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IMPORTANT INSIGHTS

GST Process Reforms 2026: Faster Refunds, Simplified Compliance and Stronger Safeguards for Taxpayers

Recent Developments:

- The **57th GST Council meeting**, held on 8 October 2026 under Union Finance Minister Nirmala Sitharaman, recommended a new phase of **process-oriented GST reforms**, focusing on registration, returns, refunds, adjudication and trade facilitation.
- While the **56th meeting (September 2025)** focused on rate rationalisation, the latest meeting prioritised reducing compliance costs, improving working capital and limiting unnecessary litigation. The Council also recommended specific changes and clarifications concerning goods and services, rather than a broad restructuring of GST rate slabs.
- Major recommendations include automated refunds, wider refund eligibility for accumulated **Input Tax Credit (ITC)**, higher prosecution thresholds, removal of arrest provisions, simplified e-commerce registration and restrictions on arbitrary interception of goods. These recommendations require the relevant statutory amendments, rules or notifications for implementation.

Background: Evolution of GST Reforms:

- **Goods and Services Tax (GST)** is a destination-based, indirect tax introduced on 1 July 2017, subsuming several central and state indirect taxes to create a more integrated national market.
- The **101st Constitutional Amendment Act, 2016** established the constitutional framework for GST, including Article 246A on legislative powers, Article 269A on inter-State supplies and Article 279A on the GST Council.
- The **GST Council**, a constitutional body comprising the Union and State representatives, recommends tax rates, exemptions, model laws and other measures for the functioning of GST.
- The reform trajectory has evolved from tax consolidation and rate rationalisation towards **administrative efficiency, taxpayer facilitation and predictable enforcement**.

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Major Recommendations of the 57th GST Council:

Faster Refunds and Improved Working Capital:

- **Automated refund processing:** The Council recommended system-based processing, including provisional sanction of 90% of eligible claims relating to zero-rated supplies and inverted duty structure, subject to system-based risk assessment. The acknowledgement or deficiency-memo timeline is proposed to fall from 15 days to 10 days.
- **Wider ITC refund eligibility:** Refunds of accumulated ITC on input services under the inverted duty structure are recommended for credit availed from **1 November 2026**. Refunds relating to eligible capital goods are proposed to be spread over 60 months for credit availed from **1 April 2027**.
- **Economic significance:** Faster refunds can reduce working-capital blockages, improve liquidity and support investment in sectors such as pharmaceuticals, food processing and consumer goods.

Simplified Registration and Return Filing:

- **Predictable registration:** Standardised document requirements, clearer online guidance and improvements to application forms are intended to reduce unnecessary queries and rejections.
- **Small e-commerce sellers:** A proposed simplified registration mechanism would enable eligible suppliers to sell goods through e-commerce platforms in additional States without establishing a physical place of business in each State, subject to prescribed conditions.
- **Simpler amendments and cancellations:** The Council recommended greater automation of registration amendments and cancellations, subject to compliance requirements, including filing pending returns and payment of dues.
- **Annual Return Quarterly Payment (ARQP):** An optional scheme received in-principle approval for eligible businesses with annual turnover up to ₹5 crore that exclusively supply to unregistered consumers. It aims to simplify return compliance while retaining quarterly tax payments; final implementation remains subject to further decisions.

Changes to Arrest, Prosecution and Penalties:

- **Removal of arrest powers:** The Council recommended omitting Section 69 of the Central Goods and Services Tax Act, 2017, thereby withdrawing arrest powers under the GST framework, subject to legislative implementation.
- **Higher prosecution threshold:** The monetary threshold for prosecution is proposed to increase from ₹1 crore to ₹5 crore, alongside rationalisation of specified offences under Section 132.
- **Lower penalties:** The maximum general penalty under Section 125 is proposed to decline from ₹25,000 to ₹10,000. A 5% reduced penalty is recommended for qualifying non-fraud cases where tax and interest are paid within the prescribed period, with removal of the minimum ₹10,000 penalty in such cases.
- **Significance:** These measures seek to distinguish genuine compliance disputes from serious fraud, improve proportionality in enforcement and strengthen trust between taxpayers and the administration.

Safeguards for Inter-State Movement of Goods:

- **Intelligence-based interception:** Vehicles carrying goods would generally be intercepted only on specific intelligence and with authorisation from an officer of at least Joint Commissioner rank.
- **Jurisdictional limits:** Inspection and detention would generally be restricted to cases where the supplier or recipient is located or registered in the State conducting the interception. Transit States would not ordinarily intercept consignments.
- **Exceptions:** The proposed framework retains powers to act where an e-way bill or the prescribed documents establishing the origin or destination of goods are absent.
- **Expected outcome:** These safeguards could reduce arbitrary detention, transport delays and logistics costs while preserving enforcement against tax evasion.

Export Facilitation and ITC Reforms:

- **Export of services:** Proposed amendments to the Integrated Goods and Services Tax Act, 2017, would remove certain restrictions affecting services supplied to or through foreign offices and branches, facilitating export treatment and related refunds where the statutory conditions are satisfied.
- **Blocked ITC:** The Council recommended removing specified restrictions on ITC, including those relating to selected insurance, catering and other supplies, subject to the proposed legal changes.
- **Other clarifications:** Recommendations concerning e-commerce delivery services include a 5% GST rate without ITC for specified services supplied through electronic commerce operators. The Council also proposed changes relating to scrap transactions and other classification issues.

Digital Administration and Dispute Resolution:

- **Return reconciliation:** Proposed changes to GST returns and electronic statements aim to improve consistency between outward supplies, tax liabilities and ITC claims, reducing mismatches and avoidable notices.
- **Fairer adjudication:** Standardised guidance for demand notices, adjudication and appeal orders is intended to promote reasoned decisions, timely proceedings and adherence to the principles of natural justice.
- **Faceless administration:** Digital assessment and reduced officer–taxpayer interaction can improve consistency and transparency. However, any separate faceless-assessment initiative should be distinguished from the specific recommendations formally listed in the Council's press release.

Significance for India:

- **Ease of doing business:** Simplified procedures and fewer discretionary interactions can reduce compliance costs, particularly for MSMEs and small online sellers.
- **Investment and exports:** Timely refunds and improved ITC flow can reduce tax cascading, ease liquidity constraints and strengthen the competitiveness of Indian manufacturers and service exporters.
- **Cooperative federalism:** GST reforms require coordination between the Union and States, making the GST Council an important institution for fiscal cooperation.
- **Formalisation:** Easier registration and digital compliance can encourage smaller enterprises to enter the formal economy and widen the tax base over time.

Challenges and Concerns:

- **Implementation gap:** Council recommendations do not automatically amend the law; legislative changes, notifications, rule amendments and portal upgrades may be necessary.
- **Revenue protection:** Faster automated refunds require effective risk assessment to prevent fraudulent ITC claims and wrongful disbursements.
- **Federal balance:** Limiting interception powers must not weaken legitimate action against evasion, particularly in cases involving missing documents or fraudulent transactions.
- **Digital exclusion:** Smaller businesses may continue to face difficulties due to limited digital literacy, unreliable connectivity and complex reconciliation requirements.
- **Legal certainty:** Changes to prosecution and adjudication must be accompanied by clear definitions, consistent procedures and safeguards against both arbitrary enforcement and deliberate non-compliance.

