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GS Paper II: Current Affairs

1. UGC Regulations on Equity and Discrimination in Higher Education: Issues and Constitutional Concerns

a. Introduction: Universities, Equality and Social Reality

Institutions of higher education are expected to function as spaces of equality, dignity and intellectual freedom. They play a central role in shaping democratic values, social attitudes and critical thinking, and therefore occupy a special position in India's constitutional ecosystem.

However, universities do not exist in isolation from society. Social hierarchies, historical exclusions and structural inequalities often find expression within academic campuses as well. As a result, higher education institutions may reproduce, rather than neutralise, patterns of discrimination present in the wider society.

To address these concerns, regulatory frameworks have been developed to promote equity and prevent discrimination. The recent debate surrounding the UGC regulations on equity and discrimination brings into focus a deeper constitutional challenge: how to protect historically disadvantaged groups, particularly in relation to caste, while simultaneously ensuring fairness, clarity, due process and institutional trust.
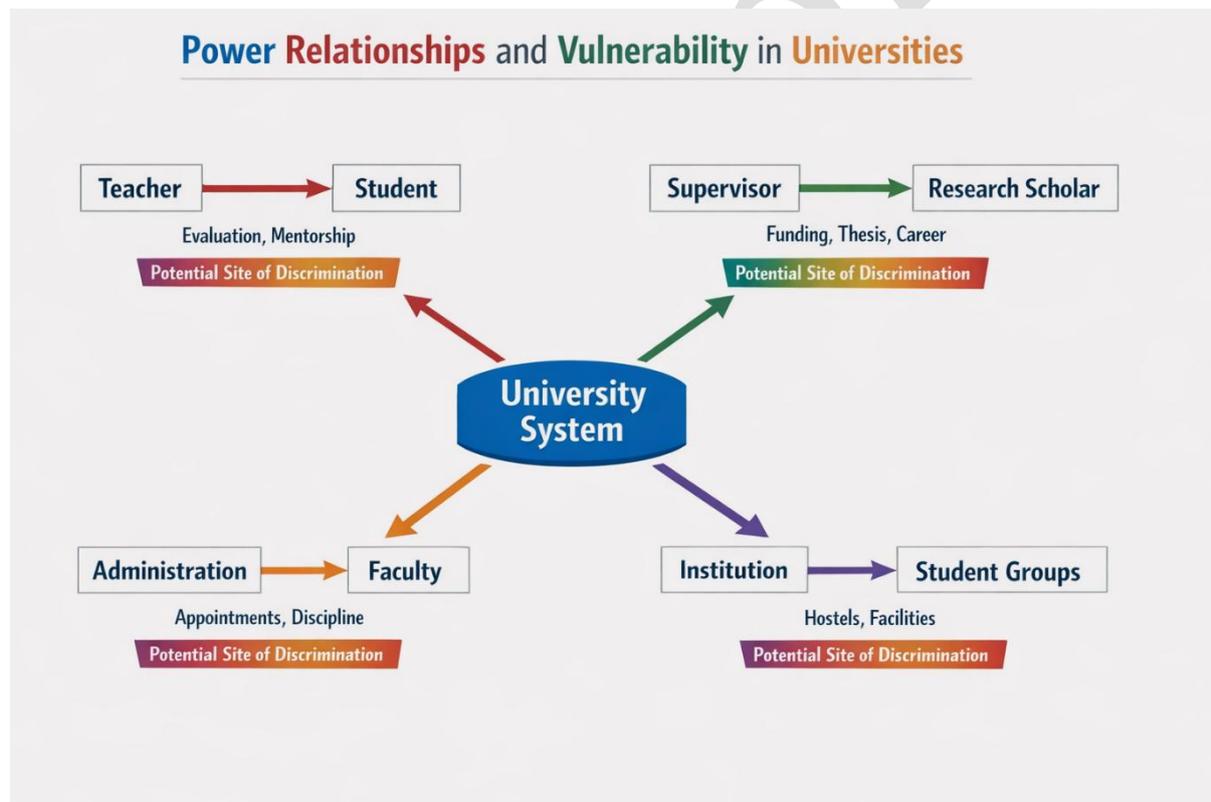
b. Equity and Non-Discrimination in Higher Education

Equity in education goes beyond identical treatment. It recognises that individuals and groups affected by historical disadvantage may require additional protection and support to achieve real and meaningful equality. This understanding is firmly embedded in India's constitutional philosophy.

