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# POLITY

## Illegal Immigrants and Legal Rights: Supreme Court's Position

### ✦ Syllabus Mapping:

- **GS Paper II – Polity (Fundamental Rights, Citizenship, Judicial Review)**
- **GS Paper II – International Relations (Refugee Law, Humanitarian Norms)**
- **GS Paper III – Internal Security (Border Management, Illegal Migration)**

### Introduction

While hearing a **Habeas Corpus** petition concerning the alleged disappearance of certain **Rohingya individuals** from official custody, the Supreme Court delivered a significant ruling: *illegal immigrants do not possess legal rights within India*. The Court stressed that State resources and welfare measures must prioritise Indian citizens and that the nation's security and demographic stability—particularly in sensitive border regions—necessitate firm control over irregular migration.

### Supreme Court's Key Observations

#### 1. Legal Status of Rohingyas Requires Government Recognition

- The Court questioned the blanket use of the term “**refugee**” for Rohingyas, noting that refugee classification requires **explicit governmental recognition**.
- Without formal acknowledgement, individuals entering the country without authorization remain **illegal migrants**, devoid of enforceable legal rights.

#### 2. Limited Obligations Toward Illegal Entrants

- While affirming that the State must extend **basic humanitarian treatment**, the Court expressed reservations about illegal entrants invoking **legal or constitutional protections**.
- It emphasised that allowing non-citizens who entered unlawfully to claim rights could undermine the integrity of India's legal and administrative systems.

#### 3. National Priorities and Security Concerns

- The Court underscored the imperative of securing India's borders—especially in the **northeast**, where demographic imbalances have historically triggered ethnic and security tensions.
- It reiterated that **citizen welfare, national security, and population management** must take precedence over obligations to illegal migrants.

### Legal Framework Governing Refugees and Illegal Migrants in India

#### 1. International Law

- **1951 UN Refugee Convention & 1967 Protocol:**
  - Define who qualifies as a refugee and outline their rights and protections.
  - **India is not a signatory** to either instrument.

#### 2. Customary International Law

- India acknowledges the principle of **Non-Refoulement**—prohibition on returning a person to danger—as part of customary norms, but it is applied in a **context-dependent and limited manner**.

#### 3. Domestic Legal Provisions

India has no separate refugee law; foreign nationals—including asylum seekers—are governed by:

- **Foreigners Act, 1946**
  - **Registration of Foreigners Act, 1939**
  - **Passports Act, 1967**
  - **Citizenship Act, 1955**
- These statutes regulate entry, stay, deportation, and citizenship matters.

#### 4. Ad-Hoc Refugee Management Mechanism

Given the absence of a dedicated refugee law, India follows a “**strategic ambiguity**” model, with roles divided as follows:

- **Ministry of Home Affairs (MHA):** Handles **Tibetan refugees** and **Sri Lankan Tamils** directly.
- **UNHCR India:** Processes asylum claims for groups such as **Rohingyas, Afghans, Myanmarese, and African nationals**.

#### 5. Communities Recognized as Refugees in India

- **Tibetans** (1959 onwards)
- **Sri Lankan Tamils** (1980s conflict period)
- **Chakma and Hajong refugees**

These groups receive varying levels of administrative support and settlement rights.

### Conclusion — Navigating the Legal-Humanitarian Balance in Migration Governance

The Supreme Court’s ruling reflects the continuing tension between **humanitarian responsibilities** and **sovereign control over borders**. By asserting that illegal immigrants do not hold enforceable legal rights unless recognized through formal channels, the Court reinforces India’s current refugee governance model. At the same time, it acknowledges the baseline humanitarian duty owed to foreign nationals. As migration pressures grow, India faces the challenge of balancing **security imperatives, demographic concerns, international expectations, and constitutional values** while operating without a comprehensive refugee law.

### Mains Practice Question

“India lacks a dedicated refugee law and relies instead on a combination of domestic statutes and administrative discretion. In this context, critically analyse the Supreme Court’s recent observations on the legal status of illegal immigrants.”

