- World Bank data confirms India's extreme poverty fell from ११.२% to २.३% in a decade.

Mains Insight: Growth has been more inclusive than expected. However, sustaining this requires improved service delivery, job creation, and rural-centric policies

११. Transforming Early Childhood Education (ECE): A Strategic Imperative

GS II – Education, Policy for Vulnerable Sections, Role of NGOs

ECE plays a transformative role in shaping an individual's long-term potential and breaking intergenerational poverty. Referencing James Heckman's research, early investments significantly impact future earnings and cognitive outcomes. However, India's ECE system is underfunded and poorly structured:

- Key Issues:

- Instructional hours in Anganwadis average just २० minutes daily.
- Only १% of pre-primary setups have trained educators.
- Foundational abilities are weak—just १०% can match objects; only २०% can identify numbers.

- Fiscal Gap: India spends merely ₹१,२२२ per child annually on ECE compared to ₹२७,००० in school education.

- Reform Initiatives: States like UP and Odisha are investing in trained ECE educators and innovative programs (e.g., Balavatikas, Jadupedi Kits).

- Community Engagement: Parental involvement is vital but hampered by low awareness. Programs like Bal Choupal and digital tools (e.g., WhatsApp learning modules) can bridge this gap.

Way Forward:

- Prioritize ECE in national policy with trained teachers, better infrastructure, and increased funding.
- Leverage public-private and NGO partnerships to scale innovation.
- Empower parents through tech-enabled learning and grassroots awareness.

१२. Rethinking Escalation: India's New Strategic Posture

GS II / III – India-Pakistan Relations, Counterterrorism, Internal Security

India's response to cross-border terrorism has evolved into a doctrine of calibrated deterrence.

The २०२३ Operation Sindoor exemplifies this shift with surgical airstrikes across the LoC—

India's boldest move since १९७१.

- Doctrinal Shift: From strategic restraint to assertive deterrence since २०१६ (e.g., surgical strikes, Balakot).
- Strategic Clarity: Emphasis on swift, limited military action to neutralize threats without triggering full-scale war.
- Diplomatic Narrative: India now actively seeks global support by exposing state-sponsored terror in Pakistan.

Challenges:

- Avoiding escalation beyond control.
- Balancing military readiness with diplomatic prudence.

१३. India's Foreign Policy Drift: Moving Away from Bandung Ideals

GS II – India's Multilateral Vision, Foreign Policy Strategy

The absence of a formal observance of Bandung's ७०th anniversary reflects India's departure from its foundational foreign policy ethos. Once a leader in the Non-Aligned Movement and post-colonial diplomacy, India is now criticized for adopting a more transactional, short-term approach.

- Earlier Stance: India championed sovereignty, multilateralism, and ethical diplomacy.
- Current Trends: Foreign policy increasingly driven by domestic optics, strategic alignments, and tactical interests.

Implications:

- Weakening of India's moral leadership in the Global South.
- Erosion of soft power tools like academia and cultural diplomacy.

Recommendations:

- Restore principled diplomacy rooted in strategic autonomy.
- Reinvest in multilateral platforms and intellectual leadership.

१४. Northeast India: From Margins to Strategic Core

GS I / II / III – Regional Development, Infrastructure, Federalism

The Northeast is emerging as India's growth and diplomatic gateway, given its geostrategic location, biodiversity, and cross-border potential. Yet, ethnic unrest, ecological sensitivity, and infrastructural lag continue to hinder its development.

- Strategic Location: Borders five nations, vital to India's Indo-Pacific and Act East Policy.
- Natural Wealth: Over ००,००० MW hydropower potential; part of Indo-Burma biodiversity hotspot.

Cultural Diplomacy: १२०+ tribes offer rich soft power opportunities.

Persistent Issues:

- Insurgency and ethnic conflict (e.g., Manipur crisis).
- Environmental concerns over hydro projects.
- Porous borders and trafficking.

Reform Roadmap:

- Prioritize peace agreements and tribal recognition.
- Expand digital and physical infrastructure via Gati Shakti and Sagarmala.
- Promote eco-tourism, renewable energy, and organic agriculture.
- Engage youth through skill-building and anti-drug campaigns.

10. Building Logistics Backbone for Trade and Growth

GS II/III– Governance, Infrastructure, Economic Policy

India's ambitious export target of USD 1 trillion by 2030 hinges on its ability to modernize logistics. Current logistics inefficiencies increase trade costs and reduce competitiveness.

- Sectoral Insights:
 - Market projected to grow from USD 338 billion (2023) to USD 800 billion (2030).
 - National Logistics Policy (2022) targets cost reduction from 14% to 8% of GDP.
 - Programs like ULIP and LDB improve transparency and coordination.
- Challenges:
 - Delays in multimodal logistics park development.
 - Skill deficits—estimated 1.2 million new logistics professionals needed.
 - Fragmented digital adoption among small enterprises.

Strategic Recommendations:

- Fast-track AI-powered customs and logistics platforms.
- Expand multimodal hubs and port electrification under Sagarmala.
- Develop tech-oriented logistics skill centers aligned with ESG goals.

11. Deepening India–Bangladesh Relations Amid Emerging Challenges

GS II–Bilateral Relations, Neighborhood Diplomacy

India's ties with Bangladesh are anchored in cultural proximity and strategic alignment. Yet, recent political instability and growing Chinese influence raise concerns.

- Key Achievements:
 - Trade worth USD 14.1 billion; energy cooperation <1,160 MW.
 - Landmark agreements: Land Boundary Agreement (2015), PIWTT, maritime access to Chittagong.
- Major Frictions:
 - Teesta water-sharing impasse.
 - Border management issues linked to migration and Rohingya crisis.
 - Political rhetoric around NRC/CAA impacting perception.

Strategic Steps Ahead:

- Operationalize CEPA and SEZs for deeper economic integration.
- Resolve Teesta via Joint Rivers Commission.
- Expand cross-border digital platforms (e.g., UPI).
- Collaborate on environmental and minority rights issues.

12. Fixing the Gaps in India's Fiscal Federalism

GS II/III– Centre–State Relations, Budgeting, Local Governance

Despite a federal structure, India's fiscal decentralization remains imbalanced. States face constraints in resource mobilization and autonomy, affecting localized development.

- Key Constitutional Mechanisms:
 - Articles 256, 270, 280, and 293 define fiscal sharing and borrowing.
 - GST has reduced States' tax discretion.
 - SFCs often ignored, undermining local body funding.
- Current Challenges:
 - Rising share of non-divisible cess/surcharge (25% of Union tax revenue).
 - Horizontal imbalances penalize high-performing States.
 - Decline in untied grants and Panchayat empowerment.

Reform Agenda:

- Increase devolution share beyond 41% in 11th Finance Commission.
- Include cess in divisible pool for equitable sharing.
- Reform GST architecture and restore State autonomy.
- Empower PRIs through fiscal and functional devolution.

13. Reimagining the India–Africa Partnership

GS II/III/IV– Foreign Policy, Economic Development, Global South Cooperation

India's evolving partnership with Africa draws strength from shared historical struggles and mutual developmental goals. However, India must now recalibrate its approach amid rising global competition and regional volatility.

● Strategic Focus Areas:

- Maritime cooperation (e.g., Mauritius base).
- Critical mineral access for green energy.
- Tech partnership via IIT Zanzibar and solar alliances.
- Peacekeeping and counterterrorism collaboration.

● Key Bottlenecks:

- Africa's debt burden and fragile security landscape.
- Infrastructure bottlenecks and diplomatic delays (e.g., IAFS gaps).
- Rising influence of China and Western powers.

Strategic Recommendations:

- Launch a permanent India-Africa Strategic Forum.
- Build innovation hubs and joint ventures in AfCFTA zones.
- Use blended finance tools and diaspora bonds for sustainable projects.
- Lead digital infrastructure development through Pan-African DPI based on India Stack.

११. AI and the Human Development Paradigm Shift: Insights from HDR २०२०

GS II – Governance, Welfare Policies | GS III – Role of Technology, AI | GS I – Society & Development

The Human Development Report (HDR) २०२० by UNDP highlights the pivotal role Artificial Intelligence (AI) can play in addressing long-standing developmental deficits across education, healthcare, and governance. Although India has advanced to the १२th rank with a Human Development Index (HDI) value of ०.७४०, it still grapples with deep-rooted inequality and gender gaps.

HDI: Conceptual Foundation

- A multidimensional index conceptualized by Mahbub ul Haq and Amartya Sen (१९९०).
- Covers health (life expectancy), education (mean and expected years of schooling), and income (GNI per capita, PPP).
- Shifts development discourse from GDP-centric to people-centric.