Universities are complex institutions marked by multiple power relationships, such as those between:

- Teachers and students
- Administrators and faculty

- Supervisors and research scholars

Discrimination in such settings may manifest in admissions, evaluation practices, access to hostels and facilities, research supervision, or participation in institutional governance. Given these vulnerabilities, institutional grievance redressal mechanisms are essential to safeguard dignity, fairness and equal opportunity on campuses.

c. The 2012 Regulatory Approach

The earlier UGC framework introduced in 2012 addressed discrimination in a broad and inclusive manner. It defined discrimination as unfair or differential treatment based on factors such as:

- Caste
- Religion
- Gender
- Disability
- Language

The framework emphasised institutional responsibility rather than individual culpability. It mandated:

- Establishment of Equal Opportunity Cells
- Appointment of anti-discrimination officers
- Creation of internal grievance redressal mechanisms

Importantly, this approach avoided rigid sub-classifications. Discrimination was treated as a structural problem, requiring preventive, corrective and sensitisation-based responses within institutions.

d. Understanding Caste-Based Discrimination

Caste-based discrimination in India has a unique historical and social character. It is deeply entrenched, structurally asymmetric and closely associated with stigma, exclusion and denial of opportunity.

Unlike many other forms of discrimination, caste hierarchies have been reproduced across generations, affecting access to education, employment and social mobility. As a result, caste discrimination cannot be understood merely as an individual prejudice; it represents a systemic social order.

Recognising this reality, Indian constitutional law accords caste a special status in the equality discourse. Provisions relating to reservations, protective discrimination and social justice are premised on the understanding that caste-based disadvantage requires targeted constitutional remedies.

e. Constitutional Framework under Articles 14 and 15

The Constitution draws a clear distinction between formal and substantive equality.

Article 14 guarantees equality before the law and protection against arbitrariness, reflecting the principle of formal equality. However, in a society marked by deep historical inequalities, formal equality alone is insufficient to achieve justice.

Article 15 embodies the idea of substantive equality. It permits special provisions for Scheduled Castes, Scheduled Tribes and Other Backward Classes to correct structural disadvantage and ensure equal outcomes, not merely equal treatment. Indian constitutional jurisprudence has consistently affirmed that substantive equality is essential for genuine justice in unequal social conditions.

f. Conceptual and Institutional Concerns

Concerns emerge when caste-based discrimination is defined as a separate and distinct category, despite already being included within a broader definition of discrimination.

This raises questions of legal necessity and conceptual clarity. If caste discrimination is already recognised, introducing a separate definition may create overlap and ambiguity rather than strengthening protection.

There is also a risk of perceived one-sidedness. Regulatory language that appears to presume culpability or fixes caste discrimination into rigid categories may alienate sections of the academic community. Such perceptions can weaken institutional cohesion and reduce trust in grievance redressal mechanisms.

Moreover, universities ideally function as spaces where inherited social identities gradually lose salience through shared academic engagement. Over-categorisation may unintentionally reinforce caste identities, harden group boundaries and increase campus polarisation, undermining the transformative role of education.

g. Ambiguity, Overreach and Chilling Effects

Another significant concern relates to ambiguity in regulatory language. Broad or undefined terms allow subjective interpretation and inconsistent application, creating uncertainty in enforcement.

In the absence of clear procedural safeguards, grievance mechanisms may become vulnerable to misuse. An effective redressal system must protect genuine victims while also ensuring fairness to those accused.

Without safeguards against false or motivated complaints, there is a risk of:

- Reputational harm
- Erosion of academic freedom
- Fear-driven administrative decision-making

Such outcomes ultimately undermine the academic environment and institutional autonomy.

h. Due Process and Principles of Natural Justice

Any regulatory framework governing rights and liabilities must adhere to the principles of natural justice, including:

- The right to be heard
- Presumption of innocence
- Proportionality in disciplinary action

Due process ensures that regulations do not become instruments of arbitrariness, even when their objectives are morally justified. The legitimacy of equity regulations therefore depends not only on intent, but also on procedural fairness and constitutional soundness.

i. Harmonising Articles 14 and 15

The core constitutional challenge lies in achieving a balance between robust protection against caste-based discrimination and the need to avoid vague, overlapping or biased legal categories.

Articles 14 and 15 must operate together, ensuring both fairness and social justice. A balanced framework preserves institutional credibility, sustains confidence in grievance redressal mechanisms and upholds the rule of law within academic spaces.

j. Way Forward

A constitutionally robust approach would:

- Retain a broad and inclusive definition of discrimination
- Clearly recognise caste-based discrimination as a serious, historically rooted subset
- Provide precise definitions and transparent procedures
- Incorporate safeguards against misuse
- Emphasise sensitisation, training and institutional accountability

The focus should remain on effective enforcement and trust-building, rather than multiplying legal categories.