Way Forward:

- **Risk-based administration:** Combine automated approvals for low-risk taxpayers with data-driven scrutiny and targeted audits for high-risk transactions.
- **Transparent implementation:** Publish clear rules, standard operating procedures, implementation timelines and practical FAQs for taxpayers and tax officers.
- **Stronger grievance redressal:** Improve help-desk support, time-bound dispute resolution and access to effective appellate mechanisms.
- **Cooperative federalism:** Consult States and industry stakeholders before implementation and evaluate the effects on revenue, compliance and litigation.
- **Outcome-based monitoring:** Track refund-processing times, registration rejection rates, litigation pendency, fraudulent ITC detection and MSME compliance costs.

Value Addition for UPSC:

- **GS Paper II:** Constitutional bodies, cooperative federalism, institutional coordination and administrative reforms.
- **GS Paper III:** Taxation, fiscal policy, ease of doing business, export competitiveness, MSMEs and economic growth.
- **Relevant constitutional provisions:** Article 246A (GST legislative powers), Article 269A (inter-State GST) and Article 279A (GST Council).
- **Key concept:** GST is a destination-based consumption tax supported by the ITC mechanism, which seeks to minimise cascading taxation.
- **Analytical conclusion:** The next phase of GST reform depends not merely on changing tax rates, but on making compliance predictable, refunds timely, enforcement proportionate and dispute resolution accessible while safeguarding public revenue.

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WHO Pandemic Agreement and India's Role: Equitable Pathogen Sharing, Health Security and Global North–South Cooperation

Recent Developments:

- On 25 September 2026, India presented its official position at the **United Nations General Assembly High-Level Meeting on Pandemic Prevention, Preparedness and Response (PPPR)** in New York, emphasising national preparedness, international cooperation, equitable access to medical products and respect for national sovereignty.
- The **World Health Organization (WHO) Pandemic Agreement**, adopted on 20 May 2025, seeks to strengthen global cooperation against future pandemics. However, the **Pathogen Access and Benefit-Sharing (PABS) Annex** remains under negotiation, preventing the agreement from opening for signature and ratification.
- In September 2026, WHO member states advanced negotiations on the PABS Annex but did not finalise it. The outcome of these negotiations is to be submitted to the World Health Assembly for consideration in May 2027, or earlier at a special session in 2026.

What Is the WHO Pandemic Agreement?

Background and Objectives:

- The **WHO Pandemic Agreement** is a legally binding international instrument adopted under Article 19 of the WHO Constitution to strengthen pandemic prevention, preparedness and response.
- It was adopted by the 78th World Health Assembly on 20 May 2025 following negotiations initiated after the COVID-19 pandemic exposed major weaknesses in global health cooperation.
- The agreement is the second international legal agreement negotiated under Article 19 of the WHO Constitution, after the **WHO Framework Convention on Tobacco Control (2003)**. It will open for signature only after the PABS Annex is adopted; entry into force requires 60 ratifications.

Why Is a Global Pandemic Framework Necessary?

- **Unequal access to vaccines:** During COVID-19, wealthier countries secured substantial vaccine supplies through advance purchase agreements, while many low- and middle-income countries experienced delays in accessing vaccines, diagnostics and treatments.
- **Limitations of voluntary cooperation:** Initiatives such as COVAX faced funding constraints, supply shortages and competition from bilateral procurement agreements.
- **Unequal sharing of biological resources:** Countries may share pathogen samples and genetic sequence data, but the resulting vaccines and treatments may be developed commercially without guaranteed, equitable access for the countries providing those resources.
- **Emerging infectious threats:** Zoonotic diseases, including avian influenza, Ebola and mpox, demonstrate the need for integrated surveillance, rapid information-sharing and coordinated international responses.

Major Pillars of the Pandemic Agreement:

Pathogen Access and Benefit-Sharing System:

- The **PABS System** seeks to establish a framework for the rapid sharing of pathogen materials and genetic sequence information, alongside fair and equitable sharing of the resulting benefits, including vaccines, diagnostics and therapeutics.
- The central negotiating challenge is to determine how manufacturers should contribute pandemic-related health products and how these benefits should be distributed through the WHO.
- The PABS Annex must establish a workable balance between scientific openness, commercial participation, public-health needs and equitable access for developing countries.

One Health Approach:

- **One Health** recognises that human, animal and environmental health are interconnected.
- Integrated surveillance, veterinary services, wildlife monitoring and laboratory networks can improve the early detection of zoonotic diseases and reduce the risk of outbreaks escalating into pandemics.
- Implementation requires sustainable financing, trained personnel and coordination across health, agriculture, environment and wildlife institutions.

Technology Transfer and Manufacturing Capacity:

- Technology transfer, manufacturing know-how and voluntary or negotiated licensing arrangements can support regional production of vaccines, diagnostics and therapeutics.
- Diversified manufacturing capacity across Africa, Asia and Latin America can reduce dependence on a limited number of production centres during global emergencies.
- Effective implementation requires suitable intellectual property arrangements, regulatory capacity, skilled personnel and access to essential raw materials.

Supply Chains and Sustainable Financing:

- The proposed **Global Supply Chain and Logistics Network** aims to improve the availability and distribution of pandemic-related health products by addressing supply bottlenecks and barriers to access.
- Sustainable financing is necessary to strengthen laboratories, disease surveillance, cold-chain infrastructure, health workforces and clinical-care capacity.
- The agreement complements existing global health initiatives, including the Pandemic Fund and the International Health Regulations (2005).

Key Concerns and Challenges:

Intellectual Property and Technology Transfer:

- Developing countries seek stronger technology-sharing arrangements and access to intellectual property flexibilities during public-health emergencies.
- The agreement's technology-transfer provisions rely substantially on mutually agreed terms, raising concerns about whether voluntary arrangements alone can ensure adequate access during severe emergencies.
- The **Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS)** and the Doha Declaration on TRIPS and Public Health remain relevant to compulsory licensing and access to essential medicines.

PABS Negotiations and Biopiracy:

- Developing countries fear that pathogen samples and genetic information could support commercially valuable products without ensuring timely access to the resulting benefits.
- Disagreements concern contractual arrangements, laboratory networks, benefit-sharing obligations and the allocation of pandemic-related products.
- A credible framework must ensure that countries contributing biological resources receive fair benefits without unnecessarily delaying scientific research or emergency responses.

National Sovereignty and Financing:

- Countries seek assurance that international cooperation will respect national laws, regulatory systems and public-health decision-making powers.
- The implementation of One Health surveillance and stronger laboratory networks can impose substantial costs on resource-constrained countries.
- Without predictable international financing, countries with weaker health systems may struggle to meet preparedness expectations, widening existing inequalities.

Commercial Incentives:

- Pharmaceutical manufacturers argue that poorly designed mandatory sharing requirements and intellectual property restrictions could weaken incentives for research and development.
- Policymakers must balance innovation incentives with affordable access, public investment and fair distribution of benefits arising from publicly or internationally supported research.