Global Observations

- Post-pandemic stagnation in human development.
- Iceland tops (०.९४४), South Sudan lowest (०.२४४).
- १ in १० people globally now engage with AI, creating both opportunities and new digital inequalities.

India's Performance Snapshot

- HDI up from ०.६३ to ०.७४ (२०२३); life expectancy at ७४ years.
- Mean schooling increased to १२ years; GNI per capita jumped to \$१,०६६.
- AI leadership evident—highest AI skill penetration, with public innovations like Bhashini and MuleHunter AI.
- Yet, २०.४% HDI loss due to inequality and >०% student readiness in digital skills are concerning.

Key Challenges

- Gender disparity in labor force participation.
- Low spending on health (२.४% GDP) and education (६.४% GDP).
- Risks of technosolutionism—AI without institutional capacity may widen digital divides.

Way Forward

- Build inclusive digital ecosystems accessible to marginalized groups.
- Human-centered AI policy with strong ethical safeguards.
- Invest in foundational education, vocational skills, and digital literacy.
- Create diverse, AI-ready public institutions that empower rather than automate out human roles.

१०. Defence Modernisation: Towards Strategic Autonomy and Technological Edge

GS II – Border Security | GS III – Internal Security, Indigenisation, Defence R&D

Triggered by security challenges like Pak infiltration and Operation Sindoor, India's defence strategy is moving towards self-reliance, tech innovation, and integrated capability-building.

Recent Gains

- Indigenous defence output reached ₹१.२४ lakh crore in FY२४; ६०% defence procurement is now domestic.
- Defence exports hit a record ₹२१,०४२ crore—३०x growth in १० years.
- DICs in UP and TN drew over ₹४,६०० crore in investments.
- ११९ startups engaged under iDEX and TDF platforms.

Key Assets

- New acquisitions: LCH Prachand, ATAGS, SCALP missiles, and loitering munitions.
- BrahMos export to Indonesia and deeper ASEAN military engagement.
- INS Vikrant with ४४% indigenous content embodies naval resilience.

Critical Challenges

- २४% of procurement still import-dependent.

- Slow roll-out of Integrated Theatre Commands.
- Defence R&D gets just 1.4% of the defence budget.
- Cyber vulnerabilities, as seen in the 2013 Mumbai grid incident, remain under-addressed.

Strategic Measures

- Enhance AI, cyber and quantum capabilities via tech partnerships.
- Reform procurement (DAP) and incentivize private sector through Defence Innovation Zones (DIZs).
- Launch a Defence Talent Academy for high-end R&D skills.
- Develop export ecosystems and open up new defence markets in Africa and Latin America.

71. Gig Economy in India: Enabler of Jobs. But at What Costs?

GS III – Informal Sector, Employment | GS II – Government Policies | Essay – Digital Economy

India's gig economy is set to employ 10 million workers by 2025, driven by digital penetration, job flexibility, and informal-to-platform employment transitions.

Opportunities Offered

- Short-term employment for youth in logistics, food delivery, and online services.
- Bridges informal and formal sectors—encourages entrepreneurial gig work.
- Women (48%) and rural workers find greater participation via digital platforms.
- Platforms contribute to tax compliance via e-Shram and digital payment trails.

Systemic Vulnerabilities

- No legal recognition of gig workers under traditional labor laws.
- Unstable incomes, long work hours, and lack of job security.
- Gig workers excluded from universal social protections, despite initiatives like AB-PMJAY.
- Algorithm-driven deactivation and harassment without grievance recourse.

Policy Imperatives

- Enact a national Gig Workers' Bill with enforceable rights, floor wages, and social safety nets.
- Portable benefits—health insurance, pensions, and life insurance—linked to worker IDs.
- Invest in digital skilling for rural and semi-skilled workers.
- Learn from state-led initiatives like Rajasthan's Gig Workers Act.

72. Mainstreaming PwDs in India's Governance and Development Framework

GS II – Vulnerable Sections, Social Justice | GS I – Empowerment | GS IV – Ethics of Inclusion

Tamil Nadu's law reserving seats for Persons with Disabilities (PwDs) in local governance marks a watershed moment in participatory inclusion.

Existing Legal Framework

- RPwDA Act, 2016 mandates 5% job and 8% education reservation.
- Schemes like Accessible India Campaign, DDRS, and National Trust Act aim for rehabilitation and accessibility.

Persistent Exclusion

- One in four disabled children never attend school.
- Only 11% of PwDs are employed; female participation is even lower at 4%.
- Infrastructure remains inaccessible (only 2% of public buildings disabled-friendly).
- Healthcare costs are disproportionately high (~20% of household expenditure).

Policy Recommendations

- Universal design norms for transport, buildings, and digital infrastructure.
- Skill development aligned with specific disabilities.
- Incentivize private sector hiring through tax breaks and performance-linked incentives.
- Strengthen the institutional architecture with empowered Disability Commissions.
- Promote positive representation in media and public life.

73. Reviving India's Industrial Engine Amid Global and Domestic Challenges

GS III – Economy, Industry, Infrastructure | GS II – Policy and Governance

Industrial growth fell to 1.1% in 2023, the weakest in four years, despite high FDI inflows and digital transformation under Industry 4.0.

Growth Catalysts

- PLI and Make in India attracted over ₹1.5 lakh crore in FDI.
- Record-high PMI of 59.1, especially in electronics and automotive manufacturing.
- Infrastructure gains via Smart Cities, logistics corridors, and affordable housing drive demand for steel and cement.
- Exports like mobile phones saw 42% growth in FY24.

Structural Bottlenecks

- Rural inflation and slowing demand hinder industrial output.

- Logistics costs are among the highest globally (11–18% of GDP).
- MSMEs face credit access barriers and red tape.
- Green manufacturing adoption remains low due to cost burdens.

Strategic Revival Plan

1. Promote AI & automation adoption, especially in MSMEs.
2. Scale up multi-modal logistics infrastructure under Gati Shakti.
3. Integrate skilling missions with advanced tech training in robotics and AI.
4. Incentivize deep-tech startups and boost R&D to 2% of GDP.
5. Boost rural demand via MGNREGA and rural infrastructure.
6. Enable green industrialization through PLI schemes and circular economy models.
7. Expand fintech-based MSME financing and simplify business regulations.
8. Fast-track FTAs and enhance global market access.
9. Emulate PURA model for rural industrial hubs.

PRELIMS BOOSTER

1. Innovative Method for Producing Green Hydrogen

A heterostructure combining copper tungsten oxide (CuWO_4) and copper oxide (CuO) has been developed to improve the Hydrogen Evolution Reaction (HER). This enhancement arises from a built-in electric field (BIEF). The structure is synthesized by growing CuWO_4 nanoparticles onto a $\text{Cu}(\text{OH})_2$ base, forming a p-n junction that causes uneven electron distribution. A Gibbs Free Energy (ΔG) gradient at the CuO - CuWO_4 interface aids in proton adsorption on CuO and facilitates desorption on CuWO_4 , demonstrating negative cooperativity that significantly raises desorption efficiency in alkaline conditions. Green hydrogen refers to zero-emission hydrogen produced by electrolyzing water using renewable energy. Major production techniques include Alkaline Electrolysis, Proton Exchange Membrane (PEM) Electrolysis, and Solid Oxide Electrolysis (SOEC).

2. Near-Surface Shear Layer (NSSL) of the Sun

The Sun has a layer beneath its visible surface called the Near-Surface Shear Layer, stretching roughly 30,000 km deep. In this region, the Sun's angular rotation speed declines rapidly, with variations linked to depth, latitude, and solar cycles. Plasma flows here converge around sunspot latitudes but reverse direction midway through the layer, creating vast circulation patterns. These flows are shaped by solar rotation and the Coriolis force but do not trigger torsional oscillations.

Observations from helioseismology using data from SDO-HMI and GONG provided three-dimensional velocity maps confirming these phenomena.

3. WAVES Anime & Manga Contest (WAM!)

WAM! (WAVES Anime & Manga Contest) is India's first large-scale effort to encourage homegrown anime, manga, webtoons, and cosplay. Spearheaded by the Ministry of Information and Broadcasting in collaboration with the Media & Entertainment Association of India, it will culminate in a national finale from May 1–4, 2025, at Mumbai's Jio World Convention Centre.

WAVES 2020 will serve as a major platform for India's Animation, VFX, Gaming, Comics, and XR sectors, under the theme "Create in India, Create for the World." The event will feature international partnerships, the Create in India Challenge, and exhibits spanning AI, AR, VR, and extended reality technologies.