## Modernizing Policing for Viksit Bharat

#### ✦ Syllabus Mapping:

- **GS Paper II – Governance, Constitution, and Polity (Police Reforms, Criminal Justice System)**
- **GS Paper III – Internal Security, Technology in Policing, Cybersecurity**

### Introduction

India’s aspiration for *Viksit Bharat* by 2047 demands a police system that is modern, citizen-centric, technologically equipped, and aligned with democratic values. As highlighted by the Prime Minister, reforming policing is central to addressing emerging security threats, strengthening rule of law, and improving service delivery. The challenges facing the police—rising complexity of crime, resource constraints, and structural weaknesses—necessitate a comprehensive overhaul rooted in innovation, capacity building, and systemic reforms.

### Key Challenges in India’s Policing Framework

#### 1. Emergence of New-Generation Crimes

- Growth of **white-collar offences** such as bribery, tax evasion, money laundering, financial frauds, and cyber-enabled scams.
- Increasing misuse of **Artificial Intelligence**, deepfakes, ransomware, and cryptocurrency-based crime.
- Policing remains reactive and lacks adequate cyber-forensic strength.

#### 2. Deficient Infrastructure

- Gaps in **transportation, communication networks, surveillance systems**, and technologically advanced weaponry.
- Limited access to forensic laboratories and need-based training in digital investigation.
- Several states continue to rely on outdated equipment.

#### 3. Human Resource Shortfall

- As per **BPR&D (2022)**, India has **152.8 police personnel per lakh population**, significantly below the sanctioned **196.23**.
- Heavy workload leads to stress, poor investigation quality, delayed response time, and low community engagement.
- Lack of specialized cadres for cybercrime, forensics, and intelligence analysis.

### Measures Needed for Comprehensive Modernization

#### 1. Adoption of Innovative, Tech-Driven Strategies

- Leveraging **NATGRID**, interoperable databases, and **AI-driven analytics** for predictive policing and real-time intelligence.
- Deployment of drones, body-worn cameras, automated facial recognition, and GIS mapping to improve operational efficiency.

### 2. Strengthening Research and Academic Partnerships

- Encouraging universities to conduct **case studies on forensic usage**, behavioural analysis, crime mapping, and technology-enabled investigation.
- Collaboration between police institutions and **IITs/National Forensic Science Universities** to create evidence-based policing models.

### 3. Whole-of-Government Approach

- Integration of **law enforcement, rehabilitation services, social departments, and community stakeholders** to deal with crime holistically.
- Addressing the root causes of crime—drug abuse, juvenile delinquency, social distress—through coordinated programmes.

### 4. Structural and Administrative Reforms

- Full implementation of **Supreme Court directives** in **Prakash Singh (2006)**:
  - Fixed tenure for DGP and senior officers
  - Independent Police Complaints Authorities
  - Insulation from political interference
  - Merit-based appointments
- Adoption of **performance-based metrics** for efficiency and accountability.
- Building a “service-oriented police ethos,” as noted by scholars like **David Bayley**, who emphasises professionalism and autonomy.

## Measures Undertaken by Government for Police Reform

### 1. ASUMP Scheme

- The **Assistance to States & UTs for Modernization of Police (ASUMP)** focuses on providing modern arms, mobility, cyber-labs, and communication systems to state police forces.
- Emphasis on modernization of **Special Forces**, including anti-terror and disaster response units.

### 2. Criminal Law Overhaul

- Enactment of new criminal codes:
  - **Bharatiya Nyay Sanhita (BNS), 2023**
  - **Bharatiya Nagarik Suraksha Sanhita (BNSS), 2023**
  - **Bharatiya Sakshya Adhiniyam (BSA), 2023**
- These aim to streamline procedures, strengthen evidence systems, emphasize victim rights, and improve case disposal.

### 3. SMART Policing Initiatives

- Adoption of **CCTNS, ICJS**, predictive policing tools, and real-time data platforms.
- Promotion of **SMART Policing (Strict and Sensitive, Modern and Mobile, Alert and Accountable, Reliable and Responsive)** as envisioned by the PM.

## Conclusion — Towards a Modern, Responsive and Tech-Driven Police Ecosystem

Building a police force aligned with the vision of **Viksit Bharat** requires focusing on **technology adoption, institutional accountability, capacity enhancement**, and **community partnership**. Modernization must go hand-in-hand with structural reforms and adherence to democratic values. A reformed police system will strengthen **internal security**, promote **citizen trust**, and ensure India’s readiness to address evolving security challenges.

## Mains Practice Question

“Discuss the key challenges facing India’s police system and evaluate how modernization initiatives can strengthen policing in the context of Viksit Bharat.”