India's Position and Contribution:

Official Position at the United Nations:

- India reiterated its commitment to a **whole-of-government, whole-of-society and all-hazards approach**, integrating surveillance, laboratory networks, emergency coordination, trained personnel, stockpiles and clinical-care capacity.
- India stated that preparedness must be incorporated into national health systems, development plans and domestic financing, while international assistance should complement national responsibility.
- India emphasised that the Political Declaration is non-binding and should be implemented according to national circumstances and capacities. It also called for fair benefit-sharing and respect for national sovereignty.

Digital Public Infrastructure and Vaccine Diplomacy:

- **Digital Public Infrastructure (DPI):** India's CoWIN experience demonstrated how digital platforms can support vaccination management, surveillance, risk communication and continuity of health services.
- **Vaccine Maitri:** India reported supplying 300 million COVID-19 vaccine doses to around 100 countries and two United Nations entities, alongside medical assistance to more than 150 countries.
- **Pharmaceutical manufacturing:** India's generic medicine industry, vaccine manufacturers and production capabilities can support affordable medical supplies and diversified global production networks.
- **Supply-chain resilience:** India remains exposed to external dependence on certain active pharmaceutical ingredients and key starting materials, making domestic manufacturing and diversified sourcing important for health security.

Measures India Can Pursue:

Bridge the Global North–South Divide:

- India can use its position as a major vaccine producer and a contributor to pathogen research to promote a **balanced PABS framework** that combines timely scientific sharing with equitable access to resulting health products.
- South–South cooperation in genomic surveillance, One Health systems, laboratory capacity and health-workforce training can strengthen preparedness across developing countries.
- India can promote interoperable digital health systems and share relevant digital public infrastructure expertise, subject to privacy, security and domestic legal safeguards.

Strengthen Domestic Preparedness:

- India should strengthen disease surveillance, biosafety, laboratory networks, emergency stockpiles and coordination among health, animal husbandry and environmental authorities.
- Domestic manufacturing incentives for active pharmaceutical ingredients, medical devices and biopharmaceutical products can reduce strategic supply-chain vulnerabilities.
- Clear rules for biological-resource access and benefit-sharing can improve research governance while supporting innovation and public-health objectives.

Advance Multilateral Cooperation:

- India should advocate predictable financing, stronger regional manufacturing, equitable access to essential medical products and the protection of legitimate public-health flexibilities under TRIPS.
- Engagement through the United Nations, WHO, BRICS and the G20 can support consensus-building on pandemic preparedness, technology transfer and sustainable health financing.

Conclusion:

- The **WHO Pandemic Agreement** offers an opportunity to strengthen global health security, but its effectiveness depends on translating legal commitments into equitable access, sustainable financing and operational preparedness.
- India can contribute through pharmaceutical manufacturing, digital public infrastructure, domestic health-system strengthening and constructive multilateral diplomacy.
- A credible global framework must ensure that countries share pathogens and scientific information promptly while receiving fair access to the vaccines, diagnostics and treatments developed from those contributions.

Value Addition for UPSC:

- **GS Paper II:** United Nations, WHO, multilateralism, international treaties, global governance and India's foreign policy.
- **GS Paper III:** Public health, biotechnology, pharmaceutical manufacturing, intellectual property rights and supply-chain resilience.
- **Important legal provisions:** Article 19 of the WHO Constitution; International Health Regulations (2005); TRIPS Agreement; Doha Declaration on TRIPS and Public Health.
- **Key concept:** The PABS framework links the sharing of pathogen materials and genetic information with the equitable sharing of benefits arising from their use.
- **Mains perspective:** Global health security requires balancing national sovereignty, scientific cooperation, commercial innovation and equitable access, supported by predictable financing and stronger domestic health systems.

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Untouchability in India: Constitutional Safeguards, Persistent Caste Exclusion and the Challenge of Substantive Equality

Recent Developments:

- In August 2026, a reported **purification ritual** at Ramlila Maidan in Haldwani, Uttarakhand, following a public rally addressed by Congress president Mallikarjun Kharge, triggered controversy over caste prejudice and the persistence of untouchability.
- The ritual was reportedly conducted on 10 August, two days after the rally. Organisers disputed the caste-discrimination allegation, while complaints and legal proceedings brought the incident into public discussion.
- The controversy raises a constitutional question: can a practice presented as a customary or religious ritual reinforce caste-based exclusion or notions of **purity and pollution** prohibited by the Constitution?
- The incident demonstrates that the abolition of untouchability requires more than formal legal prohibition; it also requires the transformation of discriminatory social attitudes and institutional practices.

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Understanding Untouchability:

Meaning and Nature:

- **Untouchability** is a historically entrenched form of caste-based exclusion rooted in notions of ritual purity and pollution, through which individuals are denied equal social status, dignity, access to public spaces and opportunities because of their caste identity.
- It has historically involved exclusion from temples, wells, common water sources, public roads, educational institutions and community facilities, alongside restrictions on social interaction and occupation.
- Untouchability is not merely interpersonal prejudice; it can operate as a **system of institutionalised inequality** sustained by social customs, inherited status, economic dependence and unequal power relations.
- The Constitution does not provide a restrictive definition of untouchability. Judicial interpretation has connected Article 17 with the historical practice of caste-based social disabilities rather than the literal meaning of physical non-contact.

Distinguishing Untouchability from Other Forms of Exclusion:

- **Caste-based untouchability** imposes discriminatory disabilities on people because of birth, inherited social identity or stigmatised status. It violates constitutional equality and human dignity.
- **Medical isolation**, including quarantine during an infectious disease outbreak, is based on scientifically assessed health risks, applies according to relevant medical criteria and is intended to prevent transmission rather than enforce hereditary social hierarchy.
- Physical separation alone does not establish untouchability. Its purpose, basis, discriminatory application, social context and consequences are essential to determining its constitutional significance.

Constitutional Provisions Against Untouchability:

Fundamental Rights:

- **Article 14 — Equality before law:** Guarantees equality before the law and equal protection of the laws, providing a general constitutional foundation against arbitrary and discriminatory treatment.
- **Article 15 — Prohibition of discrimination:** Prohibits the State from discriminating against citizens on grounds only of religion, race, caste, sex, place of birth or any of them.
    - **Article 15(2)** specifically prohibits restrictions on access to shops, public restaurants, hotels and places of public entertainment, and the use of wells, tanks, bathing ghats, roads and places of public resort maintained wholly or partly out of State funds or dedicated to public use.
    - This provision is significant because it addresses specified forms of exclusion from public spaces and facilities, including discrimination by private individuals.
- **Article 17 — Abolition of untouchability:** Abolishes untouchability, forbids its practice in any form and makes the enforcement of any disability arising from it an offence punishable in accordance with law.
    - Article 17 is a **Fundamental Right** that operates against both State action and discriminatory conduct by private individuals.
    - Its scope is not limited to government departments; individuals, institutions and other entities cannot lawfully enforce caste-based social disabilities.
- **Article 21 — Right to life and personal liberty:** Judicial interpretation has recognised dignity as an essential component of the right to life, strengthening constitutional protection against humiliation and degrading treatment.
- **Article 25(2)(b):** Enables the State to make laws providing for social welfare and reform, including throwing open Hindu religious institutions of a public character to all classes and sections of Hindus.