ξ. Brain-Computer Interface (BCI)

Brain-Computer Interfaces (BCIs) create direct links between human brain signals and external devices, translating neural activity into commands to control machines or restore lost functions caused by neurological conditions. Early BCIs were slow and imprecise with limited command sets. Modern BCIs involve implanting sensors, decoding signals through machine learning, training in virtual environments, and performing real-world tasks. BCIs have enabled people with conditions like ALS to regain speech using neural networks and digital speech avatars, with one patient achieving communication speeds up to 62 words per minute.

ο. AIMεNatuRe Programme

AIMεNatuRe is a global initiative led by the FAO from 2020–2028, funded by the UK (GBP 7 million, approximately USD 9 million), aimed at supporting nations to monitor and report on ecosystem restoration progress. It contributes to Target 2 of the Kunming–Montreal Global Biodiversity Framework, which commits to restoring 30% of degraded ecosystems by 2030. The project leverages advanced technology, standardized data collection, and capacity-building support to cover diverse ecosystems—forests, wetlands, grasslands, marine, and agricultural areas. It is part of FAO's Action Against Desertification and the AIMεForests Programme, promotes biocentric restoration approaches, empowers Indigenous Peoples, and provides Framework for Ecosystem Restoration Monitoring (FERM) tools and resources.

ϰ. Raghuji Bhosale I (1690–1700)

Raghuji Bhosale I established the Nagpur branch of the Bhosale dynasty and was a distinguished Maratha military leader during Chhatrapati Shahu Maharaj's reign. Recognized for his valor and strategic skill, he was awarded the title 'Senasaheb Subha.' Raghuji led crucial military expeditions into Bengal in 1710 and 1700, significantly extending Maratha influence into Bengal and Odisha. He also defeated the Nawabs of Kurnool and Cuddapah, further consolidating Maratha power in southern India.

ν. Muziris Heritage Project

Recently, Kerala's Leader of Opposition credited historian M. G. S. Narayanan as a major inspiration behind the Muziris

Heritage Project, despite differing academic views. Launched in 2009, this project is among India's most ambitious heritage conservation efforts, jointly implemented by the Kerala Government and the Government of India, with UNESCO's support. Its mission is to preserve and revitalize Muziris, an ancient maritime trade center with over 2,000 years of history.

8. Gyan Post Service

Gyan Post is a new India Post service designed to deliver educational, cultural, religious, and social books across the country at low cost using trackable surface transport. This initiative aims to make learning resources accessible regardless of income or location. Only printed materials with clearly identified publishers or printers will qualify. The service begins on May 1st.

9. National Internet Exchange of India (NIXI)

NIXI is a non-profit entity registered under Section 8 of the Companies Act, 2013, and established in 2003. It was created to enable Internet Service Providers (ISPs) to peer and exchange domestic internet traffic within India, rather than routing it through servers abroad (e.g., in the US). This reduces costs for ISPs by saving international bandwidth and improves overall service quality.

2 May 2020:

1. Global Antibiotic Research & Development Partnership (GARDP)

GARDP is a non-profit organization dedicated to creating new antibiotics to combat drug-resistant bacterial infections. Its mission is to meet critical public health demands related to Antimicrobial Resistance (AMR) and secure long-term access to vital antibiotics. It was founded by the World Health Organization (WHO) and the Drugs for Neglected Diseases initiative (DNDi) under the 2015 Global Action Plan on AMR. Established as an independent foundation in Geneva in 2018, GARDP collaborates with both public and private sectors to accelerate the development and availability of antibiotics worldwide.

2. NOTAM (Notice to Air Mission)

A NOTAM is a notice issued by a country's aviation authority to alert pilots about temporary changes or hazards affecting flight operations, such as airshows, VIP movements, runway closures, or military activities. These notices are encoded for accuracy but remain generally comprehensible. When advance notice of seven days isn't feasible, NOTAMs are quickly disseminated to all relevant stakeholders. They can be accessed online and through aviation information services. Checking NOTAMs

before flights is crucial for safety and operational awareness.

३. Red-Crowned Roofed Turtle

Scientific Name: *Batagur kachuga*

Also called the Bengal Roof Turtle, this species is native to India.

Nepal and Bangladesh, though it now mainly survives in the National Chambal Sanctuary. It is medium-

sized, growing up to 56

cm long and weighing up to 20 kg, with males being smaller.

Its distinctive features include a reddish-orange head marked by a black crown and a greenish-brown shell patterned with

yellow. This omnivorous turtle is critically endangered.

protected under Schedule I of India's Wildlife Protection Act.

listed as Critically Endangered by the IUCN, and included in CITES Appendix II.

४. Natural Hydrogen Natural or "white" hydrogen refers to molecular hydrogen

occurring naturally within the Earth's crust, produced through processes like serpentinization, radiolysis, and decomposition of organic

matter. It represents a clean, affordable, low-emission energy

alternative that can help cut global carbon output. Its

extraction cost is expected to be lower than that of green

hydrogen (possibly under \$1 per kilogram). This hydrogen is

typically located in tectonic zones, ophiolite complexes, ultramafic

rocks, and hydrothermal systems. In India, promising

reserves exist

in the Dharwar Craton, Singhbhum, Vindhya and

Cuddapah

basins, Andaman ophiolites, and the Himalayas.

5. Vembanad Lake Vembanad

Lake is India's longest lake and Kerala's largest, covering

about 2,033 square kilometers and stretching around 60

kilometers.

It spans the districts of Alappuzha, Kottayam, and

Ernakulam and is also known locally as Vembanad Kayal.

Punnamada

Lake Shear-Wave Splitting

Shear-wave splitting happens when seismic shear waves divide

and travel at different speeds due to aligned fractures in

rocks. Underground changes in magma and fluid movement

can alter stress, modifying how shear waves behave. An increase

in shear-wave splitting may indicate rising internal pressure

6. Kumarakom Bird Sanctuary and the annual Nehru Trophy

Boat Race.

Since 2002, it has been designated a Ramsar Wetland under

serving as an early warning for volcanic eruptions.

▶ Important Fact:

- Mount Ontake (Japan's second-highest volcano) is located in Central Honshū, near Tokyo.
- In 2014, it experienced a fatal phreatic eruption caused by steam pressure, which was difficult to predict and lacked clear seismic warnings.

2. Pulsar G309 – Galactic 'Bone'

Pulsar G309.13 is a 230-light-year-long non-thermal filament near the Galactic Center, emitting radio waves through synchrotron radiation. A break in this filament aligns with a rapidly moving pulsar traveling at 1–2 million mph, detected via X-rays (Chandra) and radio telescopes (MeerKAT, VLA). The pulsar's motion disturbed G309.13's magnetic field and structure.

▶ Important Facts:

- Chandra X-ray Observatory (launched 1999) spotted high-energy emissions from the pulsar and nearby particles.
- This phenomenon offers insights into how pulsars interact with galactic magnetic fields.

3. Pwani Molecular Form

The Pwani Molecular Form belongs to the *Anopheles gambiae* complex, the main vector transmitting malaria. It shows strong genetic divergence, suggesting it may have distinct ecological or behavioral traits.

▶ Important Facts:

- Limited to coastal East Africa (especially Tanzania and Kenya).
- It lacks standard insecticide resistance markers, raising concerns that it could be vulnerable or have alternative resistance mechanisms.
- This creates challenges for malaria control measures like insecticide-treated nets and indoor residual spraying.

4. SVAMITVA Scheme

SVAMITVA was launched in 2020 as a Central Sector Scheme by the Ministry of Panchayati Raj to create rural property ownership records using drones. It helps property owners use land as a financial asset for loans and government benefits.

▶ Important Facts:

- Supports rural development planning through accurate GIS-based maps.
- Aids property tax assessment for Gram Panchayats or states.
- Reduces legal disputes over property ownership.
- Implemented by State Revenue Departments with Survey of India as the technology partner.

8. Axial Seamount

Axial Seamount is an underwater shield volcano about 300 miles off Oregon's coast on the Juan de Fuca Ridge, sitting 1,400 meters below sea level with a large summit caldera.

Important Facts:

- It is the most active submarine volcano in the Northeast Pacific, erupting in 1998, 2011, and 2015.
- Formed by a hotspot, it hosts hydrothermal vents that support unique marine ecosystems.
- Part of the Ocean Observatories Initiative and home to the New Millennium Observatory (NeMO).

MAY ✓

1. Organization of Islamic Cooperation (OIC)

The Organization of Islamic Cooperation is the second-largest intergovernmental organization after the UN, with 57 member countries across four continents. It was founded on 25 September 1969 in Rabat, Morocco, following the arson attack on Al-Aqsa Mosque. Its goals are to safeguard Islamic values, uphold the sovereignty and independence of its members, and contribute to global peace and security.

