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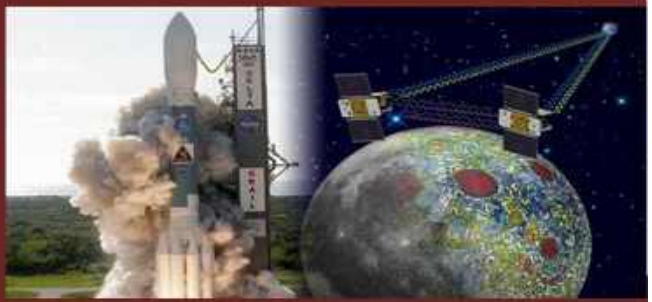

GRAIL MISSION

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DIRECTOR'S MESSAGE

Dear Aspirants,

The Iran-Israel conflict is one of the most enduring and consequential rivalries in the Middle East, rooted in historical shifts, ideological confrontations, and evolving regional dynamics. To fully understand this complex tension, we must examine the history of their relations and the key factors fuelling their hostility.

Surprisingly, relations between Iran and Israel began on a cooperative note. After the establishment of Israel in 1948, Iran—then ruled by the secular Shah—became one of the first Muslim-majority nations to quietly recognise it. From the 1950s through the 1970s, the two countries maintained discreet yet productive relations. Their mutual concern over rising Arab nationalism led to collaboration in various fields such as trade, agriculture, and defence. Iran supplied oil to Israel, while Israeli firms operated inside Iran. Although Iran had originally opposed the UN partition plan for Palestine, both nations found common ground in their regional isolation.

This quiet understanding was abruptly upended by the 1979 Iranian Revolution. The overthrow of the Shah and the rise of Ayatollah Khomeini transformed Iran into an Islamic republic governed by Shia clerics. The new regime adopted a rigid anti-Western and anti-Israel stance. Diplomatic ties with Israel were cut off, the Israeli embassy in Tehran was given to the Palestine Liberation Organisation (PLO), and Israel was denounced as the "enemy of Islam." From that point forward, support for the Palestinian cause became a core pillar of Iran's foreign policy.

The antagonism that followed has been driven by several key factors. Foremost is the ideological divide: Iran, as a Shia Islamic republic, sees itself as the defender of oppressed Muslims, particularly Palestinians. It views Israel as a colonial entity occupying Muslim land. Israel, meanwhile, sees Iran's rhetoric and regional actions as existential threats to its survival.

A major arena of conflict has been the proxy wars across the region. Iran funds and arms militant groups like Hezbollah in Lebanon and Hamas in Gaza—organizations committed to the resistance against Israel. These groups receive financial, logistical, and military support from Tehran. Israel views them as terrorist threats and has responded with both defensive and offensive measures, including military strikes. This indirect warfare has contributed to persistent instability, especially in Lebanon, Syria, and Gaza.

The two countries are also engaged in a broader competition for regional dominance. Iran's support for the Assad regime in Syria and the Houthis in Yemen is part of its bid for influence. Israel counters these moves through regional alliances and targeted military operations. The competition is not just ideological—it is deeply strategic,

aimed at shaping the political and security architecture of the Middle East.
Perhaps the most dangerous aspect of the Iran-Israel conflict is Iran's nuclear program. Israel firmly believes that a nuclear-armed Iran would pose a direct and unacceptable threat to its existence. As a result, Israel has taken multiple steps to disrupt Iran's nuclear progress. These include diplomatic campaigns against the Iran nuclear deal (Joint Comprehensive Plan of Action or JCPOA) and alleged covert operations, including cyberattacks and assassinations of key Iranian nuclear scientists.

A transformative recent development in the regional context has been the Abraham Accords of 2020. Brokered by the United States, these agreements normalised diplomatic relations between Israel and several Arab nations, including the UAE, Bahrain, Morocco, and Sudan. For decades, most Arab countries refused to engage with Israel until the Palestinian issue was resolved. The Abraham Accords marked a shift, driven largely by shared concerns over Iran's growing power and nuclear ambitions. This new regional alignment has pushed Israel and Sunni Arab states into closer cooperation on security, technology, and trade. Iran has condemned these agreements, viewing them as an existential challenge and a betrayal by fellow Muslim nations. Some analysts believe Iran's increased support for militant groups and recent escalations are in part responses to this strategic setback.

In recent years, the conflict has taken a perilous turn. Traditionally waged through proxies, it has now shown signs of direct confrontation. In April 2024, Israel allegedly bombed the Iranian consulate in Damascus, killing key Iranian personnel. Iran retaliated with missile strikes on Israeli territory—an unprecedented development. Tensions further escalated in 2025, with reports of Israeli strikes on Iranian military and nuclear facilities. The involvement of the United States, including strikes on Iranian sites in defence of Israel, marks a significant broadening of the conflict, raising the stakes for global security.

The Iran-Israel conflict is not just a bilateral issue; it is a linchpin of broader instability across the Middle East. It is driven by a blend of historical grievances, ideological opposition, nuclear fears, and power rivalries. As proxy wars rage on and direct military exchanges grow more frequent, the conflict threatens to drag the entire region into deeper turmoil. Understanding this evolving rivalry is essential to grasping the challenges to peace and stability in the Middle East today—and for the foreseeable future.

Best wishes,

Yours sincerely,

K Rajendra Kumar IPS (Retd)

June-2025

Current Affairs

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HISTORY & CULTURE

Santara (Sallekhana)

Context:

Recently a three-year-old girl in Indore reportedly died after being administered Santhara by a Jain monk, bringing the ancient Jain ritual of voluntary fasting unto death back into public and legal discourse.

About Santhara (Sallekhana):

- Definition: Santhara or Sallekhana is a Jain religious vow of voluntary fasting unto death, undertaken to purify the soul and attain moksha.
- Religious Association: Practiced in Jainism by both monks and laypersons under extreme conditions like terminal illness, old age, or famine.

Features:

- Involves gradual withdrawal from food and water.
- Taken only with spiritual maturity and under religious supervision.
- Involves forgiveness, detachment, and spiritual reflection.

About Key Jain Practices:

Core Doctrines of Jainism:

1. Ahisa (Non-violence): Jains believe in absolute non-violence towards all living beings, including insects and microbes, making it a foundational ethical principle.
2. Satya (Truthfulness): Speaking truth is mandatory, but it must not harm others—truth should be spoken with compassion and care.
3. Asteya (non-stealing): One must not take anything that is not willingly offered, emphasizing ethical acquisition and honesty.
4. Brahmacharya (Chastity): Celibacy for monks and sexual restraint for householders, promoting control over desires and spiritual discipline.
5. Aparigraha (non-possessiveness): Detachment from material and emotional possessions is stressed to reduce greed and promote liberation.

Triratna (Three Jewels of Jainism):

1. Samyak Darshan (Right Faith): Having correct perception of truth, free from doubts, is the first step toward spiritual liberation.
2. Samyak Jnana (Right Knowledge): True knowledge must be free from doubt and error, grounded in understanding reality and karma.
3. Samyak Charitra (Right Conduct): Moral and disciplined behavior aligned with Jain principles, essential for attaining moksha (liberation).

Legal Status of Santhara in India:

- 2015 Rajasthan High Court Ruling: Declared Santhara illegal, equating it with suicide under IPC Section 306.
- Supreme Court Stay: In August 2015, the SC stayed the order, recognising the practice under the constitutional right to religious freedom (Article 25).
- Current Status: Legally protected as a religious practice, subject to consent and religious guidance.

Significance in Jainism:

- Spiritual Goal: Seen as a peaceful, dignified exit from life aimed at shedding karma and achieving liberation (moksha).
- Historical Practice: Followed by Jain sages like Bhadrabahu and Chandragupta Maurya in Shravanabelagola.
- Literary References: Found in Jain texts like Ratnakaranda Shravakachara and Tamil works like Silappadikaram and Neelakesi.

Conclusion:

Santhara represents a deeply spiritual and ethical tradition in Jainism, reflecting values of detachment, discipline, and non-violence. While its legality has sparked debates, it continues to be a constitutionally protected religious practice in India. Balancing religious freedom and modern ethics remains crucial in its discourse.

Guttala Sculptural Inscription

Context:

A 16th-century sculptural inscription found near Chandrashekara temple, Guttala (Haveri district, Karnataka), records the death of 6,307 people due to a drought in 1539 CE, making it India's earliest epigraphic evidence of a humanitarian disaster.

About Guttala Sculptural Inscription:

- Found near Chandrashekara temple, Guttala village, Karnataka.
- Written in Kannada script and language on a stone slab.

What Does It Say?

- Dated Saka 1461, August 18, 1539 CE.
- Records that 6,307 people died due to "bara" (drought).
- A local named Marulaih Odeya, son of Nanideva Odeya, buried the dead in baskets to earn merit for ruler Timmarasa Svami.
- Sculpture depicts Marulaih carrying a basket with dead bodies.

Key Features:

- Rare sculptural and textual record of a natural disaster in Indian history.
- Includes exact toll and social response.
- Depicts humanitarian act and local governance structure (mention of "seeme" – territorial unit).
- Offers visual iconography to complement textual epigraphy.

Keezhadi Excavation

Context:

The Archaeological Survey of India (ASI) has asked archaeologist Amarnath Ramakrishna to resubmit the Keezhadi excavation report with revisions, citing the need for scientific accuracy and better period classification.

About Keezhadi Excavation:

What Is Keezhadi?

- Keezhadi is an archaeological site near Madurai, Tamil Nadu, along the Vaigai river basin, explored by ASI and later by the Tamil Nadu State Archaeology Department.
- Discovered In: Initial excavations began in 2015, following surveys conducted across 293 sites in the Vaigai valley during 2013–14.

Location:

- Excavation site: Pallichanthai Thidal, Sivaganga district.
- Excavated area: Only 1 out of 100 acres, yet over 4,000 artefacts have been unearthed.

Key Findings

- Carbon dating (AMS) of charcoal shows urban habitation existed by 200 BCE.
- Discovery of urban features: brick structures, ring wells, pottery, graffiti, beads, and water storage facilities.
- Artefacts suggest links with North India and Western trade networks during the Sangam Age.
- A large, decorative pot, unique to Tamil excavations, was also unearthed—highlighting artistic and cultural advancement.

Cultural Significance:

- Supports theories of a pre-Sangam urban Tamil civilisation.
- Mention of settlements like Manalur and Konthagai in Tiruvilayadal Puranam links the site to classical Tamil texts.
- Establishes Keezhadi as a centre of literacy, trade, and craftsmanship, challenging North-centric civilisational narratives.

Golden Temple

Context:

The Indian Army has denied media reports about deploying air defence guns at the Golden Temple during Operation Sindoor.

About Golden Temple (Sri Darbar Sahib, Amritsar):

What is the Golden Temple?

- The Golden Temple, or Sri Darbar Sahib, is the holiest Sikh shrine located in Amritsar, Punjab. It represents Sikhism's core values of equality, humility, and service.
- Foundation Laid: 1577 CE by Guru Ram Das Ji, the fourth Sikh Guru.
- Constructed by: Guru Arjan Dev Ji, the fifth Guru, completed in 1604.
- Land Acquisition: Land bought from local landlords (zamindars).
- Foundation Laid by: Hazrat Mian Mir, a Muslim saint from Lahore, showing interfaith harmony.

Key Personalities Involved:

- Guru Arjan Dev Ji: Architect and visionary of the central Sikh shrine.
- Baba Budha Ji: First appointed granthi (reader of Guru Granth Sahib).
- Maharaja Ranjit Singh: Beautified the temple with golden plating in the 19th century.

Architectural Features:

- Design: Built on a lower level to symbolize humility; has four entrances for universal access.
- Structure: Constructed on a 67 ft square platform in the Amrit Sarovar (holy pool).
- Materials: Features gold-covered domes and marble architecture with inlay work.
- Dome: Fluted, lotus-shaped with a "kalash" and canopy on top.
- Langar (Community Kitchen): Serves free meals to over 1 lakh people daily, upholding Sikh values of equality.

Historical Significance:

- Repeatedly attacked during Mughal and Afghan invasions in the 18th century.
- Operation Blue Star (1984): Military action to remove militants caused major damage and public unrest.

Shirui Lily Festival

Context:

The Shirui Lily Festival resumed in Manipur after a two-year hiatus due to ethnic conflict, marking the first major movement of Meiteis through Kuki-Zo regions amid tight security.

About Shirui Lily Festival:

What is the Shirui Lily Festival?

- Organised by: Manipur Tourism Department
- First Held: 2017
- Venue: Ukhrul district, home to the Tangkhul Naga tribe
- Occasion: Coincides with the blooming season of the Shirui Lily in May
- Objective: Promote eco-tourism and raise awareness about the endangered lily species

Key Features of the Festival:

- Cultural Programs: Traditional dances, music, and folk performances.
- Eco-Initiatives: Trash collection drives and awareness campaigns.
- Competitions: Cooking contests, beauty pageants, and sports events.
- Duration: Held from May 20 to May 25 annually during bloom season.

About Shirui Lily (Lilium mackliniae):

What is the Shirui Lily?

- Botanical Name: Lilium mackliniae, named by botanist Frank Kingdon-Ward after his wife Jean Macklin
- Local Name: Kashong Timrawon
- Found In: Shirui Hills, Ukhrul District, Manipur at 2,673 m elevation
- Discovery: Identified in 1946, though locally known for centuries

Features & Significance:

- Unique Habitat: Endemic to a narrow altitudinal range in Shirui Hill range.
- Conservation Status: Endangered due to habitat loss, climate change, and invasive species.
- Cultural Symbolism: Protected by mythic deity Philava, spiritual and ecological emblem of the Tangkhul community.
- State Flower: Recognised as the official state flower of Manipur.
- Scientific Efforts: ICAR-NEH scientists led by Dr. Manas Sahoo undertook lab-to-land micropropagation to conserve the species.

Kandha Tribe

Context:

Kandha women in Odisha's Kandhamal district are increasingly abandoning the centuries-old tradition of facial tattooing, once practiced as a form of protection against exploitation.

About Kandha Tribe:

Who are the Kandha?

- Kandha (or Khond) is the largest tribal community in Odisha, mainly residing in Kandhamal, Rayagada, Kalahandi, and Koraput districts.
- They speak Kui or Kuvi — both Dravidian languages.
- The term "Kandha" is derived from Telugu "Konda" meaning hill, denoting their origins as forest dwellers.
- Sub-Groups: Include Desia Kandha, Dongria Kandha, Kutia Kandha (the latter two classified as Particularly Vulnerable Tribal Groups – PVTGs).

About Facial Tattoo Tradition among Kandha Women:

Origin and Purpose:

- Began as a protective practice: Women tattooed their faces with dark, geometric patterns to appear unattractive and avoid sexual exploitation by local landlords and colonial forces.
- It later evolved into a cultural identity marker — tattoos became essential for marital eligibility and community acceptance.

Painful Ritual:

- Girls, usually around 10 years old, endured hours of facial piercing with crude tools.
- The painful process led to severe swelling and infection, lasting weeks.
- Silver ear-rings were also worn to denote marital status.

Current Status:

- Practically vanished among women under 40, due to awareness campaigns and educational interventions since the 1990s.
- The practice is no longer seen as necessary or relevant by younger generations.

Three-Year Judicial Practice Mandate

Context:

The Supreme Court reinstated the rule mandating a minimum of three years of legal practice as a prerequisite for applying to the Civil Judge (Junior Division) posts.

What Is the Three-Year Judicial Practice Mandate?

- As per the latest ruling in All India Judges Association v. Union of India, a candidate must now have at least three years of courtroom experience before appearing for judicial service exams.
- The mandate applies to entry-level judges, reinstating the condition removed in 2002 to broaden access to judicial posts.

Need for the Practice Requirement

1. Improves Judicial Preparedness: Early exposure to real courtroom scenarios builds decision-making skills and legal maturity.

E.g. The Bar Council of India (2021) stated that judges without practice were often "inept and incapable" in handling matters.

1. Reflects High Court Consensus: 23 out of 25 High Courts reported unsatisfactory outcomes from recruiting fresh graduates into the judiciary.
2. Addresses Training Gaps: Judicial academies often lack individual mentoring capacity and cannot simulate litigation complexities.
3. Fosters Professional Maturity: Advocates gain better emotional intelligence and legal intuition through active litigation.

Challenges Associated with the Mandate

1. Exclusion of Marginalized Aspirants: Women and first-generation lawyers may struggle to sustain three years in litigation due to socio-economic or familial constraints.

E.g. NFHS data shows average female marriage age is 19.2, creating early-career conflicts for female law graduates.

2. Litigation Is Not a Level Field: Early-stage advocates, especially women, often face hostile work conditions, harassment, and lack of mentorship in court corridors.
3. Tokenistic Practice Risk: Without verification norms, the mandate may become a formality rather than a meaningful experience.
4. Reduced Diversity in Judiciary: The added hurdle may deter young, capable women and others from marginalized communities from even attempting judicial entry.
5. Judicial Overreach Concerns: The mandate, as per Article 234, should be determined by State executives in consultation with High Courts, not by the Supreme Court.

Significance of the Move:

1. Enhances Quality of Judgments: Judges with courtroom experience are more adept at managing procedural complexities and ensuring fair trials.

2. Bridges Theory-Practice Divide: The move attempts to build a professionally competent Bench, not just a theoretically sound one.
3. Aligns with Global Best Practices: Most developed judicial systems expect prior legal experience before assuming judicial office.

Conclusion:

The three-year practice mandate reflects a desire to build a judiciary with practical legal insight and emotional maturity. However, without addressing socio-economic barriers and structural inequalities, it risks narrowing entry for many deserving candidates. Judicial reform must strike a balance between quality and inclusivity, rigour and representation.

Inter-Services Organisations (Command, Control and Discipline) Act, 2023

Context:

The Ministry of Defence notified subordinate rules under the Inter-Services Organisations (Command, Control and Discipline) Act, 2023, making the Act fully operational.

Summary of Newly Notified Rules:

- These rules, framed under Section 11 of the Act, provide a structured operational framework for ISOs.
- They empower ISO heads to exercise full administrative and disciplinary authority over service members from any branch.
- Rules establish command succession in case of the absence of the designated officer and prevent overlapping disciplinary proceedings.
- They ensure operational synergy across tri-service commands without altering individual service laws.

About Inter-Services Organisations (Command, Control and Discipline) Act, 2023:

- Came into Force: May 10, 2024, after receiving Presidential assent on August 15, 2023, and Parliament passage during the 2023 Monsoon Session.

Objective:

- To unify command and promote functional efficiency across inter-services establishments such as Andaman & Nicobar Command, National Defence Academy, and Defence Space Agency.

Key Features of the Act:

Empowering ISO Leadership:

- Commanders-in-Chief and Officers-in-Command can now exercise disciplinary and administrative control over all personnel under their ISO, regardless of whether they belong to the Army, Navy, or Air Force.
- Promotes quick decision-making and a clear chain of command.

Tri-Service Integration:

- Recognises existing ISOs and provides a legal framework for forming new Joint Services Commands.
- Encourages jointness in planning and execution across forces.

No Change in Existing Service Laws:

- Does not alter the Army, Navy, or Air Force Acts.
- Ensures that unique service conditions remain intact while enabling joint administrative mechanisms.

Command Clarity and Emergency Protocols:

- Provides clear succession procedures when commanding officers are on leave or unavailable.
- Allows higher formations to deputize acting commanders during emergencies.
- Administrative Efficiency: Prevents duplication of disciplinary actions, promotes synergy in resource utilisation, and strengthens command accountability.

Advance Authorisation Scheme

Context:

The government decided to ease rules under the Advance Authorisation (AA) Scheme, allowing exporters to claim duty-free benefits even if goods were shipped before licence issuance, provided the Bill of Entry is filed post licence date.

About Advance Authorisation Scheme:

What It Is?

- A foreign trade policy initiative allowing duty-free import of inputs used in manufacturing export products.
- Administered By: Directorate General of Foreign Trade (DGFT) under the Ministry of Commerce and Industry.
- Aim: To reduce input costs for exporters, thereby improving the global competitiveness of Indian goods.

Key Features of the Scheme:

- Duty-Free Import: Allows import of raw materials, packaging, fuel, oil, and catalysts without payment of Customs duties.
- Standard Input-Output Norms (SION): Exports must conform to sector-wise norms issued by DGFT. Exporters can also seek ad-hoc norms if SION doesn't apply.
- Eligibility: Open to manufacturer exporters and merchant exporters linked with supporting manufacturers.
- Physical Incorporation Principle: Inputs must be physically consumed or used in the manufacture of the final export product.

Recent Relaxation:

- Previous Rule: If goods were shipped before the AA licence was issued, duty exemption was denied even if the Bill of Entry was filed later.
- New Rule: Exporters can now avail benefits as long as the Bill of Entry is filed after licence issuance, regardless of shipment date.
- Restriction: Relaxation does not apply to restricted or canalised goods unless special DGFT approval is granted.
- Impact: Removes ambiguity, streamlines Customs clearance, and boosts exporter confidence amid rising logistics challenges.

Quality Council of India (QCI)

Context:

Minister of State for Commerce and Industry inaugurated the new unified headquarters of the Quality Council of India (QCI) at the World Trade Centre, New Delhi.

About Quality Council of India (QCI):

What is QCI?

- QCI is an autonomous national accreditation body responsible for ensuring quality assurance in products, services, and processes across sectors, through independent third-party assessments.
- Established In: 1996, based on recommendations from an EU Expert Mission and inter-ministerial consultations.
- Nodal Ministry: Ministry of Commerce and Industry (Department for Promotion of Industry and Internal Trade – DPIIT)
- Headquarters: Now located at World Trade Centre (WTC), New Delhi

Objectives of QCI:

- Promote quality standards across public and private sectors.
- Provide independent accreditation and third-party assessment.
- Enhance quality of life and public service delivery through better governance standards.
- Act as a nodal body to implement National Quality Campaigns aligned with global benchmarks.

Structure and Governance

- Public–Private Partnership (PPP) model involving the government and industry associations — CII, FICCI, ASSOCHAM.
- Registered under Societies Registration Act, 1860.
- Governing Council of 39 members with equal representation from government, industry, and stakeholders.
- The Chairperson is nominated by the Prime Minister of India.

Key Functions of QCI:

- Accreditation Services: Through bodies like NABL, NABH, NABET, NBQP, ensuring quality in labs, healthcare, environment, etc.
- Third-party Assessments: Independent evaluation of services, infrastructure, and government programs.
- Policy Implementation: Supports quality mandates under schemes like Swachh Bharat, Ayushman Bharat, etc.
- Capacity Building: Trains personnel for quality audits and quality improvement across sectors.
- Global Collaboration: Aligns India's quality ecosystem with international benchmarks and WTO standards.

Emblems and Names (Prevention of Improper Use) Act, 1950

Context:

The Supreme Court dismissed a petition seeking protection of V.D. Savarkar's name under the Emblems and Names (Prevention of Improper Use) Act, 1950.

About Emblems and Names (Prevention of Improper Use) Act, 1950:

What is It?

- A regulatory legislation to prevent the commercial or improper use of national emblems, names, and symbols that hold public significance or represent national institutions.
- Enforced On:1st September, 1950, through Gazette notification.
- Nodal Authority: Central Government – empowered to amend the Schedule and issue rules under the Act.

Objectives of the Act:

- Prohibit misuse of names/emblems associated with national institutions or public trust.
- Protect the dignity of names and symbols associated with the Indian government, historic personalities, and international bodies.
- Maintain decorum in commercial branding, preventing deceptive or misleading affiliations.

Key Features:

- Prohibition Clause (Section 3): Disallows the use of specified names/emblems for business, trade, patents, or advertising without Central Government permission.

Scope (Section 1 & 2):

- Applies across India and Indian citizens abroad.
- "Name" includes abbreviations, and "emblem" includes flags, seals, and coats of arms.
- Ban on Registrations (Section 4): Authorities cannot register companies, trademarks, or patents bearing protected names/emblems.
- Penalty (Section 5): Misuse punishable by fine up to 500.
- Mandatory Sanction (Section 6): Prior sanction from the Centre is needed before prosecution.
- Dynamic Schedule: The Schedule includes protected items such as the Indian National Flag, Mahatma Gandhi's name, Rashtrapati Bhavan, and others.

Experiential Learning

Context:

Article in newspaper highlights India's exam-centric education and advocates experiential learning for cultivating higher-order thinking skills.

- Aligns with NEP 2020 reforms promoting critical thinking and real-world application of knowledge.

About Experimental Learning:

What is Experiential Learning?

- A learner-centric approach where knowledge is gained through experience, reflection, and application (David Kolb, 1984).

Key Features:

- "Learning by Doing" through hands-on activities.
- Builds skills like problem-solving, teamwork, and creativity.

Follows a four-stage cycle:

- Starting with a concrete experience
- Moving to reflective observation
- Followed by abstract conceptualisation
- Finally leading to active experimentation.

Why India Needs Experiential Learning:

- Exam-Centric Limitations: 80% of students in India struggle with application-based questions (ASER Report 2023).
- Unequal Learning Outcomes: Urban-rural and public-private divides hinder holistic education access.
- Low Higher-Order Thinking: Present rote learning model restricts skills like analysis, evaluation, and innovation.
- Cognitive Diversity: As per Gardner's Theory of Multiple Intelligences, different students learn differently—visual, kinaesthetic, or auditory.

Implementing Experiential Learning in India:

Pedagogical Strategies:

- Flipped Classrooms: Students learn theory at home; apply and discuss in class.
- Field Projects: Linking science with real-world problems via outdoor experiments.
- Collaborative Learning: Group tasks, role-playing, and peer feedback.
- Simulation & Tech: Use of AR/VR in history, geography, and STEM simulations.

Best Practices:

- Inquiry-based learning in Navodaya Vidyalaya's.
- Activity-based learning adopted in Tamil Nadu schools has improved retention and engagement.

Challenges:

- Logistics & Training: Shortage of trained educators; lack of labs and digital tools in rural schools.
- Contextual Readiness: Not all students may be prepared; e.g., Grade 8 students reading at Grade 2 level (ASER 2022).
- Uniform Policy Pitfalls: One-size-fits-all frameworks ignore socio-economic and cultural diversity.

Way Ahead:

- Policy Integration: Embed experiential modules within existing curriculum without disrupting current structure.

- Capacity Building: Train teachers under DIKSHA and NCERT's new training modules.
- Tech + Community: Use digital platforms and local knowledge holders (farmers, artisans) for learning activities.
- Assessment Reform: Shift from memory-based tests to portfolio-based, outcome-focused evaluation.
- Public-Private Partnerships: Leverage NGOs and Ed-Techs for scalable implementation.

Conclusion:

Experiential learning transforms the classroom into a laboratory of life. It nurtures curious, self-driven learners ready to face real-world challenges. Integrating it within India's education system is not just desirable but essential for equitable, quality learning.

Biennial Election for Rajya Sabha

Context:

The Election Commission has announced the schedule for the biennial elections for the eight Rajya Sabha seats including six seats from Tamil Nadu and two seats from Assam.

About Biennial Election for Rajya Sabha:

What It Is?

- Rajya Sabha is the Upper House of Parliament, representing the States and Union Territories.
- It is a permanent body, and elections are held periodically to fill the seats of retiring members.

Term and Membership:

- Total strength: 250 (maximum), currently 245 members.
- 233 elected members (States and UTs)
- 12 nominated members by the President (experts in literature, art, science, or social service)
- Tenure: Each member serves a 6-year term.
- Retirement: One-third of members retire every 2 years.

Election Process:

Indirect Elections:

- Conducted via proportional representation by means of the single transferable vote.
- State MLAs elect representatives from States.
- UT Electoral Colleges elect members from Union Territories (Delhi, Puducherry, J&K).

Bye-Elections:

- Held when a seat becomes vacant before the term ends.
- Member elected serves only the remainder of the predecessor's term.

Qualifications (Article 84):

- To be eligible for Rajya Sabha membership, a person must:
- Be a citizen of India.
- Be at least 30 years of age.
- Make and subscribe an oath of office (as per the Third Schedule).
- Meet any other qualifications prescribed by law.

Disqualifications:

A person can be disqualified if:

- They hold an office of profit under the government.
- They are declared unsound of mind or Whistleblowing

Whistleblowing

Context:

The World Economic Forum (WEF) is conducting an internal investigation into its founder Klaus Schwab after whistleblower allegations of ethical and financial misconduct.

About Whistleblowing:

- Definition: Whistleblowing is the lawful disclosure of misconduct or unethical activity within an organization to authorized entities.

Ethical Basis:

- Aristotelian Ethics: Focuses on moral character rather than just rules or consequences.
- Ross's Prima Facie Duty Theory: In whistleblowing, the duty to prevent harm and promote justice outweighs the duty of loyalty to one's employer.
- Bhagavad Gita – "Karmanye vadhikaraste" meaning one must perform one's duty without attachment to results, even in face of adversity.

Key Features of Whistleblowing:

- Right Information: Involves exposing violations of law, fraud, corruption, abuse of authority, or threats to public safety.
- Protected Disclosure: Done through authorized channels like an internal ombudsman, regulator, or court.
- Scope: Applies to both government and corporate wrongdoing (e.g. insider trading, embezzlement, toxic workplace).
- Anonymity and Protection: Effective mechanisms often ensure identity safeguards and protection from retaliation.

Importance of Whistleblowing in Ethics:

- Promotes Accountability: 2018 whistleblower complaint in a major bank led to top-level resignations and internal audits.
- Protects Public Interest: Helps avert systemic failures (e.g. housing finance fraud exposed in 2020).
- Reinforces Governance: Whistleblower complaints are a top tool in detecting corporate fraud, according to ACFE studies.
- Saves Costs: KPMG (2023) found companies with proactive mechanisms were 70% better at early fraud detection.

Global & Indian Legal Frameworks:

Global Laws:

- US SEC Whistleblower Program: $600 million awarded in FY 2023, incentivising ethical disclosures.
- EU Whistleblower Protection Directive: Ensures confidentiality, non-retaliation, and right to legal redress.
- UN Convention Against Corruption: Recognizes whistleblowing as a key anti-corruption tool.

Indian Laws:

- Whistleblower Protection Act, 2014: Covers public servants; lacks corporate coverage and anonymity.
- Companies Act 2013: Mandates vigil mechanisms in certain companies to report ethical violations and fraud.
- SEBI Guidelines (2021): AMCs must adopt whistleblower policies, especially for insider trading and market abuse.
- RTI Act, 2005: Empowers citizens to expose corruption in public offices.

Challenges to Whistleblowing:

- Fear of Retaliation: 51% of Indian whistleblowers face victimisation (Global Integrity Report 2024).
- Lack of Confidence: Over 50% cite distrust in complaint resolution or fear of professional backlash.
- No Corporate Protection Law: Private sector whistleblowers remain vulnerable.
- Social Stigma: Cultural hesitance and peer loyalty prevent internal disclosures.

Way Forward:

- Enforce Whistleblower Protection Act: Bring it into force with amendments to cover private sector and anonymous tips.
- Strengthen Vigil Mechanisms: Every organization must ensure independent hotlines, legal support, and training.
- Reward Ethical Action: SEBI model of monetary rewards should be extended across regulators.
- Transparency Culture: Strong leadership must encourage ethical disclosures and recognize whistleblowers.

Conclusion:

Whistleblowing remains a cornerstone of ethical governance, exposing corruption and promoting transparency. However, without legal protection and cultural change, whistleblowers risk serious retaliation. India must institutionalize protections and promote ethical courage to uphold accountability in public and corporate life.

Ethical Obligation to Refugee

Context:

The World Refugee Crisis is once again in focus after a 3-year-old refugee girl died during forced displacement, reviving global debates on ethical responsibilities and humanitarian obligations.

About Ethical Obligation to Refugees:

- Definition & Moral Claim: Ethical obligation refers to the moral responsibility of states and individuals to protect innocent people fleeing persecution, war, or violence.
- Global Refugee Data: As of 2025, there are 43.7 million refugees worldwide (UNHCR). 75% remain in the Global South in precarious conditions.

Types of Refugees:

- Conflict Refugees: Flee war zones (e.g., Syria, Ukraine, Afghanistan).
- Persecuted Minorities: Escape religious or ethnic oppression (e.g., Rohingya, Yazidis).
- Climate Refugees: Displaced by rising seas, droughts (e.g., small island nations, Sub-Saharan Africa).

Obligations of States Towards Refugees:

1. Negative Obligations: Do No Harm
   - Border Abuse: Many Global North states inflict violence at borders (e.g., Calais, EU-Turkey border, US-Mexico wall).
   - Containment Policies: Policies like the EU–Libya agreement trap refugees in unsafe zones, violating rights.
   - Detention & Encampment: Indefinite detention in Libya and forced camps in Greece breach the right to movement and dignity.
2. Positive Obligations: Protect and Assist
   - Resettlement Programs: Accepting refugees through humanitarian visas ensures autonomy and dignity (e.g., Ukrainian visa schemes by UK/EU in 2022).
   - Safe Routes & Rights Access: Facilitate legal travel, employment, and education for refugees (e.g., Eurostar free travel for Ukrainians).
   - Infrastructure Aid to Host Countries: Invest in refugee support in Global South nations to prevent desperation-led migration (e.g., Jordan, Turkey, Lebanon)

Philosophical Justifications:

- Singer's Samaritan Principle: If you can prevent great suffering without significant sacrifice, it is morally wrong not to act.
- Arendt's Theory of Rightlessness: Refugees lose rights not due to lack of humanity but lack of national protection — denying them redress and dignity.
- Moral Equality Principle: The moral worth of all refugees (Ukrainian or not) is equal; ethical response must be consistent and universal.

Significance of Ethical Obligations Toward Refugees:

1. Individual Level
   - Moral Responsibility: Upholding compassion and moral universality by aiding those fleeing persecution affirms our shared humanity.
   - Ethical Agency: Enables individuals to act with moral courage and resist bystander apathy in the face of human suffering.
2. Institutional Level:
   - Democratic Legitimacy: Institutions that respect refugee rights strengthen rule of law, social justice, and procedural fairness.
   - Ethical Governance: Promotes accountability, human dignity, and equitable policy-making based on Kantian respect for persons.
3. Global Level:
   - Global Justice & Solidarity: Reinforces cosmopolitan ethics and fosters collective moral responsibility under international human rights frameworks.
   - Moral Leadership: Ethical refugee policies enhance soft power and global norm entrepreneurship, setting standards for humane governance.

Conclusion:

Global North states cannot ignore or actively harm refugees under the guise of border control. Ethical obligations—both to refrain from harm and to actively protect—are grounded in universal moral principles. A humane, rights-respecting approach, as extended to Ukrainian refugees, must be institutionalised for all.

Konkan Railway Corporation Limited (KRCL)

Context:

The Maharashtra government officially approved the merger of Konkan Railway Corporation Limited (KRCL) with Indian Railways, clearing the last hurdle for full integration.

About Konkan Railway Corporation Limited (KRCL):

What It Is?

- KRCL is a special purpose vehicle created under the Ministry of Railways in 1990, distinct from Indian Railways.
- Coverage: The line stretches 741 km through Maharashtra, Goa, Karnataka, and coastal Kerala, connecting Roha to Mangaluru.

Strategic Importance:

- Built across the Western Ghats, it overcame extreme terrain with engineering innovation, showcasing Indian technical expertise.
- Acts as a lifeline for passengers and freight, reducing travel time significantly and enabling economic integration of the Konkan region.

Why Separate from Indian Railways?

- KRCL was structured as a joint venture model:

- GOI (51%), Maharashtra (22%), Karnataka (15%), Goa and Kerala (6% each).
- Its separation allowed independent decision-making and faster project execution in difficult geography.