Directive Principles and Legislative Powers:

- **Article 35** gives Parliament the power to make laws prescribing punishment for acts declared offences under Part III, including the enforcement of Article 17.
- **Article 38** directs the State to promote a social order informed by justice and to minimise inequalities in status, facilities and opportunities.
- **Article 46** directs the State to promote the educational and economic interests of weaker sections, particularly the Scheduled Castes and Scheduled Tribes, and protect them from social injustice and exploitation.
- Together, these provisions establish that the State must not only refrain from discrimination but also take measures to address entrenched social inequalities.

Legal Framework:

Protection of Civil Rights Act, 1955:

- The **Protection of Civil Rights Act, 1955**, originally enacted as the Untouchability (Offences) Act, criminalises the preaching and practice of untouchability and the enforcement of disabilities arising from it.
- It addresses discriminatory restrictions connected with access to public places, services, religious institutions and social or religious customs.
- The Act gives practical effect to Article 17 by providing punishments for specified conduct, including the justification or encouragement of untouchability.

Scheduled Castes and Scheduled Tribes (Prevention of Atrocities) Act, 1989:

- The **SC/ST (Prevention of Atrocities) Act, 1989** seeks to prevent atrocities against members of the Scheduled Castes and Scheduled Tribes and provides for special courts, trial of offences, and relief and rehabilitation for victims.
- Its provisions apply to specified offences and circumstances; not every instance of caste prejudice automatically constitutes an offence under this Act.
- Effective implementation requires prompt registration of complaints where legally warranted, proper investigation, victim and witness protection, and timely prosecution.

Related Legal Measures:

- Laws prohibiting **manual scavenging and hazardous sanitation work** address occupational practices that have historically burdened particular caste groups. Their effective implementation is essential to breaking the connection between caste identity and degrading labour.
- Legal safeguards work best when supported by accessible complaint mechanisms, legal aid, social protection, rehabilitation and public awareness.

Why Does Untouchability Persist?

Sociological Factors:

- **Purity and pollution:** Traditional beliefs associating particular castes with impurity continue to legitimise exclusion from shared spaces, religious institutions and community activities.
- **Social reproduction of caste:** Family structures, kinship networks, inherited status and everyday social customs transmit caste hierarchies across generations.
- **Endogamy:** Restrictions on inter-caste marriage preserve caste boundaries and reinforce the social separation of communities.
- **Normalisation of discrimination:** Separate utensils, segregated seating, unequal access to religious spaces and restrictions on social interaction may be defended as customary practices, allowing exclusion to continue without always appearing overtly coercive.
- **Intersectionality:** Caste discrimination can combine with gender, class, occupation and rural disadvantage, intensifying the exclusion experienced by particular groups.

Economic Factors:

- **Caste–class intersection:** Landlessness, insecure employment, indebtedness and dependence on dominant caste groups can discourage victims from reporting discrimination or challenging local power structures.

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- **Occupational segregation:** The continued association of particular caste communities with sanitation work, waste handling and other stigmatised occupations reflects the persistence of inherited occupational inequalities.
- **Unequal access to resources:** Disparities in education, land ownership, credit, public services and employment can reproduce social dependence even where formal legal equality exists.
- **Weak enforcement:** Delayed investigations, social pressure, fear of retaliation, inadequate legal assistance and low confidence in institutions can reduce the practical deterrent effect of anti-discrimination laws.

Key Judicial Interventions:

Devarajiah v. B. Padmanna (1957):

- The Mysore High Court clarified that **"untouchability" under Article 17 must not be interpreted in its literal or grammatical sense**.
- It referred to the historically developed system of caste-based social disabilities imposed on people because of their birth in particular castes.
- The decision is important because it links Article 17 to the social practice the Constitution intended to abolish, rather than to every instance of physical separation.

State of Karnataka v. Appa Balu Ingale (1992; reported in later citations):

- The Supreme Court addressed the denial of access to a public water source to members of a Scheduled Caste community.
- It underscored that Article 17 seeks to dismantle caste-based disabilities and secure equality, dignity and participation in public life.
- The judgment stressed that constitutional abolition must be implemented in practice, rather than remaining a formal declaration.
- It also highlighted the responsibility of public authorities and the importance of effective enforcement of the Protection of Civil Rights Act, 1955.

Surya Narayan Choudhary v. State of Rajasthan (1988):

- The Rajasthan High Court dealt with discriminatory conditions imposed on Scheduled Caste devotees seeking entry to the Nathdwara temple.
- The court directed that devotees must not be subjected to additional conditions that were not imposed on other worshippers, including caste-specific purification requirements.
- The decision demonstrates that **custom or religious tradition cannot justify discriminatory access conditions** at a public temple.

Indian Young Lawyers Association v. State of Kerala (2018) — Sabarimala Case:

- In the Sabarimala judgment, Justice D. Y. Chandrachud's opinion discussed the wider constitutional significance of exclusion based on ideas of purity and pollution and connected such exclusion with dignity and equality.
- The opinions in the case differed on the application of Article 17 to the specific restriction on women's entry. Therefore, the judgment should not be presented as a unanimous holding that every form of gender-based exclusion constitutes untouchability.
- Its broader relevance lies in the constitutional scrutiny of practices that stigmatise people and deny equal access on the basis of notions of impurity.

Sukanya Shantha v. Union of India (2024):

- The Supreme Court held that caste-based discriminatory provisions and practices in prison rules and manuals violated constitutional guarantees, including Articles 14, 15, 17, 21 and 23.
- The Court directed governments to revise discriminatory prison rules and manuals and remove caste-based practices in the treatment and classification of prisoners.
- The judgment demonstrates that constitutional equality must apply within State institutions, including prisons, and that inherited caste stereotypes cannot determine work allocation, segregation or treatment.

People's Union for Democratic Rights v. Union of India (1982):

- The case is primarily associated with the enforcement of labour rights and constitutional protections against exploitation, including the interpretation of forced labour under Article 23.
- It is relevant to the wider understanding that Fundamental Rights can impose obligations on the State to address exploitation and protect vulnerable workers.
- It should not be cited as a principal ruling specifically defining Article 17 or untouchability.

Untouchability and Medical Isolation: A Constitutional Distinction:

Basis, Purpose and Application:

- **Caste-based untouchability:** Arises from inherited social hierarchy, targets people on the basis of caste identity and imposes social disabilities that may persist across generations.
- **Medical isolation or quarantine:** Is based on public-health evidence, addresses a particular infection risk and should be proportionate, time-bound and applied without caste-based discrimination.
- **Constitutional position:** Article 17 prohibits untouchability, while the State may adopt lawful public-health measures to protect life and health, subject to applicable constitutional safeguards.
- **Safeguards against misuse:** A public-health measure must have a legitimate health objective and must not be used as a pretext for caste segregation, stigma or denial of equal services.