Important Facts:

- Headquarters: Jeddah, Saudi Arabia
- Official Languages: Arabic, English, French
- Key Bodies: Islamic Summit Conference (ISC), Council of Foreign Ministers (CFM), General Secretariat
- Works with UN agencies, national governments, and civil society groups

2. ECINET (Election Commission Integrated Network Enabled Technology)

ECINET is a unified digital platform built by the Election

Commission of India (ECI) to streamline election operations. It integrates 8+ existing applications, including Voter Helpline, eVIGIL, Suvidha 2.0, ESMS, Saksham, and KYC App.

▶ Important Facts:

- Provides a simplified user interface (UI) and experience (UX)
- Eliminates the need for multiple logins
- Only authorized personnel can enter data
- Ensures compliance with the Representation of the People Acts (1950 & 1951)
- Expected to benefit 100 crore voters and over 70 lakh election staff

3. Alcatraz Island

Alcatraz Island, or "The Rock," is a 22-acre island in San Francisco Bay, California. It was home to California's first lighthouse in 1854, became a military fort in 1869, and turned into a military prison in 1861.

▶ Important Facts:

- Designated the Pacific Branch of the U.S. Military Prison in 1907
- Served as a federal prison (1934–1963) housing up to 330 inmates (usually fewer than 260)
- Closed due to high costs
- Became a tourist destination in 1972

4. Sanjay Gandhi National Park (SGNP)

SGNP lies near Borivali, spanning Mumbai Suburban and Thane districts. Originally called Krishnagiri National Park, it was renamed in 1981.

▶ Important Facts:

- Covers 103 sq. km, making it among the largest city-based parks in the world
- Home to the Kanheri Caves (1st–10th century CE) showcasing Buddhist heritage
- Contains Tulsi and Vihar Lakes, which supply water to South Mumbai
- Rich in biodiversity: Teak, Kadamba trees, leopards, deer, butterflies, birds

०. Total Allowable Catch (TAC)

TAC sets the maximum amount of fish that can be legally caught in a specific period to ensure sustainable fishing and protect marine life.

▶ Important Facts:

- India applies this principle through seasonal fishing bans during breeding seasons:
 - East Coast: April १० – June १६
 - West Coast: June १ – July ३१
- Helps restore fish populations during monsoon months

१. Santhara

Santhara, also called Sallekhana or Samadhi Maran, is a Jain spiritual practice involving voluntary, gradual fasting to death to attain detachment and purify karma.

▶ Important Facts:

- Intended only for terminal illness, extreme old age, or severe hardship
- Example: A person losing eyesight who may unknowingly harm life (violating ahimsa) could choose Santhara
- Recent controversy: The death of a toddler under Santhara has raised ethical and legal concerns about whether children can give informed consent

१. Mangar Bani

Mangar Bani is a Paleolithic archaeological site and a sacred grove hill forest located in the Aravalli range on the Delhi-Haryana border.

▶ Important Facts:

- It is the only primary forest in the Delhi NCR
- Despite having forest characteristics, not officially notified under the Forest (Conservation) Act
- A primary forest is a mature, naturally regenerated ecosystem with minimal human disturbance

१. Procedure for Voter Registration

The Election Commission of India (ECI) requires new voters to apply using Form १.

▶ Important Facts:

- Applicants must provide:

- o Self-attested age and address proof (e.g., utility bills, passport)
- o A signed declaration of Indian citizenship
- Proof of citizenship is not mandatory unless the Electoral Registration Officer (ERO) doubts the claim
- . The process involves:
 - o Document verification
 - o Hearings for objections
 - o Acceptance or rejection of the application
- Section 31 of the RP Act, 1950 penalizes false declarations

9. OPEC+

OPEC+ consists of 2 oil-producing countries, 2 OPEC members and 10 non-OPEC nations).

Important Facts:

- . Formed in 2016 after the Algiers Accord (September) and the Vienna Agreement (November)
- . Created in response to plummeting oil prices due to U.S. shale oil production
- Non-OPEC members include Russia, Kazakhstan, Azerbaijan, Brunei, Bahrain, Mexico, Oman, South Sudan, Sudan, Malaysia

10. NAMASTE Scheme

NAMASTE (National Action for Mechanised Sanitation Ecosystem) was launched July 2023 by the Ministry of Social Justice and Empowerment with the Ministry of Housing and Urban Affairs

Important Facts:

- . Aims to end hazardous manual cleaning of sewers and septic tanks by promoting mechanized, safe practices
- . Components include:
 - o Profiling sanitation workers
 - o Health insurance (AB-PMJAY)
 - o Occupational safety training
 - o Capital subsidy for equipment
 - o PPE kits and safety devices
 - o Awareness campaigns

- In २०२३, the scheme was expanded to cover waste pickers, supporting safe, dignified livelihoods

MAY १

१. Lagrangian Growth-Advection (GA) Model

The Lagrangian Growth-Advection Model merges particle tracking with advection processes and biological growth to simulate phytoplankton succession and carbon transport through ocean currents. It accounts for spatial and temporal lags in carbon generation and export, incorporating the role of zooplankton and biological succession.

Important Facts:

- Validated using deep-sea data from Station M
- More accurately captures carbon flux events previously undetected by older models
- Improves understanding of oceanic carbon storage and climate regulation

२. Human Development Report २०२०

Released annually by the UNDP, the Human Development Report evaluates nations via the Human Development Index (HDI). The २०२० edition, titled "A Matter of Choice" explores AI's impact on development.

Important Facts:

- Iceland ranked highest on HDI
- India placed १३०th with an improved score of ०.७१०
- India showed progress in life expectancy, education, and gross national income
- India excelled in AI skills and retaining talent among developing countries

३. Kaleshwaram Lift Irrigation Project (KLIP)

KLIP is a multi-purpose irrigation project on the Godavari River at Kaleshwaram, Telangana. It provides water for irrigation and drinking to ३० lakh acres across २० districts, including Hyderabad.

Important Facts:

- World's largest multi-stage lift irrigation project
- Begins at the Pranhita-Godavari confluence
- Involves १ links and २१ packages over ००० km

- Total canal network exceeds 1,800 km
- Designed to handle 28 TMC of water for various uses

ξ. Bhimgad Wildlife Sanctuary

Located in Belgaum district, Karnataka, Bhimgad Wildlife Sanctuary was declared in December 2011. Named after Bhimgad Fort, built by Shivaji Maharaj in the 17th century.

► Important Facts:

- Borders five sanctuaries, including Dandeli and Mhadei
- Contains diverse terrain: hills, valleys, plateaus
- Headwaters for Tillari, Malaprabha, and Mhadei Rivers
- Home to the Barapede Caves, the only breeding site of the Wroughton's Free-tailed Bat
- Dominated by moist broadleaf forests

ο. IXPE (Imaging X-ray Polarimetry Explorer)

IXPE is a mission by NASA and the Italian Space Agency, launched on 9 December 2021. It is the first satellite dedicated to measuring X-ray polarization.

► Important Facts:

- Studied BL Lacertae (BL Lac), a type of blazar
- Detected weak X-ray polarization (~1%) and high optical polarization (~5%)
- Findings confirmed that electrons, not protons, produce X-rays via Compton Scattering

MAY 9

ι. Chirality in Quantum Materials

Chirality describes when an object or molecule cannot be superimposed on its mirror image—like left and right hands.

► Important Facts:

- KV_3Sb_5 (Potassium Vanadium Antimonide) has a Kagome lattice structure
- Researchers used a Scanning Photocurrent Microscope (SPCM) to detect the Circular Photogalvanic Effect (CPGE), a signature of chirality
- At 8 Kelvin, it showed spontaneous symmetry breaking through Charge Density Waves (CDW)

- First evidence of chiral charge order in a bulk quantum material

२. Kosmos १८२

Kosmos १८२ was a Soviet Venus lander, launched on २१ March १९७२ as part of the Venera programme.

▶ Important Facts:

- A timer malfunction left it in Earth orbit rather than heading to Venus
- The main spacecraft burned up, but a २००-kg lander module remains
- Expected to re-enter Earth's atmosphere around १० May २०२०
- Venera programme (१९६१–१९८१) launched २८ probes, with १० successful Venus landings
- Landers had titanium hulls and cooling systems to endure Venus's extreme heat and pressure

३. IMDEX Asia

IMDEX Asia is a leading maritime and defence exhibition, held every two years in Singapore since १९९७.

▶ Important Facts:

- Platform for navies, coast guards, and defence firms to showcase systems and technology
- Includes International Maritime Security Conference (IMSC), started in २००९
- Focuses on maritime security and cooperation
- Co-organised by Singapore Navy and RSIS

४. SCALP (Storm Shadow)

SCALP is a long-range, air-launched cruise missile, developed by France and the UK for deep strike missions.