Conclusion

Equity regulations in higher education must function as protective instruments rather than punitive tools. Their purpose is to safeguard the dignity of historically disadvantaged groups while ensuring fairness, trust and procedural justice for all stakeholders.

A constitutionally sound framework must reflect both the lived reality of caste discrimination and the foundational principles of equality, due process and the rule of law. Only then can universities truly serve as spaces of dignity, dialogue and inclusion.

GS Paper III: Environment

2. Carbon Capture, Utilisation and Storage (CCUS): A Critical Technology for Achieving Net-Zero Emissions

a. Introduction: CCUS in the Climate Change Discourse

Mitigating carbon dioxide emissions lies at the core of the global response to climate change and global warming. Over the past two decades, rapid expansion of renewable energy and improvements in energy efficiency have made important contributions to emission reduction. However, these measures alone are insufficient to achieve deep decarbonisation across all sectors of the economy.

Certain economic activities emit carbon dioxide as an inherent outcome of their production processes, irrespective of the energy source used. In such cases, emissions cannot be eliminated merely by shifting to renewable electricity.

It is in this context that Carbon Capture, Utilisation and Storage (CCUS) emerges as a critical climate mitigation technology, particularly for achieving long-term net-zero emission targets.

b. Understanding Carbon Capture, Utilisation and Storage

Carbon Capture, Utilisation and Storage refers to a set of technologies designed to prevent carbon dioxide from entering the atmosphere after it is generated. The process involves three broad actions:

- Capturing carbon dioxide at the point of emission
- Transporting it safely to another location
- Either utilising it productively or storing it securely for long durations

In essence, CCUS allows economic and industrial activity to continue while ensuring that associated carbon emissions do not contribute to climate change.

c. The CCUS Process Explained

Overview of the CCUS Value Chain

The CCUS value chain consists of four interlinked stages, each playing a distinct role in managing carbon emissions from source to final disposition.

i. Carbon Capture

The first stage involves separating carbon dioxide from gases released during industrial and energy-related activities such as:

- Power generation
- Cement manufacturing
- Steel production
- Oil refineries
- Chemical and petrochemical industries

This stage is both energy-intensive and cost-intensive, as advanced separation technologies are required to isolate carbon dioxide efficiently from flue gases.

ii. Transportation

After capture, carbon dioxide is compressed and transported to utilisation or storage sites. Transportation may occur through:

- Pipelines for long-distance, high-volume transfer
- Ships, trucks or rail for shorter or flexible routes

Ensuring safety during transportation is critical to prevent leakage and accidental release.

iii. Utilisation

Captured carbon dioxide can be converted into value-added products, including:

- Chemicals such as methanol and urea
- Synthetic fuels
- Construction materials like carbon-cured concrete
- Industrial inputs for manufacturing

Utilisation helps offset part of the cost of carbon capture, although it does not guarantee permanent removal of carbon from the atmosphere.

iv. Storage

In the storage stage, carbon dioxide is injected deep underground into suitable geological formations such as:

- Depleted oil and gas reservoirs
- Deep saline aquifers
- Stable rock formations

The objective is to ensure permanent isolation of carbon dioxide from the atmosphere, thereby eliminating its climate impact.

d. Why CCUS is Essential for Certain Industries

Some industrial sectors are described as hard-to-abate because their emissions arise from chemical reactions inherent to production, not merely from energy use.

- In cement production, carbon dioxide is released during the calcination of limestone
- In steel manufacturing, carbon acts as a reducing agent in iron ore processing
- Chemical and refinery processes generate unavoidable process-based emissions

For such sectors, renewable energy adoption—though necessary—is insufficient on its own. CCUS remains the only viable pathway for deep and sustained emission reduction, making it indispensable for industrial decarbonisation.