Measures Required Beyond Legal Prohibition:

Strengthen Enforcement and Accountability:

- Ensure prompt registration of complaints, impartial investigation, time-bound trials where feasible, legal assistance and effective protection of victims and witnesses.
- Improve coordination among police, district administration, legal services authorities, commissions and special courts, while monitoring compliance with statutory duties.
- Collect and publish reliable, disaggregated data on reported offences, investigation, prosecution, convictions and victim rehabilitation to identify implementation gaps.

Reform Education and Social Attitudes:

- Integrate constitutional values, equality, dignity, social reform and anti-caste movements into curricula, with appropriate teacher training and classroom discussion.
- Challenge the normalisation of discrimination in everyday settings, including schools, workplaces, housing, religious institutions and community events.
- Promote shared public facilities, inclusive neighbourhoods and inter-caste social interaction without making affected communities solely responsible for overcoming discrimination.

Reduce Economic Dependence:

- Expand equitable access to quality education, skill development, land and livelihood support, formal employment, credit and social protection.
- Enforce prohibitions on manual scavenging and hazardous sanitation work, while ensuring rehabilitation, alternative livelihoods and accountability for violations.
- Protect complainants against social boycotts, economic retaliation, intimidation and exclusion from essential services.

Improve Institutional and Community Responses:

- Ensure that public officials respond promptly to caste-based discrimination, including discriminatory practices in public facilities and institutions.
- Encourage community-level awareness and engagement with local bodies, civil society organisations, educators and legal aid services.
- Evaluate anti-discrimination initiatives through measurable outcomes, including access to common facilities, reporting confidence, rehabilitation and reduction in caste-linked occupational segregation.

Conclusion:

- Article 17 represents a decisive constitutional rejection of caste-based untouchability, while Articles 14, 15 and 21 reinforce equality, non-discrimination and dignity.
- The persistence of practices justified through custom, purity and pollution shows the gap between **constitutional morality and social practice**.
- Durable change requires enforceable laws, accountable institutions, economic independence, inclusive education and transformation of discriminatory social norms. The constitutional objective is not merely the absence of physical exclusion, but equal citizenship and dignity in everyday life.

Value Addition for UPSC:

Important Constitutional Linkages:

- **Article 14:** Equality before law and equal protection of laws.
- **Article 15(2):** Access to specified public spaces and facilities without caste-based discrimination.
- **Article 17:** Abolition of untouchability and prohibition of its practice in any form.
- **Article 21:** Life and personal liberty, including the judicially recognised importance of dignity.
- **Article 35:** Parliamentary power to prescribe punishment for acts declared offences under Part III.
- **Article 38:** Reduction of inequalities and promotion of a just social order.
- **Article 46:** Protection of weaker sections, particularly Scheduled Castes and Scheduled Tribes, from social injustice and exploitation.

Important Acts and Judgments:

- **Protection of Civil Rights Act, 1955:** Criminalises the practice and preaching of untouchability and enforcement of associated disabilities.
- **SC/ST (Prevention of Atrocities) Act, 1989:** Provides a framework for preventing specified atrocities, prosecution and victim relief.
- **State of Karnataka v. Appa Balu Ingale:** Constitutional abolition of untouchability must translate into effective access to common resources and equal dignity.
- **Surya Narayan Choudhary v. State of Rajasthan:** Caste-specific conditions for entry to a public temple cannot be justified as ordinary custom.

- **Sukanya Shantha v. Union of India:** Caste-based discrimination in State prison rules violates constitutional guarantees.

Mains Integration:

- **GS Paper I — Indian Society:** Caste, social stratification, endogamy, social exclusion and persistence of traditional hierarchies.
- **GS Paper II — Polity and Governance:** Fundamental Rights, constitutional remedies, anti-discrimination laws, judicial enforcement and the role of the State.
- **Essay:** Constitutional morality versus social morality; formal equality versus substantive equality; dignity as the foundation of democratic citizenship.
- **Core argument:** The constitutional abolition of untouchability is complete in law, but its social eradication depends on effective enforcement, reduced economic dependence and the rejection of inherited notions of purity and pollution.

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Stubble Burning in North India: Groundwater Conservation, Agricultural Incentives and the Challenge of Sustainable Crop Residue Management

Recent Developments:

- **Official monitoring, 2025:** According to the Union Government, Punjab and Haryana recorded a combined reduction of more than 90% in reported paddy-stubble-burning incidents during the 2025 harvesting season compared with the corresponding period in 2022. However, independent analysis has questioned whether this figure reflects the actual reduction in fires.
- **Satellite-monitoring limitations:** A 2025 assessment by the Initiative for Climate and Environment Research found that monitoring based mainly on polar-orbiting satellites may miss fires occurring later in the day, making multiple-satellite observations and burn-scar assessment important for reliable measurement.
- **Haryana's 2026 strategy:** In September 2026, Haryana announced plans for a dedicated **Parali Protection Force**, drone surveillance, late-evening patrols and an incentive of ₹1,200 per acre for effective utilisation of crop-residue management machinery.
- **Regulatory approach:** The Commission for Air Quality Management (CAQM) continues to coordinate state-level monitoring, enforcement and residue-management measures across Punjab, Haryana and adjoining regions.

Understanding Stubble Burning:

Meaning and Geographical Distribution:

- **Stubble burning** refers to setting fire to crop residue, particularly the stalks and lower portions of plants left in fields after harvesting. It is commonly practised in northwestern India, especially Punjab, Haryana and parts of Uttar Pradesh, during the paddy-harvesting season from October to November.
- Paddy straw is a major concern because of the large volume generated within a short harvesting period. Punjab and Haryana together produce approximately **29 million metric tonnes** of paddy straw, according to the supplied material.
- Farmers often burn residue to clear fields quickly before sowing the next crop, particularly wheat, within a narrow agricultural window.

Environmental and Health Impacts:

- **Air pollution:** Burning releases particulate matter, carbon monoxide, volatile organic compounds and other harmful substances, contributing to smoke and smog. Its effects can combine with vehicle emissions, industrial pollution, construction dust and unfavourable winter meteorological conditions to worsen air quality in Delhi and the Indo-Gangetic Plain.
- **Public health:** Exposure to smoke and fine particulate matter can aggravate respiratory and cardiovascular conditions, irritate the eyes and airways, and increase health risks for vulnerable populations.
- **Soil degradation:** Burning can destroy surface organic matter, reduce soil moisture and release nutrients such as nitrogen and sulphur into the atmosphere. Repeated burning can adversely affect soil biological activity and nutrient cycling.
- **Climate implications:** Incomplete combustion releases greenhouse gases and black carbon, contributing to climate change and atmospheric warming.
- **Regional effects:** Smoke can reduce visibility and affect road safety, while pollutants transported across state boundaries make coordinated regional action necessary.

Why Stubble Burning Became a Structural Problem:

Historical and Agricultural Context:

- Stubble burning expanded in Punjab during the late 1970s and early 1980s with the spread of combine harvesters, which increased harvesting efficiency but left substantial crop residue in the fields.
- Its timing became more problematic as groundwater-conservation measures delayed paddy cultivation, pushing harvesting closer to the wheat-sowing season.
- **PUSA-44**, a long-duration paddy variety requiring approximately 150–160 days to mature, further narrows the time available for residue management. Combine harvesters can leave substantial stubble, while manual removal requires considerable labour and expenditure.