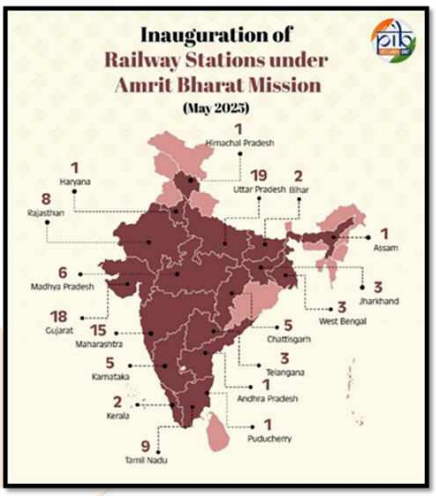
Additional information:

- The Indian Railways have 70 divisions under its 17 zones.
- Recent addition is Jammu Railway division.
- If you include Metro Railway and Kolkata India has 19 zones in total.
- Each zone has a General Manager (GM) in charge. A Divisional Railway Manager (DRM) leads each division.

Amrit Bharat Railway Stations

Context:

Prime Minister inaugurated 103 Amrit Bharat railway stations across 86 districts in 18 States/UTs via video conference from Deshnoke, Rajasthan.



About Amrit Bharat Railway Stations:

What It Is?

- A centrally sponsored initiative to redevelop and modernize 1,275 railway stations across India with a long-term, phased vision.
- Launched In: 2022 by the Ministry of Railways, Government of India.

Objectives:

- Enhance passenger experience through improved infrastructure.
- Promote heritage preservation, tourism, and regional economic development.
- Integrate stations into multimodal urban mobility hubs.

Key Features of Amrit Bharat Railway Stations:

- Master Plan Approach: Development carried out in phases based on future needs.

Passenger Amenities:

- Improved accessibility, waiting halls, executive lounges, toilets, lifts, escalators.
- Free Wi-Fi, better signage, digital passenger information systems.
- Business lounges, retail kiosks (under One Station One Product), and roof plazas.
- Architectural Integration: Reflects local art, culture, and heritage in station design.
- Green Infrastructure: Focus on eco-friendly buildings, sustainable materials, and Divyangjan-friendly facilities.
- Multimodal Connectivity: Seamless links with metro, bus terminals, and city transport systems.
- Economic Boost: Expected to generate employment, enhance tourism, and promote local handicrafts.

Significance of the Scheme:

- Cultural Preservation: Protects and showcases India's regional heritage and traditions.
- Tourism Promotion: Station aesthetics attract tourists, especially in heritage zones.
- Urban Transformation: Converts railway premises into vibrant public spaces and city centres.
- Digital & Physical Modernization: Bridges the gap between traditional rail infrastructure and future-ready smart transport hubs.
- Inclusive Development: Special focus on facilities for persons with disabilities, women, and senior citizens.

LibTech India Report on MNREGA

Context:

A LibTech India report on MGNREGA for FY 2024–25 highlights a stark mismatch between rising registrations (increase by 8.6%) and declining employment delivery (decline by 7.1%), mainly due to delayed payments and budget shortfalls.

About MGNREGA:

- What it is: A social security and livelihood assurance program guaranteeing 100 days of wage employment to rural households.
- Launched in: 2005 under the Mahatma Gandhi National Rural Employment Guarantee Act.
- Ministry: Ministry of Rural Development.
- Objective: Enhance livelihood security by providing employment in unskilled manual labour and building rural assets.
- Key Features: Demand-driven, legal entitlement to work, time-bound wage payment (within 15 days), compensation for delays, emphasis on transparency via MIS and social audits.

Key Data on MGNREGS:

- Registrations: Increased from 13.80 crore (FY24) to 14.98 crore (FY25), a rise of 8.6%.
- Employment Delivery: Dropped by 7.1%; only 7% of households got 100 days of work.
- Person-days: Fell from 52.42 to 50.18 days per household (↓4.3%).
- Fund Utilisation: 82,963 crore spent (106% of 86,000 crore budgeted).
- State Trends: Decline in Odisha (−34.8%), TN (−25.1%), Rajasthan (−15.9%). Increase in Maharashtra (+39.7%), Bihar (+13.3%).

About MGNREGA Wage Payment System:

- Stage 1 (State): Must complete muster roll, measurement, wage list, and FTO generation in 8 days.
- Stage 2 (Centre): Central government processes FTO and credits wages within 7 days post Stage 1.
- Formula for Delay Compensation: 0.05% of wage/day beyond 15 days from muster roll completion.

Payment Types:

- Aadhaar-based (APBS): Routed via NPCI mapper, prone to rejections if Aadhaar-bank mapping fails.
- Account-based: Direct to bank account, easier resolution of errors.

LibTech 2021 Data:

- 71% Stage 2 payments were delayed.
- SC: 80% payments in 15 days, ST: 63%, Others: only 51%.
- Chhattisgarh had the highest rejection (11.4%), affecting 21,537 job cards.

Issues Surrounding MGNREGA:

- Delayed Wage Payments: Workers are not getting paid on time, which goes against the law. A report shows 71% of central government payments were delayed.
- Lack of Funds: The government gave 86,000 crore, but this is not enough as more people are asking for work.
- Caste-based Payment Delays: Payments are being split by caste. SC/ST workers are paid first, while others have to wait longer.
- Payment Failures: Over 4 crore worth of payments failed, mainly due to Aadhaar-related technical problems.
- Low Compensation for Delays: Even when payments are late, workers rarely get compensation. Only 3.76% of dues were paid.

Way Ahead:

- Give More Funds: Increase the budget to 1.5–2 lakh crore to meet rising demand for work.
- Simplify the Payment System: Use simple bank transfers instead of Aadhaar-based payments to avoid delays and confusion.
- Ensure Timely Compensation: Automatically pay compensation to workers if their wages are delayed.
- Improve Monitoring: Use real-time tracking systems to check payment status and fix problems faster.
- Treat All Workers Equally: Stop separating payments based on caste. All workers should be treated the same under the law.

Conclusion:

Despite its shortcomings, MGNREGA remains a cornerstone of rural resilience, particularly post-COVID.

Addressing payment delays, ensuring adequate funding, and simplifying systems are essential to uphold its constitutional promise of livelihood with dignity.

Clientelism, Patronage, and Freebies in Politics

Context:

Recent debates have reignited scrutiny over freebies, often conflated with patronage and clientelism, raising concerns over democratic integrity.

About Clientelism, Patronage, and Freebies in Politics:

Differences in Clientelism, Patronage, and Freebies

1. Clientelism

- A reciprocal, election-driven exchange where politicians offer individual benefits (cash, gifts, liquor) in return for assured votes.
- Involves monitoring and potential retribution; relies on party brokers or local networks to ensure loyalty (e.g., vote buying in urban slums or rural belts).

2. Patronage

- A long-term relationship where politicians distribute sustained benefits like jobs, loans, or subsidies to build loyal voter bases.
- Operates through institutional capture or access to state resources (e.g., state recruitment biases, cooperative bank appointments).

3. Freebies

- Universally targeted schemes aimed at broad social classes or groups with no electoral strings attached (e.g., free bus rides for women, DBT to female accounts).
- These are state-funded, transparent, and auditable, reducing intermediary influence and fostering inclusion.

Issues Surrounding These Practices:

- Conflation Muddies Debate: Equating clientelism with universal welfare leads to misguided criticism of inclusive policies (e.g., DBT schemes labelled as freebies).
- Undocumented Clientelism: Election-time inducements, such as cash or liquor, remain underreported but directly distort democratic choice.
- Democratic Undermining: Clientelism undermines voter autonomy and entrenches inequality, while formal freebies may enhance social outcomes.
- Urban Bias & Access Gaps: Patronage and clientelism often exclude rural poor or marginalised groups, while freebies aim for equitable access.
- Lack of Monitoring Mechanisms: Informal practices like clientelism are hard to audit or regulate, making them politically invisible yet powerful.

Way ahead:

- Differentiate Welfare from Vote-Buying: Establish legal and policy boundaries to distinguish universal welfare schemes from reciprocal political inducements.
- Institutionalise Accountability: Strengthen election expenditure audits, enforce Model Code of Conduct, and empower ECI surveillance units.
- Promote Transparent DBT Systems: Expand tech-enabled, cashless delivery models that reduce political mediation and leakage.
- Educate Voters on Electoral Ethics: Run voter literacy campaigns to reduce acceptance of inducements and promote informed democratic participation.
- Regulate Long-term Patronage Networks: Institute transparent hiring and allocation processes in state jobs and local development schemes.

Conclusion:

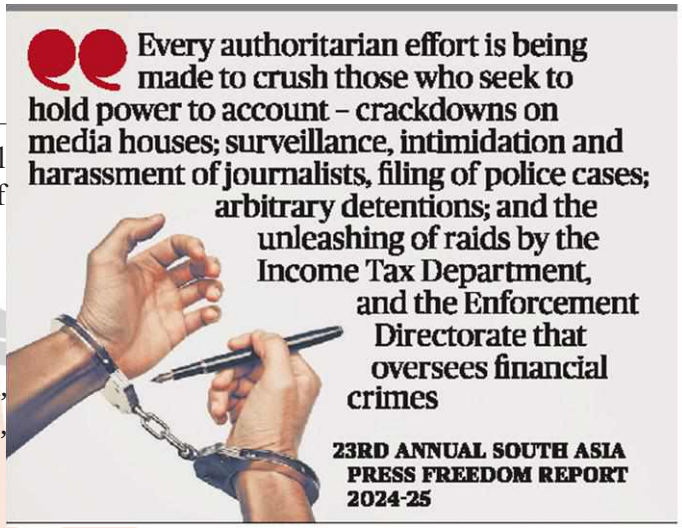
While clientelism and patronage threaten democratic fairness through selective incentives, well-structured freebies aim at inclusive development. India must refine its policy and electoral frameworks to discourage informal political

exchanges while strengthening transparent welfare delivery. Differentiating these concepts is crucial to safeguarding both democracy and development.

South Asia Press Freedom Report 2024–25

Context:

The 23rd Annual South Asia Press Freedom Report 2024–25, titled "Frontline Democracy: Media and Political Churn", has flagged India as part of a wider trend of shrinking press freedom.



About South Asia Press Freedom Report 2024–25:

Publisher: Asia Press Freedom group

- Coverage: 8 South Asian countries – India, Pakistan, Afghanistan, Sri Lanka, Bangladesh, Nepal, Bhutan, Maldives

Key Findings:

- 250+ media rights violations recorded; 69 journalists jailed/detained, 20 killed in the line of duty.
- India ranked 151st globally in press freedom; Bhutan fell to 152nd, its lowest ever.
- Pakistan saw its most violent year for journalists in two decades.
- Major risks stem from disinformation, legal suppression, surveillance, and AI-related threats.

Issues Surrounding Press Freedom:

- Legal and Institutional Pressure: Frequent use of UAPA, PMLA, sedition, and defamation laws against critical journalists.

  Example: Income Tax and ED raids on dissenting media outlets.

Disinformation Ecosystem:

- Political party "IT Cells" amplifies hate speech and fake news, undermining public trust.
- Global Risks Report 2024 names manipulated information the biggest short-term global threat.
- Choking of Independent Media: Denial of government advertisements, restrictions on digital media platforms, and selective internet shutdowns.
- AI and Gig Economy Risks: AI-generated content threatens journalistic authenticity; gig workers face low wages and job insecurity.
- Gender Inequality: Limited representation of women in newsroom leadership roles; widespread gender-based harassment in the media.

Consequences of Declining Press Freedom:

- Self-Censorship: Fear of legal action and violence compels media houses to avoid critical reporting.
- Democratic Deficit: Weakens the fourth pillar of democracy, hampering accountability and transparency.
- Public Mistrust: Rising perception of media bias erodes trust in institutions.
- Information Access Shrinks: Laws like India's DPDP Act 2023 and amended RTI provisions block legitimate public queries.

Way ahead:

- Media Law Reforms: Pass the Media Transparency Bill 2024 to curb monopolies and politicised ad distribution.
- Independent Regulatory Framework: Establish a media ombudsman to review censorship complaints and promote fair editorial standards.
- Protect Journalists' Rights: Enact labour protections for freelance and gig journalists; ensure legal aid and safety mechanisms.
- Fact-Checking Infrastructure: Invest in independent fact-checking bodies to counter disinformation, especially during elections.
- Promote Digital Pluralism: Support independent and community-driven media to balance dominant

corporate and political narratives.

Conclusion:

Press freedom in South Asia is under acute strain due to state control, legal harassment, and disinformation. India must act now to safeguard journalistic integrity, ensure citizens' right to know, and protect democratic institutions. A free and fair press is the bedrock of participatory governance.

India's Legal and Ethical Battle Against Digital Misinformation

Context:

India, identified as one of the most misinformation-vulnerable nations by the WEF Global Risks Report 2024, faces increasing challenges with the unchecked rise of influencer-driven content.

- This has triggered calls for tightened regulation and ethical accountability of social media influencers.

About Digital Misinformation and De-Influencing:

What is Digital misinformation and De-influencing?

- Digital misinformation refers to false or misleading information shared online, often without intent to deceive, but with harmful consequences.
- De-influencing is a growing social media trend where influencers discourage the purchase of certain products. While it may promote mindful consumption, it frequently relies on clickbait, half-truths, and exaggerated narratives to gain traction.
- In a rapidly digitising society, these phenomena blur the line between opinion, advertising, and deception, making regulatory clarity vital.

Background:

- The proliferation of Instagram, YouTube, and TikTok has created a new class of digital opinion-makers — influencers.
- Their content — often promotional — impacts health behaviour, consumption patterns, and public discourse.
- India's Ministry of Consumer Affairs, SEBI, and ASCI have issued guidelines like "Endorsement Know-hows" to regulate paid promotions.
- Despite this, viral health content, such as "liver detox hacks" or "anti-cancer diets", regularly escapes scrutiny, undermining evidence-based practices.

India – A Legally Regulated, Ethically Conscious Model:

- India has adopted a layered regulatory framework combining constitutional safeguards, statutory mandates, and industry self-regulation to manage the influence economy:

Legal Framework:

- Article 19(1)(a) of the Constitution ensures freedom of speech, but with reasonable restrictions under Article 19(2) to curb defamation and protect public order.
- Consumer Protection Act, 2019 explicitly bans misleading advertisements, holding influencers legally accountable for deceptive content.
- IT Act Sections 66 & 67 and the Intermediary Guidelines, 2021, penalize the spread of harmful or obscene content.

Ethical Oversight:

- Guidelines by the Advertising Standards Council of India (ASCI) and SEBI set benchmarks for fair disclosures and truthful influencer endorsements.
- Non-compliance may lead to public reprimands and blacklisting from platforms or campaigns.

Evolving Jurisprudence and Regulatory Trends

- Indian Medical Association v. Union of India: Held influencers accountable for false health endorsements.
- Delhi HC (2024): Restricted an influencer from disparaging a brand, stating that freedom of speech is not absolute, especially in health-related content.
- Public Trust Principle: Courts are emphasizing authenticity, credentials, and fact-verification in digital discourse.

Concerns

- Blurring of Fact and Opinion : Influencer content often uses selective data, emotional appeals, and ambiguous language, making it difficult for viewers to discern truth from manipulation.
- Health Sector Risks : Health advice without professional qualification can be life-threatening.
- Current platform self-regulation lacks the rigour needed for such sensitive content.
- Trust Erosion and Commercial Exploitation: Monetising public trust through sensational negativity or sponsored misinformation undermines the credibility of digital platforms.
- Lack of Registration and Tracking: No mandatory registration database exists for influencers, especially those giving health or financial advice.

Way Ahead: Strengthening Digital Accountability

- Create a Public Registry for High-Risk Influencers: Set up a mandatory registration system for influencers offering health or financial advice, including:
- Professional credentials
- Nature of content (paid/unpaid)
- Regulatory compliance record
- Strengthen Platform Responsibility: Mandate fact-checking overlays, flag sponsored health content, and use AI tools to detect misinformation.
- Build Digital Literacy Among Consumers: Launch government-led campaigns to, promote source verification, encourage critical thinking and teach how to report misleading content.
- Co-regulation with Civil Society: Involve medical associations, consumer forums, and legal bodies in creating sector-specific content standards.
- Enforce Ethical Review Mechanisms: Require platforms to implement periodic audits of top influencers in high-risk categories like health, finance, and

Conclusion:

India's growing digital influence landscape demands urgent regulatory recalibration.With AI-driven misinformation and unchecked influence over public choices, the stakes for public health, financial safety, and social cohesion have never been higher. A blend of constitutional restraint, legal enforcement, and ethical vigilance can ensure that digital empowerment does not come at the cost of truth and trust.

ECINET initiative

Context:

The Election Commission of India (ECI) has announced the development of ECINET, a unified digital platform, to simplify and streamline election-related service.

About ECINET

- ECINET is a comprehensive digital interface being created by the ECI to unify more than 40 existing mobile and web applications into a single, user-friendly platform.
- It is designed to provide easy access to election-related services for voters, election officials, political parties, and civil society organisations.

Objectives of ECINET

- Simplify Access to electoral services through a single window.
- Eliminate Redundancy of using multiple applications with different logins.
- Ensure Real-Time Access to verified election data for all stakeholders.

- Strengthen Electoral Infrastructure through digital innovation and integration
- Enhance Cybersecurity of electoral platforms through robust trials and protocols.

Key Features

- Unified Platform: Merges over 40 ECI apps including Voter Helpline, cVIGIL, Suvidha 2.0, ESMS, Saksham, KYC App, etc.
- Single Sign-On: One login for all services, reducing user confusion and friction.
- Cross-Device Compatibility: Accessible on both desktops and smartphones.
- Modern User Interface: Clean, aesthetic design for an intuitive user experience.
- Data Integrity Assurance: Only authorised EC officials can input data. In case of discrepancies, statutory forms prevail.
- Enhanced Cybersecurity: Undergoes rigorous testing for safety, performance, and ease of use.
- Nationwide Reach: Aimed to serve nearly 100 crore voters and the entire electoral administration

Caste Census in India

Context:

The Cabinet Committee on Political Affairs (CCPA) has approved caste enumeration census as part of the upcoming Population Census, reversing its 2021 stance.

About the Caste Census in India:

What is a Caste Census ?

- It is the systematic collection of data on caste identities of individuals during a national census.
- It provides socio-demographic insights essential for affirmative action and social justice planning.

Legal/Constitutional Backing:

- No specific constitutional provision mandates caste census, but it is permitted under Article 340 for identifying backward classes.
- As per Article 246 of the Constitution of India, Census is a union subject listed at 69 in the Union List in the Seventh Schedule.

Historical Context & Origin:

- First conducted in British India from 1881 to 1931.
- Independent India (1951 onwards) excluded caste enumeration except for Scheduled Castes (SCs) and Scheduled Tribes (STs).

Last Caste Census Held:

- 1931 Census was the last full caste enumeration.
- SECC 2011 attempted caste data collection but data remains unpublished.

Need for Caste Census in India:

- Data-Driven Affirmative Action: Accurate OBC population data is lacking; Mandal Commission estimated 52% OBCs, but no empirical backing.

  E.g.: Bihar's 2023 caste survey revealed OBC+EBC population at 63%.
- Reservation Rationalisation: Helps in quota restructuring and possible sub-categorisation within OBCs for equitable benefit distribution.
- Social Justice Planning: Enables targeted health, education, and livelihood schemes for marginalized caste groups.
- Women's Political Reservation: Census data is needed for delimitation, which will operationalize women's

reservation in legislatures.

- Constitutional Mandate under Article 15(4): Allows state to make special provisions for backward classes – which needs clear identification.

Challenges to Conducting Caste Census:

- Enumeration Complexity: Multiple castes/sub-castes, overlapping categories (e.g., SC-OBC status) make classification difficult.
- Lack of Standardised Caste Lists: Centre and states have different OBC lists, making aggregation inconsistent.
- Political Manipulation: Caste data can fuel vote bank politics, leading to social polarization.
- Data Sensitivity & Accuracy: Self-declaration may result in false reporting or exaggeration, leading to flawed conclusions.
- Risk of Deepening Caste Identities: Critics argue it may perpetuate caste consciousness instead of reducing inequalities.

Way Ahead:

- Scientific Categorisation: Build consensus on standardised classification of castes and sub-castes.
- Transparent Methodology: Use digital tools and trained enumerators to improve accuracy and security of caste data.
- Safeguard Against Misuse: Ensure data privacy and restrict caste data usage to policy and welfare only.
- Post-Census Action Plan: Publish findings, consult stakeholders, and integrate caste data into policy design.
- Constitutional Validation: Any quota revision/sub-categorisation based on caste census must undergo judicial and parliamentary scrutiny.

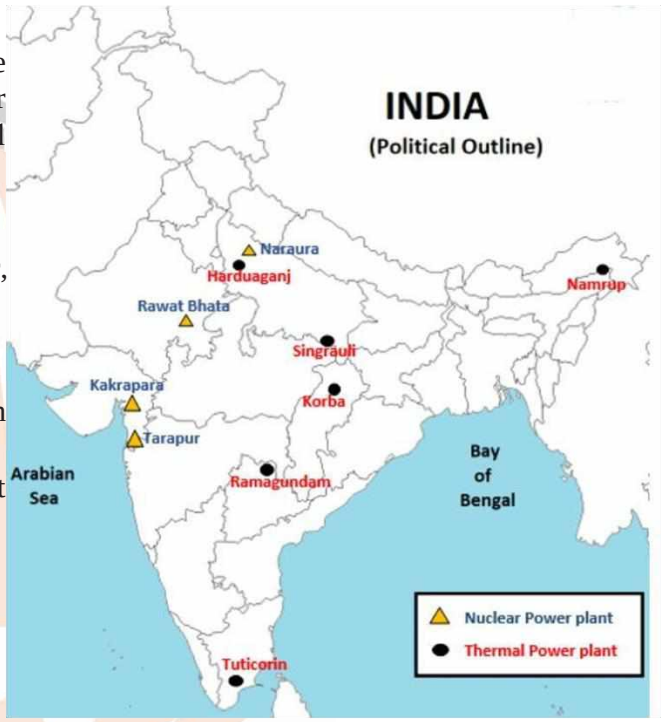
Conclusion:

The caste census marks a major policy shift aimed at correcting historical data gaps. While it promises greater social justice, the success will depend on methodological integrity and non-political usage. If executed transparently, it can redefine India's affirmative action roadmap for the next generation.

Ghatampur Thermal Power Project

Context:

Prime Minister of India dedicated Unit-1 (660 MW) of the Ghatampur Thermal Power Project in Kanpur Nagar, Uttar Pradesh, marking a significant milestone in India's thermal energy expansion and infrastructure development.



About Ghatampur Thermal Power Project:

- Location: The power plant is located in Ghatampur, in Kanpur Nagar district, Uttar Pradesh.

Implementing Agency:

- The project is managed by Neyveli Uttar Pradesh Power Ltd (NUPPL) — a joint venture between: NLC India Ltd (owns 51%) and UP Rajya Vidyut Utpadan Nigam Ltd (UPRVUNL) (owns 49%).

Power Capacity:

- The project has 3 power units, each of 660 MW.
- Total capacity is 1,980 MW.
- Total Cost: The project cost is ⊠1,780.94 crore.

Power Distribution:

- 75.12% (1487.28 MW) of electricity will go to Uttar Pradesh.
- 24.88% (492.72 MW) will go to Assam, depending on the transfer of shares.

Main Features:

- Efficient Technology: Uses supercritical boilers with 88.81% efficiency, which saves fuel and increases output.
- No Wastewater Release: The plant has a Zero Liquid Discharge (ZLD) system, so no water is released into rivers or land.

Pollution Control:

Uses modern systems to cut air pollution:

- SCR (Selective Catalytic Reduction) reduces harmful NOx gases.
- FGD (Flue Gas Desulphurization) reduces SOx gases from smoke.
- CEMS & AAQMS track emissions and air quality 24/7.

Water Saving:

- 288 km of canal is lined to save 195 million litres of water per day.
- The plant stores up to 46 lakh cubic meters of raw water.

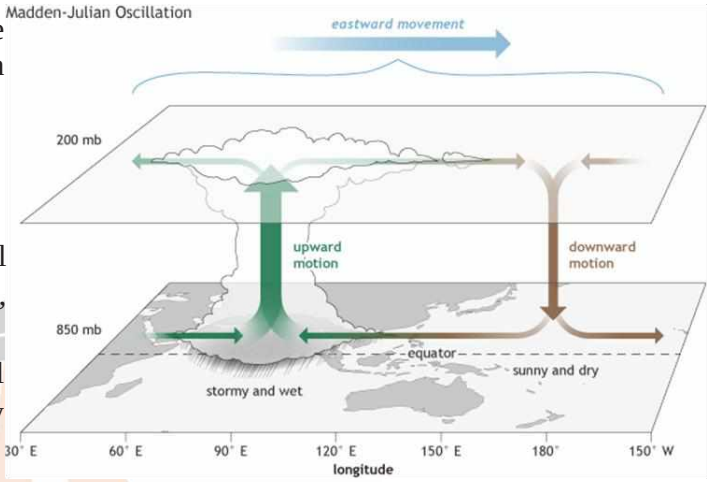
Coal Supply:

- Has its own coal mine producing 9 million tonnes per year.
- Can store coal for 30 days of full operation (10.165 lakh tonnes).

Madden-Julian Oscillation (MJO)

Context:

The Madden-Julian Oscillation (MJO) played a key role in triggering the early onset of the southwest monsoon in Kerala and Mumbai.



About Madden-Julian Oscillation (MJO):

What is MJO?

- The MJO is an eastward-moving tropical atmospheric disturbance involving clouds, rainfall, winds, and pressure patterns.
- Discovered in 1971 by Roland Madden and Paul Julian, it typically completes a global circuit every 30–60 days.

It features two alternating phases:

- Enhanced Convective Phase: Characterized by increased rainfall and greater cloud formation due to rising air and moisture convergence.
- Suppressed Convective Phase: Marked by reduced rainfall and clearer skies, as sinking dry air inhibits cloud development.

How is MJO Formed?

- Surface convergence of winds initiates rising air motion in the tropics.
- This leads to condensation and cloud formation, supported by upper-level divergence.
- The entire dipole system moves from west to east across the equator, especially between 30°N and 30°S latitude.

Factors Influencing MJO:

- Sea Surface Temperature (SST) anomalies, particularly in the Indian and Pacific Oceans.
- Atmospheric moisture content and zonal wind anomalies.
- Seasonal conditions like El Niño, which can amplify or suppress MJO activity.

Impacts of MJO:

On Indian Monsoon:

- MJO in its active phase over the Indian Ocean can:
- Trigger early monsoon onset, as seen in 2024 and 2025.
- Boost cyclogenesis and increase rainfall intensity during its passage.
- Improve intra-seasonal rainfall variability and monsoon breaks.

Global Influence:

- Modulates cyclone frequency and strength across ocean basins.
- Alters jet streams, influencing weather extremes in the U.S., Europe, and Australia.
- Can cause cold surges, heatwaves, and floods in mid-latitude regions.
- Acts as a short-term climate modulator unlike ENSO, which has seasonal effects.

Early Arrival of Monsoon

Context:

The India Meteorological Department (IMD) declared the onset of the southwest monsoon over Kerala on May 24, 2025, eight days ahead of the usual June 1 date.

- This marks one of the earliest monsoon arrivals in over a decade, last seen in 2009.

About Early Arrival of Monsoon:

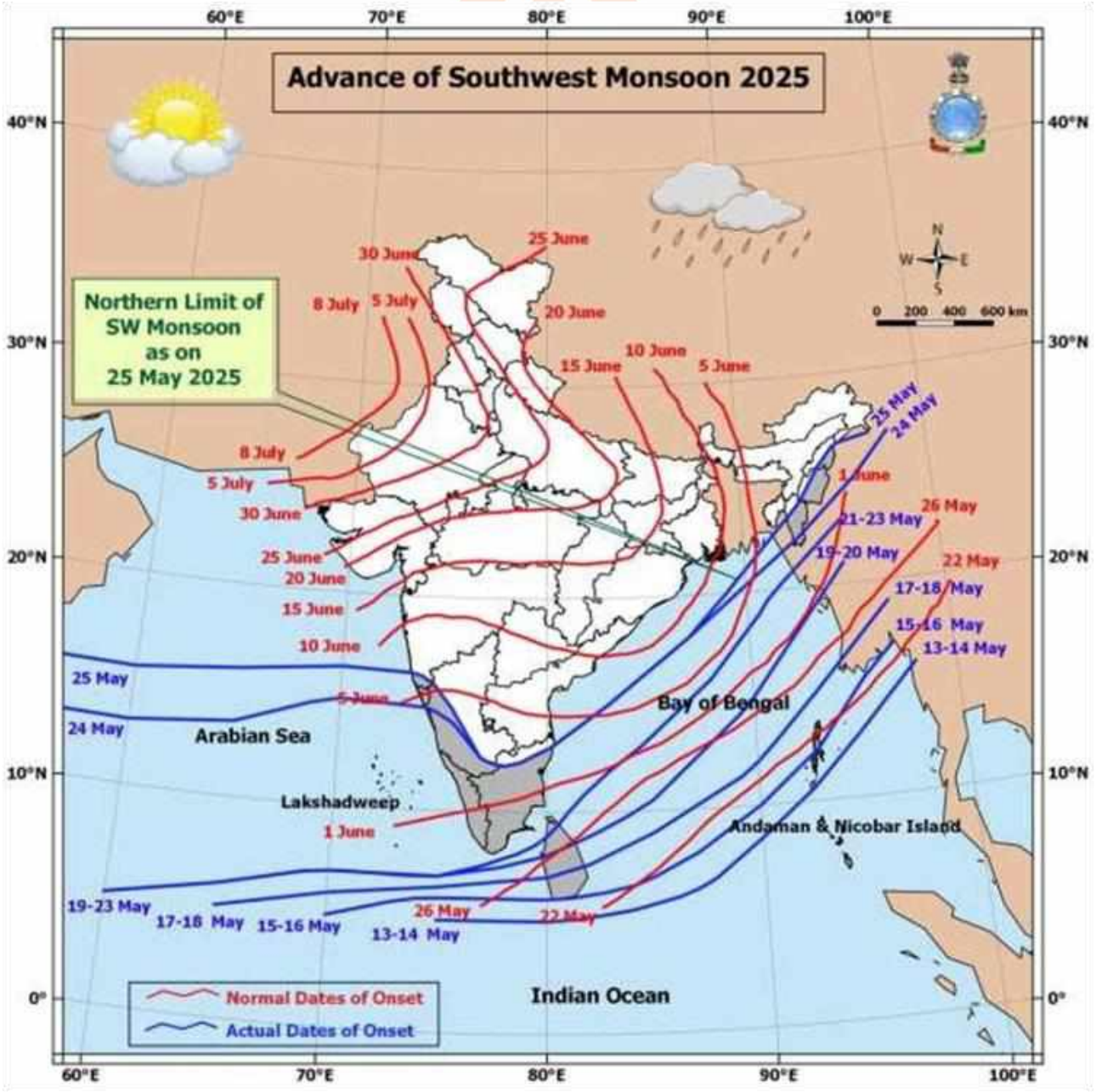
What is the Southwest Monsoon?

- The Southwest Monsoon is a seasonal wind system that brings over 70% of India's annual rainfall during June–September.
- It plays a critical role in agriculture, water availability, and overall economic activity.

When is Monsoon Onset Declared?

The IMD uses three main criteria to confirm the monsoon's onset over Kerala:

1. Rainfall Trigger: 60% of 14 designated stations must record ≥2.5 mm rainfall for two consecutive days.
2. Wind Field Criteria: Westerlies should extend up to 600 hPa (hectoPascals) level with wind speeds of 15–20 knots at 925 hPa.
3. Outgoing Longwave Radiation (OLR): OLR must be below 200 W/m², indicating active convection and cloud cover.



Factors Behind Early Monsoon Onset 2025:

- Madden-Julian Oscillation (MJO): Enhanced eastward-moving tropical disturbance boosted convection and rainfall over the Indian Ocean.

  E.g. MJO impact observed from May 13 over the south Andaman Sea (IMD).

- Mascarene High Intensification: Strong high-pressure system over the southern Indian Ocean aided in directing moist winds to Indian coastlines.
- Convection Surge: Rising heat and moisture movements increased vertical cloud build-up, bringing early rains.
- Somali Jet Strengthening: Cross-equatorial winds became stronger, accelerating the arrival of monsoon currents over Kerala and Karnataka.
- Heat Low Formation: Persistent low pressure over Pakistan and NW India created suction for moist monsoonal air.
- Monsoon Trough Activation: Elongated low-pressure zone stretching from Arabian Sea to Bay of Bengal activated rainfall over central India and NE India.

Consequences of Early Monsoon Onset

- Agriculture Boost: Early sowing of Kharif crops such as paddy and pulses can begin, improving crop calendar adherence.
- Reservoir Recharge: Helps early water level replenishment in drought-prone states like Tamil Nadu and Karnataka.
- Urban Flooding Risk: Cities unprepared for early rain, e.g., Bengaluru, may see increased urban flooding.
- Altered Weather Patterns: Early monsoon may disrupt normal temperature patterns, seen in cooler summer 2025 trends across south India.
- Forecast Challenges: Early onset may or may not ensure a longer or stronger monsoon season, posing risks for water management planning.

Conclusion:

The early onset of the 2025 monsoon is the result of favourable atmospheric and oceanic conditions including MJO and Somali Jet dynamics. While it brings hope for agriculture and water security, it also demands preparedness against urban flooding and misaligned rainfall patterns.

Chagos Islands

Context:

The United Kingdom has officially agreed to transfer sovereignty of the Chagos Islands to Mauritius, ending decades of British control.

About Chagos Islands:

Location:

- The Chagos Archipelago consists of over 60 small islands located in the central Indian Ocean, south of the Maldives, and east of Seychelles.
- The largest island, Diego Garcia, hosts a key US-UK military base.

Previous Control:

- The islands were under British rule since 1814, ceded by France.
- In 1965, the UK separated Chagos from Mauritius, forming the British Indian Ocean Territory (BIOT) before Mauritius gained independence in 1968.

Strategic Significance:

- Diego Garcia has served as a critical logistics and intelligence base for US military operations in West Asia, South Asia, and East Africa.
- It has hosted over 2,500 personnel, nuclear-capable aircraft, and surveillance systems.

About UK–Mauritius Chagos Sovereignty Deal (2025):

- After a UK High Court ruling, England Prime Minister signed a treaty handing sovereignty of the Chagos Islands to Mauritius.

- The deal includes a 99-year lease of Diego Garcia to the UK and US for continued military use.
- The UK will pay Mauritius approximately £101 million/year, totalling billions over the lease period.

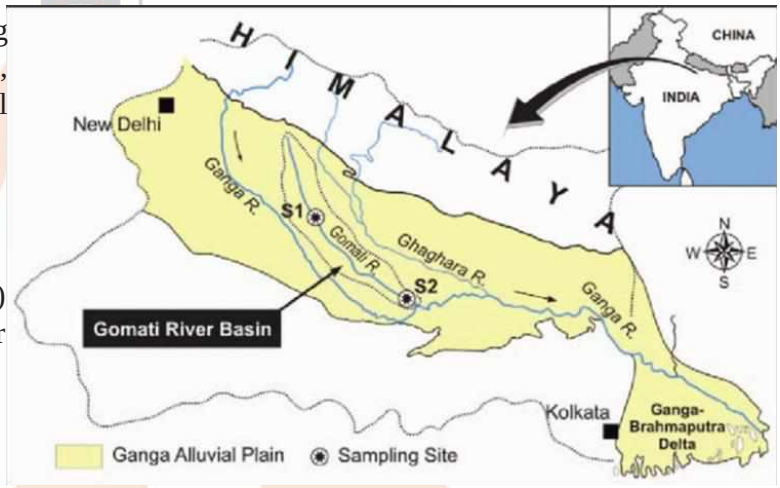
Significance:

- Marks the completion of Mauritius's decolonisation process.
- Balances sovereignty claims with strategic military requirements of Western allies.
- Seen as a "win-win"—recognising Mauritian control while maintaining UK-US security presence.
- India's Official Stance: India has consistently supported Mauritius's claim over Chagos in line with its principles of territorial integrity, sovereignty, and international law.