▶ Important Facts:

- Range: ~२०० km
- Warhead: १०० kg
- Speed: Mach ०.८ (subsonic)
- Guidance: Terrain-following navigation, GPS/INS, infrared homing
- Deployed with Rafale jets in the Indian Air Force

- Stealthy, precise, all-weather capable

0. Anak Krakatau Volcano

Anak Krakatau is an active stratovolcano in the Sunda Strait, Indonesia.

▶ Important Facts:

- Emerged in 1927 from remains of the 1883 Krakatoa eruption
- Part of the Pacific Ring of Fire
- Known for frequent strombolian eruptions
- 2018 flank collapse triggered tsunami that devastated nearby coasts

MAY 12

1. Pangenome of Asian Rice

Scientists created the first pangenome for Asian rice (*Oryza sativa* L.), using 144 wild and cultivated varieties.

▶ Important Facts:

- Maps all core and unique genes, revealing full genetic diversity
- Comparable to the Human Genome Project, but for rice
- Aims to breed disease-resistant, climate-resilient rice varieties
- Rice feeds two-thirds of humanity
- India achieved a record 22.0 million tonnes production in 2022-23, yield 4.2 tonnes/hectare

2. RNA Exosomopathies

RNA exosomopathies are genetic disorders that affect RNA exosome function, causing brain maldevelopment, e.g., PCH).

▶ Important Facts:

- RNA exosome degrades faulty RNA and matures rRNA
- Humanised yeast models confirmed mutations disrupt exosome function
- Yeast systems enable rapid, low-cost research on these diseases

३. Magnetars

Magnetars are neutron stars with the strongest known magnetic fields.

▶ Important Facts:

- A २००९ giant flare revealed delayed gamma-ray emissions, hinting at radioactive decay of neutron-rich isotopes
- Suggests r-process nucleosynthesis, forming heavy elements like gold and uranium
- Implies magnetars may have contributed to the universe's early chemical enrichment

४. Credit Guarantee Scheme for Startups (CGSS)

Launched in २०२२ to back loans for DPIIT-recognized startups. Managed by National Credit Guarantee Trustee Company Ltd. (NCGTC).

▶ Important Facts:

- Guarantees given to banks, NBFCs, and SEBI-registered AIFs
- Covers venture debt, working capital, debentures, mezzanine finance
- Recent revisions:
 - Guarantee limit raised to ₹२० crore
 - Coverage up to ८०%
 - Annual Guarantee Fee reduced to १% for Champion Sectors

०. LICONN (Light-microscopy-based Connectomics)

LICONN is a new brain mapping technique developed by Institute of Science and Technology Austria (ISTA).

▶ Important Facts:

- Combines light microscopy, hydrogel expansion, fluorescent tagging, AI analytics
- Overcomes electron microscopy limitations by offering both structural and molecular visualization
- Brain tissue is expanded ११ times to achieve sub-microscopic resolution
- First non-EM method to fully reconstruct synaptic connections

१३ May

१. Central Public Health and Environmental Engineering

Organisation (CPHEEO)

CPHEEO is the technical division of the Ministry of Housing and Urban Affairs, originally set up in 1904 under the Ministry of Health.

- ◆ Role: Advises states and urban bodies on water supply, sanitation, and solid waste management.
- ◆ Staff: Group 'A' engineers selected by UPSC in public and environmental engineering.
- ◆ Functions: Provides technical guidance, policy input, scheme appraisals (including projects funded by international agencies), and develops national strategies and guidelines.

Note: While it guides policy, water and sanitation are State subjects.

2. Magnetic Flip-Flop

Earth's magnetic field shields us from harmful space radiation and is generated by electric currents in the molten outer core.

◆ Magnetic Reversals: Poles swap over long periods (e.g., Brunhes-Matuyama reversal, ~780,000 years ago).

◆ Geomagnetic Excursions: Shorter, partial flips (e.g., Laschamps event, ~41,000 years ago).

◆ History: ~182 reversals over 82 million years due to fluid turbulence in the core.

◆ Recent Trend: Field has weakened 10% in the last 200 years, and the poles are moving faster.

3. Indian Grey Wolf

A subspecies of the grey wolf distributed from Nepal to India, inhabiting scrublands and semi-arid grasslands.

◆ Traits: Nocturnal, small pack hunter, lacks a thick winter coat.

◆ Status: IUCN Least Concern globally, but locally endangered in India.

◆ Protection: Listed in CITES Appendix I and Schedule I of Wildlife Protection Act, 1972.

◆ Threats: Disease from domestic dogs (canine distemper) and genetic dilution.

◆ Management: Vaccination preferred over culling to address ethical concerns.

4. Chenab River

Named from 'Chan' (Moon) + 'nab' (Water), the Chenab starts at the confluence of Chandra and Bhaga rivers in Himachal Pradesh.

Pradesh.

- ◆ Course: Flows through Jammu & Kashmir into Pakistan, joining the Jhelum at Trimmu before merging with the Sutlej.
- ◆ Length: ~945 km, largest river by volume in Himachal.
- ◆ Tributaries: Miyar Nalla, Sohal, Thirot, Bhut Nalla, Marusudar, Lidari.
- ◆ Governance: Water use regulated under the Indus Waters Treaty.

9. Crohn's Disease

A chronic inflammatory bowel disease (IBD) that causes swelling mainly in the end of the small intestine and start of the large intestine

- ◆ Symptoms: Diarrhea, abdominal pain, cramping, weight loss.
- ◆ Complications: Can lead to severe health issues.
- ◆ Treatment: No cure, but therapies can reduce symptoms and achieve long-term remission, allowing patients to live normal lives.

1. Great Nicobar Island

The southernmost island in the Nicobar chain, separated from Andaman by the Ten Degree Channel.

- ◆ Size: ~1,888 sq. km; ~80% is dense rainforest.
- ◆ Features: ~100 km of unspoiled beaches, coral reefs, Indira Point (India's southern tip).
- ◆ Highest Peak: Mount Thullier (2,105 ft).
- ◆ Conservation: Great Nicobar Biosphere Reserve (UNESCO site) with rare species like Dugong, Saltwater Crocodile, and Nicobar Megapode.

14 May

1. Germanium

India is negotiating with China over export restrictions on germanium—a critical input for semiconductors, fiber optics, and solar panels.

- ◆ Properties: Silver-grey metalloid (atomic number 32), similar to silicon, with a diamond-like lattice.
- ◆ History: Predicted by Mendeleyev (1869), discovered by Clemens Winkler (1886).
- ◆ Extraction: Mainly from zinc ores (70%) and coal (20%).
- ◆ Global Supply: China produces 60% of the world's germanium.

२. Boramdeo Wildlife Sanctuary

Located in Kawardha, Chhattisgarh, within the Maikal range of the Satpura hills.

- ◆ Area: 352 sq. km.
- ◆ Named after: Boramdeo Temple, known as the “Khajuraho of Chhattisgarh”.
- ◆ Connectivity: Part of the Kanha–Achanakmar Corridor.
- ◆ Ecosystem: Moist and dry deciduous forests; sources of Fen and Sankari rivers.
- ◆ Fauna: Tigers, leopards, sloth bears, deer, diverse birds.

३. Buddhavanam and Nagarjunakonda

Buddhavanam is a 279-acre Buddhist theme park in Telangana, along the Krishna River.

- ◆ Purpose Attract global tourists as part of the Integrated Buddhist Circuit
- ◆ Components Buddhacharitha Vanam, Jataka Park, Dhyana Vanam, Stupa Vanam, heritagemuseum.
- ◆ Nearby: Nagarjunakonda, ancient capital of the Ikshvaku dynasty (3rd–4th century CE), a major Mahayana Buddhist center with stupas and monasteries.

४. Ferroelectricity

Refers to the spontaneous alignment of electric dipoles in certain crystals, reversible by an external electric field.

- ◆ Examples: Barium titanate (BaTiO_3), Rochelle salt.
- ◆ Features: Domains (aligned dipole regions), domain walls, ferroelectric hysteresis.
- ◆ Curie Temperature: Threshold beyond which alignment disappears.
- ◆ Technique: ORNL’s SOPFM (Scanning Oscillator Piezoresponse Force Microscopy) uses atomic force microscopy with precise timing to track domain wall motion.

५. Axions and HAYSTAC Experiment

Axions are theoretical particles proposed to solve the Strong CP problem in QCD, also considered candidates for Cold Dark Matter.

- ◆ Properties: Electrically neutral, extremely light, weakly interacting.
- ◆ HAYSTAC: Aims to detect axions by observing their conversion into photons in a strong magnetic field.
- ◆ Innovation: Uses quantum squeezing to lower noise—shared only with LIGO among major experiments.