Groundwater Depletion and the Punjab Law:

- Punjab's intensive paddy cultivation depends heavily on groundwater irrigation. The supplied material reports that approximately 73% of its cropped area was irrigated using groundwater in 2012 and highlights substantial groundwater deficits.
- A NASA satellite-based study published in 2009 estimated major groundwater losses across parts of northwestern India, including Punjab, Haryana and Rajasthan, during 2002–2008.
- The **Punjab Preservation of Subsoil Water Act, 2009** sought to reduce groundwater depletion by regulating the timing of paddy sowing and transplantation. The restrictions delayed cultivation to better align it with the monsoon.
- These restrictions also shifted harvesting later in the year, leaving farmers only around 10–15 days in many cases to clear fields and prepare them for wheat.
- The resulting conflict illustrates a policy trade-off: a measure designed to conserve groundwater can intensify residue-management pressure when crop choice, harvesting schedules and affordable machinery remain unchanged.

Why Farmers Continue Paddy–Wheat Cultivation:

Procurement and Power Subsidies:

- **Assured procurement:** Paddy and wheat procurement at minimum support prices provides farmers with relatively predictable markets and income. The supplied figures indicate that procurement is much more prevalent in Punjab and Haryana than the national average.

- Paddy procurement during 2012–2024 averaged approximately 87% in Punjab and 74% in Haryana, compared with 37% nationally.
- Wheat procurement averaged approximately 70% in Punjab and 63% in Haryana, compared with 30% nationally.

- **Subsidised electricity:** Free or heavily subsidised agricultural electricity reduces the private cost of groundwater pumping, weakening incentives to shift away from water-intensive crops.
- **Limited diversification options:** Farmers may lack assured buyers, suitable storage, processing facilities and price guarantees for alternative crops. Consequently, crop diversification can appear financially riskier than continuing the established paddy–wheat cycle.
- These incentives create a structural contradiction: policy encourages paddy cultivation through procurement and subsidies, while farmers face penalties for the residue-management problem associated with the same cropping system.

Crop Residue Management: Options and Limitations:

In-Situ Management:

- **In-situ management** incorporates or retains crop residue in the field instead of burning it. Happy Seeders, Super Seeders, rotavators and related machinery can support residue management and timely wheat sowing.
- Short-duration paddy varieties and direct-seeded rice can reduce water use or ease pressure on the agricultural calendar, depending on local conditions and agronomic suitability.
- However, specialised machinery can require high-horsepower tractors, is expensive to own and may remain underutilised for much of the year. Delays in accessing rented equipment can make it difficult for farmers to meet sowing deadlines.

Ex-Situ Utilisation:

- **Ex-situ management** removes residue from fields for use in bioethanol, compressed biogas, biomass pellets, briquettes, industrial fuel and other applications.
- The approach can create additional income opportunities and reduce open burning, but it requires balers, rakers, storage facilities, transport networks and reliable industrial demand.
- The supplied material estimates costs of approximately ₹1,500–₹2,500 per acre for certain residue-management operations, which can be substantial for small and marginal farmers.
- The Crop Residue Management Scheme provides financial assistance for machinery and supports custom-hiring centres, helping farmers access equipment without purchasing it individually.

Policy Responses and State-Level Approaches:

National and Regulatory Measures:

- **Commission for Air Quality Management:** CAQM coordinates action plans, monitoring and enforcement across affected states. Its directions have addressed residue management, monitoring mechanisms and the use of paddy-straw-based biomass in eligible industrial applications.
- **Monitoring and enforcement:** During the 2025 season, 31 Central Pollution Control Board flying squads assisted monitoring in 18 Punjab districts and 13 Haryana districts. Authorities also strengthened field-level coordination and reporting.
- **Legal accountability:** The National Green Tribunal and the Supreme Court have featured in discussions on enforcement measures against stubble burning. Any penalty must operate within the applicable legal framework and should be accompanied by practical alternatives for farmers.

- **Policy balance:** Parliamentary recommendations have emphasised that penalising farmers should be a last resort and that residue procurement or minimum-price mechanisms can make ex-situ utilisation economically viable.

Punjab and Haryana:

- **Punjab:** The state has relied substantially on in-situ crop-residue management. Challenges include timely machinery availability, support for compressed-biogas plants, residue collection and effective implementation at the field level.
- **Haryana:** The state has adopted a combination of incentives and enforcement, including support for machinery use, direct-seeded rice and crop diversification. Its September 2026 plan proposed a dedicated protection force, drones and late-evening patrols to address fires that may escape satellite observation.

The Measurement Problem:

Why Official Fire Counts Need Caution:

- The **CREAMS** monitoring system, operated by the Indian Agricultural Research Institute, uses satellite observations, including data from NASA's MODIS and VIIRS instruments, to identify active fire locations.
- Polar-orbiting satellites observe a location only during particular overpasses. If fires are lit outside those observation windows, they may not be recorded as active fire events.
- A 2025 multi-satellite assessment argued that later-day and evening fires were undercounted by conventional monitoring and reported a more gradual decline than the official 90% figure.
- Burn-scar mapping, observations from additional satellites, geostationary monitoring and late-evening field patrols can improve detection. **Reported fire incidents, actual burning events and total area burned are different indicators** and should not be treated as interchangeable.
- Better measurement is essential for evaluating policy effectiveness, allocating subsidies and determining whether reductions in recorded fires reflect genuine behavioural change.

Way Forward:

- **Reform agricultural incentives:** Expand assured markets and remunerative prices for alternative crops, reduce excessive dependence on the paddy–wheat cycle and encourage crop diversification suited to local agro-climatic conditions.
- **Make residue management affordable:** Ensure timely access to subsidised machinery, strengthen custom-hiring centres and provide targeted support to small and marginal farmers.
- **Build a residue economy:** Develop dependable supply chains linking farmers with biomass, bioenergy, biogas and industrial users. Minimum-price arrangements or viable procurement contracts can help cover collection, transport and storage costs.
- **Improve measurement and enforcement:** Combine satellite data, burn-scar assessment, drones and field verification. Enforcement should be evidence-based, consistent and accompanied by practical alternatives.
- **Coordinate air-quality policy:** Address stubble burning alongside transport emissions, industrial pollution, construction dust and waste burning through regional airshed planning.
- **Promote research and extension:** Encourage suitable short-duration crop varieties, direct-seeded rice where agronomically appropriate, soil-health practices and farmer training based on local conditions.

Conclusion:

- Stubble burning is not simply an individual farmer's choice; it reflects the interaction of crop-procurement incentives, subsidised groundwater extraction, delayed harvesting and inadequate residue-management infrastructure.

- Haryana's combination of incentives and intensified monitoring offers useful policy lessons, but its effectiveness must be assessed through reliable and comparable evidence.
- A durable solution requires **crop diversification, economically viable residue utilisation, affordable machinery and robust satellite monitoring**. Enforcement alone cannot resolve a problem sustained by the prevailing agricultural incentive structure.