Gomti River

Context:

The Gomti River in Lucknow is at risk of becoming ecologically dead due to rising untreated sewage, declining oxygen levels, and increasing faecal coliform levels.



About Gomti River:

Origin:

- Arises from Gomat Taal (Fulhaar Jheel) near Madho Tanda, Pilibhit district, Uttar Pradesh.

Course:

- Flows entirely through Uttar Pradesh, traversing districts like Lucknow, Sitapur, Sultanpur, Jaunpur, Faizabad, and others.
- Joins the Ganga River at Kaithi in Ghazipur district.

Length & Basin:

- Total Length: ~960 km
- Drainage Area: ~18,750 sq km (7,240 sq miles)
- Perennial river with sluggish flow except during the monsoon season.
- Major Tributaries: Sai River, Chowka River, Kathina River, Saryu River, and Sarayan River.

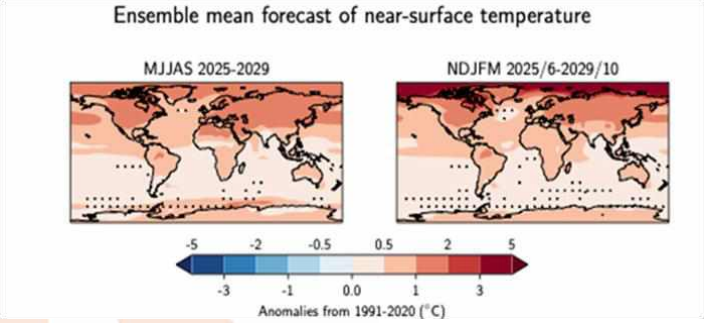
Cultural and Religious Significance:

- Considered sacred in Hinduism, believed to be the daughter of Rishi Vashishtha.
- Mentioned in the Bhagavata Purana as one of the five transcendental rivers.
- The rare Gomti Chakra is found in its sands.

WMO Global Climate Forecast 2025–2029

Context:

The World Meteorological Organization (WMO) has released a new decadal climate forecast, warning that global temperatures between 2025 and 2029 are expected to remain at or above record levels, significantly increasing climate-related risks and development challenges.



About WMO Global Climate Forecast 2025–2029:

- Temperature Range: Annual global mean surface temperature is projected to be 1.2°C to 1.9°C above pre-industrial (1850–1900) levels.

Record-Breaking Heat:

- 80% chance that one year between 2025–2029 will exceed 2024, the hottest year on record.
- 86% chance that one year will cross the 1.5°C threshold.

Five-Year Average Warming:

- 70% probability that 2025–2029 average will exceed 1.5°C, up from 47% in last year's report.
- Long-Term Context: 1.5°C target in Paris Agreement refers to multi-decade averages, but short-term overshoots are now increasingly likely.

Key Issues Highlighted in the Report:

- Accelerated Arctic Warming: Winter temperatures in the Arctic are expected to be 2.4°C above the 1991–2020 average, over 3.5× faster than global average.
- Decline in Sea Ice: Further reductions predicted in the Barents Sea, Bering Sea, and Sea of Okhotsk, impacting biodiversity and indigenous livelihoods.

Changing Precipitation Patterns:

- Wetter conditions expected in Sahel, Alaska, Northern Europe.
- Drier conditions over the Amazon and parts of South Asia, intensifying drought risks.
- Regional Variability: South Asia may witness continued wet years, though not uniformly across seasons.

Consequences of Predicted Warming:

- Extreme Weather Intensification: Every fraction of warming drives stronger heatwaves, floods, and droughts, impacting both urban systems and agrarian economies.
- Melting Ice and Rising Seas: Sustained warming leads to glacial melt, contributing to sea-level rise and coastal threats.
- Ocean Heating & Acidification: Increased temperatures cause marine ecosystem degradation, endangering fisheries and food chains.
- Threat to Sustainable Development: Warming undermines SDGs, especially food security, water access, and public health in vulnerable regions.

Way Ahead:

- Strengthen Climate Action (NDCs): Nations must revise and scale up their Nationally Determined Contributions (NDCs) at COP30 for alignment with Paris targets.
- Accelerate Renewable Transitions: Shift to clean energy and net-zero pathways is vital to reduce GHG emissions.
- Boost Adaptation Planning: Implement climate-resilient infrastructure and early warning systems in high-risk zones.

- Enhance Global Climate Monitoring: Expand WMO-led efforts for decadal forecasting, regional risk assessments, and public policy guidance.
- Protect Natural Carbon Sinks: Preserve forests, wetlands, and oceans which act as critical buffers against rising CO_2 levels.

Conclusion:

The WMO's forecast reinforces the urgency of aggressive climate action. The likelihood of surpassing 1.5°C even temporarily signifies increasing systemic risks. Without immediate global commitment, climate extremes will become the new normal.

Species: Dugong

Context:

World Dugong Day was observed to raise awareness about the conservation needs of Dugongs, with India reaffirming its focus on habitat protection in areas like Palk Bay and Gulf of Mannar.

About Dugongs:

- What it is: Dugongs (Dugong dugon) are large, herbivorous marine mammals often called "sea cows." They are the only extant species of the Dugongidae family and closely related to manatees.

Habitat in India:

- Warm shallow coastal waters
- Found in: Gulf of Mannar, Palk Bay, Gulf of Kutch, Andaman & Nicobar Islands

IUCN Status:

- Global: Vulnerable
- India: Regionally Endangered
- Schedule I species under Wildlife (Protection) Act, 1972 (highest legal protection)
- Features of Dugongs:

Physical Characteristics:

- Body shape: Dugongs have a torpedo-shaped body with flipper-like forelimbs and no dorsal fin for streamlined swimming.
- Size: They can grow up to 3 meters long and weigh around 300 kg.
- Lifespan: Dugongs can live up to 70 years in the wild.

Biological Traits:

- Diet: Dugongs are herbivores that feed mainly on seagrass, consuming 20–30 kg daily.
- Teeth: Their teeth regenerate throughout life due to constant wear from abrasive seagrass.

Reproductive Traits:

- Maturity: They reach reproductive maturity at around 9–10 years of age.
- Birth cycle: Dugongs give birth once every 3–5 years, making reproduction slow.
- Population growth: Their population increases at a maximum rate of about 5% per year.

Social Behaviour:

- Grouping: Dugongs are usually solitary or seen in mother-calf pairs.
- Habitat preference: Unlike Manatees, Dugongs live strictly in marine environments and avoid human interaction.

Ecological Importance:

- Known as "gardeners of the sea" for maintaining healthy seagrass beds.
- Promote biodiversity by nurturing fish nurseries.
- Play a vital role in carbon sequestration and coastal ecosystem stability.

Operation Olivia

Context:

The Indian Coast Guard, under Operation Olivia, successfully protected a record 6.98 lakh Olive Ridley turtles during their mass nesting at the Rushikulya river mouth in Odisha.

About Operation Olivia:

- What it is: A flagship marine conservation initiative launched annually by the Indian Coast Guard (ICG) from November to May to protect Olive Ridley turtles during their mass nesting season.
- Organisation Involved: Indian Coast Guard in collaboration with State Pollution Control Boards, NGOs, and local fishing communities.

Objectives:

- Prevent illegal fishing during turtle breeding season.
- Ensure safe nesting along Odisha's key beaches (Gahirmatha, Rushikulya, Devi).
- Promote use of Turtle Excluder Devices (TEDs) among fishing communities.

Key Features:

- 5,387+ surface patrol sorties and 1,768+ aerial missions since inception.
- Extensive community outreach, educational awareness, and MoUs with NGOs.
- Use of modern surveillance systems and inter-agency coordination for enforcement.

About Olive Ridley Turtles:

- Scientific Name: Lepidochelys olivacea
- IUCN Status: Vulnerable

Habitat & Distribution:

- Found in warm waters of the Pacific, Indian, and Atlantic Oceans.
- Major nesting sites in India: Odisha (Gahirmatha, Rushikulya, Devi), Tamil Nadu, Andhra Pradesh, Andaman & Nicobar Islands.

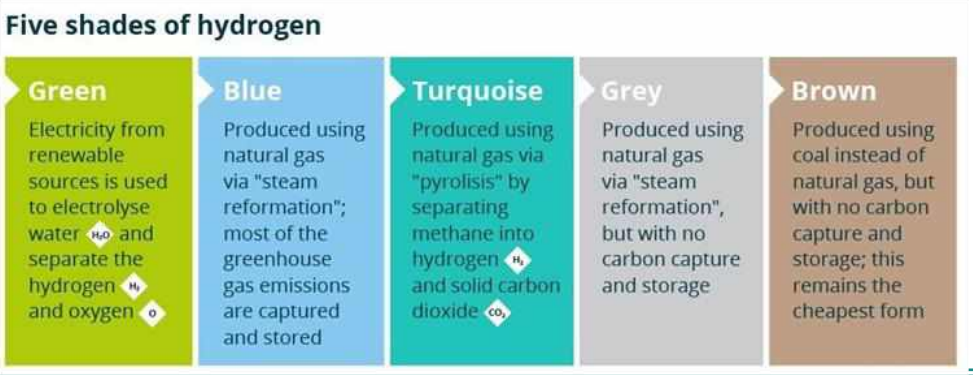
Biological Features:

- Smallest sea turtle species, weighing up to 45 kg, olive-coloured, heart-shaped carapace.
- Arribada (mass nesting): Thousands of turtles nest simultaneously, especially from Nov–Apr.
- Omnivorous diet: Feeds on crustaceans, jellyfish, algae, molluscs.

Natural Hydrogen

Context:

Governments and private firms across the globe are intensifying efforts to explore natural hydrogen as a low-cost, zero-emission fuel, with recent discoveries in France's Moselle region and strong interest from India.



About Natural Hydrogen:

What is Natural Hydrogen?

- Natural hydrogen is free molecular hydrogen (H_2) that occurs naturally underground due to geological processes like serpentinisation and radiolysis.
- It is a clean-burning, non-polluting, and potentially renewable energy source if extracted sustainably.

Key Features of Natural Hydrogen:

- Zero-Emission Fuel: Burns to produce only water vapor; no CO_2 emissions.
- Low-Cost Potential: Estimated production cost $1/kg, much cheaper than green hydrogen.
- Sustainable: Naturally regenerates in geological formations.
- High Energy Efficiency: Hydrogen fuel cells are 3 times more efficient than gasoline.

How Does Hydrogen Occur in Nature?

- Found in hard rock formations, ophiolite belts, and hydrothermal systems.

Generated by processes like:

- Serpentinisation: Reaction between water and ultramafic rocks.
- Radiolysis: Breakdown of water by natural radioactive decay.
- Organic decomposition: Release from deep carbonaceous material.
- Co-located with helium in some formations, indicating deep crustal origins.

Extraction Process of Natural Hydrogen:

- Exploration: Detect hydrogen seeps using geophysical tools and geochemical sampling in favourable geological regions.
- Drilling: Boreholes are drilled at identified sites (e.g., Mali, France, U.S.) to access underground hydrogen pockets.
- Capture & Compression: Extracted hydrogen is filtered, purified, and compressed for safe storage and transport.
- Distribution: The gas is delivered to fuel cells, refineries, or industrial users as a clean energy source.

Challenges in Natural Hydrogen Adoption:

- Unmapped Reserves: Lack of extensive surveys makes global hydrogen availability uncertain.
- Scattered Deposits: Economically unviable if reserves are too spread out.
- Storage & Transport: Hydrogen's low energy density requires high-pressure containment, increasing cost.
- Safety Concerns: Highly flammable and odourless, making leak detection difficult.
- Lack of Infrastructure: Refuelling stations, pipelines, and distribution are still underdeveloped.

Way ahead:

- National Mapping: Conduct a comprehensive geological survey of hydrogen-bearing formations, especially in India's cratonic belts and ophiolites.
- Policy Push: Develop a Natural Hydrogen Exploration Policy and include it in India's National Hydrogen Mission.
- Global Collaboration: Leverage USGS models, and collaborate on R&D with nations like France and the U.S.
- Private Sector Incentives: Attract investments through PPP models, tax breaks, and startup incubation in this sector.
- Infrastructure Development: Build safe storage, pipelines, and fuel cell refueling networks alongside hydrogen hubs.

Conclusion:

Natural hydrogen offers a promising, low-emission, and scalable alternative to fossil fuels. Its success depends on effective exploration, safety, and commercialization frameworks. With India's untapped reserves, strategic focus can position it as a leader in next-generation hydrogen energy.

India's First Inter-State Cheetah Conservation Corridor

Context:

Rajasthan has agreed to join India's first inter-state cheetah conservation corridor with Madhya Pradesh.

About India's First Inter-State Cheetah Conservation Corridor:

What is it?

- A wildlife corridor project designed to connect protected habitats in Madhya Pradesh and Rajasthan for the reintroduced cheetahs to roam safely and naturally across a vast ecosystem.

Geographical Coverage:

- Total area: 17,000 sq. km is covered between Madhya Pradesh (10,500 sq. km) and Rajasthan (6,500 sq. km).

Key Locations Involved:

- Palpur Kuno National Park, Madhya Pradesh: Located in Sheopur district, Kuno is the main site for India's cheetah reintroduction project.
- Gandhi Sagar Sanctuary, Madhya Pradesh: Situated along the Chambal River in Mandsaur district, this sanctuary is rich in hilly terrain and diverse wildlife.
- It is being developed as the second habitat for cheetahs in Madhya Pradesh.
- Mukundara Hills Tiger Reserve, Rajasthan: Located in Kota division, it comprises parts of Darrah, Jawahar Sagar, and Chambal sanctuaries.
- The reserve has been identified as a potential cheetah habitat due to its arid grassland ecosystem.
- Rajasthan districts: Kota, Bundi, Baran, Jhalawar, Sawai Madhopur, Karauli, Chittorgarh.
- Proposed inclusion: Forest areas of Jhansi and Lalitpur (Uttar Pradesh)

Key Features of the Corridor:

- Inter-State Connectivity: First-of-its-kind wildlife linkage across two major states.
- Seamless Movement: Enables cheetahs to migrate naturally between reserves.
- Ecological Restoration: Aims to restore and conserve the grassland ecosystem.
- Strategic Collaboration: Supported by NTCA and Wildlife Institute of India, with expected MoU between states.
- Model for Asia: Recognised as a unique conservation model in Asia by experts.

Significance for India:

- Revives Native Species: Strengthens India's cheetah reintroduction mission.
- Strengthens Federal Conservation: Reflects cooperative federalism in ecological governance.
- Aligns with Global Goals: Supports Convention on Biological Diversity (CBD) targets.

Chapter-
5

SCIENCE & TECHNOLOGY

India's First Indigenous Thrombectomy Device

Context:

The Technology Development Board (TDB) under DST has funded India's first indigenously developed mechanical thrombectomy device for stroke treatment.

About India's First Indigenous Thrombectomy Device:

What is it?

- A Mechanical Thrombectomy Kit used to treat acute ischemic stroke caused by large vessel blockage. It offers quicker and more effective recovery than traditional clot-busting drugs.
- Developed by: M/s S3V Vascular Technologies Limited, Mysuru — with financial assistance from the Technology Development Board (TDB), Department of Science & Technology.

How It Works:

- The device is put into a blocked artery in the brain during a stroke.
- It removes the blood clot using special tools like stent retrievers and aspiration catheters.
- This helps restore blood flow to the brain, preventing paralysis or permanent brain damage.

Key Features:

- Indigenous Innovation: First Indian company to design and manufacture stroke-care tools like microcatheters, aspiration catheters, guidewires, and stent retrievers.
- Advanced Manufacturing: Built at Medical Devices Park, Oragadam, with an integrated facility for high-precision production.
- Patent-Driven R&D: Patent filings underway for innovations like clot retriever head design and advanced catheter structures.
- Skill Development: Offers simulator-based training programs for young doctors, especially in Tier-II cities.
- Global Standards: Targeting CE and USFDA certifications to enable global exports and ensure world-class quality.

Why It Matters?

- Helps India reduce its need to import expensive stroke-care devices.
- Makes stroke treatment more affordable and easier to access for patients.
- Will be part of Ayushman Bharat, supporting public health programs.
- Strengthens India's global presence in medical technology.

India AI Mission

Context:

Union Minister announced a major expansion of India's national AI infrastructure, adding 15,916 new GPUs, while the Cabinet approved ₹10,300+ crore for the IndiaAI Mission to boost AI startups.

About India AI Mission:

What it is?

- IndiaAI is a national program by the Government of India to develop indigenous Artificial Intelligence capabilities, infrastructure, datasets, and startups under a structured public-private partnership model.
- Launched by: Ministry of Electronics and Information Technology (MeitY)
- Launched in: Approved by Cabinet in March 2024

Objectives:

- Make AI in India and Make AI work for India
- Democratize AI access and use for governance, startups, and citizens
- Build indigenous foundation and language models
- Promote ethical, safe, and responsible AI
- Create a self-reliant AI innovation ecosystem

Key Features:

- Massive Compute Boost: India now has over 34,000 GPUs, enabling training of large AI models.
- Foundational Model Development: Selection of startups like Sarvam AI, Soket AI, Gnani AI, and Gan AI to build India-specific multilingual LLMs and Voice AI models.
- AI Innovation Centre (IAIC): A leading academic institution to drive research, foundational models, and talent retention.
- Open Datasets Platform (AI Kosh): Over 367 datasets already uploaded; aims to improve access to public data for AI research and governance.
- Startup Financing & Talent Pipeline: Includes startup funding, AI labs in Tier-II cities, and AI skill development programs for graduates and postgraduates.
- Ethical & Safe AI: Development of frameworks for safe, trusted, and inclusive AI deployment across sectors.
- Global AI Leadership: Aims to place India in the top league of AI-powered nations through indigenous innovation and global collaborations.

Battery Aadhaar Initiative

Context:

At the Battery Summit 2025, Tata Elxsi, in partnership with Tata Motors, Tata AutoComp, and IIT Kharagpur, unveiled the Battery Aadhaar initiative to key government stakeholders.

- The project aligns with India's green mobility and circular economy

About Battery Aadhaar Initiative:

What It Is?

- Battery Aadhaar is a digital identification system for batteries, designed to enable full traceability across their lifecycle using secure, blockchain-backed technologies.
- Developed By: Spearheaded by Tata Elxsi through its MOBIUS+ platform, in collaboration with Tata Motors, Tata AutoComp Systems, and IIT Kharagpur.

Objective:

- To assign unique digital IDs to each battery, enabling safe use, regulated reuse, and efficient disposal.
- To align battery usage with national and global compliance standards like the EU Battery Regulation.

Key Features:

- Blockchain Integration: MOBIUS+ ensures tamper-proof, real-time data logging for each battery unit.
- Lifecycle Transparency: Tracks manufacturer details, usage history, and material content.
- Regulatory Compliance: Automates reporting for both Indian and international policy frameworks.

- Sustainability Link: Supports circular economy models by reducing battery waste and environmental risks.

Significance:

- Prevents unsafe reuse of old or degraded batteries, ensuring safety in EV ecosystems.
- Strengthens India's battery supply chain visibility and sustainability commitment.
- Encourages eco-conscious innovation across mobility, energy storage, and electronics industries.
- Promotes India's position in green tech leadership and aligns with the National Electric Mobility Mission Plan (NEMMP).

India's First Gene-Edited Sheep

Context:

Sher-e-Kashmir University of Agricultural Sciences and Technology (SKUAST-Kashmir) has successfully produced India's first gene-edited sheep, enhancing muscle mass by 30%.

About India's First Gene-Edited Sheep:

What It Is?

- A genetically modified lamb with enhanced muscle mass, developed by editing the myostatin gene, which regulates muscle growth in sheep.
- Developed By: Sher-e-Kashmir University of Agricultural Sciences and Technology (SKUAST-Kashmir)

Technology Used:

- CRISPR-Cas9 gene editing – a Nobel Prize-winning precision genome editing technique.
- Conducted under international biosafety protocols, ensuring no foreign DNA was inserted.

Key Features:

- Muscle Enhancement: 30% higher muscle mass than Indian breeds — a trait found in European breeds like Texel.
- Non-Transgenic: Does not involve foreign DNA insertion, different from GMOs, increasing chances of regulatory acceptance.
- Multipurpose Use: Can be extended for disease resistance, improved reproduction, and even animal twinning.
- Efficient Research Output: Result of 4 years of dedicated research, supported by Indian Council of Agricultural Research (ICAR).

Significance of the Achievement:

- Boost to India's Livestock Sector: Offers a blueprint for improving meat yield and quality in Indian sheep breeds.
- Global Recognition: Positions India on the global map of advanced genome editing research.
- Biotech Policy Alignment: Supports India's evolving regulatory framework for gene-edited organisms, which is distinct from GMO laws.
- Sustainability & Food Security: Enhances productivity per animal, reducing resource use and supporting sustainable livestock farming.
- Foundation for Future Innovation: Builds on SKUAST's earlier success of cloning Noori, the world's first cloned Pashmina goat (2012).

India Crypto Policy

Context:

A Trump-linked US firm, World Liberty Financial Inc (WLFI), has signed an MoU with Pakistan's Crypto Council to develop a crypto-based financial system, prompting geopolitical and security concerns for India.

About India Crypto Policy:

Pakistan's Crypto Pact with WLFI:

- MoU Signed: Pakistan's newly-formed Crypto Council and WLFI have agreed to introduce stablecoins, monetize rare earth assets, and position Pakistan as a regional crypto hub.
- High-Level Support: Endorsed by PM Shehbaz Sharif and Army Chief Asim Munir, the deal includes use of blockchain for financial inclusion and trade.
- Diaspora Link: Pakistan is leveraging its US-based diaspora to connect with Trump's team and global crypto investors.

Strategic Risks to India:

- Terror Financing via Crypto: The decentralized and pseudo-anonymous nature of cryptocurrencies makes them ideal for illicit financing, raising concerns akin to hawala networks, as highlighted by FATF.
- Cross-border Laundering Risk: Crypto assets can bypass formal banking channels, enabling money laundering across jurisdictions—a threat amplified by Pakistan's crypto pivot.
- Geopolitical Influence Operations: Through crypto deals like the WLFI-Pakistan MoU, Islamabad is leveraging tech diplomacy to gain US favor, which could reduce India's strategic tech advantage in the region.
- Diaspora-led Influence Shift: Pakistan is actively using its US-based tech diaspora to establish crypto alliances—contrasting India's diaspora focus on traditional tech sectors.
- Strategic Oversight Parallels: Just as India underestimated Pakistan's nuclear capability in the 1970s, ignoring the early-stage crypto pivot could similarly allow adversaries to reshape financial power balances.

India's Regulatory and Strategic Crypto Vacuum:

- Tax Without Law: India taxes crypto (30% + 1% TDS) but has no legal framework—flagged by the Supreme Court in May 2025.
- User Boom, No Oversight: With 100+ million users (Triple-A), there's no central regulator, exposing users to scams.
- Cybersecurity Gaps: Lacking compliance norms, India faces major frauds—e.g., 900 crore GainBitcoin scam.
- No Investor Safeguards: Unlike SEBI or RBI, crypto lacks grievance redressal or risk protection.
- Slow CBDC Rollout: The RBI's e- pilot lacks clear links to private crypto, limiting India's digital currency leadership.

Way Ahead for India:

- National Crypto Strategy: Develop a centralized strategy combining monetary, cybersecurity, and geopolitical objectives.
- Regulatory Clarity: Establish a Digital Asset Regulatory Authority to streamline compliance, prevent misuse, and guide innovation.
- Financial Intelligence Monitoring: Enhance FIU-IND tracking of crypto-linked transactions to identify risks and track terror financing.
- Global Alignment: Coordinate with G20, FATF, and IMF for global crypto standards and cross-border data-sharing.
- CBDC Push: Accelerate RBI's e- project, giving India a sovereign edge in digital currency without undermining the banking system.
- Awareness Campaigns: Educate youth and investors about legal status, risks, and financial literacy in crypto.

Conclusion:

India cannot afford to overlook the emerging crypto-geopolitical nexus involving Pakistan and the US. With over 100 million users, India must urgently develop a clear, forward-looking crypto strategy that ensures national security, financial integrity, and technological leadership.

Made in India Fifth-Generation Fighter Jet

Context:

The Defence Minister has officially approved the execution of the indigenous fifth-generation stealth fighter jet project, the Advanced Medium Combat Aircraft (AMCA).

About Made in India Fifth-Generation Fighter Jet:

What It Is?

- A next-generation stealth-enabled fighter jet, designed and built in India to enhance the Indian Air Force's (IAF) deep-strike and air superiority capabilities.
- Organisations Involved: Ministry of Defence, Defence Research and Development Organisation (DRDO), and Aeronautical Development Agency (ADA) in partnership with Hindustan Aeronautics Limited (HAL).

Key Features:

- Stealth technology with reduced radar cross-section.
- Advanced avionics with integrated sensors and data fusion.
- Super cruise capability (sustained supersonic flight without afterburners).
- Network-centric warfare and electronic warfare systems.
- Multi-role capability for air-to-air, air-to-ground, and surveillance missions.
- Global Examples: F-22 Raptor (USA), F-35 Lightning II (USA), Sukhoi Su-57 (Russia), and Chengdu J-20 (China)

About Advanced Medium Combat Aircraft (AMCA):

What is AMCA?

- A fifth-generation stealth multirole fighter aircraft being developed indigenously for the Indian Air Force.
- Envisioned to replace aging MiG and Jaguar fleets, and operate alongside Tejas LCA and MRFA platforms.

Features:

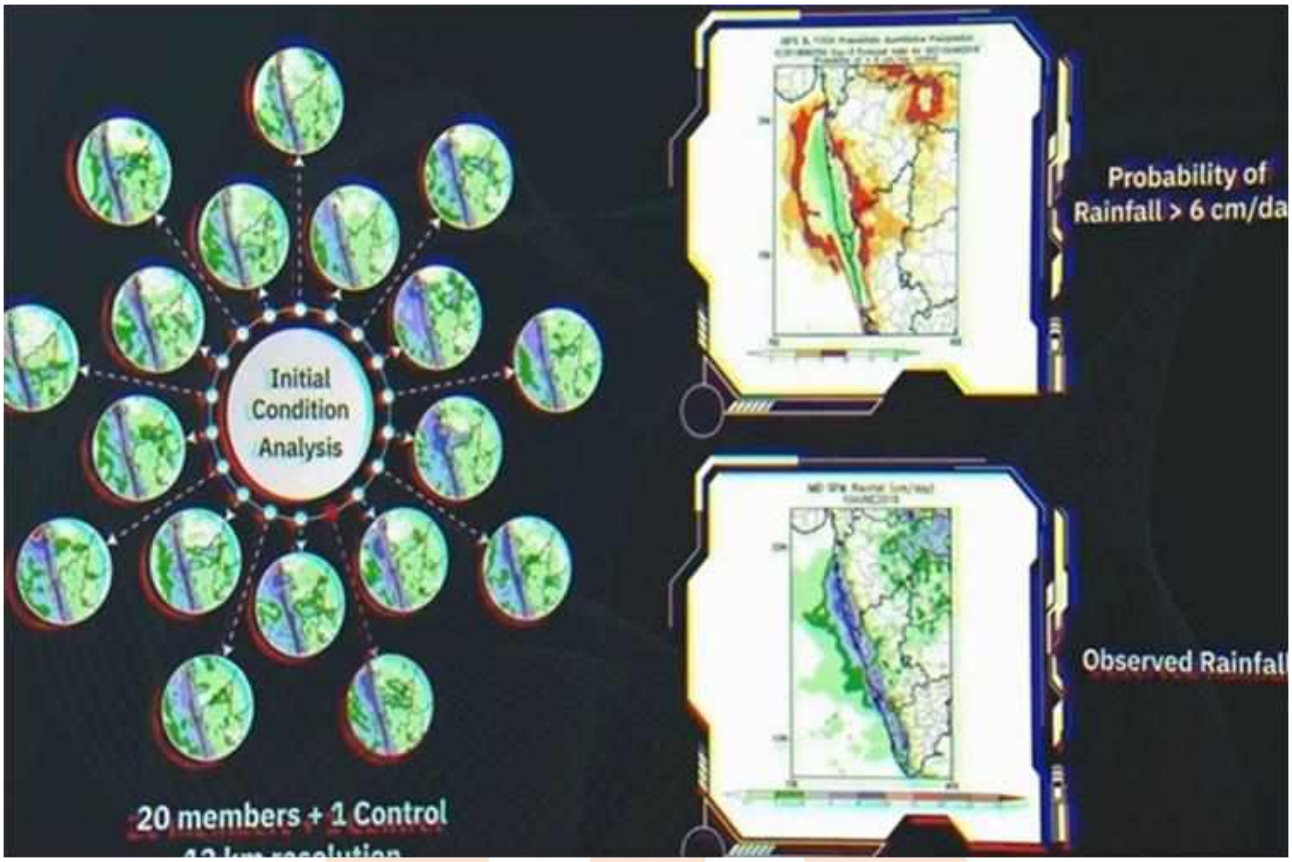
- Stealth Design: Radar-absorbing materials, internal weapon bays.
- Advanced Avionics: AESA radar, AI-enabled flight controls, sensor fusion.
- Twin-engine Configuration: Capable of super cruise and high manoeuvrability.
- Multi-role Capability: Air superiority, ground attack, reconnaissance.
- Digital Fly-by-Wire System with advanced cockpit interface.

Bharat Forecasting System (BFS)

Context:

The Union Ministry of Earth Sciences launched the Bharat Forecasting System (BFS) on May 26, 2025.

- It is the world's highest-resolution weather prediction model using a 6 km x 6 km grid, powered by India's supercomputer Arka.



About Bharat Forecasting System (BFS):

What is BFS?

- BFS is India's most advanced numerical weather prediction system.
- It provides highly localized, short-term weather forecasts up to panchayat level using ultra-high-resolution grids.

Developed by

- Developed by scientists at the Indian Institute of Tropical Meteorology (IITM), Pune.
- Led by researcher Parthasarathi Mukhopadhyay.

How It Works?

- Utilizes supercomputer Arka (11.77 PetaFLOPS, 33 Petabyte storage) to run simulations faster (within 4 hours).
- Uses real-time inputs from 40+ Doppler Weather Radars, which will soon expand to 100.
- Processes data for regions between 30° South to 30° North latitude, covering tropical zones including India.

Key Features:

- Highest global resolution: 6 km grid (compared to 9–14 km used by EU, UK, US models).
- Faster processing: Cuts prediction time by 60% compared to previous model Pratyush.
- Covers India comprehensively: Including small villages and blocks.
- Supports nowcasting – forecasts for the next 2 hours.

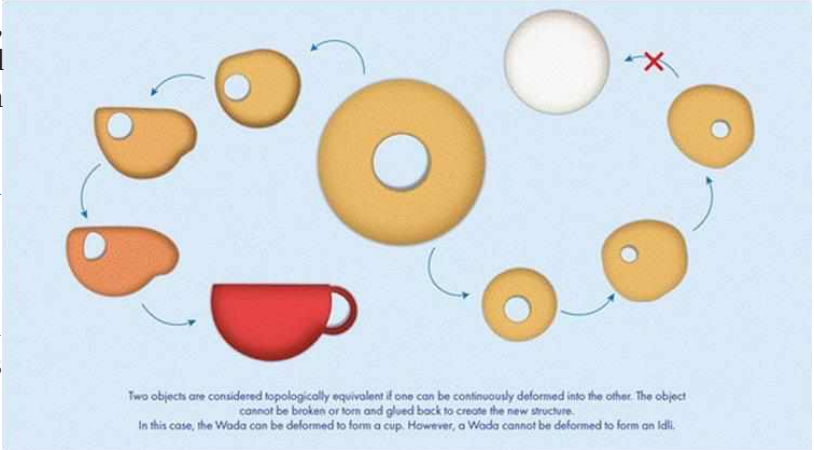
Significance:

- Disaster Risk Reduction: Enables quicker evacuation and flood alerts.
- Agricultural Resilience: Assists farmers with timely rainfall, heatwave, and drought warnings.
- Water Resource Planning: Better irrigation management and reservoir operations.
- Food Inflation Management: Helps stabilize prices by reducing crop losses.
- Public Health: Early warning for heatwaves and pollution episodes.

A New Method To Detect Topological Invariants in Quantum Materials

Context:

Scientists at Raman Research Institute (RRI), Bengaluru, have discovered a new method to detect topological invariants in quantum materials using spectral function.



About A New Method to Detect Topological Invariants in Quantum Materials:

What is Spectral Function?

- The spectral function is a quantum tool that describes how energy and particles like electrons behave inside a material.
- It's widely used to study electronic structure, such as density of states and dispersion relations.
- Developed By: Developed by Raman Research Institute (RRI), under the Department of Science and Technology.

How It Works?

- The team analysed momentum-space spectral function (SPSF), which acts like a quantum fingerprint.
- SPSF maps how electrons distribute over energy and momentum, revealing hidden topological features.

Key Features:

- Topology Detection: Unveils invariants like winding numbers (1D) and Chern numbers (2D).
- Non-Invasive Technique: Avoids complex physical manipulation or destructive probing.
- Faster and Accessible: Easier than traditional tools like ARPES (Angle-Resolved Photoemission Spectroscopy).
- Universal Application: Can be applied across different classes of topological materials.
- Quantum Insight: Provides deeper understanding of electron dynamics and material behaviour at the quantum level.

Significance:

- Revolutionizes Quantum Research: Opens new avenues in condensed matter physics.
- Boosts Quantum Technology: Aids development of quantum computing, energy-efficient devices, and fault-tolerant electronics.
- Simplifies Material Classification: Helps identify topological materials without advanced experimental setups.

Customised Gene-Editing Treatment

Context:

A nine-month-old boy suffering from a rare CPS1 deficiency became the first known human to receive a customised gene-editing treatment using a base editing technique.

About Custom Gene Editing Technique:

What It Is?

- A personalised gene therapy based on an evolved form of CRISPR-Cas9, known as base editing.
- It allows for single-base correction in DNA without breaking both strands, unlike traditional CRISPR.
- Organisation Involved: Developed by University of Pennsylvania and Children's Hospital of Philadelphia.

Procedure:

- Diagnosis: The child (KJ) was found to have a mis paired base in his DNA, leading to CPS1 deficiency.
- Programming the Edit: Scientists designed a guide RNA and attached it to a base-modifying enzyme fused with Cas9.

- Targeted Delivery: The tool identified the faulty base and converted it to the correct base without making a double-strand cut.
- Analogy: Base editing is like using a pencil and eraser, whereas CRISPR is like scissors and glue.

Gene editing vs Base Editing:

Feature	Gene Editing (CRISPR-Cas9)	Base Editing
Discovery	Developed in 2012 by Doudna and Charpentier	Developed later as an advanced form of CRISPR-Cas9
Mechanism	Introduces **double-strand breaks** in DNA	Alters **single DNA base** without breaking both DNA strands
Enzyme Used	Cas9 endonuclease	Cas9 fused with **base-modifying enzyme** (e.g., deaminase)
Process Analogy	Like using **scissors and glue** (cut-paste mechanism)	Like using a **pencil and eraser** (precise correction)
Need for Donor DNA	Requires **external donor DNA** to insert correct sequence	No external DNA needed; edits directly
Precision	Less precise, may cause **off-target effects**	Highly precise, **reduces off-target mutations**

Significance:

- First Human Success: Pioneering example of real-time precision medicine in rare genetic disorders.
- No Foreign DNA Required: Unlike older CRISPR methods, this does not require external DNA insertion.
- Compact Delivery: Easier to deliver using viral vectors due to fewer components.
- Potential Reach: Can treat thousands of genetic conditions once personalised sequencing is done.