१९ May

१. BSF (Border Security Force)

India's First Line of Defence under the Ministry of Home Affairs.

- ◆ Raised: १ December १९६०, post Indo-Pak war.
- ◆ Duties: Border security, wartime support to the Army, anti-Naxal operations.
- ◆ Strength: १८१ battalions, ~२.०७ lakh personnel.
- ◆ Assets: Air, Marine, Artillery units, Tear Smoke Unit, Camel & Dog squads.
- ◆ Leadership: DG is from the IPS.

२. GRAIL Mission

NASA's GRAIL (Gravity Recovery and Interior Laboratory) was a २०११ lunar mission with twin spacecraft Ebb and Flow.

◆ Goal: Produce the most detailed lunar gravity map by tracking distance shifts between the orbiters.

◆ Discoveries:

- Thinner, porous crust
- Tidal differences across the Moon
- Volcanic and heat imbalances
- Evidence of dikes (past expansion)
- Crustal asymmetry affecting lava flows

३. World Food Prize

Award honoring contributions to global food security, called the "Nobel Prize for Food and Agriculture."

- ◆ Established: १९८६ by Dr. Norman Borlaug.
- ◆ Prize: \$०००,०००, awarded during the Borlaug Dialogue in Iowa.
- ◆ First Winner: M. S. Swaminathan (१९८७).
- ◆ २०२० Winner: Mariangela Hungria, Brazilian microbiologist for biological seed and soil treatments.

४. e-Passport

Digital passport with an RFID chip storing biometric and personal data.

- ◆ Security Features:
 - BAC: Prevents unauthorized scanning
 - PA: Detects tampering
 - EAC: Secures fingerprint data

- PKI: Ensures authenticity
 - ◆ Benefits: Faster processing, better security, global compatibility.

◦. Coral Reefs

Marine structures formed by calcium carbonate-secreting coral polyps

- ◆ Types: Fringing reefs, barrier reefs, atolls.
- ◆ Conditions:
 - Warm ($\leq 20^{\circ}\text{C}$), clear, shallow tropical seas
 - Depth $\leq 50\text{m}$, minimal pollution, abundant plankton
 - ◆ Examples: Great Barrier Reef, Gulf of Mannar, Lakshadweep

२. May

१. Polar Satellite Launch Vehicle (PSLV)

ISRO's four-stage rocket for launching satellites into sun-synchronous polar orbits.

- ◆ Stages:
 - Stage 1: Solid fuel with 1 strap-on boosters (thrust $\sim 4.8\text{ MN}$).
 - Stage 2: Liquid fuel ($\text{UDMH} + \text{N}_2\text{O}_4$), Vikas engine.
 - Stage 3: Solid fuel.
 - Stage 4: Liquid fuel with twin engines.

२. Presidential Reference (Article 143)

Allows the President to consult the Supreme Court on legal/constitutional questions.

- ◆ Types:
 - 143(1): Public importance issues.
 - 143(2): Pre-Constitution treaties.
 - ◆ Nature: Advisory, non-binding but persuasive.
 - ◆ Procedure: Heard by minimum 5-judge Bench on advice of Union Cabinet.

३. RS-24 Yars

Russian ICBM with MIRV capability, introduced in 2010.

- ◆ Specs:
 - Range: 2,000–10,000 km
 - Warheads: Up to 10 MIRVs (300 kilotons each)

- Guidance: Inertial + Glonass
- Features decoys, manoeuvrability to evade missile defence.

ξ. Canary Islands

Spanish archipelago in the North Atlantic, ~100 km off Morocco.

◆ Key Facts:

- Largest in Macaronesia
- Area: ~7,447 sq. km
- Teide Peak (3,718 m) is Spain's tallest point.
- Subtropical climate, major tourism hub.

ο. Indrayani River

Tributary of the Bhima River, which flows into the Krishna.

◆ Origin: Western Ghats near Panavala.

◆ Length: ~103.5 km.

◆ Cultural Sites: Alandi (Dnyaneshwar's samadhi), Dehu (Saint Tukaram's birthplace).

◆ Uses: Irrigation, hydroelectricity (Valvan Dam at Kamshet).

२१ May

1. **Wholesale Infrastructure Critical Institutions for MIs** the backbone of India's capital markets.

. Components:

- o Stock Exchanges
- o Clearing Corporations
- o Depositories
- Functions: Enable efficient trading, clearing, settlement, and record-keeping.
- Importance: Any disruption can destabilize the entire financial system.
- Governance: Profit-oriented but act as first-line regulators with stringent compliance standards.
- Regulator: SEBI, which mandates all MIIs to be registered to protect investors.

Udanti Sitanadi Tiger Reserve

- 2 • Location: Gariaband and Dhamtari districts, Chhattisgarh.

- Formed by Merging Udanti and Sitanadi Wildlife Sanctuaries
- Area: 1,872 sq km
- Rivers: Mahanadi, with tributaries Udanti, Sitanadi, Indravan, Pairi.
- Significance Corridor linking to Indravati Tiger Reserve
- Terrain:
 - Highest peak Deo Dongri
 - Prominent mountain Atānga Dongar
- Forests: Tropical Peninsular Sal and Dry Deciduous Mixed.
- Wildlife: Tigers, endangered Wild Buffalo, Indian Wolf, Sloth Bear, Mouse Deer.

Nineveh

- 3 • Ancient Capital Assyrian Empire under King Sennacherib (late 7th century BCE).
 - Location: East bank of Tigris River (modern Mosul, Iraq).
 - Founded Settled as early as 1000 BCE.
 - Religious Center Worship of goddess Ishtar by 700 BCE.
 - Golden Age Neo-Assyrian Empire (912–612 BCE).
 - Features Famous gardens, zoo, art, and urban culture.
 - Destruction Fell in 612 BCE to the Babylonians and Medes, ending Assyrian dominance.

Directorate General of Foreign Trade (DGFT)

- 4 • Role: Apex body for India's trade policy.
 - Parent Ministry: Ministry of Commerce and Industry
 - Earlier Name: Chief Controller of Imports & Exports (CCI&E) before 1991 reforms.
 - Key Functions:
 - Formulates and implements Foreign Trade Policy (FTP).
 - Issues Importer Exporter Code (IEC) – a unique 10-digit identifier.
 - Regulates exports under bilateral treaties.
 - Prescribes input-output norms for exporters.

- Network HQ in New Delhi + 24 regional offices.
- Trade Promotion Facilitates regional trade, especially with neighbouring nations.

5 National Investigation Agency (NIA)

- Established Under NIA Act, 2008 after the 26/11 Mumbai attacks.
- Mandate India's main counter-terrorism investigative agency
- Jurisdiction: Nationwide, plus extraterritorial offences involving Indians or Indian interests.
- Powers:
 - Investigates Scheduled Offences e.g., UAPA, Arms Act).
 - Files charges in Special NIA Courts.
 - Coordinates with state police.
- HQ: New Delhi; zonal offices in Guwahati and Jammu.
- Leadership Led by a Director-General (DG) senior IPS officer).

6 e-Zero First Information Report (FIR) Initiative

- Launched by: Indian Cybercrime Coordination Centre (I²C), Ministry of Home Affairs.
- Purpose Automate FIR registration for financial cybercrimes over ₹10 lakh
- How it Works:
 - Complaints via 1930 helpline or National Cybercrime Reporting Portal
 - Auto Zero FIR generated at Delhi's e-Crime Police Station.
 - Victims must convert Zero FIR to regular FIR within 7 days.
- Integration Combines NCRP, Delhi Police's e-FIR system, and NCRB's CCTNS.
- Goal: Faster investigations, reduced delays, and better victim support.

२२ May

1. PBAT (Polybutylene Adipate Terephthalate)

- Type: Biodegradable thermoplastic polymer.
- Composition: Adipic acid + 1,4-butanediol + terephthalic acid.
- Properties:
 - 100% compostable within 180 days under industrial composting.
 - Flexible, tough, moisture-resistant.
 - Chemically inert.
- Comparison with PLA:
 - PBAT: More flexible, faster degradation, less costly.
 - PLA: Rigid, used in cutlery and electronics packaging.

2. Jarosite

- Description: Yellow-brown mineral of potassium, iron, sulphate.
- Found in: Arid saline environments like Kachchh, Gujarat.
- Research: Indian study explored Jarosite as a "natural clock" on Mars via luminescence dating.
- Observation: Four stable luminescent emissions (100–300 °C).
- Significance: Simulates Mars-like conditions for planetary science.