Limits of Renewables and the Need for CCUS
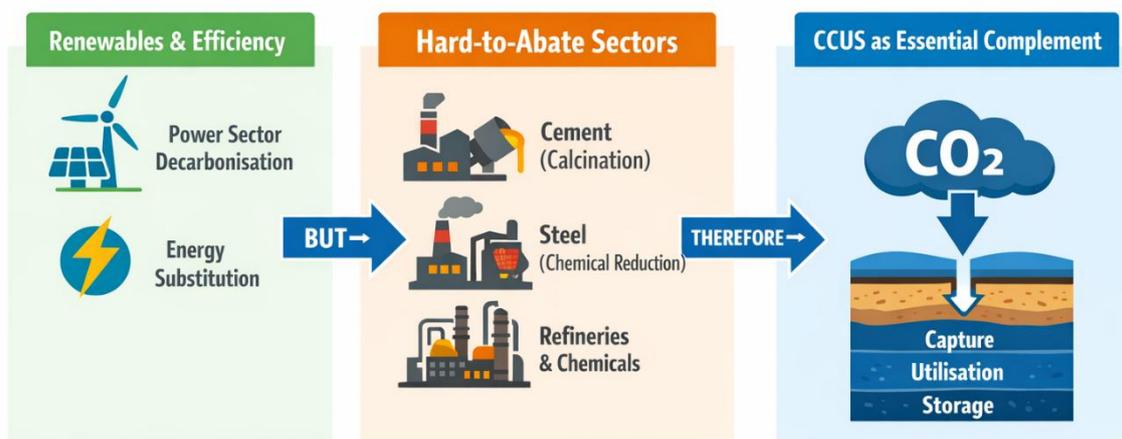
e. Global Significance of CCUS

Globally, annual carbon dioxide emissions are estimated at around forty billion tonnes. At present, only a small fraction—approximately fifty million tonnes per year—is captured using CCUS technologies.

Scientific assessments indicate that achieving global net-zero targets by mid-century would require carbon capture at a scale of hundreds of millions to several billion tonnes annually.

This vast gap between current capacity and future requirements highlights that net-zero pathways without CCUS are largely unrealistic, especially for industrialised and emerging economies.

f. CCUS in the Context of India's Development

India is a rapidly growing economy with expanding infrastructure, industrial output and energy demand. In the short to medium term, carbon emissions are likely to rise as developmental needs are met.

At the same time, India has committed to long-term emission reduction and net-zero goals. CCUS provides a balanced transition pathway, enabling continued industrial growth while progressively reducing carbon intensity.

It allows India to reconcile development imperatives with global climate commitments.

g. Current Status of CCUS in India

In India, CCUS is still at a nascent stage. Current efforts include:

- Pilot and demonstration projects in power, cement and steel sectors
- Indigenous technology development
- Identification of suitable geological storage sites
- Strengthening academic and research capabilities

The country is gradually transitioning from laboratory research to early-stage deployment.

h. Challenges in Large-Scale Deployment

Despite its potential, CCUS faces multiple challenges:

- High energy requirements and integration difficulties
- High capital and operating costs
- Limited immediate commercial returns
- Absence of strong carbon pricing signals
- Need for long-term monitoring of storage sites
- Lack of clear legal frameworks for storage liability

These barriers reduce private sector incentives and slow large-scale adoption.

i. Role of Public Support

Although CCUS technologies are scientifically proven, they are not yet commercially competitive at scale. Public investment is therefore essential to:

- Reduce financial risk
- Support large-scale demonstration projects
- Improve efficiency and reduce costs
- Attract private sector participation

This trajectory mirrors the early development of renewable energy technologies, which required sustained public support before achieving competitiveness.

j. CCUS and Climate Change Mitigation

CCUS plays a crucial role in addressing residual emissions that cannot be eliminated through renewable energy or efficiency improvements. It complements other mitigation strategies by:

- Enabling industrial decarbonisation
- Expanding feasible net-zero pathways
- Supporting long-term temperature stabilisation goals

Without CCUS, achieving the objectives of the Paris Agreement becomes significantly more difficult.

k. Way Forward

India's CCUS roadmap should focus on:

- Scaling pilot projects into commercial operations
- Establishing clear legal and regulatory frameworks
- Integrating CCUS within industrial clusters
- Developing transport and storage infrastructure
- Promoting public–private partnerships
- Linking CCUS deployment with carbon markets and climate finance

Conclusion

Carbon Capture, Utilisation and Storage is not a substitute for renewable energy, but a necessary complement to it. For sectors where emissions are structurally unavoidable, CCUS is indispensable for meaningful climate action.

For India, CCUS offers a pragmatic, development-aligned pathway to achieve long-term climate goals while sustaining economic growth. In the journey towards net-zero emissions, it represents not an option, but a strategic necessity.

GS Paper IIII: Disaster Management

3. Guidelines on Comprehensive Disaster Victim Identification and Management

a. Disaster Victim Identification: Concept and Context

Disaster Victim Identification (DVI) refers to the scientific, systematic and humane process of establishing the identity of deceased persons in situations involving mass fatalities. Such identification becomes essential when routine methods—such as visual recognition by relatives—become unreliable due to the large number of victims or the damaged condition of bodies.