Limitations:

- High Cost: Currently costs hundreds of thousands of dollars, making it unaffordable for most.
- One-Time Customisation: Each tool is unique to the patient, making mass-scale application difficult.
- Lack of Regulatory Clarity: Countries like India face regulatory bottlenecks, delaying clinical use.
- Low Pharma Incentive: Not commercially viable for pharmaceutical firms due to individual-specific design.

High-Altitude Platform (HAP) Prototype

Context:

India's indigenously developed High-Altitude Platform (HAP) prototype, designed by NAL, successfully completed pre-monsoon flight tests using a certified autopilot system.

About High-Altitude Platform (HAP) Prototype:

What is HAP?

- A High-Altitude Platform (HAP) is a solar-powered, unmanned stratospheric aircraft that operates at 17–22 km altitude, bridging the gap between terrestrial systems and satellites.

Developed By:

- National Aerospace Laboratories (NAL), Bengaluru under CSIR.
- Supported by Aeronautical Test Range (ATR), Chitradurga, Karnataka.

Objectives:

- Border patrolling and surveillance over sensitive and remote terrains.
- To provide persistent aerial coverage for military and civil applications.
- Serve as a telecommunication relay and meteorological platform.

Key Features of India's HAP:

- Solar-Powered Platform: Enables extended, high-endurance flight.
- Certified Autopilot System: Fully autonomous flight with fail-safe algorithms and redundant control sensors.
- Altitude Achieved: Up to 24,000 ft (FL240) in recent tests and full-scale version can operate at 65,000 ft (20 km).
- Payload Capacity: Subscale – 1kg and Full-scale – 10kg (including radiosondes, 5G base stations).
- Endurance: 8.5+ hours in test flights and longer duration planned in final model.
- Wingspan: 12 metres (subscale model) and light-weight under 22kg.

Applications of HAP:

- Defence: Border surveillance, intelligence gathering, disaster response.
- Meteorology: Radiosonde deployment, monsoon cloud measurements (IITM, Pune use case).
- Telecommunications: Temporary or mobile 5G connectivity in remote or disaster-hit areas.
- Geoinformatics: Real-time mapping, environmental monitoring.
- Crowd Monitoring: Public safety during large events or protests.

Atomiser

Context:

The atomiser, a vital yet overlooked device, has come under focus for its vast industrial, medical, and environmental applications, especially in fields ranging from aerosol medicine to spray-drying and firefighting.

About Atomiser:

What is an Atomiser?

- An atomiser is a device that breaks a liquid into fine droplets (spray) for even distribution over a surface or space.
- It allows conversion of liquid storage into mist delivery, balancing ease of handling and maximum surface coverage.

How Does an Atomiser Work?

- Works on pressure-drop, turbulence, or external force to shatter liquid into droplets.

Types of atomisers include:

- Pressure-swirl atomisers: Create a vortex, ejecting liquid in conical patterns.
- Air-assisted atomisers: Use compressed air to tear the liquid into fine mist.
- Ultrasonic atomisers: Use high-frequency vibrations to generate nano-droplets.
- Narrow-channel atomisers: Use geometric constriction to break fluid into a spray.

Key Features of Atomisers:

- Drop Size: Smaller drops for aerosols, larger ones for surface coating.
- Spray Pattern: Can be flat, circular, or conical.
- Application Angle: Tailored for maximum efficiency and coverage.

- Relative Span Factor (RSF): Indicates drop size uniformity (closer to 1 is better).
- Customisation: Atomisers are tuned for pressure, particle size, and spray geometry.

Applications of Atomisers:

- Industrial Use: Used in fuel injection, machinery lubrication, and spray drying in food and pharma sectors.
- Agriculture: Essential for efficient spraying of pesticides, fertilizers, and precision irrigation in poor-soil areas.
- Healthcare: Enables drug delivery via nasal and aerosol sprays; used in disinfectants and pain-relief sprays.
- Disaster & Safety Management: Supports fire suppression with foam sprays and public health safety during pandemics.
- Household & Environment: Found in deodorants and cleaners; also used in climate studies for aerosol modelling

US Research Fund Crunch and Indian Opportunity

Context:

The US National Science Foundation (NSF) and National Institutes of Health (NIH) are facing unprecedented budget cuts, leading to large-scale termination of scientific research grants.

About US Research Fund Crunch and Indian Opportunity:

About US Fund Crunch:

- Nature of Crisis: The US FY26 budget proposes a 55% cut to NSF funding, leading to the termination of 1,400+ research grants and cancellation of 1,000 graduate fellowships.
- Impacted Sectors: Research in public health, climate science, digital innovation, and disaster resilience are all severely affected.
- Economic Ripple: NIH grant cuts alone could cause a $6.1 billion GDP loss and 46,000 job cuts, particularly impacting university towns and scientific communities.
- Global Talent Migration: European nations like France are opening refugee science programs to absorb displaced researchers.

Opportunity for India:

- Reclaiming Talent: India can attract top Indian-origin researchers in the US and global scientists seeking stable research environments.

  E.g. VAIBHAV and VAJRA fellowships can be scaled to encourage long-term relocation.
- Bridge Funding: India can take over ongoing Indo-US NIH projects, ensuring continuity in public health and biomedical research.
- Boost Knowledge Economy: Leveraging the crisis, India can position itself as a global science hub by offering infrastructure, autonomy, and funding.
- Philanthropic Push: With 1.31 lakh crore in social philanthropy in 2024, Indian private foundations can co-invest in global research excellence.

Challenges for India:

- Limited Research Funding: India's R&D spend is just 0.64% of GDP, compared to the OECD average of 2.7%.
- Bureaucratic Bottlenecks: Complex grant procedures and delayed disbursements deter international talent.
- Academic Rigidities: Lack of autonomy, tenure uncertainty, and administrative interference affect innovation in Indian institutions.

- Diversity and Inclusion Gaps: Skewed representation across caste, gender, and region in academia limits broad-based scientific progress.

Way Ahead:

- Expand Fellowship Programs: Widen VAIBHAV/VAJRA into multi-year schemes with enhanced funding and transparent selection.
- Ease Institutional Norms: Grant more autonomy to research institutions, enable faster funding approvals, and foster collaborative labs.
- Incentivize Relocation: Offer infrastructure, tax benefits, and relocation support to foreign and diaspora scientists.
- Public-Private Collaboration: Encourage Indian corporates and philanthropists to co-fund basic science through CSR and endowments.
- Global Collaboration Hubs: Create interdisciplinary research clusters linked to SDGs and climate resilience to attract global partners.

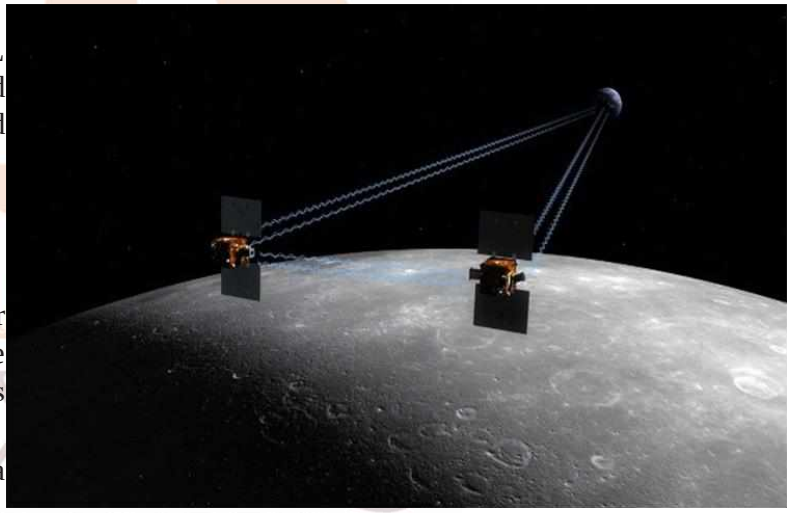
Conclusion:

India stands at a historic crossroads where global brain circulation can be turned into brain gain. With timely reforms and strategic investments, the country can leapfrog into the top tier of global science leaders. This window may never reopen.

GRAIL mission

Context:

A new NASA study using data from the GRAIL mission has revealed why the Moon's nearside and farside look so different, solving a decades-old lunar mystery.



About GRAIL mission:

What is GRAIL?

- GRAIL (Gravity Recovery and Interior Laboratory) was a NASA lunar science mission aimed at mapping the Moon's gravitational field in high resolution.
- Launch Year: Launched in 2011 using a Delta II rocket from Cape Canaveral.
- Organizations Involved: Conducted by NASA's Jet Propulsion Laboratory (JPL) in collaboration with MIT for scientific oversight.

Key Features:

- Consisted of two spacecraft, named Ebb and Flow, flying in tandem around the Moon.
- Measured minute variations in gravitational pull to reveal the Moon's internal composition.
- Ended with a controlled impact on the lunar surface after successful mission completion.

Key Discoveries from GRAIL:

- Tidal Deformation & Gravitational Asymmetry: The Moon's nearside flexes more than the far side due to Earth's gravitational pull, indicating asymmetry in internal structure.

Volcanic History & Heat Distribution:

- The nearside was more volcanically active, with dark basaltic plains ("known as mare").
- Higher concentrations of heat-producing elements like thorium and titanium warmed the nearside mantle up to 200°C more than the farside.

Crustal Thickness Variation:

- Nearside crust is thinner, allowing magma to erupt more easily, forming flat plains.
- Far side remains rugged and cratered due to thicker crust and less volcanic activity.

Bhargavastra Counter-Drone System

Context:

India successfully conducted trials of 'Bhargavastra', a new low-cost counter-drone micro-missile system, developed by Solar Defence and Aerospace Ltd (SDAL).

About Bhargavastra Counter-Drone System:

What it is?

- A micro-missile-based counter-drone system designed to detect and eliminate hostile drones, including drone swarms, using guided munitions.
- Developed by: Solar Defence and Aerospace Ltd (SDAL) in partnership with Economic Explosives Ltd.
- Objective: To provide a cost-effective, rapid-response solution for neutralising drone threats, especially in sensitive border and conflict zones.

Key Features of Bhargavastra:

- Long Detection Range: Can detect small aerial drones beyond 6 km.
- Micro-Missile Arsenal: Supports simultaneous launch of 64 micro missiles, enabling rapid engagement of multiple targets.
- Salvo Launch Capability: Successfully tested salvo mode firing of two rockets within 2 seconds.
- Mobile Deployment: Mounted on a mobile platform, ensuring flexible deployment across varied terrains including high altitudes.
- Extended Engagement Range: Targets can be neutralised at distances beyond 2.5 km, ensuring stand-off protection.

Significance:

- First of its Kind: India's first micro-missile-based counter-drone system for Army Air Defence.
- Bridges Capability Gap: Addresses a critical void in India's anti-drone warfare preparedness.
- Cost-Effective: Offers an economical alternative to expensive air defence systems against low-cost drone threats.
- Dual Interest: Indian Air Force has shown interest, reflecting joint-service utility.
- Global Relevance: Few comparable systems exist globally, marking India's leap in indigenous defence innovation.

2D Metal

Context:

Scientists in China have successfully fabricated atomically thin 2D metal sheets of bismuth, gallium, tin, and lead using a novel high-pressure technique.

About 2D Metal:

What are 2D Metals?

- 2D metals are ultra-thin layers of metal atoms, usually just 1–2 atoms thick, where electrons are confined to move only in two dimensions.
- Unlike bulk metals, they exhibit unique quantum properties due to quantum confinement effects.

New Breakthrough:

- A team in China (Beijing and Dongguan) successfully created atomically thin 2D sheets of bismuth, gallium, indium, tin, and lead.

Technique:

- Metal powder is melted between two layers of MoS_2-coated sapphire plates.
- Under 200 million Pa pressure, the metal flattens into an ultra-thin sheet.
- The result: bismuth sheets only 6.3 Å thick — around 2 atoms deep.

Key Features:

- Thickness: Just a few angstroms (Å) – atomically thin.
- Quantum Confinement: Alters energy levels of electrons, leading to novel electrical behaviours.
- Strong Field Effect: Electrical conductivity can be externally modulated.
- Nonlinear Hall Effect: Generates perpendicular voltage under electric fields — a property not seen in 3D metals.
- Topological Properties: Some 2D metals act as topological insulators, conducting only along edges.

Applications:

- Quantum Computing: Enables creation of faster, low-energy computing systems.
- Flexible Electronics: Ideal for use in next-gen sensors, transistors, and wearable devices.
- Photonics and Optoelectronics: Suitable for high-efficiency LEDs, lasers, and photodetectors.
- Medical Diagnostics: Could power super-sensitive biosensors and imaging tools.

Drone-based Quantum Key Distribution

Context:

The Centre for Development of Telematics (C-DOT) signed an MoU with Synergy Quantum India to jointly develop drone-based Quantum Key Distribution (QKD) systems.

About Quantum Key Distribution (QKD):

What is Quantum Key Distribution (QKD)?

- QKD is a secure method of key exchange that uses quantum mechanics instead of mathematical encryption algorithms to share cryptographic keys.

How QKD Works?

- Photons (light particles) with random quantum states are transmitted over a channel.
- The no-cloning theorem and measurement disturbance principle ensure any eavesdropping is detectable.
- After transmission, both parties compare a subset to detect errors or interception.
- Final keys are extracted after error correction and privacy amplification.

Types of QKD:

Prepare-and-Measure Protocols:

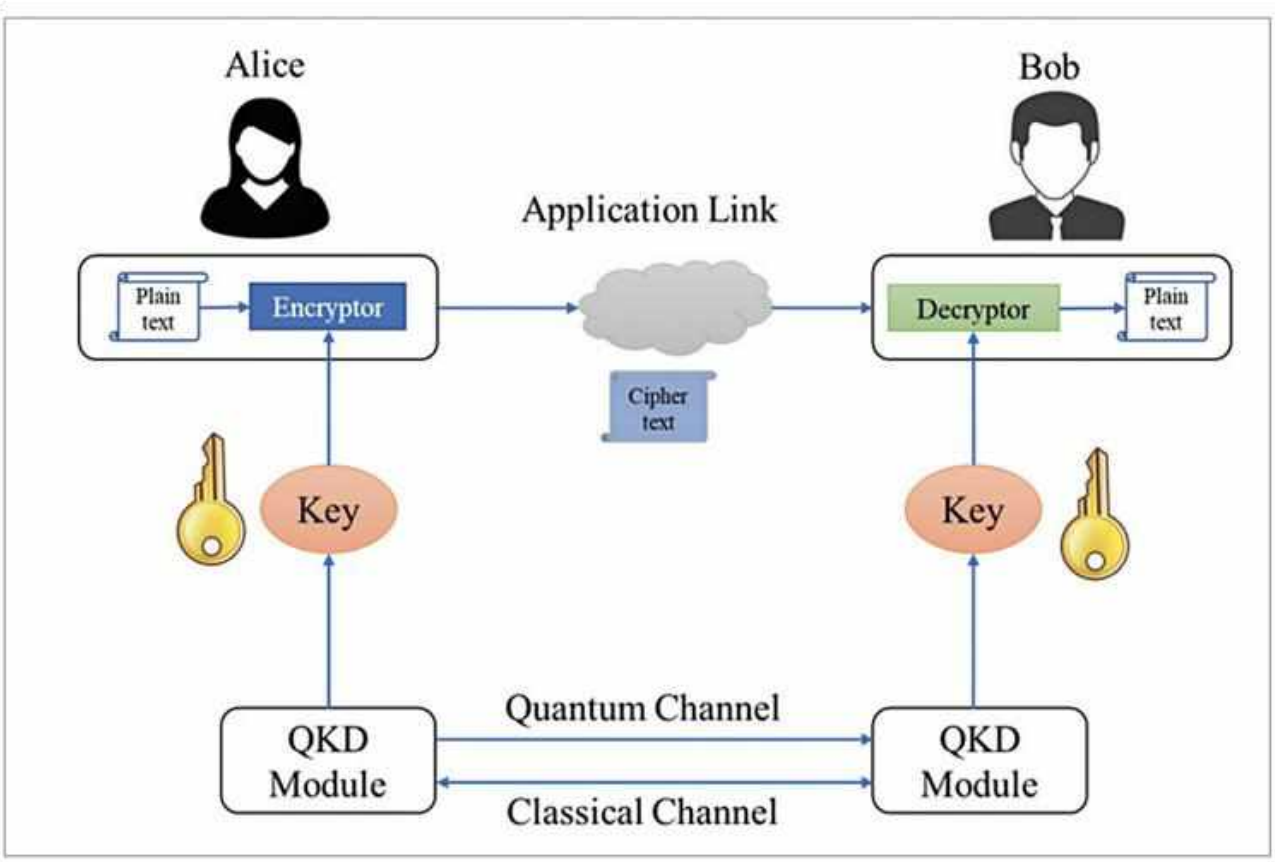
- Sender prepares photons in known states (e.g., BB84 protocol).
- Used to detect interception.

Entanglement-Based Protocols:

- Relies on quantum entanglement.
- Change in one entangled particle affects its pair, enabling tamper detection.
- Discrete Variable QKD (DV-QKD): Uses individual photons and polarization for data encoding.
- Continuous Variable QKD (CV-QKD): Uses laser properties like amplitude and phase for encoding (e.g., Silberhorn protocol).

Key Features:

- Tamper detection: Any interception is instantly detectable.
- Provable security: Based on physical laws, not computational complexity.
- Quantum-resilient: Immune to future threats from quantum computers.



About Drone-Based Quantum Key Distribution Technology:

What is Drone-Based Quantum Key Distribution Technology?

- A futuristic application of QKD via drones, enabling secure key exchange over dynamic and remote locations without dependency on fixed fiber-optic infrastructure.

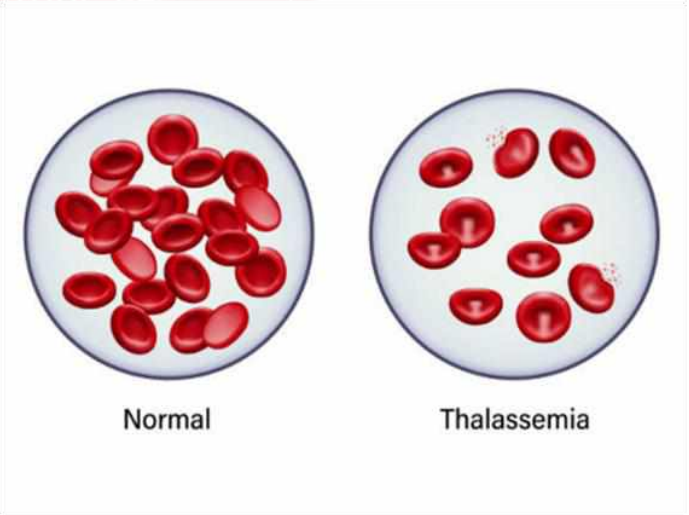
Features:

- Mobility & Flexibility: Can be deployed quickly in disaster zones, border areas, or rural setups.
- Uses Decoy-State BB84 Protocol: Enhances security and efficiency using polarization encoding.
- Targeted for TRL 6+: Demonstrates a system prototype in a relevant environment.
- Boosts Secure Communication: Especially vital for defense, surveillance, and confidential data transfer.
- Atmanirbhar Bharat-Aligned: Promotes indigenous research and innovation in quantum technologies.

Thalassemia

Context:

On World Thalassemia Day observed on May 8th every year, experts revealed that West Bengal's Thalassemia carrier rate (6–10%) is well above the national average (3–4%), due to low awareness and limited genetic screening.



About Thalassemia:

What is Thalassemia?

- Thalassemia is an inherited blood disorder where the body produces insufficient or abnormal haemoglobin, impairing oxygen delivery.
- It is one of the most common single-gene disorders globally, especially prevalent in South Asia.

Caused By:

- Result of mutations or deletions in genes that produce haemoglobin chains (alpha or beta).
- Passed genetically from both parents, either as a carrier (minor) or a full expression (major).

Types of Thalassemia:

Alpha Thalassemia:

- Involves up to 4 gene deletions; severity depends on how many are missing.
- Most common in people of Southeast Asian, Middle Eastern, and African ancestry.

Beta Thalassemia:

- Caused by mutations in the beta-globin gene.
- Prevalent among people of Mediterranean, South Asian, and Chinese descent.

Includes:

- Thalassemia Minor (carrier, mild or no symptoms)
- Thalassemia Major / Cooley Anaemia (severe form needing lifelong transfusions)
- Symptoms: Fatigue and weakness, Pale or yellow skin (jaundice), Facial bone deformities, Growth retardation, Enlarged spleen and liver, and Shortness of breath

Impacts:

- Affects quality and longevity of life; untreated major cases may result in death before age 30.
- Leads to social, emotional, and financial burden, especially in high-prevalence regions.

Treatment:

- Regular blood transfusions to maintain haemoglobin levels.
- Iron chelation therapy to prevent iron overload.
- Bone marrow/stem cell transplantation: only curative option in select cases.
- Supportive care: vaccinations, nutritional support, and mental health counselling.

Satellite Communication Regulation in India

Context:

India has framed new regulatory guidelines for satellite communication companies mandating local manufacturing, data localisation, NavIC compliance, and enhanced national security cooperation.

About Satellite Communication Regulation in India:

What is Satellite Communication?

- Satellite communication (satcom) enables wireless transmission of signals using satellites orbiting the Earth. It supports broadband, TV broadcasting, GPS navigation, and remote area connectivity.

Regulating Agencies:

- Department of Telecommunications (DoT) – Issues operational guidelines and approvals.
- Telecom Regulatory Authority of India (TRAI) – Finalises policy framework including spectrum allocation and pricing.

Key Provisions under New Satcom Guidelines (2025):

Local Manufacturing & Indigenisation

- Satcom firms must submit a 5-year phased manufacturing plan.
- At least 20% of the ground segment should be indigenously produced by Year 5.

Data Localisation & Monitoring:

- No user traffic should be routed through foreign gateways or PoPs.
- All user data, DNS services, and control systems must be located in India.
- Mandatory lawful interception, user monitoring, and data security protocols.

NavIC Compliance

- User terminals should support NavIC (India's regional navigation system) on a best-effort basis.
- Full implementation deadline set for 2029.

National Security Provisions

- Must enable service restrictions during hostilities or emergencies.
- Establish Special Monitoring Zones (within 50 km of borders and coastal EEZ).
- Report unregistered/foreign user terminals in real-time to law enforcement agencies.

Service-Specific Security Clearance

- Separate security clearance needed for voice and data services.

India's First Genome-Edited Rice Varieties

Context:

India has launched its first genome-edited rice varieties, DRR Dhan 100 (Kamala) and Pusa DST Rice 1, developed by ICAR using CRISPR-Cas9 technology.

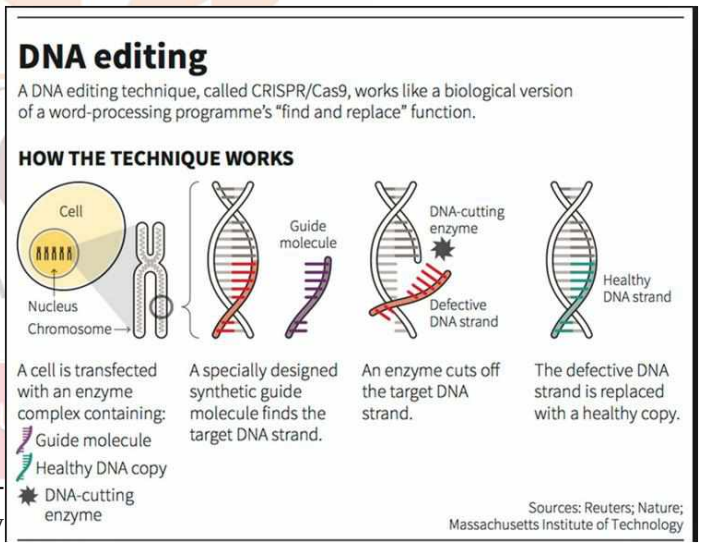
About India's First Genome-Edited Rice Varieties:

About DRR Dhan 100 (Kamala):

- It is a new rice variety developed by ICAR-IIRR in Hyderabad.
- It is based on the popular Samba Mahsuri (BPT 5204) variety.

Features:

- This new variety gives 19% more yield and matures about 20 days earlier, taking only 130 days.
- It has a strong stem that prevents the plant from falling, and it saves a large amount of irrigation water—around 7,500 million cubic meters.
- It uses genome-editing to change the CKX2 (Gn1a) gene, which helps produce more grains per plant.
- Because it grows faster, it also releases less methane into the environment.



About Pusa DST Rice 1:

- It is another new rice variety developed by ICAR-IARI in New Delhi, using the MTU 1010 variety as its base.
- This variety has been edited to improve its tolerance to drought and salty soils by targeting the DST gene.
- It performs better in tough soil conditions and can give up to 30.4% more yield in such areas.
- It does not contain any foreign DNA and is genome-edited using the SDN1 method, which means it does not fall under strict GMO rules.

Stratospheric Airship Platform

Context:

India successfully conducted the maiden flight trial of the Stratospheric Airship Platform developed by DRDO, reaching an altitude of 17 km.

About Stratospheric Airship Platform:

What is the Stratospheric Airship Platform?

- A lighter-than-air, high-altitude airship designed to operate in the stratosphere (~17 km altitude) for extended surveillance and observation missions.
- Developed By: Aerial Delivery Research and Development Establishment (ADRDE), Agra
- Under the Defence Research and Development Organisation (DRDO)

Objectives of the Test:

- Validate envelope pressure control system.
- Test emergency deflation mechanisms.
- Collect real-time sensor data for future simulation models.
- Demonstrate system recovery after mission.

Key Features:

- Operates at ~17 km altitude (stratosphere).
- Carries instrumental payloads for ISR tasks.
- 62-minute endurance flight successfully completed.
- Capable of long-duration airborne operation.
- Deployable for static surveillance and real-time observation.

Applications & Strategic Significance:

- ISR Capability Enhancement: Improves India's Intelligence, Surveillance, and Reconnaissance operations for military and disaster response.
- Earth Observation: Supports border monitoring, coastal surveillance, and high-resolution atmospheric sensing.
- Low-Cost Alternative to Satellites: Offers persistent coverage without requiring costly satellite launches.
- Dual-Use Potential: Can assist in civilian use cases like disaster management, communication relays, and environmental monitoring.
- Strategic Independence: Places India among a few nations with indigenous high-altitude airship technology, crucial amid rising border threats.

National Medical Register

Context:

Less than 1% of India's doctors have applied for enrolment in the National Medical Register (NMR) eight months after its launch.

About National Medical Register (NMR):

What is the NMR?

- The National Medical Register (NMR) is a centralised digital database of all licensed allopathic (MBBS) doctors in India.
- It is designed to bring transparency, authenticity, and accountability to the medical profession.

Launched In: August, 2024

- Established Under: Section 31 of the National Medical Commission (NMC) Act, 2019
- Nodal Ministry: Ministry of Health and Family Welfare, Government of India

Objectives:

- Create a comprehensive, digital registry of all allopathic doctors across India.
- Enhance public trust and governance in the healthcare system.
- Facilitate better credential verification and policy planning.

Key Features:

- Mandatory Enrolment: All registered medical practitioners (RMPs) must register in the NMR.
- Aadhaar Linkage: Each doctor's record is linked to their Aadhaar ID to verify authenticity.
- Public & Private Data Access: Some data is public-facing; sensitive data remains secure for use by EMRB, SMCs, NBE, and institutions.
- Real-Time Updates: The portal will be dynamically updated for transparency and governance.
- Central + State Collaboration: State Medical Councils (SMCs) are responsible for verifying degrees and facilitating the process.

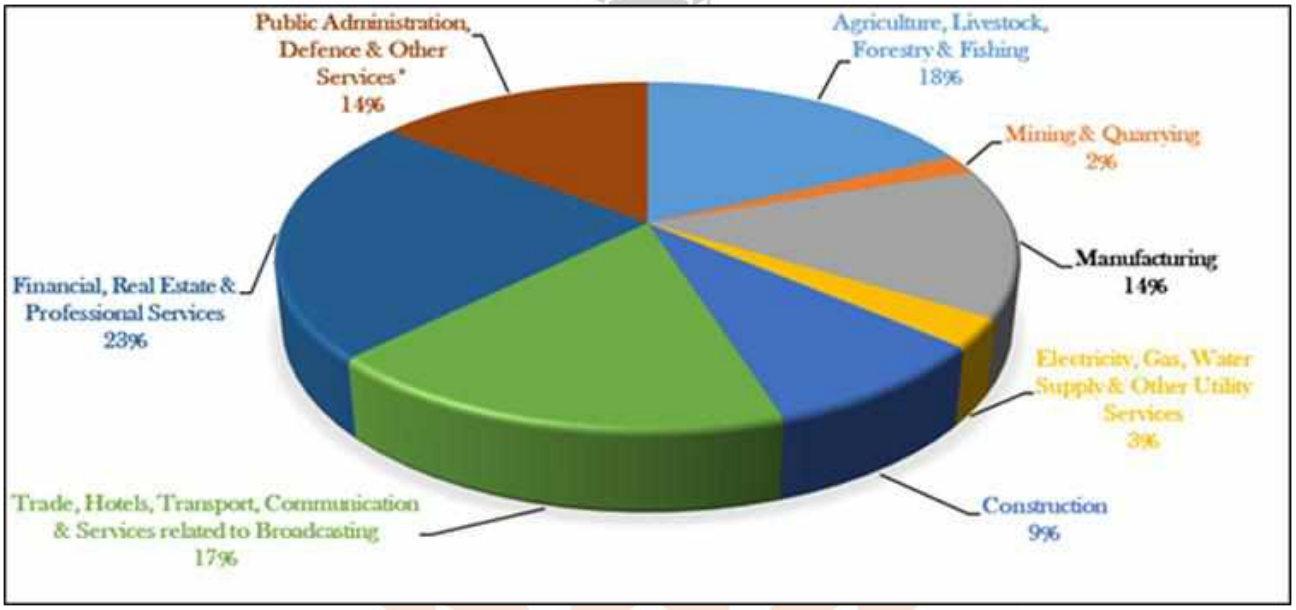
Functions:

- Serve as the single source of verified data on licensed doctors.
- Enable policy planners, regulators, and medical institutions to access accurate and timely data.
- Strengthen digital health infrastructure in line with India's broader Digital Health Mission.

Provisional Estimate of GDP

Context:

The Ministry of Statistics and Programme Implementation (MoSPI) released Provisional Estimates (PEs) for India's FY25 GDP and GVA.



About Provisional Estimate of GDP:

What is Provisional GDP?

- Definition: Provisional GDP refers to national income and output data released at the end of the financial year, incorporating all four quarters. These figures are subject to revision as more accurate data becomes available.
- Released by: MoSPI (Ministry of Statistics and Programme Implementation).

Revision Cycle:

- First Advance Estimates: January
- Second Advance Estimates: February
- Provisional Estimates: May
- Revised Estimates: Over the next two years

Key Summary of Provisional GDP Estimates FY 2024–25:

- Real GDP grew by 6.5% in FY25, reaching 187.97 lakh crore, while Nominal GDP rose by 9.8% to 330.68 lakh crore.
- In Q4 FY25, real GDP increased by 7.4% and nominal GDP by 10.8%, indicating strong year-end performance.
- Real GVA growth stood at 6.4%, with notable sectoral performances in construction (9.4%), public services (8.9%), and financial services (7.2%).
- Primary sector rebounded with 4.4% growth, up from 2.7% last year, and posted 5% growth in Q4 alone.
- Private Final Consumption Expenditure (PFCE) saw a rise of 7.2%, showing revival in demand, while Gross Fixed Capital Formation (GFCF) grew by 7.1%.
- Manufacturing sector continues to lag with lower CAGR (4.04%) compared to agriculture (4.72%), affecting employment dynamics.

- Estimates are compiled using benchmark-indicator methods with data from over a dozen key macro indicators like IIP, crop output, rail & port traffic, and tax data.
- These figures are provisional and will undergo further revision based on updated datasets in 2026 and 2027.

Analysis:

Positives:

- Consistent economic expansion: Despite global uncertainties, India remains one of the fastest-growing major economies.
- Resilience in agriculture: GVA in agriculture has grown faster than manufacturing since FY20.
- Improved data integration: The estimates now capture Q4 data, providing a fuller picture of the economy.

Negatives:

- Slowing nominal GDP growth: At 9.8%, FY25 shows the third-slowest nominal GDP growth since 2014.
- Manufacturing lag: Manufacturing GVA growth lags behind agriculture, highlighting industrial stagnation.
- Employment concerns: Sluggish manufacturing explains high urban youth unemployment and increased labour migration to rural areas.

Significance:

- The data offers critical input for fiscal planning, monetary policy, and investment strategies.
- It reflects India's macroeconomic stability but also exposes vulnerabilities in key growth engines like manufacturing.
- For international observers, the real GDP growth rate is essential for cross-country comparisons, as it adjusts for inflation.

Conclusion:

India's provisional GDP data shows moderate economic resilience with real growth at 6.5%, but deeper issues persist, especially in manufacturing. Addressing sectoral imbalances and revitalizing industrial growth are vital for sustainable development. The GDP trends offer a mirror to both progress and pending structural reforms.

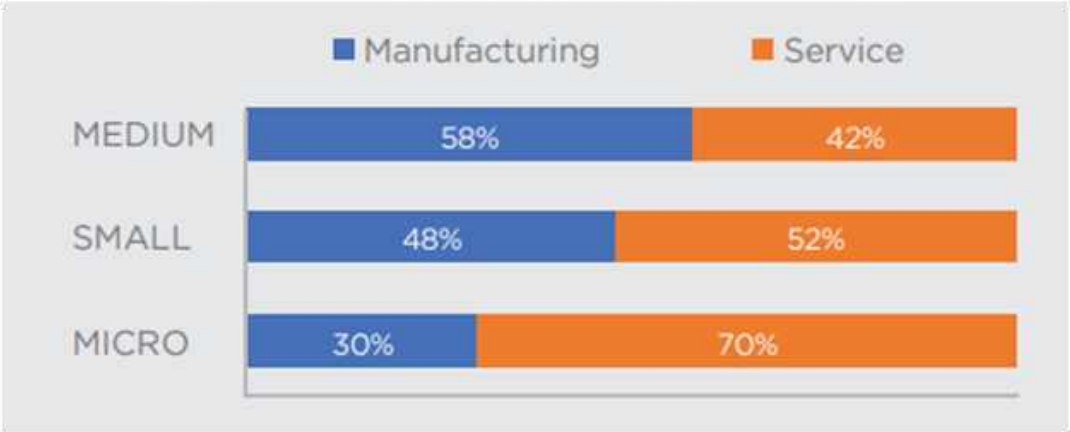
Designing a Policy for Medium Enterprises Report

Context:

NITI Aayog has released a landmark report titled "Designing a Policy for Medium Enterprises", aimed at empowering medium enterprises to become future industrial giants and drive India's vision for Viksit Bharat @2047.
Summary of the Report "Designing a Policy for Medium Enterprises":

What are Medium Enterprises?