3. Shirui Lily Festival

- Location: Ukhrul district, Manipur
- Organising Tribe: Tangkhul Nagas.
- Focus: Celebrate Shirui Lily (*Lilium mackliniae*) – endemic to Shirui Hills.
- History:
 - Discovered in 1946.
 - RHS award in 1948.
 - Declared Manipur's State Flower in 1989.
- Purpose: Conservation and cultural promotion.

4 Vitamin D

• Type: Fat-soluble vitamin (calciferol).

• Sources:

- Synthesized in skin via UV sunlight
- Fatty fish, liver, mushrooms, eggs.
- Fortified foods: milk, cereals.

- Functions: Aids calcium & phosphorus absorption, supports bone health.
- Deficiency: Leads to rickets, osteoporosis, hypocalcemia.
- Supplements: Widely used among those with low sun exposure or darker skin.

◦ Operation Olivia

- Agency: Indian Coast Guard.
- Period: Annual operation (November–May).
- Goal: Protect Olive Ridley turtles along Odisha coast (Gahirmatha Beach).
- Activities:
 - Continuous patrolling and aerial surveillance.
 - Promotion of Turtle Excluder Devices (TEDs).
 - Collaboration with NGOs and locals.
- Status: Olive Ridley – Vulnerable, protected by IUCN Red List, WPA 1972 (Schedule I), and CITES Appendix I.

२२ May

◦ The International Booker Prize

- What: Annual literary award for best fiction or short stories translated into English and published in the UK/Ireland.
- Founded: 2005 (biennial), switched to annual in 2015.
- Prize Money: £50,000 shared equally between author and translator; shortlisted teams get £2,000 each.
- Administered by: Booker Prize Foundation.
- 2020 Winner: Heart Lamp by Banu Mushtaq, translated from Kannada by Deepa Bhashti.
 - Significance:
 - First Kannada work to win.

- First short story collection to win .
- Explores Muslim women's experiences in South India (1990-2023).

2 International Day for Biological Diversity (IDB)

- Date: May 22 every year .
- Purpose: Raise awareness about biodiversity challenges .
- 2020 Theme: Harmony with nature and sustainable development .
 - Linked to SDGs and the Kunming-Montreal Global Biodiversity Framework (KMGBF) .
- Origin:
 - Initially marked on 29 December (date of Convention on Biological Diversity's entry into force) .
 - Shifted to May 22 in 2000 to mark the 1992 Nairobi Final Act .

3 CEIR (Central Equipment Identity Register)

- Developed by: Department of Telecommunications (DoT) .
- Purpose: Track lost or stolen mobile phones using IMEI .
- Features:
 - Maintains a central IMEI database
 - Users can report loss with IMEI + FIR copy .
 - Tracks devices even with SIM changes
- IMEI: 15-digit unique identifier linked to each handset .
- EIR Lists:
 - White List: Authorized devices .
 - Grey List: Monitored devices .
 - Black List: Blocked /stolen devices .
- Objectives Discourage theft, protect consumers, detect fraud, and restrict illegal imports .

4 SWOT (Surface Water and Ocean Topography) Satellite

- Agency: NASA & CNES (France) collaboration .

- Launch: २०२२.
- Technology: Ka-band Radar Interferometer (KaRI) for precise water measurements.
- Capabilities:
 - Measures elevation, width, movement of water bodies.
 - Covers ७०% of major floods globally during their lifecycle.
- Use: Improves understanding of river waves, floods, and nutrient transport.
- Advantage: Overcomes sparse coverage of traditional stream gauges

5 INSV Kaundinya

- Launch: July २०२३.
- Partners: Ministry of Culture, Indian Navy, HODI Innovations
- Purpose: Promote India's maritime heritage
- Planned Voyage: Gujarat to Oman in २०२४, retracing ancient trade routes.
- Construction:
 - Ancient stitched shipbuilding technique
 - Inspired by Ajanta murals.
- Symbols: Gandabherunda, Simha Yali, Harappan-style stone anchor.
- Name: Commemorates Kaundinya, legendary Indian mariner.

6 Intercrystals

- What: Structures combining features of crystals and quasicrystals.
- Formed by: Stacking twisted graphene layers over hexagonal boron nitride (h-BN).
- Phenomenon: Twistronics—tiny rotation angles create moiré patterns.
- Properties:
 - Show both symmetry and non-repeating patterns.
 - Small structural shifts trigger superconductivity.

magnetism, and exotic quantum states.

- Applications: Developing new materials with tunable electronic properties.

२६ May

1 □ Tianwen-२ Mission

- Agency: China National Space Administration (CNSA).
- Targets:
 - Asteroid Kamo'oalewa—Earth's quasi-satellite discovered in २०१६.
 - Later, comet ३११P/PANSTARRS.
- Launch Vehicle: Long March २B.
- Sampling Methods:
 - Touch-and-go collection.
 - Anchor-and-attach technique.
- Significance: Part of China's Tianwen series:
 - Tianwen-१: Mars orbiter and rover.
 - Tianwen-२: Planned Mars sample return by २०२८.

२ □ Debt Recovery Tribunals (DRTs)

- Established: Recovery of Debts Act, १९९३
- Role: Adjudicate loan defaults over २० lakh.
- Jurisdiction:
 - Secured debt cases.
 - Securitisation Applications (SAs) under SARFAESI Act, २००२.
- Structure:
 - ३९ DRTs across India.
 - Each led by a Presiding Officer
 - Debt Recovery Appellate Tribunals (DRATs) hear appeals.
- Powers: Summon witnesses, examine evidence, conduct hearings.

New Development Bank (NDB)

- 3
- Formed by: BRICS nations (Brazil, Russia, India, China,

South Africa).

- Purpose Finance infrastructure and sustainable development projects.
- Proposed: २०१२ New Delhi Summit
- Established: २०१४ Fortaleza Summit
- Operations Began: २०१५
- Headquarters: Shanghai regional offices in South Africa, Brazil.
- Membership Open to all UN members equal voting rights.
- Capital:
 - Authorized USD १०० billion.
 - Subscribed USD ५० billion, equally shared.
- Governance Rotating leadership among BRICS, Board of Governors & Board of Directors.

4 Nagshankar Temple

- . Location: Biswanath district, Assam (north bank of Brahmaputra).
- . Dedication Lord Shiva.
- . History:
 - Built by King Narasankar (Nagakha dynasty, ६th century AD).
 - Renovated by Ahom King Su-sen-phai (१६८०).
- . Unique Feature: Large pond housing १०-२० rare turtles —black softshell, Indian softshell, Malayan softshell.
- . Wildlife: Peacocks, deer, pythons.
- . Cultural Importance: One of Assam's oldest Hindu temples.

◦ INSACOG (Indian SARS-CoV-2 Genomics Consortium)

- Established: December २०२०
- Led by:
 - Ministry of Health.
 - Department of Biotechnology (DBT).

- o CSIR.
- o ICMR.
- Network: 84 labs, coordinated by NCDC and IDSP.
- Focus: Genomic surveillance of COVID-19 and emerging variants.
- Objectives:
 - o Detect variants with public health impact.
 - o Investigate unusual patterns (e.g., vaccine breakthroughs).
 - o Integrate genomic & epidemiological data for policy action.

27 May

1. Association of Southeast Asian Nations (ASEAN)

. What: A regional intergovernmental organisation for political, economic, and security cooperation in Southeast Asia.

. Founded: 1967 via the Bangkok Declaration

. Original Members Indonesia, Malaysia, Philippines, Singapore, Thailand.

. Current Members (10): Includes Brunei, Vietnam, Laos, Myanmar, Cambodia.

. Headquarters: Jakarta, Indonesia

. Key Bodies:

- o ASEAN Summit
- o Coordinating Council
- o Secretariat
- o ASEAN Regional Forum (India joined ARF in 1996)

• Decision-making: Based on consultation and consensus.

2. Indian National Space Promotion and Authorisation Centre (IN-SPACe)

• What: An autonomous agency under Department of Space (DoS).

• Purpose: Authorize and promote private sector participation in space.

• Functions:

- o Provides access to ISRO facilities
- o Supports startups and academia in space innovation.
- Headquarters: Bopal, Ahmedabad.
- Related Facilities:
 - ISRO Propulsion Complex (IPRC) at Mahendragiri, Tamil Nadu.
 - o Upcoming spaceport at Kulasekarapattinam Tamil Nadu.
 - Space Technology Incubation Centre (STIC) at NIT Trichy.

- 3 Kiru Hydropower Project
- Type: Run-of-river hydroelectric scheme.
 - Capacity: 124 MW.
 - Location: Chenab River, Kishtwar district, J&K.
 - Features:
 - o 130 m high concrete gravity dam.
 - o Underground powerhouse with 4 x 106 MW Francis turbines.
 - Cost: Estimated at ₹ 2,87 crore.
 - Developer: CVPP, a JV of NHPC (49%), JKSPDC (49%), PTC (2%).
 - Goal: Reliable power supply to northern grid.