Value Addition for UPSC:

Relevant Syllabus Linkages:

- **General Studies Paper III:** Environmental pollution, agricultural practices, irrigation, crop diversification, science and technology, and government interventions.
- **General Studies Paper II:** Centre–State coordination, regulatory institutions and implementation of environmental policies.
- **Essay:** Policy contradictions, sustainable agriculture, environmental justice and the relationship between farmer welfare and public health.

Key Terms:

- **In-situ management:** Retaining or incorporating crop residue within the field.
- **Ex-situ management:** Collecting crop residue for use outside the field.
- **Airshed approach:** Managing air pollution across a shared geographical region rather than through isolated administrative boundaries.
- **Policy trade-off:** A situation in which a measure designed to achieve one objective creates pressure on another policy goal.
- **Mains-ready argument:** Effective stubble-burning control requires aligning agricultural incentives with environmental objectives so that farmers can earn from sustainable residue management instead of bearing the cost of a system-wide policy contradiction.

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Decarbonising India's Cement Sector: Low-Carbon Construction, Industrial Transformation and the Net-Zero Challenge

Recent Developments:

- **NITI Aayog's Cement Sector Decarbonisation Roadmap:** In January 2026, NITI Aayog released sector-specific green-transition roadmaps to align industrial growth with **Viksit Bharat by 2047** and India's **net-zero emissions target by 2070**. The cement roadmap prioritises refuse-derived fuel (RDF), clinker substitution, carbon capture technologies and stronger carbon-market mechanisms.
- **Projected emissions challenge:** India produced approximately **391 million tonnes (Mt)** of cement in 2023, generating an estimated **246 $MtCO_2e$**. Under a business-as-usual scenario, sectoral emissions could rise substantially as infrastructure and cement demand expand.
- **Decarbonisation target:** The roadmap envisages reducing cement's emissions intensity from approximately **0.63 tonnes of CO_2 equivalent per tonne of cement in 2023** to around **0.09–0.13 tonnes by 2070**.

Understanding Construction-Related Emissions:

Embodied Carbon and Operational Carbon:

- **Embodied carbon** refers to emissions associated with extracting raw materials, manufacturing construction materials, transporting them and constructing buildings; cement and steel are major contributors.
- **Operational carbon** arises from the energy used to operate buildings, including electricity for lighting, cooling, heating and appliances. Decarbonising construction therefore requires both cleaner materials and energy-efficient buildings.
- Cement is particularly difficult to decarbonise because its emissions arise from **both fuel combustion and chemical reactions**, not merely from the electricity consumed by factories.

India's Cement Sector: Scale and Environmental Footprint

Industry Profile:

- India is the **world's second-largest cement producer after China**, with cement supporting housing, highways, railways, metros, industrial facilities and urbanisation.
- According to figures cited in the NITI Aayog roadmap, India had **333 cement manufacturing units**, comprising 159 integrated large plants, 116 grinding units, 62 mini cement plants and five clinkerisation units.
- Cement production reached approximately **391 Mt in 2023**, accounting for around **246 $MtCO_2e$**, or roughly **6% of India's national greenhouse gas emissions** under the cited estimates.

How Cement Manufacturing Generates Emissions:

- **Limestone extraction:** Limestone is the principal raw material for ordinary Portland cement. Mining can cause land degradation, vegetation loss, habitat disturbance and changes in local drainage.
- **Calcination:** Limestone, primarily calcium carbonate, is heated to produce lime and release carbon dioxide. This is an unavoidable process emission when conventional limestone-based clinker is manufactured.
- **Clinker production:** Limestone and other materials are heated in kilns to approximately **1,450°C**. Coal and petroleum coke have traditionally supplied much of the thermal energy, generating additional emissions.
- **Grinding and blending:** Clinker is ground with gypsum and other suitable materials. The proportion of clinker used in cement strongly influences its carbon intensity.
- **Major emissions sources:** Process emissions from calcination, fuel combustion and electricity consumption together determine the sector's footprint. NITI Aayog's earlier technical assessment attributed approximately **57–60%** of emissions to calcination, **27–31%** to thermal energy and **10–13%** to electricity, although shares vary by plant and accounting methodology.

Key Strategies for Cement Decarbonisation:

Reduce Clinker Content and Expand Blended Cement:

- **Clinker substitution** reduces the quantity of carbon-intensive clinker required per tonne of cement by using suitable supplementary cementitious materials, including fly ash, blast-furnace slag and calcined clay.
- **Portland Pozzolana Cement (PPC)** and **Portland Slag Cement (PSC)** can have lower embodied emissions than Ordinary Portland Cement (OPC), depending on composition and production methods.
- **Limestone Calcined Clay Cement (LC3)** and Portland limestone cement offer additional pathways to reduce clinker demand, subject to performance requirements, material availability and applicable standards.

- Lower clinker content reduces process emissions and can improve resource efficiency, but substitutions must meet the required strength, durability and safety standards.

Replace Fossil Fuels with Refuse-Derived Fuel:

- **Refuse-Derived Fuel (RDF)** is produced by processing combustible fractions of municipal solid waste and can replace part of the coal or petroleum coke used in cement kilns.
- NITI Aayog's roadmap recommends achieving a **20% thermal substitution rate by 2030**. Its published overview estimates cumulative emissions reductions of approximately **73 $MtCO_2e$**; some summaries cite figures approaching 80 Mt, so the precise estimate should be linked to the relevant scenario and reporting period.
- Effective implementation requires source-level waste segregation, processing facilities, consistent fuel quality, reliable transport and pollution-control safeguards.

Improve Energy Efficiency and Clean Electricity:

- **Energy-efficient kilns**, waste-heat recovery, efficient grinding equipment and improved process controls can reduce fuel and electricity consumption.
- Greater use of **renewable electricity**, electrification where technically feasible and improved plant efficiency can reduce indirect emissions.
- These measures cannot eliminate all emissions because limestone calcination releases CO_2 through a chemical reaction even when cleaner energy is used.

Deploy Carbon Capture, Utilisation and Storage:

- **Carbon Capture, Utilisation and Storage (CCUS)** involves capturing CO_2 from industrial processes, followed by its utilisation or long-term storage.
- CCUS is especially relevant for cement because conventional process emissions cannot be eliminated solely through fuel switching or renewable electricity.
- India's Department of Science and Technology launched a national CCUS research and development roadmap in December 2025, highlighting industrial test beds, collaboration and technological development for hard-to-abate sectors, including cement and steel.

Encourage Traditional and Innovative Building Materials:

- **Lime-based binders**, earth-based construction, recycled materials and other suitable alternatives can reduce reliance on conventional cement in selected applications.
- Material choice must reflect structural loads, durability, climate, local resource availability and building regulations; historical examples alone do not establish suitability for modern high-rise or infrastructure projects.

Challenges in Adopting Green Cement:

Technical and Commercial Barriers:

- **Strength development and durability:** Some blended cements gain early strength more slowly than OPC, requiring adjustments to construction schedules and quality-control practices.
- **Established industry practices:** Conventional cement benefits from familiar standards, established supply chains, broad commercial availability and widespread acceptance among builders and contractors.
- **Waste-management constraints:** Poor segregation of municipal waste can reduce RDF availability and quality, while unsuitable waste may create operational and environmental risks.