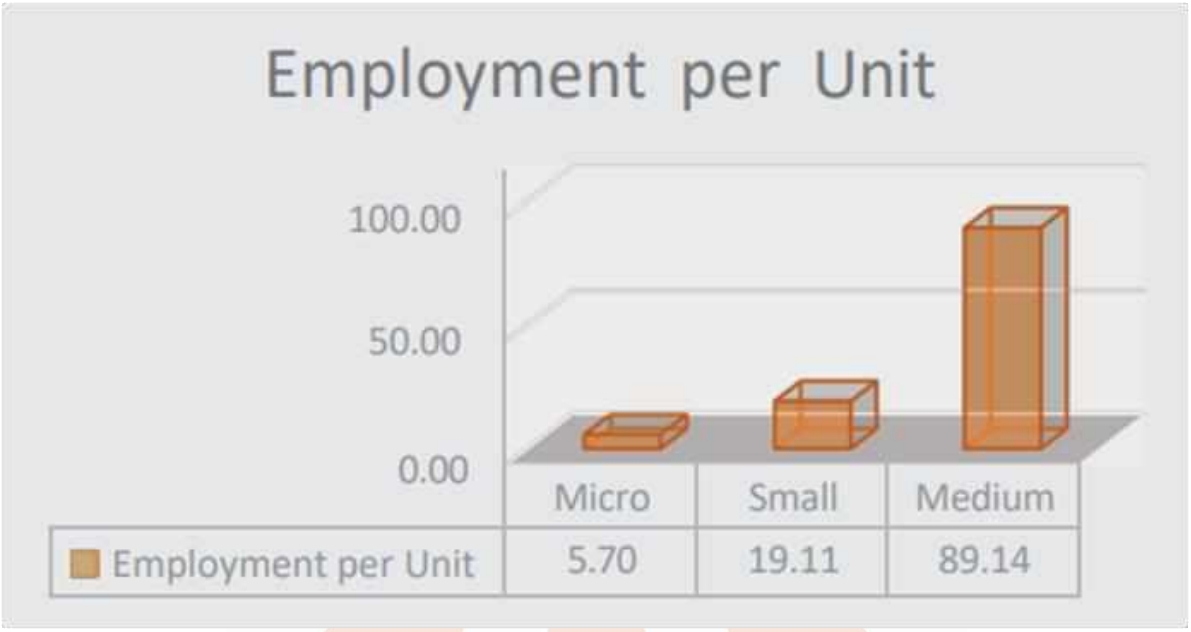
- Medium Enterprises are defined (as of April 2025) as businesses with:
- Investment up to 125 crores
- Turnover up to 500 crores
- They form 0.3% of MSMEs but contribute 40% of MSME exports, indicating their strategic role.



Sector Overview:

- GDP Contribution: MSMEs contribute 29% to GDP and medium enterprises form a vital manufacturing backbone.

- Employment: Medium enterprises generate 89 jobs per unit on average—more than micro (5.7) or small (19.1).
- Export Impact: Contribute ~50,562 crore in forex income annually.
- R&D Investment: Medium enterprises account for 81% of total R&D expenditure by MSMEs.



Analysis of the Report:

Positive Aspects:

- High Productivity Units: High per-unit profitability and employment generation rates.
- Export Engines: 40% of MSME exports come from this 0.3% group.
- Innovation Focused: Spend more on R&D per unit than micro/small enterprises.
- Untapped Growth Multiplier: A 20% increase in medium enterprises could generate ~5.4 lakh crore extra in forex and create 12 lakh jobs.
- Strong Case for Policy Realignment: Emphasizes missed potential due to a skewed incentive structure in favour of micro and small enterprises.

Key Challenges Identified:

- Low Awareness: Only 10% use government scheme portals and most unaware of tailored support.
- Finance Gap: No dedicated working capital scheme and over-reliance on personal savings.
- Tech Backwardness: 82% lack access to Industry 4.0 tools like AI and IoT.
- Skill Deficit: Existing training doesn't meet sector-specific enterprise needs.
- R&D Support Lacking: Absence of central R&D mechanism tailored for medium units.
- Compliance Complexity: Red tape and fragmented information ecosystem.

Way Ahead:

Tailored Finance:

- 5 crore credit card facility at market rates.
- Working capital scheme linked to turnover.
- Industry 4.0 Integration: Upgrade Technology Centres into SME 4.0 Competence Centres.
- Cluster-Based Testing: Add sector-specific facilities under MSE-CDP for medium enterprises.
- Skilling Reform: Custom training linked to region, industry, and growth stages.
- R&D Push: Create a 3-tier R&D framework with national-level project funding.
- Digital One-Stop Portal: AI-powered sub-portal within Udyam for scheme discovery, compliance help.

Conclusion:

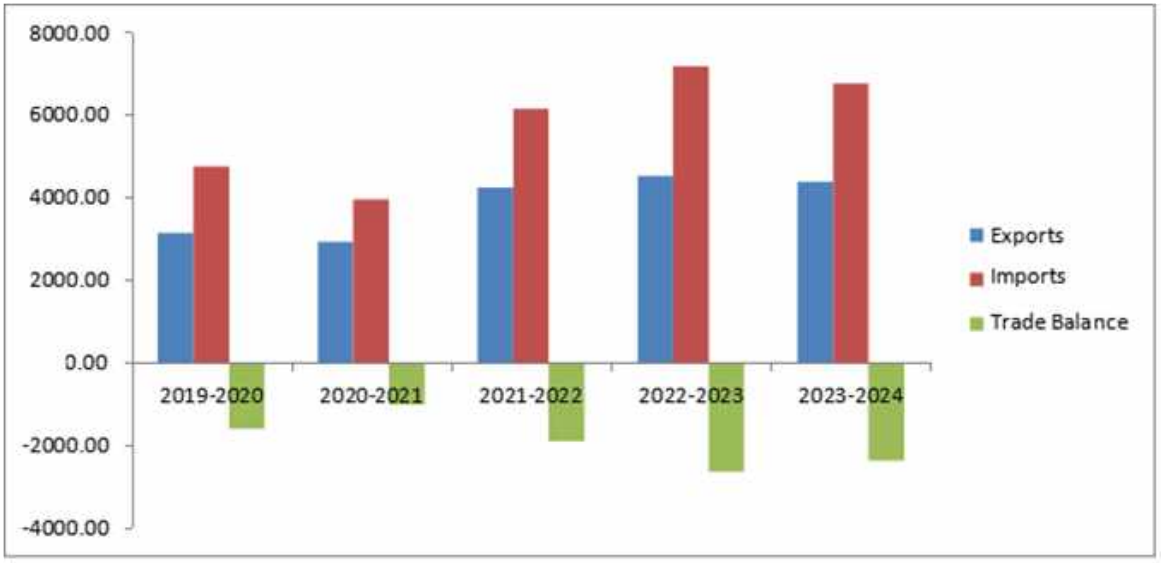
The NITI Aayog report rightly focuses on a dedicated policy that addresses long-standing gaps in support for this high-impact segment. A focused, innovation-led, and tech-integrated policy approach can turn them into drivers of exports, jobs, and economic growth.

India's Agri Export Regime

Context:

India recently signed multiple Free Trade Agreements (FTAs) with the UK, EFTA bloc, and finalized terms for an India–US trade deal.

- However, agriculture remains excluded from these deals, raising concerns over India's long-term agri-export strategy.



About India's Agro-Export Regime:

What It Is?

- India's agro-export regime refers to the framework of policies, infrastructure, and institutional mechanisms guiding the export of agricultural commodities.

Current Status:

- Agri-export value fell to $48 billion in 2023–24, from $52 billion in 2022–23.
- Basmati rice alone contributes to 21% of total agri exports.
- Institutions like APEDA and ODOP-GI tags support promotion and branding.
- India has kept agriculture largely out of recent FTAs, including with UK, EFTA, and US, citing sensitivity concerns.

Challenges to India's Agri-Export Regime:

- FTA Exclusions: Agriculture is often in the sensitive list or given long transition periods in FTAs due to political and livelihood concerns.
- Export Rejections: High rejection rates for products like mangoes and peanuts due to pesticide residues and SPS non-compliance.
- Fragmented Governance: Trade is a Union subject, while agriculture is a state subject, causing frequent policy contradictions and delays.
- Low Value Addition: Export focus remains on raw commodities instead of processed and branded products, limiting earning potential.
- Infrastructure Gaps: Lack of cold chains, inland container depots, and export logistics in landlocked states like UP and MP.
- Investment Distortions: High subsidies on power, water, and fertilizers reduce the incentive to shift toward exportable high-value crops.

Way Ahead – Strategic Solutions:

- Promote Value Addition: Create agro-processing clusters near APMCs, link them with export hubs, and incentivize with output-based schemes.
- Policy Synchronisation: Form a National Agri Trade Council with representatives from the Centre, States,

APEDA, FSSAI, and exporters to align regulatory processes.

- Switch to Direct Benefit Transfers (DBT): Replace input subsidies with unconditional cash transfers to offer flexibility and encourage crop diversification.
- Agri-Tech Integration: Scale up AI-driven crop monitoring, vernacular mobile advisories, and real-time data platforms for scheme access and market insights.
- Digital and Physical Infrastructure: Invest in GIS-based produce mapping, beneficiary tracking systems, and pre-cooling logistics chains in hinterland zones.
- Improve Connectivity for Landlocked States: Establish inland ports, container depots, and cold storage linkages to empower states like Uttar Pradesh and Madhya Pradesh.

Conclusion:

India's cautious stance on integrating agriculture with global trade needs a strategic rethink. Protectionism must evolve into smart enablement through technology, value addition, and infrastructure. Making Agri-exports competitive is essential for doubling farmer incomes and achieving trade resilience.

India and Road Safety

Context:

India recorded 1.68 lakh road fatalities in 2022, the highest in five years, prompting urgent calls for reform in road safety governance.

- Road crashes cost India an estimated 3% of its GDP annually. This hampers national development and underscores the urgency for effective road safety measures.

About India and Road Safety:

Current Status:

- India has the second-largest road network globally, covering over 6.3 million km.
- In 2022, road accidents caused 1.68 lakh deaths, translating to 12.2 deaths per 1 lakh population.
- Compared to the UK (2.6) and Japan (2.5), India's fatality rate is alarmingly high.
- Road crashes cost India 3% of its GDP annually, impacting economic and human capital.

Issues Plaguing Road Safety in India:

1. Driver Error Dominance: Around 78% of road accidents are due to driver faults (over speeding, intoxication, lane indiscipline).
2. Poor Infrastructure & Black Spots: Lack of pedestrian zones, poor road design, and 5,000+ black spots remain unrectified.
3. Weak Enforcement Mechanisms: Inconsistent rule enforcement and low deterrence despite high penalty provisions in MV Act, 2019.
4. Inadequate Emergency Response: Delays in medical aid and limited trauma care availability, especially on rural and state highways.
5. Fragmented Governance: Road construction and safety responsibilities are divided between Centre and States, reducing accountability.

Government Initiatives Taken: (4 Es of road safety)

1. Education:

- National Road Safety Month, campaigns under Road Safety Advocacy Scheme.
- Establishment of Driving Training Centres and Research Institutes.

2. Engineering:

Road Design:

- Mandatory Road Safety Audits at all NH project stages.

- Rectification of accident black spots.
- Implementation of e-DAR system for accident reporting.

Vehicle Design:

- Mandatory airbags, ABS, seat belt reminders, and reverse parking sensors.
- Bharat NCAP safety rating system introduced.
- Vehicle Scrappage Policy launched to phase out unsafe vehicles.

3. Enforcement:

- Strict penalties under MV (Amendment) Act, 2019.
- E-challan system and CCTV-based enforcement in high-risk zones.
- Rules for electronic monitoring and automated testing stations.

4. Emergency Care:

- Good Samaritan protection, increased compensation for hit-and-run cases.
- Deployment of ambulances at toll plazas with trained paramedics.
- Cashless treatment pilot scheme in six states in collaboration with National Health Authority.

Way Ahead – Strategic Roadmap:

- Adopt the Safe System Approach: Design roads forgiving of human error; prioritize pedestrians, cyclists, and public transport users.
- Create a National Road Safety Authority: Integrate state and central efforts under one umbrella for policy coherence and accountability.
- CSR for Road Safety: Mandate automobile manufacturers to contribute CSR funds for long-term road safety infrastructure and research.
- Strengthen Data Systems: Scale up digital accident data management to support evidence-based policymaking.
- Invest in Infrastructure: Adopt World Bank's $109 billion investment recommendation to halve road fatalities by 2030.

Conclusion:

Road safety is not just a technical or legal issue — it is a fundamental right under Article 21. India's vision of Viksit Bharat 2047 must include inclusive, people-centric, and safer mobility systems. A data-driven, coordinated, and long-term approach can transform road safety from a challenge into a success story.

Wholesale Price Index (WPI)

Context:

India's WPI inflation eased to a 13-month low of 0.85% in April 2025, sharply down from 2.05% in March, driven by falling fuel and primary article prices.

About Wholesale Price Index (WPI):

What is WPI?

- The Wholesale Price Index (WPI) measures the average change in prices of goods traded in bulk by wholesalers to other businesses.
- It reflects inflation at the producer level, before the goods reach the end consumer.

Administering Body:

- Published monthly by the Office of Economic Adviser, under the Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce and Industry.

Objective:

- To track price movements in wholesale markets and assess cost pressures faced by producers and industries.
- Aids in understanding supply-demand dynamics across primary, energy, and manufacturing sectors.

Base Year and Calculation:

- Base Year: Updated to 2011–12 (from 2004–05) for alignment with GDP and IIP data.
- Method: Weighted average of prices from a basket of 697 items, across three main groups:
- Primary Articles (22.62%)
- Fuel and Power (13.15%)
- Manufactured Products (64.23%)

Key Features of WPI:

- Covers only goods, not services.
- Reflects price trends before retail level, unlike Consumer price index (CPI) which tracks consumer prices.
- Published monthly, showing price changes over the entire month.
- Useful for industry cost analysis, but not used by the RBI for monetary policy decisions.

Significance of WPI in India:

- Serves as an early indicator of inflation trends.
- Helps in analysing input cost pressures on producers.
- Essential for fiscal planning, business forecasting, and policymaking.
- Provides insights into sector-specific inflation—crucial for agriculture, mining, energy, and industry.
- Complements CPI in macro-economic analysis, though RBI prefers CPI for interest rate decisions.

Credit Guarantee Scheme for Startups (CGSS)

Context:

The Government has notified an expansion of the Credit Guarantee Scheme for Startups (CGSS), doubling the guarantee limit from ₹10 crore to 20 crore and reducing guarantee fees for startups in Champion Sectors.

About Credit Guarantee Scheme for Startups (CGSS):

What is CGSS?

- A flagship credit guarantee initiative aimed at providing collateral-free funding support to DPIIT-recognised startups.
- Designed to enable term loans, working capital, venture debt, and other fund-based/non-fund-based instruments.

Established In:

- October 2022, under the Startup India Action Plan.
- Operationalised by National Credit Guarantee Trustee Company (NCGTC).
- Ministry: Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce and Industry.

Objective and Significance:

- Lower perceived risk for lenders financing startups.
- Enable debt-based early-stage funding without collateral.
- Foster R&D, innovation, and domestic manufacturing in priority sectors.
- Aligns with the Viksit Bharat vision and Startup India movement.

Eligibility Criteria for Startups:

- Recognised by DPIIT as per official notifications.
- Not classified as Non-Performing Asset (NPA) and not in default to any lender.
- Eligibility certified by the lending institution.

Eligible Lenders:

- Scheduled Commercial Banks
- Non-Banking Financial Companies (NBFCs) rated BBB and above with 100+ crore net worth
- SEBI-registered Alternative Investment Funds (AIFs)

Key Features of the Expanded Scheme:

- Guarantee Limit Raised: From 10 crore to 20 crore per borrower.

Guarantee Coverage:

- 85% of amount in default for loans up to 10 crore.
- 75% for loans exceeding 10 crore.
- Annual Guarantee Fee (AGF) reduced to 1% for 27 Champion Sectors (earlier 2%).
- Coverage through Trustee (NCGTC) for eligible fund instruments (venture debt, subordinated debt, debentures, etc.).
- Operational Reforms: Streamlined process, automatic guarantee issuance via NCGTC portal.
- Umbrella-based Guarantee: Covers pooled investments, up to 5% of investment or 20 crore cap, based on actual losses.

International Monetary Fund (IMF)

Context:

India abstained from an IMF vote approving new financial assistance to Pakistan and raised concerns over Pakistan's repeated misuse of IMF funds, and its poor reform record linked to cross-border terrorism risks.

About International Monetary Fund (IMF):

What is the IMF?

- The International Monetary Fund (IMF) is a global financial institution that promotes international monetary cooperation, economic stability, and trade expansion.
- It was established as part of the Bretton Woods Agreement to maintain global economic order post-World War II.

Established In:

- Year: 1945
- Operational Since: 1947
- Headquarters: Located in Washington D.C., United States

Key Functions:

- Surveillance: Monitors global and national economic developments via reports like World Economic Outlook and Global Financial Stability Report.
- Capacity Building: Provides technical training and policy advice on public finance, monetary policy, data analytics, and governance.
- Lending: Offers short- and long-term financial support to help countries manage balance-of-payment crises.

Sources of Funding:

- IMF's primary resources come from member country quotas, determined by each country's relative size in the world economy.
- Special Drawing Rights (SDRs) supplement reserves and enhance liquidity.

Loan Instruments:

- Extended Fund Facility (EFF): For structural economic reforms.
- Resilience and Sustainability Facility (RSF): Aims to strengthen long-term economic sustainability.
- Stand-by Arrangements (SBA): Provides rapid crisis support.
- Loans often carry conditionalities, termed Structural Adjustment Programs, which require recipient countries to implement economic reforms.

India's Legal and Ethical Battle Against Digital Misinformation

Context:

India, identified as one of the most misinformation-vulnerable nations by the WEF Global Risks Report 2024, faces increasing challenges with the unchecked rise of influencer-driven content.

- This has triggered calls for tightened regulation and ethical accountability of social media influencers.

About Digital Misinformation and De-Influencing:

What is Digital misinformation and De-influencing?

- Digital misinformation refers to false or misleading information shared online, often without intent to deceive, but with harmful consequences.
- De-influencing is a growing social media trend where influencers discourage the purchase of certain products. While it may promote mindful consumption, it frequently relies on clickbait, half-truths, and exaggerated narratives to gain traction.
- In a rapidly digitising society, these phenomena blur the line between opinion, advertising, and deception, making regulatory clarity vital.

Background:

- The proliferation of Instagram, YouTube, and TikTok has created a new class of digital opinion-makers — influencers.
- Their content — often promotional — impacts health behaviour, consumption patterns, and public discourse.
- India's Ministry of Consumer Affairs, SEBI, and ASCI have issued guidelines like "Endorsement Know-hows" to regulate paid promotions.
- Despite this, viral health content, such as "liver detox hacks" or "anti-cancer diets", regularly escapes scrutiny, undermining evidence-based practices.

India – A Legally Regulated, Ethically Conscious Model:

- India has adopted a layered regulatory framework combining constitutional safeguards, statutory mandates, and industry self-regulation to manage the influence economy:

Legal Framework:

- Article 19(1)(a) of the Constitution ensures freedom of speech, but with reasonable restrictions under Article 19(2) to curb defamation and protect public order.
- Consumer Protection Act, 2019 explicitly bans misleading advertisements, holding influencers legally accountable for deceptive content.
- IT Act Sections 66 & 67 and the Intermediary Guidelines, 2021, penalize the spread of harmful or obscene content.

Ethical Oversight:

- Guidelines by the Advertising Standards Council of India (ASCI) and SEBI set benchmarks for fair disclosures and truthful influencer endorsements.
- Non-compliance may lead to public reprimands and blacklisting from platforms or campaigns.

Evolving Jurisprudence and Regulatory Trends

- Indian Medical Association v. Union of India: Held influencers accountable for false health endorsements.
- Delhi HC (2024): Restricted an influencer from disparaging a brand, stating that freedom of speech is not absolute, especially in health-related content.
- Public Trust Principle: Courts are emphasizing authenticity, credentials, and fact-verification in digital discourse.

Concerns

- Blurring of Fact and Opinion : Influencer content often uses selective data, emotional appeals, and ambiguous language, making it difficult for viewers to discern truth from manipulation.
- Health Sector Risks : Health advice without professional qualification can be life-threatening.
- Current platform self-regulation lacks the rigour needed for such sensitive content.
- Trust Erosion and Commercial Exploitation: Monetising public trust through sensational negativity or sponsored misinformation undermines the credibility of digital platforms.
- Lack of Registration and Tracking: No mandatory registration database exists for influencers, especially those giving health or financial advice.

Way Ahead: Strengthening Digital Accountability

- Create a Public Registry for High-Risk Influencers: Set up a mandatory registration system for influencers offering health or financial advice, including:
- Professional credentials
- Nature of content (paid/unpaid)
- Regulatory compliance record
- Strengthen Platform Responsibility: Mandate fact-checking overlays, flag sponsored health content, and use AI tools to detect misinformation.
- Build Digital Literacy Among Consumers: Launch government-led campaigns to, promote source verification, encourage critical thinking and teach how to report misleading content.
- Co-regulation with Civil Society: Involve medical associations, consumer forums, and legal bodies in creating sector-specific content standards.
- Enforce Ethical Review Mechanisms: Require platforms to implement periodic audits of top influencers in high-risk categories like health, finance, and

Conclusion:

India's growing digital influence landscape demands urgent regulatory recalibration.With AI-driven misinformation and unchecked influence over public choices, the stakes for public health, financial safety, and social cohesion have never been higher. A blend of constitutional restraint, legal enforcement, and ethical vigilance can ensure that digital empowerment does not come at the cost of truth and trust.

16th Finance Commission

Context:

As states demand greater fiscal autonomy and a larger share of the divisible tax pool, the 16th Finance Commission (FC) faces a complex challenge.

About the 16th Finance Commission

- The 16th Finance Commission (FC)was constituted under Article 280 in December 2023, chaired by Arvind Panagariya, to recommend tax devolution and fiscal federalism reforms for 2026-31.

Current Structure of Devolution:

- States' Share: Fixed at 41% by the 15th FC (reduced from 42% post J&K's reorganization).
- De Facto Share: States receive only about 32% of Centre's gross tax revenues due to the rise in cesses and surcharges (not shareable).

Key Issues Before the 16th Finance Commission:

- Shrinking Divisible Pool and Rising Cesses: Cesses and surcharges have reduced the size of the divisible pool from 88.6% (2011–12) to 78.9% (2021–22) of the Centre's gross tax revenue (RBI data).
- States argue for restoring fairness by capping these levies and increasing their share to 50%.

Fiscal Constraints of the Union Government:

- High Demand on Centre's Budget: It may not be feasible to raise total transfers without fiscal stress.
- Borrowing for Transfers: Centre is borrowing to fund grants, raising questions on spending priorities.
- Tied vs. Untied Transfers – Need for Rebalancing:
- Current Scenario: Excessive reliance on centrally-sponsored schemes (CSS) ties states to Centre-dictated spending.
- Proposal: Increase untied transfers to allow states more discretion within the existing transfer envelope.
- Challenge: Requires pruning of CSS, which are politically and developmentally sensitive.

Implications of Increasing Untied Transfers:

Quality of State Spending:

- Rising Revenue Deficits: Many states, including Karnataka and Punjab, are facing worsening revenue balances.
- Risk of Misuse: Untied funds may be diverted towards revenue expenditure or non-merit subsidies (e.g., free electricity, water), rather than capital investments.

Rise in Cash Transfer Schemes:

- Quasi-Universal Transfers: 14 states have launched income support schemes, totalling 0.6% of GDP (Axis Bank report).
- Concern: More untied funds could be used for electoral populism instead of systemic improvements.

Equity in Public Service Delivery:

- Inter-State Disparities: Low-income states like Bihar spend significantly less per capita on public services.
- Question: Will more untied funds lead to convergence in service delivery standards across states?

Devolution to Local Governments:

- Neglect of the Third Tier: Panchayats and municipalities receive a much smaller share of total public spending compared to countries like China and South Africa.
- Hope: More untied funds could incentivize states to devolve more resources to local governments.

Way Forward:

- Reform Transfers Framework: Consider capping cesses, rationalizing CSS, and increasing untied transfers with accountability safeguards.
- Strengthen Institutional Capacity: Build monitoring systems to ensure untied funds are spent on productive and equitable outcomes.
- Incentivize Local Devolution: FC can recommend performance-based grants to states promoting third-tier empowerment.
- Adopt Differentiated Approaches: Tailor devolution mechanisms to reflect state capacity, developmental needs, and fiscal health.

Conclusion:

The 16th Finance Commission must navigate the fine line between enhancing fiscal autonomy for states and safeguarding national fiscal stability. A rebalanced transfer structure—one that ensures equitable, accountable, and convergent public service delivery—will be crucial in deepening India's cooperative federalism.

DHRUVA (Digital Hub for Reference and Unique Virtual Address)

Context:

The Department of Posts released the policy framework for DHRUVA (Digital Hub for Reference and Unique Virtual Address). It marks a critical step toward developing a national digital addressing public infrastructure using geospatial technology.

About DHRUVA (Digital Hub for Reference and Unique Virtual Address):

What is DHRUVA?

- DHRUVA is a national policy framework for creating a standardized, geo-coded, and digital address infrastructure, serving as Address-as-a-Service (AaaS) for secure, efficient data sharing.
- Launched in: May 2025, by the Department of Posts, under the Ministry of Communications.

Objective:

- To transform address information management into a digital public good.
- Enable interoperable, secure, and user-consent-based access to address data.
- Foster public-private collaboration in sectors like e-governance, e-commerce, logistics, and emergency response.

Key Features:

- DIGIPIN Integration: Builds upon the geo-tagged Digital Postal Index Number (DIGIPIN) system for national-level consistency.
- Address-as-a-Service (AaaS): Allows address data to be securely managed, shared, and validated across platforms.
- User Autonomy: Citizens have control over their digital address data, enhancing privacy and user experience.
- Open and Accessible: Designed as freely accessible infrastructure for public and private stakeholders.
- Consent-Driven Framework: Enables address data to be shared securely, only with user approval.

Significance:

- Geospatial Governance: Supports better planning, disaster response, and targeted public delivery.
- Inclusive Access: Streamlines KYC, banking, subsidy delivery, and rural service reach.
- Boost to Logistics & E-commerce: Improves last-mile delivery efficiency and transparency.
- Digital Economy Push: Aligns with Digital India and ease of living goals through smart, location-based services.
- Public-Private Synergy: Encourages collaborative innovation in address-linked solutions.

Honorary Rank Promotion Scheme

Context:

The Ministry of Home Affairs has introduced a policy granting honorary rank promotions to retiring personnel of CAPFs and Assam Rifles from Constable to Sub-Inspector.

About Honorary Rank Promotion Scheme:

The Honorary Rank Promotion Scheme is a recognition initiative by the Ministry of Home Affairs under the leadership of Union Home Minister Amit Shah. It awards a one-rank higher honorary title to retiring personnel of Central Armed Police Forces (CAPFs) and Assam Rifles, from Constable to Sub-Inspector rank.

Objective:

- To uplift morale, pride, and self-respect of retiring security personnel.
- To honour long and commendable service without altering financial entitlements.
- To recognize dedication and integrity through symbolic promotion.

Key Features:

- Ministry: Ministry of Home Affairs (MHA), Government of India.
- Coverage: Applies to all eligible CAPF and Assam Rifles personnel below officer rank.
- Timing: Conferred on the day of retirement.
- Nature: No financial or pension benefits attached.
- Category Constraint: Applicable only if the rank to be granted exists within the service's organizational structure.
- Seniority: Does not alter the inter-se seniority order of personnel.

Eligibility Criteria:

- Personnel must fulfil all promotion prerequisites at the time of retirement.
- Must have a clean record with no major disciplinary actions in the last five years.
- The Annual Performance Appraisal Report (APAR) for the last 5 years should be rated at least 'Good'.
- Integrity certification must be beyond doubt.
- Clearance from departmental inquiries and vigilance is mandatory.
- Recommendation by the commanding officer is required.

Eligible personnel of the Central Armed Police Forces (CAPFs) and Assam Rifles (AR) will be granted honorary ranks as follows:

Central Armed Police Forces (CAPFs)		Assam Rifles (AR)	
Retired Rank	**Honorary Rank**	**Retired Rank**	**Honorary Rank**
Constable	Head Constable	Rifleman	Havildar
Head Constable	Assistant Sub-Inspector	Havildar	Warrant Officer
Assistant Sub-Inspector	Sub-Inspector	Warrant Officer	Naib Subedar
Sub-Inspector	Inspector	Naib Subedar	Subedar

Swachh Survekshan Grameen 2025

Context:

Union Jal Shakti Minister launched Swachh Survekshan Grameen (SSG) 2025,

- India's largest rural sanitation survey.

Launch of Swachhata Chronicles Volume III by Union Minister of Jal Shakti, Minister of State, Secretary- DDWS, ASMD -JJM& SBMG and Economic Advisor

About Swachh Survekshan Grameen 2025:

What it is?

- A nationwide rural sanitation ranking survey covering 21,000 villages across 761 districts in 34 States/UTs.
- Anchored under Swachh Bharat Mission (Gramin) Phase-II to assess the sustainability of ODF Plus outcomes.
- Organisation & Ministry: Conducted by the Department of Drinking Water and Sanitation (DDWS) under the Ministry of Jal Shakti.
- An independent agency is engaged for field verification, ensuring data authenticity and transparency.

Key Objectives:

- To measure sanitation progress in rural areas using structured and technology-driven methods.
- To strengthen citizen engagement and reward high-performing villages and states.
- To promote a people-led movement (Jan Bhagidari) towards a clean and healthy India.

Survey Criteria & Components:

- SSG 2025 ranks rural regions based on four performance-based components:
- Service-Level Progress (SLP): Based on district self-assessment and desktop validation of ODF Plus Model Verified Villages.
- Direct Observation of Sanitation Status of Villages: Field visits to households, public places (schools, CSCs, Panchayat Bhavans) to verify cleanliness practices.
- Direct Observation – Infrastructure Functionality: Evaluation of Plastic Waste Management Units (PWMU), Faecal Sludge Management (FSM) plants, GOBARdhan units, etc.
- Citizen Feedback: Collected through mobile applications and face-to-face surveys, promoting inclusive participation.

Key Features:

- Geo-fencing Enabled Data Collection: Ensures authenticity and location-verified entries.
- Swachhata Green Leaf Rating (SGLR): Tracks quality of sanitation services.
- Best Practices Documentation: Launch of Swachhata Chronicles Vol. III as a compendium of successful State interventions.
- Technology Integration: Mobile app for feedback, real-time data monitoring, and transparency.
- Inclusivity & Capacity Building: Mobilises Swachhagrahis, Training Units, and local governance structures.

Modified Interest Subvention Scheme (MISS)

Context:

The Union Cabinet has approved the continuation of the Modified Interest
Subvention Scheme (MISS) for FY 2025–26, maintaining a 1.5% interest subvention on short-term Agri loans to promote affordable credit access for farmers.

About Modified Interest Subvention Scheme (MISS):

What is MISS?

- MISS is a central sector scheme that offers concessional short-term crop loans to farmers via the Kisan Credit Card (KCC) at reduced interest rates, incentivizing timely repayment.

- Launched In: Originally introduced in 2006–07 to improve credit availability and reduce rural indebtedness.
- Implementing Agencies: Jointly implemented by the Reserve Bank of India (RBI) and NABARD through Public Sector Banks, RRBs, Cooperative Banks, and Private Sector Banks.

Nodal Ministry: Ministry of Agriculture and Farmers' Welfare

Objectives of MISS:

- Enhance credit flow to agriculture and allied sectors.
- Provide short-term working capital for farming, dairy, animal husbandry, and fisheries.
- Reduce borrowing costs for small and marginal farmers.
- Encourage prompt repayment through interest incentives.
- Offer financial relief during natural calamities.

Key Features of MISS (2025–26):

Subsidised Interest Rate:

- Farmers get loans up to 3 lakh at 7% interest.
- An interest subvention of 1.5% is given to lending institutions.
- Prompt repayment incentive (PRI) of 3% lowers the effective rate to 4%.
- Sectoral Coverage: Applicable to crop loans, animal husbandry, and fisheries (up to 2 lakh).
- Loan Limit Enhancement: Under Budget 2025–26, limit proposed to be raised to 5 lakh for expanding agri-needs.
- Calamity Support: 2% subvention on restructured loans in the event of natural disasters.
- Massive Outreach: Covers over 7.75 crore KCC accounts nationwide, fostering rural credit inclusion.
- Digital Reforms: Kisan Rin Portal (KRP) launched in 2023 for fast and transparent claim processing.

Department Of Posts New Digital Platforms

Context:

The Department of Posts launched two new digital platforms — 'Know Your DIGIPIN' and 'Know Your PIN Code' — to modernize India's addressing and geospatial infrastructure, in line with the National Geospatial Policy 2022.

About Department Of Posts New Digital Platforms:

About Know Your DIGIPIN Portal:

- Ministry Involved: Department of Posts, Ministry of Communications.
- Objective: To enable digital address precision using geo-coded grids and enhance last-mile service delivery across India.
- Developed By: In collaboration with IIT Hyderabad and NRSC, ISRO.

Features:

- Geo-coded Addressing: Each DIGIPIN corresponds to a precise latitude-longitude grid, offering high-resolution location identification.

- Address-as-a-Service (AaaS): Supports government, private firms, and users with standardized and secure address solutions.
- Open-Source Platform: Technical data and source code are hosted on GitHub, promoting innovation and public adoption.
- GIS Integration: Enables accurate logistics, disaster response, and e-governance by integrating GIS into address systems.
- Inclusivity: Facilitates digital inclusion of rural and remote areas by offering uniform address identifiers.

About Know Your PIN Code Portal:

- Ministry Involved: Department of Posts, Ministry of Communications.
- Objective: To modernize the traditional six-digit PIN Code system using geospatial technology and GNSS-based mapping.

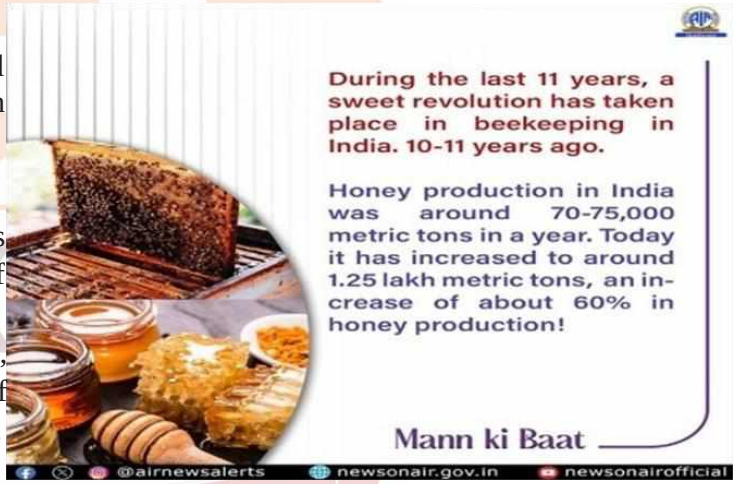
Features:

- Geo-fencing of PIN Codes: Digitally maps boundaries of over 1.5 lakh PIN Codes to improve accuracy.
- Location-based PIN Retrieval: Users can identify the correct PIN using real-time GNSS location inputs.
- Public Feedback System: Enables citizens to submit suggestions to refine the PIN dataset for continuous improvement.
- Open Data Access: The geo-referenced PIN Code data is available on the Open Government Data (OGD) Platform.
- Support for Delivery Services: Enhances e-commerce, emergency response, and postal logistics with accurate regional mapping.

Honey Mission

Context:

Prime Minister highlighted India's rise as a global honey-producing leader, citing a 60% surge in production and the success of the Honey Mission.



About Honey Mission:

- Launched By: Khadi and Village Industries Commission (KVIC) under the Ministry of MSME, in 2017.
- Objective: To promote sustainable beekeeping, ensure pollination support, enhance income of farmers, and strengthen rural entrepreneurship.

Key Features:

- Skill Development: More than 50,000 beekeepers trained through CBRTI, Pune in modern apiculture.
- Income Generation: Beekeepers earned 325 crore from 20,000 MT honey, with 25 crore in exports in FY 2024–25.
- Holistic Model: Supports production, processing plants, marketing, and digital access (e.g., selling on GeM portal).
- Empowerment Focus: Engages youth, tribal farmers, and women, boosting self-reliance.