- 4 Bharat Forecasting System (BFS)
- Developed by: IITM Pune.
 - What: Advanced high-resolution weather prediction model
 - Resolution: 1 km, compared to older 10 km GFS.
 - Powered by: Arka supercomputer (1.77 petaflops, 33 PB storage).
 - Coverage: Tropical zone (40°S to 30°N).
 - Features:
 - o Integrated AI/ML.
 - o Data from Doppler radars (to be expanded to 100).

o Open access to global researchers.

- 5 Caliphaea sinuofurcata
- What: Newly discovered damselfly species
 - Location: Arunachal Pradesh, Upper Siang & Lower Dibang Valley.
 - Nickname: Bearded Bronzeback due to dense black bristles on mouthparts
 - Significance:
 - o Only the second Caliphaea species in India after C. confusa (recorded 160+ years ago).
 - Habitat: Rocky seasonal streams in broadleaf evergreen forests 1200–1300 m elevation.
 - Features:
 - o Metallic copper-green body.
 - o Brownish wings.
 - o Sinuous forked paraproct used for identification.



28 May

1

Kumbakonam Vetrilai

- What: A betel leaf variety from Thanjavur's Cauvery basin, Tamil Nadu.
- Cultivation Areas: Kumbakonam, Ayyampettai, Swamimalai, Rajagiri.
- Uses: Central to paan preparation, also exported.
- Harvest Stages:
 - o Kolundhuvetrilai: First leaves (20–25 days).
 - o Maaruvethalai: Larger, first-year leaves.
 - o Kelavethalai / Kattavethalai: Smaller leaves in years 2–3.

2

Semi-transparent Perovskite Solar Cells

- What: High-efficiency solar cells layered over silicon in a terminal tandem configuration.
- Technology: Halide perovskite semiconductors (ABX₃ crystals).
- Efficiency: ~30%, vs ~20% for silicon.

- Advantages:
 - Higher efficiency.
 - Lower cost.
- Challenges:
 - Shorter lifespan.
 - Stability issues.

- 3 Panchayat Advancement Index (PAI)
- Purpose: Assess holistic development of Panchayats
 - Alignment: Localised SDGs & India's 2030 Agenda
 - Indicators: 430 metrics (331 mandatory + 104 optional) across 12 LSDG themes.
 - Categories:
 - Achiever
 - Front Runner
 - Performer
 - Aspirant
 - Beginner
 - Version: PAI 2.0 covering 16 lakh Gram Panchayats in 29 States /UTs

- 4 East China Sea
- Where: Western Pacific Ocean East Asia.
 - Borders: China, Japan, Taiwan, South Korea.
 - Connections:
 - To Japan Sea via Tsushima Strait.
 - To South China Sea via Taiwan Strait.
 - Major Rivers: Yangtze and Yellow River.
 - Features:
 - Monsoon-dominated.
 - Contains disputed islands – Diaoyu / Senkaku, Ryukyu.
 - 30% of global petroleum shipments passed through in 2023.

- 5 Jinchuanloong niedu
- What: Early eusauropod dinosaur species
 - Period: Middle Jurassic (~160 million years ago)
 - Discovery Site: Xinhe Formation, Gansu, China
 - Group: Eusauropods—large herbivorous quadrupeds like Shunosaurus and Omeisaurus.
 - Significance: Survived global warming in Early Jurassic, later dominated ecosystems.



29 May

- 1 Ghaggar River
- Type: Seasonal /intermittent river
 - Origin: Shivalik Range, Himachal Pradesh.
 - Course: Flows through India into Pakistan, vanishing in Thar Desert
 - Pakistan Section: Called Hakra River.
 - Historical Importance:
 - Associated with the Saraswati River.
 - Linked to Indus Valley Civilization.
 - Main Tributaries: Kaushalya, Markanda, Sarsuti, Tangri, Chautang.
- 2 Breakthrough Prizes
- Founded: 2013 by Zuckerberg, Brin, Wojcicki, Milners, etc.
 - Focus: Life Sciences, Fundamental Physics, Mathematics including Parkinson's and neurodegenerative disease research.
 - Prize: \$2 million each (higher than Nobel).
 - Selection: By past laureates; open public nominations.
 - Nicknamed: Oscars of Science.
 - Features: Televised ceremonies, public lectures, repeat winners allowed.

- 3 Invar Missile
- What: Anti-tank guided missile (ATGM) for T-90 tanks.
 - Built by: Russia's Rosoboronexport, licensed to Bharat Dynamics Limited.

- Guidance: Semi-automatic laser beam riding, resistant to jamming.
- Capabilities:
 - Defeats Explosive Reactive Armour (ERA).
 - Engages targets up to 8 km away.
 - Effective against moving targets (up to 7 km/h).
- Specs:
 - Flight time: 17.6 sec.
 - Weight: 17.2 kg.
 - Caliber: 120 mm.

ξ ▯ Mt. Khangchendzonga

- Height: 8,586 m—India's tallest peak, world's third highest.
- Location: India-Nepal border (Sikkim / Darjeeling).
- Meaning: Five Treasuries of the Great Snow (five summits).
- Glaciers: Zemu, Talung, Yalung, Kanchenjunga.
- Features:
 - Heavy monsoon snow.
 - Khangchendzonga National Park to the east.
- First Ascent: 1955, British team led by Charles Evans.

◦ ▯ Bow Echo

- What: Radar signature shaped like an archer's bow indicating intense thunderstorms.
- Size: 20–100 km wide, lasting 1–6 hours.
- Named by: Ted Fujita (1975).
- Formation: Rain-cooled gust fronts lift warm air, generating new storms that bend into an arc.
- Impact: Produces strong damaging winds.
- Recent Example: 2022 bow echo struck Delhi-Noida, winds up to 100 km/h.

३. May

1 ▯ Nurdles

- What: Small plastic pellets (1–5 mm) used as primary feedstock in plastic production.

- Composition: Made of polyethylene, polypropylene, polystyrene, and PVC.
- Uses: Manufacture of packaging, bottles, toys, textiles.
- Environmental Impact:
 - Major source of primary microplastics.
 - Break down further into micro and nano plastics.
 - Pollute marine and coastal ecosystems.
 - Enter food chains, threatening wildlife and human health.

Modified Interest Subvention Scheme

- 2
 - Type: Central Sector Scheme providing low-cost short-term loans to farmers.
 - Target: Loans via Kisan Credit Cards (KCC).
 - Features:
 - 1.5% interest subvention on crop loans up to ₹2 lakh at a base 7% interest.
 - Prompt Repayment Incentive (PRI) of 3%, reducing effective rate to 4%.
 - For animal husbandry /fisheries, applies to loans up to ₹2 lakh.
 - Administration: Implemented by RBI and NABARD through eligible banks.
 - Note: No structural changes made to the scheme.

Stromatolites

- 3
 - What: Layered sedimentary formations created by algae and cyanobacteria.
 - Era: Flourished in the Precambrian, over 2.5 billion years old.
 - Present: Rare today, surviving mainly in saline lagoons.
 - Significance:
 - Evidence of ancient microbial life.
 - Provide insights into tectonic history and Earth's early atmosphere.
 - Example: Krol Group stromatolites in Chambaghat formed in the Tethys Sea during Gondwana.

- Indian Sites :

- o Chitrakoot
- o Morni Hills
- o Mussoorie
- o Nainital
- o Jaisalmer
- o Dharwar
- o Bhima Basin

Seven Summits Challenge

4 • What: Climbing the highest peak on each continent.

- First Completion: Richard Bass, 1985.

- Peaks:

- o Mount Everest (Asia) – 8,848 m
- o Aconcagua (South America) – 6,962 m
- o Denali (North America) – 6,194 m
- o Kilimanjaro (Africa) – 5,892 m
- o Elbrus (Europe) – 5,642 m
- o Mount Vinson (Antarctica) – 4,892 m
- o Kosciuszko (Australia) – 2,228 m
- o Puncak Jaya (Oceania) – 4,884 m

- Versions:

- o Bass List: Includes Kosciuszko.
- o Messner List: Includes Puncak Jaya.

“Dark Patterns”

5 • Definition: Deceptive interface design that manipulate users into actions they didn’t intend

- Origin: Term coined in 2010 by Harry Brignull .

- Techniques:

- o Sneak into basket (automatic addition to carts)
- o Hidden fees
- o Misleading cookie consent prompts

- Legal Status in India:

- o No dedicated law yet.
- o Covered under Consumer Protection Act, 2019.
- o In November 2023, India issued guidelines identifying 13 dark patterns as unfair trade practices.