Mass fatality incidents may result from natural disasters such as earthquakes, floods, cyclones, landslides and avalanches, as well as human-induced events like air and rail accidents, industrial explosions, fires and terrorist attacks. In many of these situations, bodies may be burnt, fragmented, decomposed, commingled or displaced far from the original site.

Under such circumstances, visual identification alone is prone to serious errors, making a structured forensic approach indispensable.

b. Rationale for a Structured DVI Framework in India

India's vulnerability to disasters is shaped by its diverse geography, dense population, rapid urbanisation and increasing frequency of extreme weather events. Past disaster responses have exposed several systemic weaknesses in victim identification, including:

- Prolonged delays in identifying deceased persons
- Misidentification due to poor tagging and documentation
- Weak coordination among multiple agencies
- Overburdened forensic laboratories
- Near absence of organised ante-mortem data such as medical or dental records

These shortcomings not only delay compensation and legal closure but also intensify psychological trauma for affected families.

Recognising these gaps, the National Disaster Management Authority (NDMA) proposed a uniform, nationally applicable Disaster Victim Identification framework, aligned with international best practices while remaining sensitive to Indian realities.
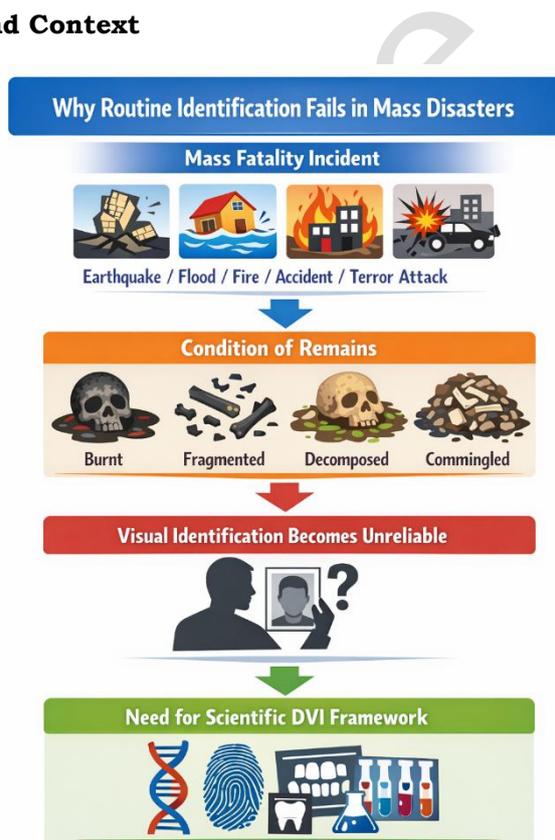
c. Humanitarian Forensics: The Philosophical Foundation

The NDMA guidelines are anchored in the principle of humanitarian forensics, which stresses that forensic accuracy must be accompanied by empathy, dignity and respect for human life—even after death.

Identification of disaster victims is not merely a technical or administrative exercise; it is a moral obligation of the State. Accordingly, the guidelines emphasise:

- Respect for cultural and religious practices
- Dignified handling of human remains
- Transparent communication with families
- Provision of psychological and social support

Thus, DVI is conceptualised as an area where science serves humanity, rather than replacing it.

d. The Four-Stage Disaster Victim Identification Process

Overview of the DVI Framework

The NDMA framework organises DVI into four sequential and interlinked stages, each building upon the previous one to ensure scientific reliability, legal credibility and humanitarian sensitivity.

i. Stage One: Systematic Recovery of Human Remains

The first stage involves the orderly and scientific recovery of bodies and body parts from disaster sites. Key components include:

- Proper tagging and labelling
- Detailed documentation and photography
- Mapping of recovery locations
- Strict maintenance of chain of custody

This stage is especially challenging in floods, landslides, explosions and fires, where remains may be scattered or severely damaged. A disciplined recovery process prevents commingling and preserves forensic evidence for later stages.

ii. Stage Two: Collection of Post-Mortem Data

At this stage, comprehensive forensic examination of recovered remains is conducted, including:

- Medico-legal autopsies
- Recording physical and biological characteristics
- Fingerprinting wherever feasible
- Dental examination
- DNA sampling
- Photographic documentation

The objective is to generate a scientifically robust post-mortem profile for each individual.