About Honey Production in India:

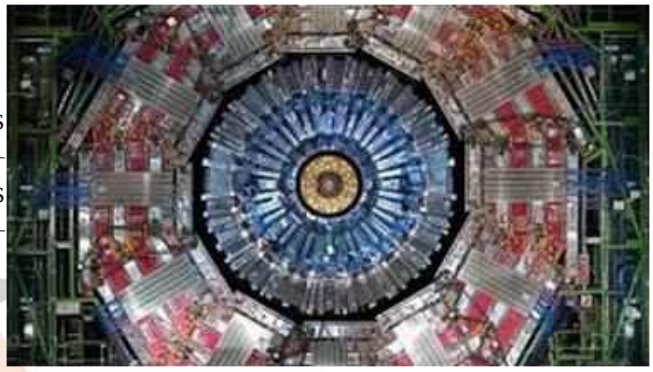
- Ministry Involved: Khadi and Village Industries Commission (KVIC), under the Ministry of MSME.
- Key Mission: Honey Mission – launched to promote beekeeping as a tool for income and self-reliance.

Data Snapshot:

- Honey production has risen from ~75,000 MT to 1.25 lakh MT in the last 11 years (~60% growth).
- India now ranks among the top honey-producing countries globally.
- In FY 2024–25, honey exports under KVIC touched 25 crore.
- Top States in Honey Entrepreneurship: Uttar Pradesh, Gujarat, Jammu & Kashmir, West Bengal, and Arunachal Pradesh.

- Export Status: India is among the top 10 honey exporters
- Organic Honey Success: Tribal honey like 'Sonhani' from Korea district (Chhattisgarh) showcases value addition and global outreach.

Breakthrough Prize Physics 2025



Context:

The 2025 Breakthrough Prize in Fundamental Physics has been awarded to major experimental teams at CERN—ATLAS, CMS, ALICE, and LHCb—based on their findings from the Large Hadron Collider (LHC) Run-2 data (2015–2024).

About Breakthrough Prize Physics 2025:

What It Is?

- Often dubbed the "Oscars of Science," the Breakthrough Prize honors transformative achievements in fundamental physics.
- Awarded by: Given annually by the Breakthrough Prize Foundation.
- Awarded to: Teams behind ATLAS, CMS, ALICE, and LHCb experiments at CERN, comprising over 13,500 researchers.
- Prize Amount: $3 million awarded jointly to the four LHC experiments.

Eligibility Criteria:

- Recognizes major discoveries and data-driven contributions that advance understanding of the Universe.

Awarded For: Work contributing to understanding the:

- Higgs boson
- Quark-gluon plasma
- Matter-antimatter asymmetry
- Physics beyond the Standard Model

India's Contributions:

- Indian institutions like TIFR, BARC, IITs, IISc, VECC, IUAC, IOP etc., made crucial contributions in:
- Detector R&D
- Data analysis
- Worldwide LHC Computing Grid
- Manpower training
- India plays an active governance role in CERN's scientific boards and decision-making.

About the Large Hadron Collider (LHC):

What It Is?

- The LHC is the world's most powerful particle accelerator used to probe the fundamental structure of matter.
- Developed By: Built and operated by CERN (European Organization for Nuclear Research) near Geneva, Switzerland.

Key Features:

- Structure: 27-km underground ring using 1232 superconducting dipole magnets.
- Cooling: Operates at −271.3°C using liquid helium—colder than outer space.
- Collisions: Sends two beams of protons or heavy ions near light-speed in opposite directions for high-energy collisions.
- Experiments: Four major detectors—ATLAS, CMS, ALICE, LHCb—placed at beam collision points.
- Magnets and Control: Uses dipoles to bend and quadrupoles to focus beams, controlled centrally from the CERN Control Centre.

Significance:

- Helped confirm the existence of the Higgs boson (2012).
- Enabled study of early universe conditions via quark-gluon plasma.
- Essential for progress in quantum field theory, supersymmetry, and dark matter research.
- Strengthens international science diplomacy and India's global scientific stature.

Madhubani and Gond Art

Context:

Artists of Madhubani and Gond art met President Droupadi Murmu under the Artists-in-Residence Programme – Kala Utsav at Rashtrapati Bhavan.

About Madhubani and Gond Art:

About Madhubani Art (Mithila Art):

- Region: Originates from the Mithila region of Bihar; also referred to as Mithila painting.

What It Is?

- A folk-art form traditionally created by women on walls and floors of huts during auspicious occasions.
- Now practiced on cloth, canvas, and handmade paper.

Key Features

- Natural Materials: Uses plant-based pigments, cow dung-treated paper, and bamboo pens.
- Bold Outlines: Black lines made with cow dung and charcoal; filled with vibrant natural colors.

Themes:

- Religious: Depictions of Hindu deities like Radha-Krishna, Shiva, Saraswati, etc.
- Social: Scenes from village life, weddings, and festivals.
- Nature: Birds, animals, trees (Tulsi, Banyan), sun, and moon.
- Cultural Identity: Symbol of female creativity and rural tradition passed down through generations.

About Gond Art:

- Region: Practiced by Pardhan Gond tribes of Madhya Pradesh and adjoining Central Indian states.

What It Is?

- Tribal art form with roots in oral storytelling and ritualistic practices.
- Initially drawn on walls of homes to depict folk tales and nature.

Key Features:

- Mythical Narratives: Depicts divine stories, village folklore, and animist beliefs.
- Pattern Work: Fills motifs with fine dots and lines to create visual rhythm.
- Nature Connection: Harmonious coexistence of humans, flora, and fauna.
- Colour Use: Bright, bold colour schemes with creative compositions.
- Global Reach: Popularized internationally through works like "The Night Life of Trees" by Tara Books.

Three Digital Initiatives to Streamline PDS

Context:

Union Minister launched three new digital platforms—Depot Darpan, Anna Mitra, and Anna Sahayata—to streamline India's Public Distribution System (PDS), ensuring transparency, efficiency, and accountability.

About Three Digital Initiatives to Streamline PDS:

About the Three Digital Initiatives:

The Ministry of Consumer Affairs, Food and Public Distribution has unveiled three tech-driven initiatives to modernize warehousing, empower frontline workers, and improve grievance redressal under PM-GKAY and NFSA.

1. Depot Darpan Initiative:

- Aim: Improve infrastructure and operational performance of food grain depots under FCI and CWC.

Key Features:

1. Digital self-assessment portal for depot-level performance tracking.
2. Composite ratings based on a 60:40 ratio (Operations: Infrastructure).
   - IoT integration for real-time monitoring, CCTV surveillance, and live analytics.
1. Capital infusion: 1000 crore (FCI) & 280 crore (CWC) for depot upgrades.

2. Anna Mitra Initiative:

- Aim: Empower field-level PDS stakeholders through real-time data access.

Key Features:

1. Mobile app launched for FPS dealers, DFSO officers, and food inspectors.
2. Enables access to stock details, sales reports, alerts, and FPS performance.
   - Conducts geo-tagged inspections and stock verifications.
1. Currently rolled out in Assam, Uttarakhand, Tripura, and Punjab in Hindi and English.

3. Anna Sahayata Initiative:

- Aim: Provide advanced, accessible grievance redressal for PMGKAY

Key Features:

1. Utilizes WhatsApp, IVRS, and Automatic Speech Recognition (ASR) for filing complaints.
2. Built for accessibility, speed, and multilingual reach.
   - Pilot phase in Gujarat, Jharkhand, Telangana, Tripura, and Uttar Pradesh in 5 languages.

Super-Fast Charging Sodium-Ion Battery

Context:

Indian scientists at JNCASR, Bengaluru, have developed a super-fast charging sodium-ion battery that can reach 80% charge in just 6 minutes and last over 3,000 cycles, potentially revolutionising India's energy storage sector.

About Super-Fast Charging Sodium-Ion Battery:

What it is:

- A next-generation sodium-ion battery (SIB) designed to charge ultra-fast and offer extended durability, using indigenous materials and nanotech-based design.
- Developed by: Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), an autonomous institute under the Department of Science and Technology (DST), Govt of India.

How It Works?

- NASICON-type Material: Provides a stable crystal framework for fast sodium-ion movement in both cathode and anode.
- Anode Composition ($Na_{1.0}V_{0.25}Al_{0.25}Nb_{1.5}(PO_4)_3$): This specially engineered compound enhances energy storage and improves ion conductivity.
- Nanoscale Particle Engineering: Reducing particle size increases surface area, allowing sodium ions to travel faster during charge and discharge.
- Carbon Coating: A thin carbon layer on particles boosts electrical conductivity and protects from degradation.
- Aluminium Doping: Adding small amounts of aluminium improves structural integrity and helps maintain battery performance over time.

Key Features:

- Rapid Charging (80% in 6 minutes): Enables ultra-fast energy refill, ideal for high-demand applications like electric vehicles.
- Long Life (3,000+ cycles): Provides high durability, lowering the need for frequent replacements and reducing lifecycle costs.
- High Safety: Reduces risk of thermal runaway and fire, unlike lithium-ion batteries which are heat-sensitive.
- Tested Reliability: Proven using advanced techniques like electrochemical cycling and quantum simulations for real-world readiness.

Superiority Over Lithium-Ion Batteries:

- Abundant Resource: Sodium is plentiful and cheap in India, unlike lithium which is imported.
- Self-Reliance: Boosts Atmanirbhar Bharat by reducing battery import dependency.
- Eco-Friendly: Less environmentally invasive mining processes.
- Scalable Applications: Ideal for EVs, drones, solar grids, and rural electrification.
- Geopolitical Independence: Reduces reliance on volatile lithium supply chains.

Jnanpith Award

Context:

President of India presented the 58th Jnanpith Award to Jagadguru Rambhadracharya (Sanskrit) in New Delhi.

- Renowned poet Gulzar (Urdu poet) also received the award but could not attend due to health reasons.

About Jnanpith Award:

What is the Jnanpith Award?

- India's highest literary honour, awarded annually for outstanding contribution to Indian literature.
- Established in: 1961 by the Bharatiya Jnanpith Trust, founded by industrialist Sahu Shanti Prasad Jain.
- Objective: To honour literary excellence in Indian languages and promote the cultural and intellectual heritage of India.

Historical Background:

- Idea conceived on Sahu Shanti Prasad Jain's 50th birthday (22 May 1961).
- First award conferred in 1965.

Eligibility Criteria:

- Only Indian citizens are eligible.
- The award is open to all Indian languages listed in the Eighth Schedule of the Constitution, and English. (from the 49th award).
- A language becomes ineligible for 3 years once awarded.

Selection Process:

- Proposals Invited: From universities, literary bodies, critics, and readers across the country.

Language Advisory Committees (LACs):

- Each language has a 3-member committee of literary experts.
- LACs are reconstituted every 3 years.
- Free to consider names beyond submitted proposals.

Evaluation Criteria:

- Comprehensive assessment of an author's entire literary contribution.
- Must reflect contemporary relevance and cultural impact.

Selection Board:

- Comprises 7 to 11 eminent scholars of high integrity.
- Recommendations from LACs are reviewed for final decision.

Award Details:

Award Components:

- Cash prize (currently 11 lakh),
- Citation and plaque.
- Earlier awarded for a specific work (first 17 awards); now recognizes overall literary contribution.

Three Jan Suraksha Schemes

Context:

The three Jan Suraksha Schemes—PMJJBY, PMSBY, and APY—have completed 10 years of providing life insurance, accident insurance, and pension support to India's underprivileged.

About Three Jan Suraksha Schemes:

- Pradhan Mantri Jeevan Jyoti Bima Yojana (PMJJBY)
- Launched: 9th May 2015
- Aim: To provide life insurance coverage in case of death from any cause.

Key Features:

- Eligibility: Individuals aged 18–50 years with a bank or post office account.
- Coverage: 2 lakh payable on death from any cause.
- Premium: 436 per annum.
- Duration: 1-year cover from 1st June to 31st May (auto-renewable).
- Implementing Agencies: LIC and other approved life insurers via banks/post offices.
- Pradhan Mantri Suraksha Bima Yojana (PMSBY)
- Launched: 9th May 2015
- Aim: To offer affordable accident insurance for death or disability.

Key Features:

- Eligibility: Individuals aged 18–70 years with a bank or post office account.

Coverage:

- 2 lakh for death or total disability
- 1 lakh for partial disability
- Premium: 20 per annum.
- Duration: 1-year cover from 1st June to 31st May (auto-renewable).
- Implementing Agencies: Public and private general insurance companies via banks/post offices.

Atal Pension Yojana (APY)

- Launched: 9th May 2015
- Aim: To provide guaranteed pension to workers in the unorganised sector.

Key Features:

- Eligibility: Individuals aged 18–40 years, not paying income tax.
- Pension Benefits: 1,000 to 5,000 per month after age 60, based on contribution.
- Contribution Frequency: Monthly, quarterly, or half-yearly.
- Implementing Agency: PFRDA under the National Pension System (NPS).
- Premature Death: Spouse can continue contributions till age 60 of the original subscriber.

Inland Waterway Transport

Context:

The Inland Waterways Authority of India (IWAI) has signed a strategic MoU with Rhenus Logistics India, a global logistics firm, to operate 100 cargo barges and pusher tugs across multiple national waterways, starting in late 2025.

- This aims to boost multimodal cargo movement and private participation in India's inland water transport sector.

About Inland Waterway Transport (IWT):

What is Inland Waterway Transport (IWT)?

- IWT refers to the movement of goods and passengers through navigable rivers, canals, backwaters, and creeks using boats, barges, or ferries.
- It is a fuel-efficient, environment-friendly, and cost-effective mode of transportation.

Key Initiatives to Promote IWT in India:

- Jal Marg Vikas Project (JMVP): World Bank-funded initiative to augment capacity of NW-1 (Ganga)
- Includes dredging, terminal development, and navigational aids
- Sagarmala Programme: Integrated with IWT to boost port-led development and hinterland connectivity
- National Waterways Act, 2016: Declared 111 waterways as National Waterways (NWs) for development
- Jal Vikas Marg Society (JVMS): Institutional mechanism under IWAI for managing World Bank-assisted projects
- 'Jalvahak' Cargo Promotion Scheme (2024): Provides up to 35% operating cost reimbursement to cargo movers using IWT
- Ganga Vilas Cruise and River Tourism Initiatives: Boosts passenger traffic and tourism potential on NW-1 and NW-2

About Inland Waterways Authority of India (IWAI):

- Established: 1986 under IWAI Act, 1985
- Nodal Ministry: Ministry of Ports, Shipping and Waterways (MoPSW)
- Headquarters: Noida, Uttar Pradesh

Objectives:

- Develop and regulate national waterways
- Enhance infrastructure for navigation
- Ensure eco-friendly and cost-effective logistics and transport solutions
- Promote PPP models and private sector investment in IWT.

Chapter-
8

INTERNATIONAL RELATION

Overseas Citizen of India (OCI)

Context:

Union Home Minister launched a revamped Overseas Citizen of India (OCI) portal, aimed at enhancing digital accessibility, security, and service delivery.

About Overseas Citizen of India (OCI):

What is the OCI Card?

- The Overseas Citizen of India (OCI) card is a form of permanent residency available to Persons of Indian Origin (PIOs), allowing them to live and work in India indefinitely, with certain exceptions.
- Introduced in: August 2005 under Section 7A of the Citizenship Act, 1955.
- Objective: Strengthen India's ties with the global Indian diaspora by granting multiple rights akin to long-term residency.

Eligibility Criteria for OCI:

- A person is eligible for OCI if they:
- Were citizens of India on or after 26th January 1950, or eligible to become citizens then.
- Are children, grandchildren, or great-grandchildren of such individuals.
- Are a minor child of Indian citizens or of OCI cardholders.
- Are a foreign spouse of an Indian citizen/OCI holder, with marriage subsisting for 2+ years (subject to security clearance).

Not eligible:

- If applicant or their ancestors were ever citizens of Pakistan or Bangladesh.
- If applicant is serving or retired foreign military personnel.

Key Benefits of an OCI Cardholder:

- Lifelong, multiple-entry visa for visiting India.
- Exemption from FRRO registration, irrespective of duration of stay.
- Parity with Indian citizens in domestic airfares and ticket fees for national monuments and parks.

Parity with NRIs in:

- Adoption of Indian children.
- Admission in Indian educational institutions against NRI or supernumerary seats.
- Purchase of non-agricultural properties.
- Pursuing professions like doctors, lawyers, architects, and CAs.
- Faculty appointments allowed in premier institutes like IITs, NITs, IIMs, and AIIMS.

Latest Rules & Restrictions (as of 2021 notification):

OCI cardholders must take special permission for:

- Research, missionary, journalistic activities, or mountaineering.
- Visiting restricted/protected/prohibited areas.
- Interning with or working in foreign diplomatic missions in India.
- Also, OCIs are treated at par with foreign nationals under FEMA 2003, reversing earlier parity with NRIs in economic/financial matters.

Key Restrictions on OCI cardholders:

- Cannot vote or contest elections.
- Cannot hold Indian constitutional positions (e.g., President, Vice President, Supreme Court Judge).
- Cannot hold regular government jobs.
- Cannot buy agricultural or plantation property.

Renunciation of OCI:

- Any OCI cardholder may voluntarily renounce OCI status.
- Upon registration of renunciation, they cease to be OCI holders.
- The same applies to their minor children registered under the OCI scheme.

India-Pakistan Tension and The Subcontinent's Challenge

Context:

Following the Pahalgam terror attack and killing 26 civilians, India launched Operation Sindoor across Pakistan and PoK, triggering retaliatory actions from Pakistan.

- Tensions have reached their highest point since Balakot 2019, with concerns about possible regional escalation and nuclear risks.

About India-Pakistan Tension and The Subcontinent's Challenge:

Historical Context of India-Pakistan Tensions:

Year	Event
1947–48	First war over Kashmir; Kashmir accedes to India.
1965	Second war after Pakistan's infiltration into Kashmir.
1971	India supports Bangladesh's liberation; Simla Agreement signed.
1999	Kargil War after Pakistani troops occupy Indian posts.
2001–08	Attacks on Parliament, Mumbai; increased LoC hostilities.
2016, 2019	Uri and Pulwama attacks; surgical and Balakot strikes.
2025	Pahalgam terror attack and retaliatory strikes mark a new threshold.

Strategic Implications:

On India:

- Economic Costs: Military escalation diverts resources; past wars have slowed down GDP growth by 0.5–1.2% (Source: RBI reports post-Kargil).
- Security Recalibration: India has demonstrated its ability to retaliate without cross-border movement (e.g., drone strikes), redefining deterrence norms.
- Diplomatic Leverage: India is pressing at IMF and multilateral forums to block Pakistan's bailout pathways.

On the Global Stage:

- Nuclear Risk Concerns: As nuclear states, India-Pakistan escalation draws global anxiety—UN and major powers have called for de-escalation.

- China's Role: Pakistan's strategic alliance with China raises the possibility of multi-front conflict (especially in Ladakh or Arunachal).
- Regional Instability: Repeated conflict in South Asia undermines global confidence in the region's investment climate and development trajectory.

Key Challenges to South Asia:

- Leadership Vacuum: Absence of long-term visionary leadership has kept historical grievances unresolved.
- E.g. Failed post-Musharraf dialogues on Kashmir autonomy.
- Terror as State Policy: Pakistan's tolerance or support for non-state actors' fuels insecurity across borders.
- Lack of Regional Integration: SAARC remains dysfunctional; trade within South Asia is only 5% of total trade.
- People-to-People Divide: Nationalistic narratives overshadow cultural and human linkages, increasing hostility.
- External Power Play: China's overt support to Pakistan and US disengagement from the region worsen strategic uncertainty.

Way Ahead:

- Backchannel Diplomacy: Reinitiate confidential talks through Track II channels to create space for dialogue.
- Border Management: Strengthen intelligence and technological surveillance to prevent terrorist infiltration.
- Revive SAARC/BBIN Dialogues: Focus on shared economic and environmental goals to rebuild trust.
- IMF & FATF Leverage: Use multilateral forums to push for action against terror financing networks.
- Domestic Consensus: Build cross-party unity in India on national security issues, avoiding politicization.

Conclusion:

India and Pakistan must recognize that prolonged hostility benefits neither and only hampers the region's economic and social progress. Military options offer short-term tactical gains but political solutions remain the only sustainable path. Regional peace is essential for realizing the potential of a rising South Asia.

Human Development Index (HDI)

Source: HT

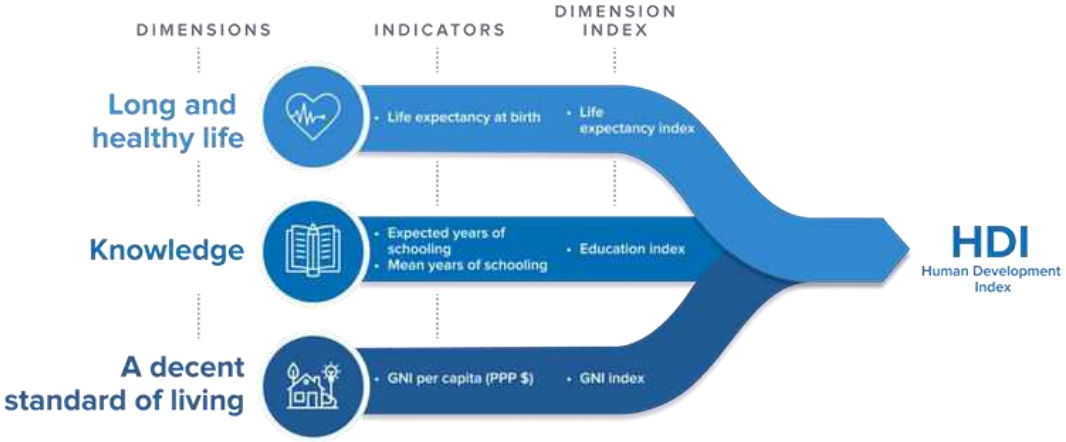
Context:

India has climbed three positions to rank 130 out of 193 countries in the 2023 Human Development Index (HDI), according to the 2025 Human Development Report by the United Nations Development Programme (UNDP).

About Human Development Index (HDI):

What is Human Development Index (HDI)?

- The Human Development Index (HDI) is a composite statistical measure that assesses a country's average achievements in three key dimensions:
- Health – Measured by life expectancy at birth
- Education – Measured by mean years of schooling and expected years of schooling
- Standard of Living – Measured by Gross National Income (GNI) per capita (PPP adjusted)



- Published by: United Nations Development Programme (UNDP)
- First introduced: In 1990, in the first Human Development Report authored by Mahbub ul Haq and Amartya Sen.

Key Highlights of Human Development Report 2025:

India-Specific Insights:

- India's 2023 HDI Rank: 130 out of 193 (up from 133 in 2022)
- HDI Value (2023): 0.685 (up from 0.676 in 2022)
- Category: Still under Medium Human Development; nearing the High Development threshold (0.700)
- Comparison: Same HDI value as Bangladesh, but with differing indicators; India ahead of Pakistan (168th, 0.544) and Nepal (145th, 0.622).

Progress Made:

- Life Expectancy: Increased to 72 years in 2023, (from 67.7 years in 2022).
- Expected Years of Schooling: Rose to 13 years (from 12.6 years).
- Mean Years of Schooling: Improved to 9 years (from 6.57 years).
- GNI per capita: Rose to $9,046.76 in 2023 (from $6,951 in 2022)
- Multidimensional Poverty: 135 million Indians exited poverty between 2015-16 and 2019-21

Persisting Inequality:

- Inequality-adjusted HDI: India faces a 30.7% loss due to inequality, one of the highest in Asia
- Gender Inequality: Female labour force participation and political representation remain low (India ranks 102nd with a score of 403.)
- GNI per Capita Rank: 7 ranks below HDI rank income remains a weak spot.

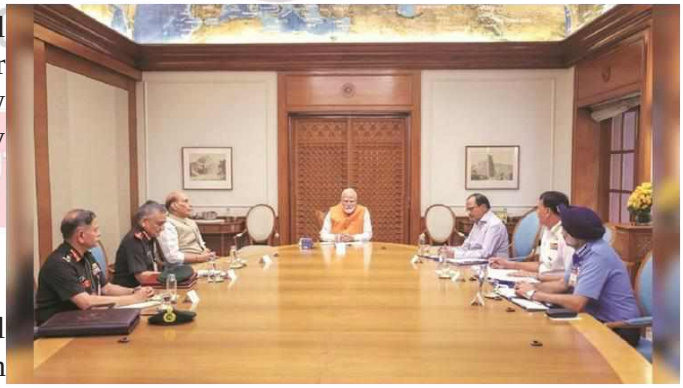
Global Trends:

- Top performer: Iceland (0.972), Norway (0.970), Switzerland (0.970).
- Bottom: South Sudan, Somalia, Central African Republic.
- BRICS Comparison: Brazil (89), Russia (59), China (75), South Africa (110) all ahead of India.
- The pace of HDI growth globally is the slowest since 1990.
- Inequality between low and very high HDI countries has worsened for the fourth consecutive year.

National Security Advisory Board

Context:

The Government of India has reconstituted the National Security Advisory Board (NSAB), appointing former R&AW Chief Alok Joshi as its Chairman, with 7 new members inducted amid heightened national security concerns.



About National Security Advisory Board (NSAB):

What is NSAB?

- NSAB is an advisory body under the National Security Council (NSC) that provides long-term strategic inputs on national security issues.
- It comprises experts from various fields outside the government.
- Established In: Constituted in December 1998 during the tenure of National Security Advisor Brajesh Mishra.

Tenure:

- Initially, members were appointed for one year.
- Since 2004-06, it has been reconstituted for a two-year term.

Objectives:

- Provide independent, non-partisan analysis on security matters.
- Offer policy options and long-term strategic perspectives to the National Security Council.
- Assist in preparing key documents like the Nuclear Doctrine (2001) and National Security Review (2007).

Composition:

- Current strength: 16 members
- Includes retired military officials, diplomats, IPS officers, academics, and civil society members.

Organizational Structure:

- Functions under the National Security Council Secretariat (NSCS).
- It has 2 subordinate bodies: National Information Board (NIB) and Technology Coordination Group (TCG)

Key Functions:

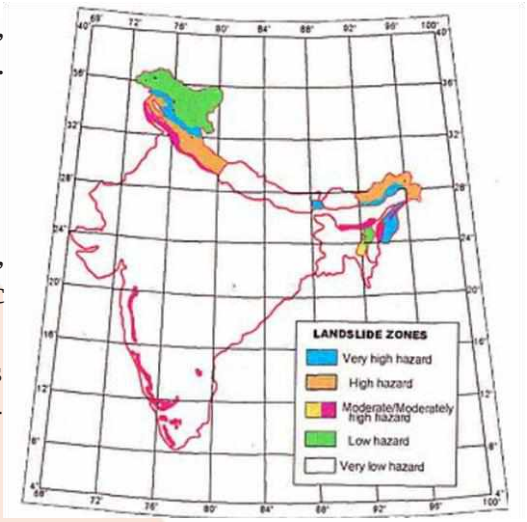
- Hold monthly or emergency meetings to assess national and global threats.
- Provide independent reports to the National Security Adviser (NSA).
- Aid in formulating comprehensive security doctrines.
- Recommend defence, cyber, diplomatic, and internal security measures.
- Bridge the gap between government machinery and academic expertise.

9 DISASTER MANAGEMENT

Landslide

Context:

A tragic landslide on the Kedarnath National Highway in Rudraprayag, Uttarakhand killed one and injured five pilgrims from Chhattisgarh. Authorities have warned against travel due to ongoing extreme weather.



About Landslides:

What is a Landslide?

- A landslide is the sudden downward movement of rock, earth, or debris due to gravity, often triggered by heavy rainfall, seismic activity, or human interference.
- India's Vulnerability: Around 15% of India's landmass is landslide-prone (NDMA), especially the Himalayas, North-East, Western Ghats, and Nilgiris.

Types of Landslides in India:

- Debris Flow: Common during monsoon in Western Ghats and Himalayas.
- Rockfalls: Observed in steep Himalayan terrains.
- Creeping Landslides: Slow and progressive, seen in Sikkim and Darjeeling.

Causes of Landslides in India:

1. Geological Factors: Fragile rock structures due to tectonic movement of the Indian plate at ~5 cm/year (Geological Survey of India).
2. Heavy Rainfall: Intense and prolonged rainfall triggers slope failures, e.g., Malpha (Pithoragarh) and Okhimath (Chamoli).
3. Seismic Activity: Earthquakes in Himalayan zones weaken slopes and trigger landslides.
4. Deforestation & Urbanisation: Removal of vegetation and unregulated construction destabilizes soil layers.
5. Road Construction & Mining: Blasting and excavation alter natural slopes, making them prone to collapse.

Impacts of Landslides:

Short-term Impacts:

- Loss of life and injuries, e.g., Kedarnath NH landslide (May 2025).
- Damage to infrastructure and crops causing economic loss.
- Obstruction to transport, especially in remote and hilly terrain.

Long-term Impacts:

- River sedimentation, leading to downstream flooding.
- Reduced reservoir life due to siltation in hydropower projects.
- Displacement of population and loss of arable land.
- Geographic isolation leading to underdevelopment.

NDMA Guidelines for Landslide Management:

- Hazard Zonation Maps: LHZ maps at 1:50,000 scale being prepared by NRSC, IITs, DST.
  E.g., NRSC Atlas for Uttarakhand corridors.

- Early Warning Systems (EWS): Use of real-time monitoring, stress sensors, remote sensing, and GIS for timely alerts.
- Land Use Regulation: No construction in vulnerable zones, excavation norms, and slope stability measures like rock bolting and retaining walls.
- Preparedness & Capacity Building: Disaster training in schools, simulation drills, and awareness campaigns in hilly districts.
- Infrastructure Measures: Drainage improvement, vegetation cover restoration, and slope reengineering.
- Insurance & Compensation: Encouraging landslide insurance and quick relief disbursals to affected families.
- Research & Development: DST supports over 30 research projects to improve landslide prediction and mitigation technologies.

Conclusion:

Landslides are a persistent threat in India's geologically fragile zones. With changing climate and unplanned development, their frequency is rising. Strengthening early warning systems, enforcing regulations, and raising public awareness are key to reducing future risk and impact.

Bengaluru Urban Flooding

Context:

Bengaluru witnessed over 130 mm rainfall in just 12 hours, leading to severe urban flooding that left 3 dead, 500 homes inundated, and major roads, underpasses, and lakes overwhelmed.

About Bengaluru Urban Flooding:

What is Urban Flooding?

- Urban flooding refers to the overflow of water in densely built environments due to poor drainage and excessive rainfall.
- Unlike rural floods, it occurs rapidly and overwhelms infrastructure—seen in cities like Mumbai (2005), Chennai (2015), and Hyderabad (2020).

Causes of Urban Flooding in Bengaluru:

Natural Causes:

- Heavy Monsoon Rains: South-west monsoon causes intense rainfall; July averages often exceed 100 mm in a day.
- Topography: The city sits on an undulating terrain with natural low-lying basins like Hebbal, Koramangala-Challaghatta valleys.

Man-made Causes:

- Encroachment of Lakes & Wetlands: Bengaluru has lost 79% of its water bodies in the last 40 years (IISc data).
- Poor Drainage Maintenance: Rajakaluves (storm drains) are choked, buried, or encroached, reducing water-carrying capacity.
- Outdated City Plans: CDP and zoning regulations have not evolved with urban density and climate risks.
- Unregulated Construction: Tech parks and apartments are often built over floodplains, violating environmental norms.
- Lack of Coordination: Civic bodies function in silos, delaying response and long-term planning.

Impacts of Urban Flooding:

- Loss of Life & Property: Monsoon 2025 led to 3 deaths and submerged areas like Koramangala, Bellandur, and ORR.
- Economic Disruptions: IT corridor shutdowns cost crores; flooding impacts India's $194B tech exports sector.

- Public Health Crisis: Waterlogging spreads vector-borne diseases and contamination-related infections.
- Transport & Power Outages: Prolonged disruption of metro, roads, and electrical systems during peak rains.

Global Best Practices:

- Singapore's SWAN System: Smart sensors detect water level rise and activate flood alerts in real-time.
- Netherlands' "Room for the River": Managed retreat and river expansion reduce flood pressure in cities.
- China's "Sponge Cities": Permeable pavements, green roofs, and wetlands absorb excess water sustainably.
- FLOAT House (New Orleans): Floating homes adapt to changing water levels, minimizing displacement.

Way Forward:

- Restore Natural Drainage: Reconnect lakes, wetlands, and rajakaluves following IISc & NDMA recommendations.
- Regular Desilting: Institutionalize desilting of secondary/tertiary drains before monsoons, with third-party audits.
- Urban Planning Reform: Revise Bengaluru's CDP to include flood zoning and green infrastructure mandates.
- Smart Flood Management: Use IoT-based water monitoring systems and integrate early warning dashboards.
- Clear Political Accountability: Strengthen BBMP's autonomy and conduct regular audits to fix administrative gaps.

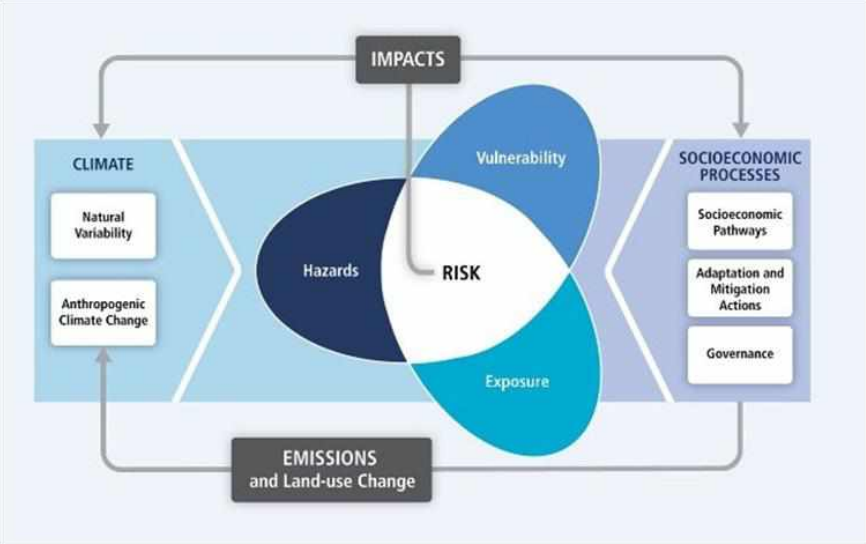
Conclusion:

Bengaluru's repeated flooding is no longer a seasonal mishap but a governance failure. Restoring ecological wisdom and enforcing climate-resilient urban planning is not optional—it is a necessity. A city of lakes must not become a city under water.

Climate Physical Risk (CPR)

Context:

Union Home Minister recently emphasized the need for proactive climate risk assessments amidst rising extreme weather events. The article highlighted India's fragmented approach to Climate Physical Risk (CPR) and called for a unified national framework.



About Climate Physical Risk:

What is Climate Physical Risk (CPR)?

- Definition: CPR refers to potential damage from acute (e.g. floods, heatwaves) and chronic (e.g. shifting rainfall patterns, droughts) climate events.

Formula:

- As per IPCC, CPR = Hazard × Exposure × Vulnerability.

Features:

- Hazard: Refers to climate-induced events like floods, cyclones, droughts, or wildfires that pose direct environmental threats.
- Exposure: Denotes the presence of people, infrastructure, or economic assets in areas susceptible to hazards.
- Vulnerability: Captures the ability of systems, communities, or infrastructure to withstand and bounce back from these

Global & Indian Context:

Global Context:

- Mandatory Climate Disclosures: Countries now require companies to disclose physical climate risks under standards like ISSB S2 and the EU Taxonomy.
- Universal Relevance: Both Global North and South face extreme events—e.g., heatwaves in Europe and wildfires in the US.