- **Infrastructure and investment:** Alternative binders, CCUS, waste-processing facilities and new kiln technologies require capital, technical expertise and dependable supply networks.
- **Standards and verification:** Performance-based standards, reliable emissions measurement and consistent certification are necessary to establish confidence in low-carbon construction materials.

Economic and Policy Barriers:

- **Demand uncertainty:** Manufacturers may hesitate to invest in low-carbon technologies without predictable demand, credible standards and long-term policy signals.
- **Limited commercial scale:** Some alternative materials and carbon-capture technologies require further testing, infrastructure development and cost reductions before widespread deployment.
- **Risk of greenwashing:** Claims of low-carbon cement need transparent lifecycle assessment, comparable emissions-intensity benchmarks and independent verification.

Way Forward:

Government Procurement and Market Creation:

- **Green public procurement** should prioritise certified low-carbon cement in suitable government infrastructure projects, creating demand and encouraging manufacturers to invest in cleaner production.
- The **Carbon Credit Trading Scheme (CCTS)** can support industrial decarbonisation through emissions-intensity targets and incentives for eligible entities that outperform their requirements.

Strengthen Waste and Industrial Infrastructure:

- Integrate municipal waste management with cement production through segregation, processing, RDF quality standards and dependable supply agreements.
- Develop regional networks for collecting industrial by-products and alternative raw materials, while ensuring that their use does not compromise product performance or environmental safeguards.

Research, Standards and Construction Practices:

- Expand research into **CCUS, LC3, alternative binders, low-carbon concrete and energy-efficient kilns**, with pilot projects to establish technical and commercial viability.
- Update relevant Bureau of Indian Standards specifications and strengthen testing, certification and lifecycle-based emissions disclosure.
- Encourage architects, engineers and public agencies to use material-efficient designs, optimise concrete requirements and select alternatives where technically appropriate.
- Improve coordination among the Ministry of Environment, Forest and Climate Change, the Ministry of Housing and Urban Affairs, the Ministry of Power, NITI Aayog, industry and research institutions.

Value Addition for UPSC:

GS Paper III:

- **Environment:** Industrial decarbonisation, greenhouse gas mitigation, climate change and India's net-zero commitment.
- **Economy and Infrastructure:** Green construction, sustainable urbanisation, industrial competitiveness and low-carbon infrastructure.

- **Science and Technology:** CCUS, alternative binders, waste-derived fuels, material innovation and industrial energy efficiency.
- **Government Policies:** NITI Aayog's Cement Sector Decarbonisation Roadmap, the Carbon Credit Trading Scheme and green public procurement.

Key Concepts:

- **Embodied carbon:** Emissions associated with producing and delivering construction materials.
- **Clinker substitution:** Replacing a portion of clinker with suitable alternative materials to reduce cement's emissions intensity.
- **Thermal substitution rate:** The share of a plant's thermal energy demand supplied by alternative fuels rather than conventional fossil fuels.
- **Hard-to-abate sector:** An industry in which emissions are difficult to eliminate because of high-temperature energy requirements or inherent chemical-process emissions.

Analytical Conclusion:

- India's cement challenge is to reconcile rapid infrastructure expansion with climate commitments.
- **Lower clinker use, waste-derived fuels, energy efficiency, cleaner electricity, CCUS and green public procurement** must operate as complementary measures.
- A credible transition requires measurable emissions reductions, technically sound standards, reliable waste-management systems and commercially viable low-carbon materials.

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QUESTIONS

1. Consider the following structural components and mechanisms under the Goods and Services Tax (GST) law in India:

(1) System-based provisional sanction of 90% of eligible refund claims for zero-rated supplies

(2) Blanket exemption from physical registration for e-commerce operators in all non-home States

(3) Automatic full credit refund on capital goods in the month of purchase under inverted duty structure

(4) Requirement of authorization from an officer of at least Joint Commissioner rank for intelligence-based interception of goods

(5) Complete withdrawal of Section 69 statutory powers regarding arrest provisions

How many of the above features align with the latest process reform trajectory recommended by the GST Council?

(A) Only two

(B) Only three

(C) Only four

(D) All five

2. With reference to the WHO Pandemic Agreement and its negotiation dynamics, consider the following statements:

(1) The agreement is being negotiated and adopted under Article 19 of the WHO Constitution.

(2) Entry into force of the Pandemic Agreement requires formal ratification by a minimum of 60 member states.

(3) The Pathogen Access and Benefit-Sharing (PABS) Annex has already been fully finalized and signed by all WHO member states in September 2026.

(4) Developing countries have raised concerns that commercial exploitation of shared pathogen genomic sequences without guaranteed benefit-sharing amounts to biopiracy.

Which of the statements given above are correct?

(A) 1, 2 and 4 only

(B) 1, 2 and 3 only

(C) 2, 3 and 4 only

(D) 1, 3 and 4 only

3. Consider the following statements on Article 15(2):

Statement 1: It prohibits denying access to public wells and roads maintained or dedicated to the public.

Statement 2: It applies horizontally to prevent discrimination by private individuals.

Which one of the following is correct in respect of the above statements?

(A) Both Statement 1 and Statement 2 are correct, and Statement 2 is the correct explanation for Statement 1.

(B) Both Statement 1 and Statement 2 are correct, but Statement 2 is not the correct explanation for Statement 1.

(C) Statement 1 is correct, but Statement 2 is incorrect.

(D) Statement 1 is incorrect, but Statement 2 is correct.

4. With reference to the structural drivers of seasonal air pollution in the Indo-Gangetic Plain (IGP), consider the following statements:

(1) Legislative mandates regulating the timing of paddy transplantation to conserve groundwater shift the harvest period closer to the onset of winter inversion.

(2) Open burning of paddy straw releases black carbon, particulate matter, and nitrogen compounds, altering soil biological activity and atmospheric chemistry.

(3) The physical characteristics of paddy straw make it inherently easier to decompose naturally in soil compared to wheat straw within a two-week period.

(4) Assured Minimum Support Price (MSP) procurement coupled with power subsidies creates a policy-driven lock-in for water-intensive cropping patterns.

Which of the statements given above are correct?

(A) 1, 2 and 3 only

(B) 2, 3 and 4 only

(C) 1, 3 and 4 only

(D) 1, 2 and 4 only

5. Given below are two statements, one labeled as Assertion (A) and the other as Reason (R):

Assertion (A): The cement industry cannot achieve net-zero carbon emissions solely through 100% renewable electricity procurement and energy-efficiency measures.

Reason (R): A major portion of CO_2 emissions in cement manufacturing is chemically generated via the thermal decomposition of calcium carbonate during calcination.

Codes:

(A) Both A and R are true, and R is the correct explanation of A.

(B) Both A and R are true, but R is NOT the correct explanation of A.

(C) A is true, but R is false.

(D) A is false, but R is true.

ANSWER KEY

1 – Answer (B), 2 – Answer (A), 3 – Answer (B), 4 – Answer (D), 5 – Answer (A)

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