iii. Stage Three: Collection of Ante-Mortem Data

Ante-mortem data refers to information about missing persons collected from families, hospitals and official records. This may include:

- Medical and surgical history
- Dental treatment records
- Photographs and physical descriptions
- Identification marks and belongings
- DNA samples from close biological relatives

Historically, the absence of organised ante-mortem data has been one of the weakest links in India's disaster response, making this stage critically important.

iv. Stage Four: Reconciliation and Confirmation

In the final stage, ante-mortem and post-mortem data are systematically compared. Once identity is scientifically confirmed:

- Legal documentation is completed
- Death certification is issued
- Remains are released to families with dignity

This stage provides both legal certainty for the State and emotional closure for families.

e. Scientific Methods Used in Disaster Victim Identification

Internationally accepted DVI standards recognise three primary identifiers:

- Fingerprints
- Dental records
- DNA profiling

Each offers a high degree of reliability when correctly applied. Among these, forensic odontology holds special relevance for India due to its cost-effectiveness, speed and resilience under extreme conditions.

f. National Dental Data Registry: An Institutional Innovation

Teeth and jaw structures are among the most durable parts of the human body, often surviving fire, decomposition and prolonged burial. Dental patterns are also highly individual-specific.

To harness this potential, the NDMA guidelines recommend establishing a National Dental Data Registry to store ante-mortem dental information. Such a registry can:

- Reduce exclusive dependence on DNA profiling
- Enable faster identification in mass casualty events
- Improve outcomes in cases involving charred or degraded remains

g. Role of Forensic Archaeology in Disaster Contexts

The guidelines also integrate forensic archaeology, which applies archaeological techniques to locate, excavate and interpret human remains.

This discipline is crucial in disasters such as landslides, avalanches, forest fires and high-altitude accidents, where remains may be buried or recovered long after the event. It reinforces the humanitarian principle that no victim should remain unidentified or forgotten.

h. Institutional and Operational Arrangements

Effective DVI requires a clear command structure. The NDMA proposes appointing a Disaster Victim Identification Incident Commander, responsible for coordinating:

- Police and investigative agencies
- Health and mortuary services
- Disaster response forces
- Forensic experts and laboratories

Clear role delineation reduces confusion, prevents duplication, and ensures accountability during high-pressure disaster responses.

i. Implementation Challenges in India

Despite a robust framework, key challenges remain:

- Shortage of trained forensic professionals
- Limited mortuary and cold-storage infrastructure
- Weak medical and dental record-keeping
- Coordination difficulties across jurisdictions
- Ethical concerns related to DNA and data privacy

j. Way Forward

Strengthening DVI in India requires:

- Dedicated State-level DVI units
- Expanded training in forensic odontology, anthropology and archaeology
- Secure, interoperable digital databases
- Integration of DVI protocols into State Disaster Management Plans
- Strong ethical and privacy safeguards

Conclusion

Disaster Victim Identification is a crucial pillar of modern disaster management, located at the intersection of science, governance and humanity. A credible and compassionate DVI framework strengthens the rule of law, builds public trust, and enhances the moral legitimacy of the State's disaster response.

Ultimately, how a society identifies and honours its dead reflects the maturity, integrity and ethical depth of its institutions.

Reader's Note — About This Current Affairs Compilation

Dear Aspirant,

This document is part of the PrepAlpine Current Affairs Series — designed to bring clarity, structure, and precision to your daily UPSC learning.

While every effort has been made to balance depth with brevity, please keep the following in mind:

1. Orientation & Purpose

This compilation is curated primarily from the UPSC Mains perspective — with emphasis on conceptual clarity, analytical depth, and interlinkages across GS papers.

However, the PrepAlpine team is simultaneously developing a dedicated Prelims-focused Current Affairs Series, designed for:

- factual coverage
- data recall
- Prelims-style MCQs
- objective pattern analysis

This Prelims Edition will be released separately as a standalone publication.

2. Content Length

Some sections may feel shorter or longer depending on topic relevance and news density.
To fit your personal preference, you may freely resize or summarize sections using any LLM tool (ChatGPT, Gemini, Claude, etc.) at your convenience.

3. Format Flexibility

The formatting combines:

- paragraphs
- lists
- tables
- visual cues

—all optimised for retention.

If you prefer a specific style (lists → paras, paras → tables, etc.), feel free to convert using any free LLM.

4. Monthly Current Affairs Release

The complete Monthly Current Affairs Module will be released soon, optimized to a compact 100–150 pages — comprehensive yet concise, exam-ready, and revision-efficient.