Indian Context:

- High Exposure: Over 80% of Indians live in districts prone to climate disasters, including floods, droughts, and heatwaves (World Bank).
- Fragmented Framework: CPR data is dispersed across IMD, IITs, and NIDM without a standardised, national-level risk assessment system.

Key Challenges in India's CPR Management:

- Fragmentation: CPR studies are isolated across ministries, lacking standardisation.
- Modelling Issues: Global models like RCPs/SSPs miss India's hyper-local climate variations.
- Data Gaps: No central repository for risk metrics at district or panchayat level.
- Private Sector Barriers: Limited tools for businesses to assess value chain exposure.

Initiatives Taken So Far:

- Adaptation Communication (2023): India submitted its first climate adaptation report to UNFCCC under Article 7 of the Paris Agreement.
- National Adaptation Plan (NAP): Work is underway for a full NAP covering nine sectors with district-level detailing.
- RBI Framework: Incorporating climate risks into India's financial sector supervision mechanisms.

Way Forward:

- India-Specific CPR Tool: Must include local climate modelling, real-time risk dashboards, and sector-wise vulnerability indices.
- Central Risk Repository: Enable data-sharing across ministries, states, and private entities.
- Financial Alignment: Direct climate finance to adaptation (e.g. resilient roads, heat-resilient crops).
- Public-Private Partnerships: Empower industries to map risks and integrate climate resilience in ESG and sustainability audits.
- Transparent Standards: Use science-based methodologies with real-time data integration and citizen feedback loops.

Conclusion:

India's development must be climate-proofed. CPR is not just a risk metric — it's a governance imperative. A unified, locally rooted, and future-ready system is essential to turn resilience from buzzword to blueprint.

Chapter-
10

INTERNAL SECURITY

India's Spatial Infrastructure for National Security

Context:

China's Beidou satellite navigation system is under scrutiny after reports suggested it may have been used by militants during the Pahalgam terror attack in India, raising serious national security concerns for India.

About India's Spatial Infrastructure for National Security:

About Spatial Infrastructure:

- Definition: Spatial infrastructure includes satellite-based systems for positioning, navigation, and timing (PNT), such as GPS, India's NavIC, and China's Beidou.
- Governing Rules: Governed by international treaties (e.g., ITU, COPUOS) and domestic space/telecom regulations like India's Satcom Policy.

Core Features:

- High-precision real-time tracking and location services.
- Integration with communication networks and AI-based surveillance tools.
- Offers Short Messaging Services (SMS), encrypted communications, and location analytics (as in Beidou).

Role in National Security:

- Tactical Military Operations: Enables secure communications and troop coordination in surveillance-heavy or mobile-network-denied regions.

  E.g. Beidou SMS capability was likely used in Pahalgam attack to evade detection.
- Border Monitoring & Drone Navigation: Crucial for precision drone strikes and patrol management.
- Disaster Management & Infrastructure Security: Used in coordination with telecom networks and IoT sensors for early warning systems.
- Cybersecurity Backbone: Supports encryption, network resilience, and secure data routing through quantum-safe protocols.

India's Spatial Infrastructure Initiatives for National Security:

NavIC & GAGAN Systems:

- NavIC offers indigenous navigation services across India and nearby regions.
- GAGAN augments GPS signals for high-precision use in aviation and defense sectors.
- Defence Space Agency (DSA): Coordinates space-based assets for military use, enhancing surveillance, navigation, and secure communications.
- RISAT & EOS Satellite Series: Provide real-time radar imaging for border monitoring, terrain mapping, and disaster response.

Samvad & Netra Projects:

- Samvad secures military satellite communication.
- Netra tracks space threats and enemy satellites, strengthening space situational awareness.
- Quantum Satellite Communication: ISRO-DRDO initiative to develop quantum-encrypted communication for tamper-proof defence networks.

Key Issues Surrounding Spatial Infrastructure:

- Foreign GNSS Dependence: Overreliance on external systems like GPS or Beidou compromises sovereignty and data integrity.
- Use by Non-State Actors: Beidou's high-accuracy services may be exploited by terrorists in border regions (e.g., Pakistan & J&K).
- Geo-Tech Dominance by China: China's promotion of Beidou in Sri Lanka, Nepal, and Bangladesh may reduce India's regional tech leverage.
- Lagging Indigenous Systems: NavIC lacks global coverage and commercial adoption remains low.
- Spoofing and Signal Jamming: Limited real-time capabilities to counter satellite spoofing or jamming threats.

Way Ahead:

- Upgrade NavIC Infrastructure: Expand NavIC's global coverage and integrate it into smartphones, vehicles, and defense platforms.
- Strengthen Space Surveillance: Accelerate RISAT-type missions to track cross-border movements in real-time.
- Deploy Counter-Interference Tech: Invest in signal spoofing detection, jamming devices, and GNSS firewalls near sensitive zones.
- Promote Regional GNSS Adoption: Offer technical and financial support to neighbors to adopt NavIC as a strategic alternative to Beidou.
- Raise Multilateral Concerns: Use forums like UN COPUOS and ICG to flag the dual-use nature of satellite systems being misused by non-state actors.

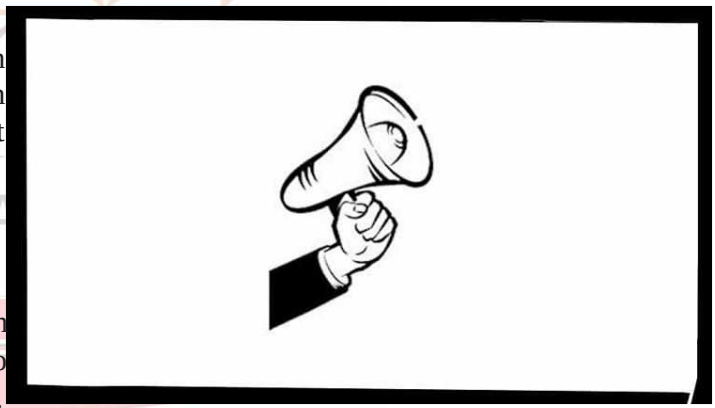
Conclusion:

The misuse of spatial infrastructure like Beidou by state and non-state actors poses new security risks for India. Strengthening indigenous capabilities like NavIC and deploying proactive countermeasures will be crucial for securing national sovereignty and ensuring strategic autonomy in a rapidly evolving digital battlespace.

War and Disinformation: A Tactical Weapon

Context:

Amid a recent India-Pakistan ceasefire, Pakistan intensified a state-sponsored disinformation campaign through doctored visuals and fake narratives to distort global and domestic perceptions.



About War and Disinformation: A Tactical Weapon

What is Disinformation?

- Disinformation refers to deliberate dissemination of false or misleading content intended to manipulate public opinion or discredit opponents.
- In modern warfare, it is a non-kinetic strategy to influence enemy morale and shape international narratives without physical aggression.

Objectives of Disinformation During War:

- Destabilize morale of the adversary (e.g., false reports of Indian drone crashes).
- Shape global opinion to gain diplomatic space (e.g., showing fake civilian casualties).
- Divide domestic populations through communal misinformation (e.g., fake missile strike in Amritsar).
- Undermine trust in institutions, media, and democratic processes.

Modes of Disinformation:

- Social Media Virality: Doctored images, misattributed videos (e.g., Turkish drone video passed as Pakistani strike).
- Fake Telegram Channels: Circulating natural disaster footage as war-related.
- Narrative Hijacking: Use of news templates and fake official-looking handles.
- Meme Warfare and influencers amplifying emotion-laced propaganda.

Consequences of Disinformation in Wartime:

- National Security Threat: Disinformation can provoke panic, disrupt civil order, and influence military decision-making.
- Erosion of Public Trust: Constant exposure to falsehoods leads to information fatigue and loss of faith in media.
- Diplomatic Fallout: False narratives impact international reputation, affecting India's position in multilateral forums.
- Communal Polarization: Targeted lies can trigger riots or deepen sectarian rifts, as seen in false missile strike claims.

Challenges in Countering Disinformation:

- Speed of Spread: Fake news spreads faster than fact-checking; virality outpaces verification.
- Deepfakes and AI Tools: Technology enables hyper-realistic fake content, difficult to debunk in real-time.
- Lack of Media Literacy: A large population lacks critical digital skills to distinguish fact from fiction.
- No Border for Propaganda: Disinformation transcends national boundaries, making legal enforcement complex.

Case Study:

- **China's playbook** involves tight state control, content farms, and centralised narrative engineering.
- Pakistan's recent disinformation efforts mirror **China's tactics** — central control, emotional narratives, and cross-platform content flooding.
- China's silent role includes **media training, tech infrastructure**, and diplomatic shielding in UN forums.

Way Ahead:

- Strengthen Fact-Checking Ecosystem: Invest in independent fact-checking networks and partnerships with social media firms.
- Media Literacy Campaigns: Integrate digital literacy into school curricula (E.g., Finland's model of critical media education).
- International Cooperation: Build alliances to trace cross-border info-warfare; strengthen cyber diplomacy with like-minded nations.
- Legal and Regulatory Tools: Update IT Rules to tackle deepfakes and coordinated disinformation networks, ensuring free speech is not curbed.
- Empower Institutions: Equip Election Commission, defence agencies, and PIB Fact Check units with real-time monitoring tools and crisis response teams.

Conclusion:

Disinformation is not just digital noise; it is a strategic weapon in modern hybrid warfare. To protect national integrity and democratic discourse, India must proactively counter narrative manipulation both online and offline. Media literacy, institutional capacity, and global partnerships are vital to win the war of perception.

Operation Sindoor

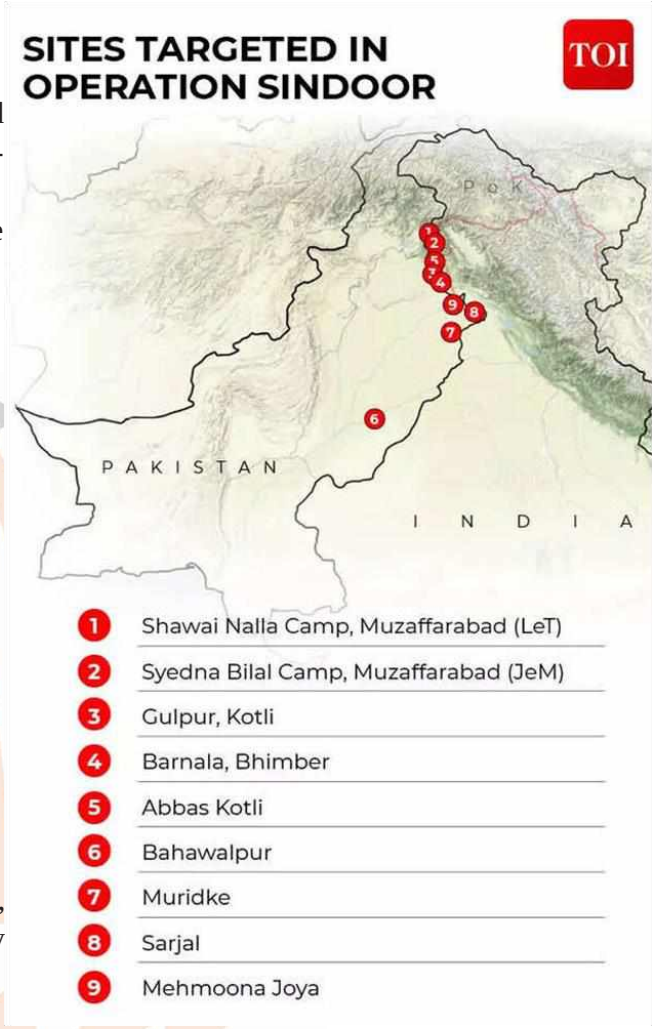
Context:

In response to the Pahalgam terrorist attack that killed 25 Indians and one Nepali citizen on April 22, 2025, India launched 'Operation Sindoor', a precise military offensive targeting nine terrorist camps across Pakistan and Pakistan-occupied Kashmir (PoK).

About Operation Sindoor:

Background:

- Trigger: A terror attack in Pahalgam (J&K) attributed to The Resistance Front (TRF), linked to Lashkar-e-Taiba.
- Attack resulted in 26 civilian deaths, including one foreign national.
- Marked the most serious civilian-targeted attack since 26/11 Mumbai attacks.



Objectives of Operation Sindoor:

- Neutralise cross-border terror infrastructure.
- Deliver justice to the victims of the Pahalgam attack.
- Prevent imminent future attacks, as indicated by actionable intelligence.
- Reassert India's right to self-defence under international law.

Operation Details

- Targets: 9 terror camps — 4 in mainland Pakistan, 5 in PoK.
- Terror groups targeted: Jaish-e-Mohammed, Lashkar-e-Taiba, Hizbul Mujahideen.
- Carried out by Indian Air Force and Special Forces, avoiding civilian zones and Pakistani military installations.

Strategic and Diplomatic Implications:

- Sends a strong deterrent message to terror sponsors and their safe havens.
- Draws global attention to Pakistan's continuing support to UN-designated terrorists like Sajid Mir.
- Reinforces India's shift towards pre-emptive counter-terrorism doctrine post-Uri and Balakot strikes.
- Likely to increase international diplomatic support for India's right to protect its civilians.

Chapter-
11

SOCIETY

Modernisation vs Westernisation

Context:

Union Minister asserted that while modernisation is essential for national progress, blind westernisation must be resisted to preserve India's cultural identity.

- He stressed the importance of balancing science and tradition to realise India's vision of becoming a 'Vishwaguru'.

About Modernisation vs Westernisation:

Modernisation:

- Definition: A comprehensive process involving technological, institutional, and value-based transformation aimed at societal development.

Features:

- Structural transformation in economy, polity, and society.
- Rationality and scientific temper over traditional beliefs.
- Democratic institutions, mass education, and urbanisation.
- Emphasis on self-sustaining growth with rising productivity and human development indicators.

Westernisation:

- Definition: Adoption of Western lifestyles, values, and systems, often at the cost of traditional cultural practices.

Features:

- Popularised by N. Srinivas in the Indian context.
- Covers secular, legal, political, and technological domains.
- Includes dress codes, food habits, language, and social institutions like live-in relationships.
- Often conflicts with Indian societal ethos, particularly in rural and traditional contexts.

Impacts of Westernisation on Indian Society:

1. Cultural Erosion: Weakening of joint family structures, caste panchayats, and traditional festivals.

   E.g. Declining interest among youth in arranged marriages and religious practices.

1. Value Conflict: Clash between individualism (West) and collectivism (Indian tradition).
2. Widening Social Divide: Gap between Westernised urban elite and rural traditional masses leading to social tension.
3. Positive Outcomes: Progressive laws (e.g., abolition of Sati, child marriage) and human rights awareness stemmed from Western influence.

Modernisation Can Drive India's Progress:

1. Technological Growth: Innovations in biotech, digital governance, and space can uplift public services.

   E.g. India ranks among the top 5 countries in digital payment adoption (RBI, 2024).

1. Institutional Reforms: Modernisation supports efficient bureaucracy, judicial efficiency, and transparent governance.
2. Educational Expansion: Promotes universal access to quality education, enabling human capital formation.

3. Cultural Resilience through Reform: India's traditional values can be modernised without being westernised.
   E.g. Promotion of Ayurveda and Yoga globally while maintaining scientific validation.
1. Balanced Development: Modernisation rooted in Indian values helps bridge the rural–urban divide without alienating cultural identity.

Conclusion:

Modernisation is a dynamic pathway to national progress when fused with cultural rootedness. India's strength lies in embracing innovation while safeguarding its value systems. The challenge is to advance without losing identity — progress must be inclusive, indigenous, and intentional.

NSO Household Consumption Expenditure Surveys and Poverty

Context:

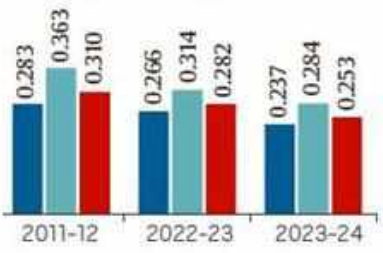
Recent NSO Household Consumption Surveys (2022–23 and 2023–24) and a World Bank report confirm a sharp fall in poverty rates in India, largely driven by high GDP growth and reduced inequality.

TABLE 1: POVERTY RATIOS USING DIFFERENT CUT-OFFS: ALL INDIA

Poverty Line (PL) Cut-offs	Rural			Urban			Rural+urban		
	2011-12	2022-23	2023-24	2011-12	2022-23	2023-24	2011-12	2022-23	2023-24
150	66.6	34.8	27.8	52.8	27.8	21.7	62.6	32.8	26
125	51.3	20.8	14.8	40.1	16.9	11.9	48.1	19.7	13.9
115	43.5	15.8	9.9	34.7	12.9	8.8	41	15	9.6
100	30.9	9.6	4.9	26.8	9.3	4.8	29.5	9.5	4.9
85	18.3	4.8	4.2	18.1	4.6	4.1	18.3	4.7	4.2
75	11.1	4.2	3.7	12.4	4.1	3.6	11.5	4.2	3.7
50	3.9	2.8	2.5	4.3	2.7	2.4	4	2.8	2.4

Note: 1. 100 per cent PL refers to Rangarajan Committee's Poverty Line, adjusted for CPI-based inflation. 2. Rural + Urban data are the weighted average; weights being their respective shares in the estimated persons. Source: Estimates using Household Consumer Expenditure Surveys of NSSO

Table 2: Gini Coefficient of Total Consumption Expenditure, All India



Source: Report No. 592 (HCES 2023-24), National Statistics Office

Key Highlights of NSO Household Consumption Expenditure Surveys and Poverty:

Key Indicator	Details
Updated Poverty Lines (Rangarajan Committee)	Rural: 972 (2011–12) to 1,837 (2022–23) to 1,940 (2023–24) Urban: 1,407 (2011–12) to 2,603 (2022–23) to 2,736 (2023–24)
Poverty Ratio (All India)	Declined from 29.5% (2011–12) to 9.5% (2022–23) and 4.9% (2023–24)
Extreme Poverty (World Bank definition)	Share of people living below $2.15/day (PPP) reduced from 16.2% to 2.3% (2011–12 to 2022–23)
Distribution of the Poor	Over 50% of poor are concentrated between 75–100% of the poverty line threshold, enabling better targeting
Consumption Inequality	Gini Coefficient declined from 0.310 (2011–12) to 0.253 (2023–24), showing improved spending equity
Rural-Urban Contribution	Both contributed equally to poverty reduction; urban areas showed faster inequality reduction
Survey Improvements	Introduced updated thresholds, refined sampling, and expanded sectoral insights in the 2022–23 and 2023–24 rounds

Poverty Trends in India (2011–2024)

- Sharp Decline in Headcount Ratio: Poverty fell from 29.5% (2011–12) to 4.9% (2023–24) — a reduction of 24.6 percentage points.

Global Benchmark Progress:

- Extreme poverty (<$2.15/day) dropped from 16.2% to 2.3% (World Bank).
- $3.65/day poverty line fell from 61.8% to 28.1%.
- Impact of Growth and Inflation: GDP growth increased to 9.2% in 2023–24. CPI inflation fell to 5.4%, aiding purchasing power.
- Poverty Clustered Near Threshold: Over 50% of the poor lie just below the poverty line, making targeted support more effective.

Challenges to Poverty Eradication in India:

- Vulnerability to Shocks: Large sections hover around the poverty line and may fall back due to health or climate crises.
- Uneven Safety Nets: Welfare coverage, especially for urban poor and migrants, remains patchy (e.g., limited urban PDS access).
- Food Inflation Concerns: Food inflation rose to 7.5% in 2023–24, which disproportionately affects the poor.
- Data Gaps in Urban Poverty: Recent surveys underrepresent informal workers and unregulated job sectors.
- Regional Disparities: States like Bihar, Jharkhand, and Odisha continue to report higher poverty despite national averages improving.

Way Ahead:

- Targeted Cash Transfers: Expand schemes like PM-GKAY and DBT for LPG to reach transient poor above poverty line.
- Resilient Rural Employment: Strengthen NREGA allocations with climate-resilient job creation.
- Urban Social Protection Framework: Develop a unified urban social safety net for gig workers and migrant families.
- Invest in Education & Nutrition: Bridge learning and nutritional gaps via PM-POSHAN and Saksham Anganwadi.
- Continuous Poverty Tracking: Institutionalize annual multidimensional poverty audits using real-time data sources.

Conclusion:

India has made commendable strides in poverty reduction, bringing it down to below 5% for the first time. This has been driven by robust GDP growth and improved consumption equity. Sustained focus on inclusive safety nets and economic resilience will be key to eradicating poverty permanently.

Ayurveda Day

Context:

The Government of India has officially declared 23rd September as Ayurveda Day through a Gazette notification.

About Ayurveda Day:

What it is:

- Ayurveda Day is a national observance to honour India's ancient system of medicine and promote it as a scientific and holistic health tradition.

New Celebration Date:

- From 2025 onwards, 23rd September will be observed annually as Ayurveda Day, coinciding with the autumnal equinox, a day symbolising balance — core to Ayurvedic philosophy.

Aim:

- To create awareness about Ayurveda as a preventive and sustainable healthcare system.

- To embed Ayurveda in global health dialogues as a science-based wellness approach.
- To enable better planning and participation through a fixed calendar date.

About Ayurveda:

What it is:

- Ayurveda is an ancient Indian system of medicine rooted in the Vedas, particularly the Atharva Veda, dating back over 5000 years. The term is derived from "Ayu" (life) and "Veda" (knowledge) — meaning "Science of Life".

Core Principles:

- Swasthasya Swasthya Rakshanam: Preserving the health of the healthy.
- Aturasya Vikara Prashamanam: Curing the illness of the sick.
- Emphasis on balance between body, mind, spirit, and environment.
- Healing through natural herbs, diet, lifestyle, and therapies.

Features of Ayurveda:

- Focus on preventive care over reactive treatments.
- Promotes mind-body harmony and seasonal routines.
- Uses herbal medicines, detox therapies, yoga, and meditation.
- Applies a customised health approach based on individual constitution (Prakriti).

Bonded Labour in India

Context:

On International Labour Day, disturbing stories of bonded labour survivors from various states are in the spotlight, highlighting the continued prevalence of forced labour in India.

About Bonded Labour in India:

- Bonded labour refers to forced work extracted under coercion due to debt, advance payments, or social obligation, often without clear time limits.

Constitutional Provisions:

- Article 23: Prohibits forced labour and begar.
- Article 21: Ensures the right to life with dignity, violated in bonded labour conditions.

Policy Evolution:

- Bonded Labour System (Abolition) Act, 1976: Criminalised all forms of bonded labour and extinguished debt obligations.
- Rehabilitation Scheme (2016): Envisioned rescuing 1.84 crore bonded labourers by 2030. Only 12,760 were rescued between 2016–2021 (MoLE data, 2021).

Data on Bonded Labour in India:

- Estimated Total Bonded Labourers:84 crore (as per Ministry of Labour & Employment, 2016 vision document).
- Rescued & Rehabilitated (2016–2021): 12,760 individuals (MoLE reply in Parliament, 2021).

- Labour Sector Composition: 39 Crore in unorganised sector out of 47 crore total workers (NSSO 2023).
- Dominant Social Groups Affected: Over 80% of bonded labourers are from SC/ST/OBC communities (various state studies).
- International Ranking: India among top countries with modern slavery (Global Slavery Index).

Persistence of Bonded Labour in India:

- Poverty and Indebtedness: Poor families take small advances for survival, leading to long-term bondage.
- Caste-Based Discrimination: SC/ST communities face structural exclusion, making them more vulnerable to exploitation.

  E.g.: A Punjab study found 84% of bonded labourers were from backward castes.
- Lack of Enforcement and Data: Weak implementation of the Bonded Labour Act and poor monitoring hinder rescue efforts.

  E.g.: Only 12,760 rescued between 2016–2021 out of 1.84 crore estimated cases.
- Unregulated Informal Sector: 90% of India's workforce is in the informal economy, with little legal or social protection.
- State Denial and Policy Gaps: Some states deny bonded labour exists, delaying rehabilitation and legal action.

  E.g.: Maharashtra omitted bonded labour from its 40-point program post-Emergency.

Key Challenges in Eliminating Bonded Labour:

- Caste-based Vulnerability: Marginalised groups like Dalits and Adivasis are disproportionately represented in bonded labour (e.g., 84% from backward castes in Punjab – Manjit Singh study).
- Lack of Political Will: Parliament acknowledged 1.84 crore bonded labourers, yet less than 1% have been rehabilitated.
- Legal and Policy Gaps: The Trafficking of Persons Bill, 2018 largely excludes forced/bonded labour from its ambit (Kiran Kamal Prasad critique).
- Organised Labour Trafficking: Exploiters use advances and social networks to recruit workers systematically, as seen in brick kilns of Karnataka and Punjab.
- Post-Rescue Vulnerability: Rescued workers often return to bondage due to social ostracism or lack of economic alternatives.

Way Ahead:

Institutional Reforms:

- Strengthen Enforcement Mechanisms: Empower District Vigilance Committees under the 1976 Act with legal authority and digital tracking of complaints.
- Transparent Monitoring Frameworks: Build a central database of rescued bonded labourers, integrated with Aadhaar and job linkages.

Social Reforms

- Community-Based Rehabilitation: Develop social protection schemes targeted at SC/ST groups vulnerable to debt bondage (e.g., skill training, land rights).
- Mass Awareness Campaigns: Promote rights education in rural and tribal areas using vernacular media and school programs.

Legal Reforms:

- Amend Labour Codes: Reinstate robust labour unionisation and collective bargaining rights, eroded under the 2019-20 Labour Codes.
- Caste-Sensitive Legislation: Introduce intersectional legal safeguards acknowledging caste, gender, and economic overlap in forced labour.

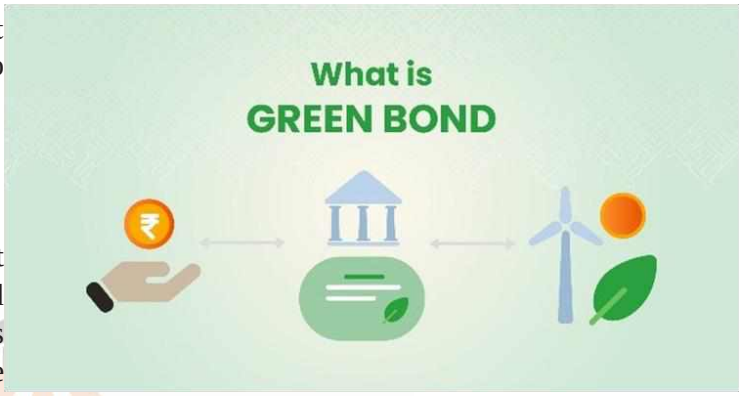
Conclusion:

Despite constitutional protection and legal bans, bonded labour persists in India due to deep social, legal, and policy failures. Real change demands multi-layered reforms combining enforcement, empowerment, and empathy. Without such a shift, India's economic growth will remain marred by invisible slavery and social injustice.

India's first certified Green Municipal Bond

Context:

Ghaziabad Nagar Nigam has issued India's first certified Green Municipal Bond, raising 150 crore to develop a Tertiary Sewage Treatment Plant (TSTP).



About India's first certified Green Municipal Bond:

What is a Green Municipal Bond?

- A Green Municipal Bond is a debt instrument issued by urban local bodies (ULBs) to fund environment-friendly infrastructure projects such as water treatment, clean energy, or waste management.
- It aligns with Green Bond Principles and is certified for sustainability compliance.

Key Features:

- Project-specific funding: Funds used only for green-certified projects like renewable energy, pollution control, etc.
- Transparency & Certification: Must adhere to independent third-party audits and ESG standards.
- Investor Attraction: Appeals to climate-conscious investors, ESG funds, and global institutions.
- Financial Innovation: Encourages fiscal discipline and creditworthiness of ULBs.

Significance:

- Supports SDGs: Aligns with UN Sustainable Development Goals (e.g., SDG 6 – Clean Water).
- Climate Resilience: Promotes low-carbon infrastructure in fast-growing urban regions.
- Water Security: Enables wastewater recycling and reduces stress on freshwater.
- Model for Other Cities: Acts as a replicable framework for other municipal bodies in India.

Fair and Remunerative Price

Context:

The Cabinet Committee on Economic Affairs has approved a Fair and Remunerative Price (FRP) of 355 per quintal for sugarcane for the 2025–26 sugar season.

About Fair and Remunerative Price (FRP):

What is FRP?

- FRP is the minimum price sugar mills must legally pay to sugarcane farmers.
- It ensures fair compensation and is a statutory mechanism under central government policy.
- Established in: Introduced in 2009, replacing the older Statutory Minimum Price (SMP)
- Legal basis: Governed under the Essential Commodities Act, 1955, ensuring price parity and farmer protection.

FRP fixed by:

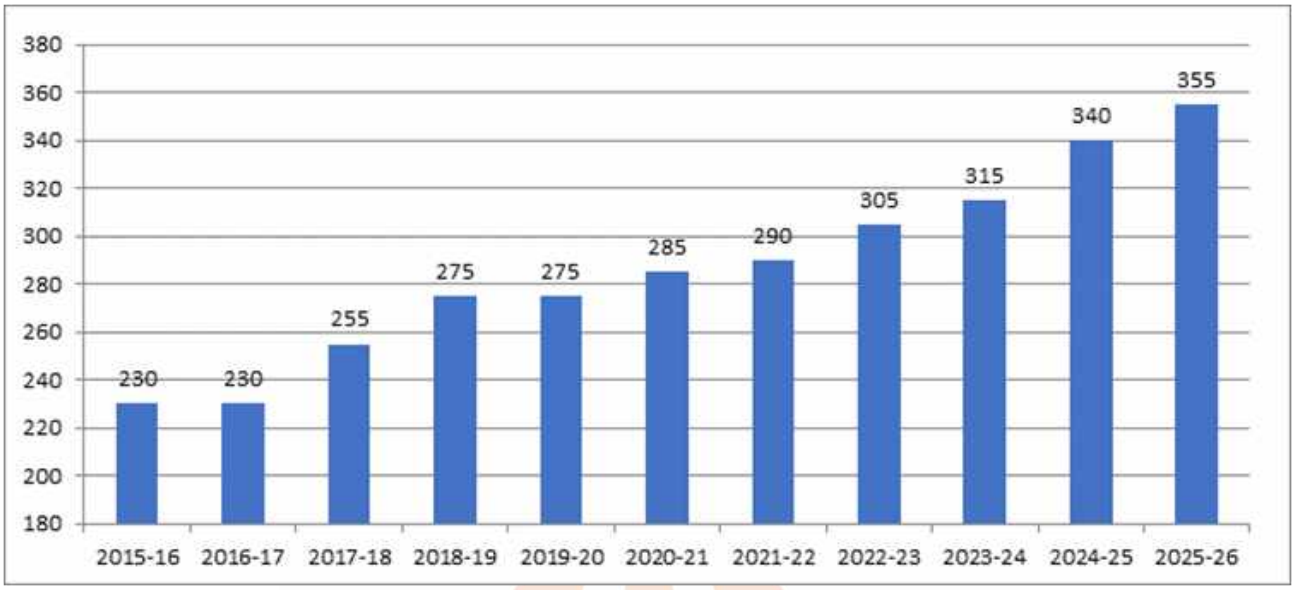
- Recommended by the Commission for Agricultural Costs and Prices (CACP).
- Final decision rests with the Cabinet Committee on Economic Affairs (CCEA).

Objectives of FRP:

- Provide assured income to sugarcane farmers.
- Shield farmers from market price volatility.
- Ensure sustainable production and protect farm livelihoods.
- Support a stable and fair supply chain in the sugar sector.

Process of Fixing FRP:

- Cabinet Committee on Economic Affairs (CACP) calculates FRP based on: Cost of production (A2 + FL), Sugar recovery rate, Demand-supply trends and Profit margin for farmers.
- Consultations held with State Governments, industry stakeholders, and farmers' bodies.



Key Features of the FRP System:

- Annual Announcement: FRP is declared each year by the Government before the sugarcane crushing season (October–September).
- State Advisory Price (SAP): Some states fix a higher SAP than FRP, in such cases, sugar mills must pay the higher of the two.
- 14-Day Payment Rule: Sugar mills are legally bound to pay farmers within 14 days of cane delivery.
- Penalty Provision: If mills delay payments, they are liable to pay interest and may face license cancellation.
- Lower Recovery Protection: Even if sugar recovery falls below 9.5%, farmers are guaranteed a minimum of 329.05/qtl, with no deduction applied.

1: Indian Media and Entertainment Industry

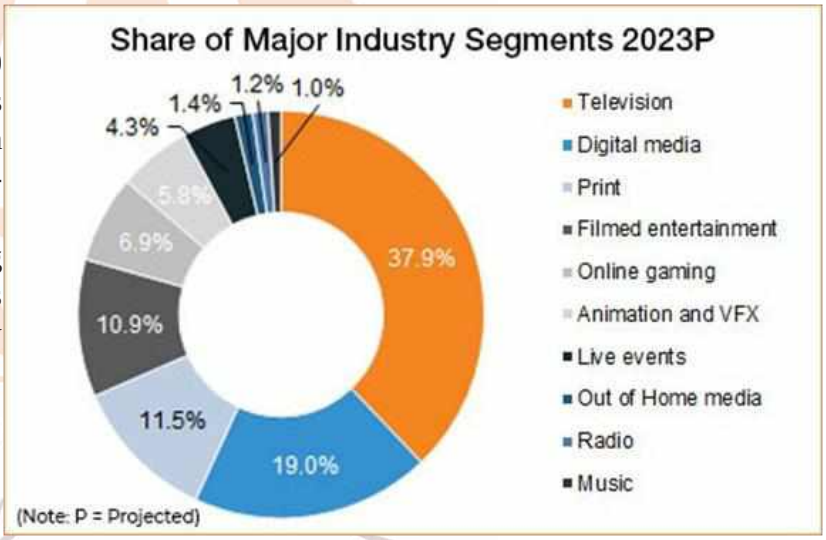
India's M&E industry is among the fastest-growing globally, driven by affordable internet, rising incomes, and rapid digital adoption. It is witnessing increasing Average Revenue Per User (ARPU) and expanding content volumes.

- As per the FICCI-EY report, India's advertising-to-GDP ratio is expected to rise from 0.38% (2019) to 0.4% by 2025.

Industry Size and Growth Projections

- Projected to grow at 10% CAGR, reaching Rs. 3.08 trillion by 2026 (from Rs. 2.55 trillion in 2024).
- Traditional media (TV, print, radio, etc.) contributed 57% of 2023 revenues; print media expected to grow 8–10% in FY25 (ICRA).
- Video market (TV + digital): Forecasted to grow from US$ 13 billion (2023) to US$ 17 billion by 2028 (Media Partners Asia).

Key Segments and Digital Surge



- Advertising: Projected at Rs. 330 billion in 2024, with TV and digital ads each contributing 38%. India ranks 8th globally in ad spend and is the fastest-growing among the top 10 markets.
- OTT & Video Streaming: Growing at a CAGR of 14.1%, the segment is expected to reach Rs. 21,032 crore by 2026. India had 481.1 million users in 2023, including 138.2 million paid subscribers and 130.2 million SVOD accounts (2022). Revenues from international users on Indian OTT platforms surged by 194% over two years.
- AVGC Sector (Animation, VFX, Gaming, Comics): Expected to grow at ~9% CAGR, reaching Rs. 3 lakh crore by 2024. Animation and VFX alone are projected to grow from US$ 1.3 billion (2023) to US$ 2.2 billion (2026) (CII GT report), increasing their share in the M&E industry from 5% to 6%.
- Online Gaming: The 4th largest M&E segment, India's online gaming market is projected to reach US$ 7 billion by 2025. The country had 455 million gamers in 2023, expected to rise to 491 million in 2024, with 90 million paying users. Revenue stood at US$ 3.8 billion in FY24, marking a 23% YoY growth. Mobile gaming time increased by 20% in Q1 FY24.

Other Notable Segments

- Digital Media: Projected to generate US$ 10.07 billion in revenue in 2024.
- Smart TVs & Short-form Videos: India is expected to have 40–50 million connected smart TVs by 2025. Around 600–650 million users are consuming short videos with an average daily viewing time of 55–60 minutes.
- Music Streaming: Set to grow from US$ 180 million (2019) to US$ 445 million (2026). India had 185 million listeners in 2023, but only 7.5 million were paid subscribers. Major platforms include Gaana (30%), Spotify (26%), JioSaavn (24%), and Wynk (15%).
- DTH Services: Estimated to grow from US$ 6.48 billion (2023) to US$ 7.59 billion (2029), at a CAGR of 2.8%.

Investments & Developments

- FDI Inflows: Totalled Rs. 99,096 crore in the Information & Broadcasting sector from April 2000 to September 2024.
- Private Equity/Venture Capital Investments: Declined by 84% YoY to US$ 575 million in 2023. Q3 CY23 recorded 8 deals worth US$ 269 million.

Government Initiatives

The Government of India has taken several regulatory and institutional steps to support the structured and ethical growth of the Media & Entertainment (M&E) industry:

- FM and Radio Expansion: Prime Minister commissioned 100W FM transmitters at 91 locations (April 2023). AIR's reach extended to 615 transmitters, covering 73.5% of the population.
- International Promotion: India showcased its AVGC capabilities at the Annecy International Animation Festival in France (June 2023).

Regulatory Reforms:

- TRAI is seeking to fast-track its recommendations to the Ministry of Information and Broadcasting (MIB) to catalyze broadcasting sector reforms.
- The Cable Television Network (Amendment) Rules, 2021 introduced a three-tier grievance redressal mechanism for citizens concerning TV content.
- The Information Technology (Intermediary Guidelines and Digital Media Ethics Code) Rules, 2021, notified on February 25, 2021, established a progressive regulatory structure for digital media, covering news publishers and OTT platforms through a three-layer grievance redressal system.

Institutional Developments:

- The government is working to establish a National Centre of Excellence for Animation, Visual Effects, Gaming, and Comics (AVGC) in Mumbai. This announcement was reiterated in November 2021.
- The Indian Broadcasting Foundation (IBF) expanded its mandate in May 2021 to include digital and OTT platforms, renaming itself as the Indian Broadcasting and Digital Foundation (IBDF). IBDF is also tasked with setting up a Self-Regulatory Body (SRB) under the 2021 IT Rules.

International Cooperation:

- India and Canada signed an audio-visual co-production agreement, allowing producers in both nations to collaborate on creative content and cultural exchange.
- Prasar Bharati and PSM Maldives signed a cooperation agreement in February 2021 for capacity building in broadcasting.

Support for OTT and Digital Platforms:

- OTT platforms such as Netflix, Amazon Prime Video, Disney+ Hotstar, ZEE5, and Voot have endorsed a self-regulation code finalized in February 2021 by the Digital Entertainment Committee of IAMAI, laying the foundation for responsible content creation.

Content Oversight Expansion:

- In November 2020, OTT platforms, films, web series, news, and current affairs on digital platforms were brought under the purview of the Ministry of Information and Broadcasting.
- Ease of Filming:
- The Film Facilitation Office (FFO) under NFDC, in partnership with the Ministry of Railways, launched a single-window clearance system to simplify permission procedures for filming at railway locations.

Road Ahead

India's M&E sector is on a trajectory of high growth—expected to outpace the global average, driven by key structural and technological shifts:

- Digital Adoption: The roll-out of 5G and upcoming 6G planning, especially in rural regions, is poised to revolutionize content consumption, opening new markets for advertisers and content creators.
- Retail and E-Commerce Advertising: The entry of new players in food & beverage, increased e-commerce usage, and exploratory campaigns by domestic firms are likely to fuel growth in retail advertisements.

- Rural Expansion: As urban markets saturate, rural India is emerging as the next frontier for M&E growth, supported by rising incomes, internet penetration, and digital literacy.

2: WAVES 2025

WAVES (World Audio Visual & Entertainment Summit) is a flagship global summit for the Media and Entertainment (M&E) sector, organized by the Ministry of Information and Broadcasting, Government of India.

- It brings together global industry leaders, innovators, and stakeholders to deliberate on challenges and growth opportunities, foster international cooperation, and shape the future of the M&E industry.
- A key initiative launched during the summit is the "Create in India Challenge", aimed at encouraging innovation, entrepreneurship, and content creation within India's vibrant creative ecosystem.

Creative Economy (Orange Economy)

The creative economy is a knowledge-intensive sector encompassing industries that involve the creation, production, and distribution of creative goods and services. These include:

- Advertising, architecture, design, and fashion
- Performing arts, visual arts, and literature
- Film, music, publishing, and photography
- Software, R&D, and digital content

India's creative industry:

- Valued at USD 30 billion
- Employs nearly 8% of the national workforce
- Hosts over 100 million content creators as of 2023

India's Media and Entertainment Sector

- India has the 5th largest M&E industry globally (after the US).
- Projected to grow to USD 44.2 billion by 2028
- A key pillar of India's soft power and digital economy, contributing significantly to employment, exports, and innovation.

3: Unleashing India's Creative Capital for Economic & Cultural Rise

India's Animation, Visual Effects, Gaming, Comics, and Extended Reality (AVGC-XR) sector is undergoing rapid growth, poised to become a global content creation powerhouse in the next 5–6 years. Government initiatives, a rich talent pool, and expanding digital infrastructure are felling this transformation.

Sector Overview and Growth Potential

- India currently houses over 4,000 AVGC studios, mainly concentrated in Mumbai, Bengaluru, Pune, Hyderabad, and Chennai, while smaller towns are also witnessing increased studio activity.
- With a foundation rooted in India's rich cultural heritage, diverse art forms, and skilled artists, the sector is increasingly being recognized for its potential in value creation and employment generation.
- The industry, growing at an annual pace of 25–35% in some segments, currently employs 2.6 lakh professionals and is expected to create 23 lakh direct jobs by 2032.
- Revenue is projected to grow from the current USD 3 billion to over USD 26 billion by 2030. Although India's current contribution to the global AVGC-XR market is just 0.5%, government estimates suggest that it can capture up to 5% (USD 40 billion) by 2025, creating 1,60,000 new jobs annually.
- Key job roles likely to emerge include content developers, animators, pre- and post-production artists, pre-visualization artists, compositors, and more.

Challenges in the AVGC-XR Sector

- Lack of Authentic Data: The absence of reliable data on employment numbers, industry size, and educational institutions makes policy planning and investment decisions difficult.
- Skill Gap in Education and Employment: The sector demands a highly specialized workforce (animators, developers, designers, product managers, localization experts), but the current academic curriculum lacks alignment with industry requirements, leading to a shortage of skilled professionals.
- Infrastructure Constraints: Inadequate training infrastructure results in poor-quality instruction and substandard workforce output, negatively impacting the industry's productivity and growth.

- Limited Focus on R&D: There's a deficiency in dedicated research narratives, resulting in low innovation and a lack of academic inquiry into future trends in AVGC-XR technologies.
- No Apex Academic Institution: Unlike sectors such as engineering or design that have IITs and NIDs, AVGC lacks a national-level institution to guide academic excellence, innovation, and skill standardization.
- Funding Limitations: With no dedicated fund for promoting AVGC-XR, startups and innovators struggle with access to capital, slowing domestic production and technological innovation.
- Weak Indigenous IP Creation: Most of India's AVGC output is outsourced foreign work; there's a lack of globally recognized Indian intellectual property (IP). To compete globally, local content creation must be incentivized through tax benefits and other concessions.

Government Interventions

- Educational Integration under NEP 2020: The National Education Policy (NEP) 2020 integrates creative arts and design into curricula from Class 6 onwards, promoting early exposure to AVGC-XR skills. Already, around 5,000 schools (CBSE + state boards) have introduced AVGC-XR learning, with national rollout underway to make animation a family-friendly, mainstream medium.
- Policy Framework and Task Force: The 2022–23 Union Budget announced an AVGC Promotion Task Force to recommend measures for strengthening domestic capacity and global positioning. Several states—Karnataka, Maharashtra, and Telangana—have implemented proactive state-specific policies, often in collaboration with industry bodies like FICCI, ABAI, and SAIK to drive tailored growth.

Way Forward

- Skilling and Education Reform: Continued emphasis on skill development programs, both formal (schools and colleges) and informal (vocational training), is essential. Courses must be tailored to actual industry requirements, preparing a job-ready workforce.
- Academic-Industry Collaboration: Stronger partnerships between educational institutions and industry players are crucial to align the curriculum with real-world needs. Initiatives such as guest lectures, internships, and industry-backed projects can bridge this gap.
- Promotion of Local IPs: India must incentivize domestic content production and support creation of globally relevant Indian stories to strengthen the country's soft power.
- Establishment of a National AVGC Institute: A dedicated national institute akin to IITs or NIDs should be established to promote research, innovation, training, and incubation of startups in the AVGC-XR domain.
- Dedicated AVGC Funding Mechanism: Government and private sector must collaborate to launch a dedicated AVGC fund that supports startups, R&D, IP development, and infrastructure enhancement through low-interest loans and grants.

Conclusion

India's AVGC-XR sector represents a confluence of digital innovation, cultural expression, and economic opportunity. By addressing foundational challenges through policy reforms, education overhaul, funding, and IP support, India can emerge as a global leader in AVGC content creation, generating employment, exports, and cultural capital in the digital economy.

4: Investment Opportunities in Media & Entertainment Sector

India's Media & Entertainment (M&E) sector is at the cusp of a transformative era. Backed by a burgeoning digital economy, a young population, and supportive government policies, the sector is rapidly evolving into a dynamic investment landscape.

- With increasing FDI inflows and a focus on original content and innovation, India is poised to become a global content powerhouse.

Market Dynamics and Growth Drivers

India's M&E sector benefits from extensive digital penetration — with 971 million internet users and 690 million smartphone users — leading to widespread content creation and consumption. Entertainment has become the fifth-largest category in monthly per capita consumption, especially among the 377 million Gen-Z, who contribute 48% of India's Out-of-Home (OOH) entertainment spending. India is:

- The second-largest mobile gaming market (by downloads).

- Host to the second-largest anime fanbase.
- The third-largest video market globally.

In 2024, new media and OOH entertainment contributed 41% and 14%, respectively, to industry revenues — underscoring their pivotal role.

FDI Landscape and Investment Scope

FDI limits range between 26% and 100%, depending on content/activity:

- 100% FDI is allowed in segments like films, gaming, animation, VFX, and advertising.
- Since 2000, the sector has attracted USD 11.5 billion in cumulative FDI, primarily in film, print, and radio.
- The new media segment alone generated Rs 876 billion in M&A deal value in 2024.

Gaming and Esports Boom

India's gaming market:

- Valued at USD 2–3 billion in 2024, expected to reach USD 9.2 billion by FY29 at a 20% CAGR.
- 23 million new gamers were added in FY24, bringing the total base to 590 million.
- Average Revenue Per Paying User (ARPPU) rose from USD 8 in FY20 to $22 in FY24, projected to reach USD 4.3 billion from IAPs by FY29.

VC/PE Investment Trends:

- $1 billion infused in 2024, a 25% YoY increase.
- Around 50 VC funds, including Sequoia, Accel, and Tiger Global, have invested in Indian gaming startups.
- Mobile gaming accounted for 60% of investments; esports & real-money gaming: 30%, gaming tech: 10%.

Global Partnerships:

- Major players like Sony (India Hero Project) and Krafton (India Gaming Incubator) have launched programmes to support Indian developers.
- Imports of gaming consoles/machines doubled to USD 75.15 million in FY24 from USD 37.64 million in FY23.
- Gaming arcades now account for 48% of all indoor amusement centers (IACs) in India.

Esports Investment Potential

India's esports market:

- Expected to grow from USD 40 million in 2023 to $100 million by 2025.
- Hosts 1.8 million players and 20 professional teams participating in global events like the Commonwealth Esports Championship and Hangzhou Asian Games.

Infrastructure Opportunities:

- High scope for investments in athlete training, LAN gaming centers, esports cafés, and arenas.
- State governments (e.g., MP, TN, Kerala, UP, Bihar, Nagaland, Meghalaya) are investing in soft and hard infrastructure to develop local esports ecosystems.
- Firms like Krafton and Nodwin are organizing grassroots tournaments, nurturing talent.

Animation & VFX: Emerging Creative Powerhouse

The Animation & VFX sector stood at USD 1.2 billion in 2024. Two major trends:

- Rise in anime consumption in India — the 2nd largest anime fanbase globally after China.
- Entry of global players like Crunchyroll.
- New opportunities in IP-related content, merchandising, and immersive experiences
- Rising domestic demand for VFX in Indian cinema and advertising:
- 30% of big-budget Indian film budgets now allocated to VFX.
- Mid-budget films spend ~15% on VFX.
- Studios like DNEG, Prime Focus, and Prana Studios are working on global projects, including Hollywood.

Infrastructure and AVGC Policy Push

The sector demands world-class infrastructure to attract global players, similar to:

- Dubai Media City
- Dutch Games Garden (Netherlands)
- SEF Arena for Esports (Riyadh)

Several Indian states (MP, Karnataka, Kerala, Rajasthan, Maharashtra) are planning AVGC parks/media cities under their state AVGC policies — creating opportunities for media firms, architectural firms, and PPP investments.

Government Initiatives & Policy Support

Since 2022, the Government of India has launched key schemes to incentivize the sector:

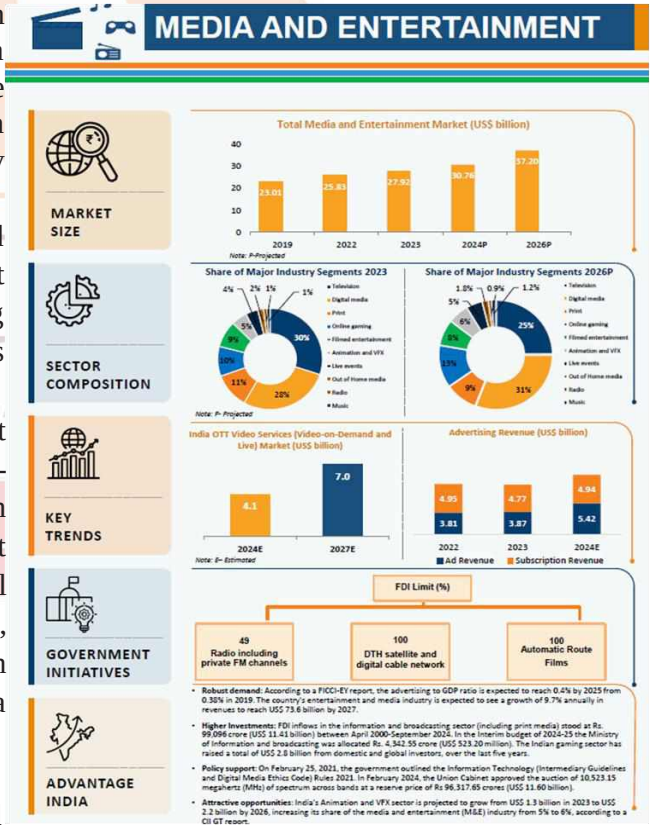
- Central incentive scheme (up to USD 3.5 million) for foreign companies producing/shooting content in India.
- 16 films incentivized so far.
- Formation of the Inter-ministerial AVGC Task Force (Budget 2022-23):
- Aims to capture 5% of the global AVGC market (USD 40 billion) and create 2 million jobs by 2030.
- In September 2024, the Union Cabinet approved the National Centre of Excellence for AVGC in Mumbai, recommended by the Task Force.

Conclusion

India's M&E sector is no longer confined to traditional entertainment. From mobile gaming and esports to animation, VFX, and out-of-home entertainment, the industry offers unprecedented investment opportunities. Robust digital infrastructure, proactive policy support, and a focus on IP creation are laying the foundation for India's emergence as a global creative hub. For global investors, the time is ripe to ride the wave of India's creative revolution.

5: Press in India' – Growth and Diversity of Print Media

The Indian print media industry has shown steady growth and resilience despite the rise of digital and social media platforms globally. The annual report 'Press in India' by the Press Registrar General provides comprehensive data on registered newspapers and periodicals, reflecting the diversity and linguistic plurality of India's publishing sector.



- Growth in Publications: From 1.18 lakh registered publications in 2017 to 1.48 lakh in 2022-23, the print media sector demonstrates adaptability and ongoing demand. In 2022-23 alone, 2,318 new periodicals were registered.
- Language Distribution: Hindi dominates the print media landscape with over 57,000 periodicals by 2022-23 and the highest circulation (~20 crores). English remains second in number (~20,000 periodicals) but shows slight circulation decline, possibly due to digital shifts. Regional languages like Marathi, Urdu, Telugu, Gujarati, and Malayalam also show significant growth in circulation, indicating strong readership and a literate, informed public across states.
- Regional Trends: Uttar Pradesh leads in the number of registered periodicals (~21,660), closely followed by Maharashtra (~20,488). These states also have high rates of compliance in filing annual statements, reflecting a robust print media ecosystem.
- Challenges and Closures: Although some periodicals ceased operations (34 in 2022-23), the decline is minimal compared to previous years, indicating resilience amidst financial challenges and changing audience preferences.
- New Publications: Title applications remain high, with over 14,000 applications in 2022-23 and around 4,772 new titles approved, showcasing ongoing dynamism and entrepreneurial interest in print media.

Chapter-
13

Kurukshetra June 2025

1- MSMEs Empowered by Science and Technology

Importance of MSMEs

- MSMEs (Micro, Small and Medium Enterprises) are crucial for economic growth, employment generation, export contribution, rural development, and inclusive growth in India.
- They enable equitable distribution of income and provide livelihood opportunities, especially in rural and semi-urban areas.
- There is a growing need to integrate MSMEs with scientific and technological advancements to convert publicly funded R&D into viable products and processes.

Science & Technology Interventions for MSMEs

- Government schemes provide MSMEs with resources in research, innovation, and technology, enhancing their global competitiveness and recognition.
- MSMEs are emerging as hubs of indigenous technological innovation in fields like energy-efficient electronics, electric bikes, drone technology, healthcare devices, and cleantech.

Key Science & Technology Initiatives

Common Research and Technology Development Hub (CRTDH)

- CRTDH, launched by Department of Scientific and Industrial Research (DSIR) in 2014-15, fosters innovation in MSME clusters by linking industry, academia, and government. It offers R&D facilities, testing labs, design centers, pilot plants, and prototype development.
- Currently, 18 CRTDHs operate in sectors including electronics, renewable energy, affordable healthcare, environmental technology, and advanced materials, focusing on creating an ecosystem for innovation and commercialization.

CSIR Mega Innovation Complex for MSMEs

- The CSIR Mega Innovation Complex for MSMEs, established in Mumbai in January 2025 by CSIR, offers world-class incubation labs, technical support, scientific infrastructure, and networking spaces. It facilitates collaboration among MSMEs, startups, CSIR labs, deep-tech firms, and public research institutions, providing advanced scientific expertise and business development services.

NIDHI-Technology Business Incubator (NIDHI-TBI) Programme

- It was launched by the Department of Science and Technology under the NIDHI umbrella, supports high-risk, high-potential tech startups through incubators in educational and research institutions.
- It provides infrastructure, mentorship, legal, financial, and IP consultancy to help startups rapidly commercialize innovations and create employment aligned with national priorities.

NIDHI-Inclusive Technology Business Incubator (NIDHI-ITBI)

- NIDHI-ITBI promotes innovation and entrepreneurship in emerging startup ecosystems, focusing on rural, tier-2, and tier-3 cities with an emphasis on social inclusion—women, geographical diversity, and differently-abled individuals.
- It provides grants for proof of concept, prototyping, and early-stage development while building local innovation networks connecting academia, investors, and industry.

Centre for Rural Enterprise Acceleration through Technology (CREATE)

- CREATE, established in Leh, promotes rural industrialization and MSME growth in challenging terrains like Ladakh by providing training and development for local products such as pashmina wool, essential oils, and bio-processing, aiming to improve productivity, quality, economic capacity, and livelihoods in remote areas.

Expansion of Technology Development Centers

- The Ministry of MSME runs 33 Technology Development Centers across sectors, aiding MSMEs in design, manufacturing, skill development, and access to advanced technologies. New centers are being developed under a Build-Operate-Transfer (BOT) PPP model to expand reach, offering services like job work, precision production, and specialized tool manufacturing.

Scheme for New Technology Centers and Extension Centers

- It aims to establish 20 Technology Centers and 100 Extension Centers on a hub-and-spoke model, bringing advanced technologies like AI, AR, VR, IoT, and Robotics to grassroots and remote areas.
- So far,25 Extension Centers have been commissioned,training over 72,000 trainees and supporting 1,440 MSMEs.

Overall Impact

- Science and technology interventions are enhancing MSMEs' competitiveness, innovation, and global recognition by fostering an ecosystem that drives innovation, employment, rural upliftment, and inclusive growth. Consequently, the MSME sector is evolving from basic economic units into innovation hubs and key drivers of sustainable development in India's economy.

2- Navigating the Future of MSME Finances

Importance of MSMEs in the Economy

- MSMEs (Micro, Small, and Medium Enterprises) are vital to economic growth, acting as engines for multifaceted industrialization, especially in backward and rural regions.
- Globally, MSMEs constitute about 90% of businesses, generate 60-70% of employment, and contribute nearly 50% of GDP.
- In India, there are 6.23 crore registered MSMEs as of April 2025, employing 26.66 crore people.
- MSMEs contribute about one-third of India's GDP and over 45% of exports.
- The sector spans multiple industries: food processing, textiles, auto components, hospitality, manufacturing (including space components for Chandrayaan).
- Around 70% of MSMEs are in services, with micro-enterprises dominating the sector.

Evolving Definition of MSME

- From April 1, 2025, MSME definitions were expanded, doubling turnover limits and increasing investment ceilings 2.5 times.
- Earlier classifications were based solely on investment; since 2020, MSMEs are defined using dual criteria: investment and turnover.
- The government simplified registration through Udyam Registration Portal (URP) and Udyam Assist Platform (UAP), making it easier for smaller enterprises to formalize.

Table-2:Criteria for Classification of MSMEs (Figures in ₹crore)

Enterprise Classification	From 2.10.2006 to 30.6.2020		From 1.7.2020 to 31.3.2025		1.4.2025 onwards	
	Investment in Plant and Machinery		Investment in Plant and Machinery or Equipment	Turnover	Investment in Plant and Machinery or Equipment	Turnover
	Manufacturing	Services	(Does not exceed)			
Micro	Upto 0.25	Upto 0.10	1	5	2.5	10
Small	More than 0.25, but upto 5	More than 0.10, upto 2	10	50	25	100
Medium	More than 5, but upto 10	More than 2, upto 5	50	250	125	500

- Formalization increased MSME registrations from 1.65 crore (April 2023) to 6.23 crore (April 2025).
- Top states with maximum MSME registrations include Maharashtra, Uttar Pradesh, and Tamil Nadu.

Strengthening MSMEs: Government Initiatives

- MSME growth depends on skill development, affordable finance, technology adoption, marketing, and infrastructure.
- The 2025 Budget enhanced MSME classification thresholds to prevent penalizing growth and to include larger enterprises in MSME benefits.
- This broadening promotes inclusivity, competitiveness, and growth.

MSME Finance Framework

- MSMEs are a key segment of Priority Sector Lending (PSL), with banks required to allocate 40% of Adjusted Net Bank Credit (ANBC) to PSL and 7.5% specifically to Micro Enterprises.
- RBI targets 20% year-on-year credit growth to MSEs and increased lending accessibility.
- Loans up to 10 lakh to MSEs are collateral-free.
- RBI is considering a move to remove foreclosure charges on floating-rate loans to enable MSMEs to switch lenders and benefit from lower interest rates.

Credit Guarantee Scheme (CGS)

- CGS protects lenders from borrower defaults by providing guarantees via Credit Guarantee Fund Trust for Micro and Small Enterprises (CGTMSE).
- The guarantee limit increased from 5 crore to 10 crore from April 2025.
- Guarantee coverage varies: up to 90% for women-owned enterprises, 85% for SC/ST entrepreneurs, 80% for enterprises in North-East and J&K, and 75% for others.
- Since 2000, CGS has given 71 lakh guarantees worth 4.27 lakh crore; in just 2023-2025, 44 lakh guarantees worth 5.02 lakh crore were given.
- The reduction of guarantee fees by 50% in 2023 greatly boosted scheme uptake.

Key Schemes Supporting MSMEs

- Prime Minister's Employment Generation Programme (PMEGP):
- Focuses on self-employment via micro-enterprises in non-farm sectors.
- Provides up to 95% bank finance with subsidies up to 35%.
- Assisted over 10 lakh enterprises, generating 83 lakh jobs.

Pradhan Mantri Mudra Yojana (PMMY):

- Offers collateral-free loans for income-generating activities.
- Disbursed over 51.67 crore loans worth 32.61 lakh crore since 2015.

PM Vishwakarma Scheme:

- Launched in 2023 to support traditional artisans with skill upgradation, toolkits, digital incentives, and concessional loans.
- Nearly 30 lakh beneficiaries registered within 18 months; 4 lakh loans sanctioned.
- Offers loans up to 3 lakh at concessional 5% interest, with government subvention.

Self Reliant India Fund:

- Set up under Atmanirbhar Bharat with 10,000 crore government contribution plus 50,000 crore private equity.
- Provides equity support to growth-oriented MSMEs through venture capital.

Key Takeaways

- MSMEs are critical for inclusive growth, employment, and exports in India.
- Recent policy reforms have broadened the definition of MSMEs, enabling more enterprises to avail benefits.
- Access to affordable and collateral-free finance, combined with credit guarantees, is boosting MSME growth and formalization.
- Government schemes like PMEGP, PMMY, and PM Vishwakarma provide comprehensive support from credit to skill enhancement.
- Upcoming RBI guidelines on foreclosure charges can further improve credit flexibility for MSMEs.
- The expansion of the Credit Guarantee Scheme reflects the government's commitment to easing financing constraints for MSMEs.

3-Technology Adoption by MSMEs in India

Micro, Small and Medium Enterprises (MSMEs) play a pivotal role in India's economic landscape. With over 4 crore enterprises employing nearly 18 crore people and contributing around 30% to the GDP and nearly 50% to exports, MSMEs are often termed as the engine of inclusive growth. However, despite their importance, the

sector continues to struggle with technological backwardness, severely hampering their productivity, innovation, and global competitiveness.

Current State of Technology in MSMEs

The MSME technology ecosystem in India remains fragmented, underdeveloped, and underperforming. Many MSMEs operate with outdated machinery, lack in-house R&D capabilities, and are unable to commercialize innovations. While government-supported R&D and innovation programmes exist, the absence of structured linkages between MSMEs and technology institutions results in poor absorption and integration of new technologies at the enterprise level.

Key Challenges in Technology Adoption

- Financial Constraints: Limited access to affordable credit, high capital costs, and thin operating margins discourage long-term investments in new technologies or machinery
- Lack of Awareness and Digital Literacy: Many MSME owners and workers are unaware of relevant technologies and their benefits. Low digital literacy further hinders the adoption of digital tools and platforms.
- Limited Market Intelligence: Inadequate access to data on consumer behavior, demand patterns, and global market trends restricts innovation and competitiveness.
- Skill Gaps and Workforce Limitations: There is a shortage of professionals skilled in emerging technologies like AI, automation, and data analytics. Additionally, limited hands-on training hampers workforce upskilling.
- Obsolete Equipment and Low Productivity: Due to the high cost of modern machinery, many MSMEs depend on outdated or second-hand equipment, affecting efficiency and product quality.
- Inadequate Infrastructure: Poor internet access, unreliable power supply, and lack of digital infrastructure in rural and semi-urban areas pose significant barriers to technology adoption.
- Misalignment and Complexity of Tech Solutions: Many off-the-shelf technologies are not tailored to MSME needs, and limited in-house capacity prevents effective customization and integration.
- Low Penetration of Emerging Technologies: Advanced solutions like AI, IoT, AR/VR, 3D printing, and Industry 4.0 remain underutilized due to high costs, complexity, and lack of awareness.

Emerging Technologies and their Impact on MSMEs

Technology	Potential	Challenges
AI & Automation	Boost efficiency, streamline operations	Job displacement, skill mismatch
IoT & Smart Manufacturing	Real-time data, predictive maintenance	High infra requirements
3D Printing	Rapid prototyping, customization	High setup cost, material limitations
AR/VR	Better customer experience, product design	Lack of awareness, investment
Green Tech	Sustainability, global market access	High cost, lack of eco-materials

Government Interventions

- MSME Technology Centres (TCs): Provide tools, product development support, and skill training through 15 new centres established under the World Bank-aided TCSP.
- ZED Certification Scheme: Promotes Zero Defect Zero Effect manufacturing by encouraging highquality production with minimal environmental impact.
- PRISM Scheme: Supports grassroots innovation and facilitates the commercialization of ideas by individuals, startups, and MSMEs.
- Extension Centres (ECs): 100 ECs are being set up to deliver Technology Centre services to last-mile MSMEs across the country.
- CGTMSE: Eases access to credit by offering collateral-free loans to micro and small enterprises through credit guarantees.
- Digital MSME Scheme: Facilitates adoption of cloud computing and ICT tools to enhance competitiveness and digital readiness.

- MSME Champions Portal: Acts as a one-stop platform for grievance redressal, access to government schemes, and real-time advisory support.

Way Forward

- Strengthening the Technology Ecosystem: Establish industry-academia linkages and sector-specific innovation hubs to co-develop and adopt scalable tech solutions for MSMEs.
- Ensuring Access to Affordable Finance: Promote fintech and alternative lending platforms, along with subsidized credit lines focused on technology upgradation.
- Capacity Building and Skill Development: Upskill the workforce in digital technologies,smart manufacturing, and green processes while expanding tool rooms and skilling centers, especially in backward regions.
- Upgrading Infrastructure: Enhance internet connectivity, power reliability, and digital infrastructure in rural and semi-urban areas to support industrial growth.
- Promoting Green and Sustainable Manufacturing: Offer subsidies for green technology adoption and introduce certification and branding for eco-friendly MSMEs to boost market competitiveness.

Conclusion

Technology adoption is no longer a luxury but a necessity for the survival and growth of MSMEs. While various government initiatives have laid the foundation, a more targeted, inclusive, and collaborative approach is required to overcome existing bottlenecks. By enhancing access to finance, building digital infrastructure, upskilling the workforce, and fostering innovation ecosystems, India can unlock the full potential of its MSME sector and make it globally competitive in the digital era.

4- Revitalizing Indian MSMEs

The Union Budget 2025–26 marks a pivotal shift in India's development trajectory by placing Micro, Small, and Medium Enterprises (MSMEs) at the core of economic transformation.

- Recognized as one of the four critical pillars alongside agriculture, exports, and private investment, MSMEs are vital to India's industrial and employment landscape.
- With over 6.3 crore registered enterprises employing more than 25 crore people and contributing 45.73% to India's total exports in FY 2023–24, MSMEs are the second-largest employment generator after agriculture and play a central role in decentralized industrialization.

Revised Classification: Enabling Growth Without Fear

- A cornerstone reform in the Budget is the upward revision of MSME classification thresholds to address the "fear of graduation." Micro Enterprises can now invest up to 2.5 crore with turnover limits raised to 10 crore.
- Small Enterprises can invest up to 25 crore with turnover up to 100 crore, while Medium Enterprises can go up to 125 crore in investment and 500 crore in turnover.
- This 2.5x increase in investment and 2x rise in turnover thresholds is designed to help enterprises scale without losing fiscal and institutional benefits, thereby bridging the "missing middle" in the industrial ecosystem.

Credit Empowerment: Strengthening Financial Access

- Credit access has received a substantial boost through the expansion of the Credit Guarantee Fund Trust for Micro and Small Enterprises (CGTMSE).
- The credit guarantee cover for micro and small enterprises has been doubled from 5 crore to 10 crore, unlocking 1.5 lakh crore in credit over five years. For innovation-driven startups, the guarantee cap has been raised to 20 crore with reduced fees for loans in 27 priority sectors.
- Export-oriented MSMEs can now access term loans up to 20 crore under a strengthened guarantee regime, advancing India's global competitiveness.
- Additionally, the launch of a customized MSME Credit Card for Udyam-registered micro units—offering up to 5 lakh credit support—will facilitate digitized, collateral-free working capital access, with 10 lakh cards to be issued in the first year.

Startup and Inclusive Entrepreneurship Push

- To stimulate grassroots innovation and inclusive growth, the Budget proposes a 10,000 crore Fund of Funds to nurture startups across sectors, especially in Tier-2 and Tier-3 cities.

- A dedicated scheme for 5 lakh first-time entrepreneurs from SCs, STs, women, and rural youth will offer term loans up to 2 crore over five years, with added support in the form of seed capital, interest subvention, technical mentorship, and institutional linkages.
- These measures build upon the Stand-Up India initiative and aim to democratize entrepreneurship across social and geographic boundaries.

Targeting Labour-Intensive Sectors: Employment and Exports

- Focusing on employment-intensive industries, the Budget introduces schemes to modernize and globalize sectors like footwear, leather, and toys.
- The Focus Product Scheme for the footwear and leather industry emphasizes design innovation, component manufacturing, and expansion in the non-leather segment—expected to create 22 lakh jobs and generate 4 lakh crore in turnover.
- Similarly, the toy sector will receive dedicated support for cluster development, modernization, and skillbuilding, positioning India as a global toy hub.
- A National Institute of Food Technology, Entrepreneurship, and Management will also be established in Bihar, aiming to boost food processing in eastern India.

Manufacturing and Clean Tech: Driving Future-Readiness

- Under the newly launched National Manufacturing Mission, MSMEs will receive policy support and sector-specific strategies to integrate into broader industrial value chains.
- A special emphasis is placed on clean technology manufacturing, with incentives for domestic production of solar PV cells, EV batteries, wind turbines, and high-voltage transmission equipment.
- These interventions align with India's green development goals and aim to position MSMEs as key players in the global clean energy transition, reducing import dependency and enhancing long-term industrial resilience.

Sustained Fiscal Commitment: Backing Growth with Budgetary Support

- The Budget allocates 23,168.15 crore to the Ministry of MSME for FY 2025–26, a moderate rise from 22,137.95 crore in FY 2024–25.
- While past years saw fluctuations—such as a drop to 17,306.70 crore in the Revised Estimate for 2024–25 and a peak at 23,628.73 crore in 2022–23—this year's allocation underscores consistent policy backing.
- Importantly, the sector's Gross Value Added (GVA) increased from 27.3% of GDP in 2020–21 to 30.1% in 2022–23, indicating growing economic resilience and impact.

Export-Led Growth and Global Integration

- MSMEs have emerged as a major force in India's export performance. Their exports grew from 3.95 lakh crore in 2020–21 to 12.39 lakh crore in 2024–25, with the number of exporting MSMEs rising from 52,849 to 1,73,350 in the same period.
- The sector's export share also climbed from 43.59% in 2022–23 to 45.79% in 2024–25 (till May 2024). This surge has been supported by trade facilitation, digital marketplaces, and product standardization, aligning MSMEs with India's global trade ambitions.

Conclusion

India's MSMEs are not just participants in economic development—they are catalysts of inclusive, sustainable, and globally integrated growth.The 2025–26 Budget sets a transformative roadmap by reinforcing scale, competitiveness, and accessibility for MSMEs across diverse sectors and geographies. As India progresses toward its $5 trillion economy goal, MSMEs will remain central to job creation, innovation, and industrial decentralization.

EXCEL

CIVILS ACADEMY

EMPOWERING FUTURE LEADERS