## ST Status Recommendation for Six Assam Communities

### 📌 Syllabus Mapping:

- **GS Paper II – Polity (Constitutional Provisions, Reservation, Backward Classes)**
- **GS Paper I – Indian Society (Tribal Issues, Social Groups)**
- **GS Paper II – Governance (Inclusive Policies, Commissions & Committees)**

## Introduction

A Group of Ministers (GoM) in Assam has proposed granting **Scheduled Tribe (ST)** status to six major communities currently classified under the **Other Backward Classes (OBC)** list. These communities—constituting nearly **27%** of the state’s population—have long demanded ST recognition to secure



socio-economic safeguards. The recommendations seek to restructure Assam's reservation system while aligning it with constitutional procedures and national frameworks.

### Background: Communities Recommended for ST Status

The six communities are:

- **Tai Ahom**
- **Tea Tribes / Adivasis**
- **Moran**
- **Motok**
- **Chutia**
- **Koch-Rajbongshi**

These groups have distinct histories, cultural identities, and developmental challenges. The demand for ST status gained momentum due to perceived exclusion from targeted tribal development programmes.

### Key Recommendations of the GoM

#### 1. Introduction of a Three-Tier ST Classification

- Proposal to add a new category: **ST (Valley)**.
- Assam currently has:
  - **ST (Plains)** – 10% reservation
  - **ST (Hills)** – 5% reservation
- The third category aims to avoid dilution of benefits for existing tribal groups.

#### 2. National-Level Reservation Alignment

- All recognised ST groups across India will benefit under a **uniform national ST quota**, ensuring parity across states.
- This approach promotes "inter-state consistency" in affirmative action policies.

#### 3. Interim Sub-Categorisation Within OBC Quota

- Until the constitutional amendment is completed, the GoM recommends **restructuring the existing 27% OBC reservation** to create sub-groups that can accommodate these communities.
- This measure prevents immediate pressure on the existing ST reservation structure.

### Constitutional Context: ST Status Recognition

#### 1. Article 366(25)

- Defines *Scheduled Tribes* as those specified under **Article 342**.

#### 2. Article 342

- **President** notifies the initial list of STs for states/UTs.
- **Parliament** has exclusive authority to **modify or amend** the ST list through law.

#### 3. Criteria for ST Identification

While the Constitution does not specify explicit criteria, the **Lokur Committee (1965)** outlined widely accepted principles:

- **Primitive traits**
- **Distinctive culture**
- **Geographical isolation**
- **Shyness of contact**
- **Backwardness**

These criteria continue to guide the appraisal of community claims, though modern scholars argue for updated socio-anthropological parameters due to evolving societal dynamics.

### Contemporary and Governance Dimensions

- Granting ST status may reshape Assam's **political representation**, demographic distribution of benefits, and tribal council structures.
- It may require **constitutional amendment**, similar to changes made in several states over the last decade.
- Aligns with national efforts to ensure **inclusive development**, especially under schemes like **TRIFED**, **Van Dhan Yojana**, and **Eklavya Model Schools**.
- Could lead to debates on *reservation expansion*, *federal negotiations*, and *identity-based mobilisation*.

### Conclusion — Balancing Identity, Equity, and Constitutional Mandates

The proposal to grant ST status to six Assamese communities reflects a broader attempt to address **historical inequities** and promote **inclusive development**. However, it also opens discussions on **reservation rationalisation**, **tribal autonomy**, and **social cohesion**. A careful approach, grounded in constitutional principles and socio-anthropological evidence, is essential to ensure that the **benefits of affirmative action** reach genuinely disadvantaged groups.

### Mains Practice Question

“Critically examine the implications of granting Scheduled Tribe status to additional communities in Assam. How does the constitutional process balance social justice with the concerns of existing tribal groups?”

## Digital Arrest Scams: Supreme Court Orders CBI Probe

### ✦ Syllabus Mapping:

- **GS Paper II – Polity & Governance (Judiciary, Investigative Agencies, Federal Issues)**
- **GS Paper III – Internal Security (Cybercrime, Emerging Threats, Technological Misuse)**

### Introduction

The Supreme Court has issued a landmark directive instructing the **Central Bureau of Investigation (CBI)** to undertake a comprehensive probe into the rising cases of **digital arrest scams** across India. These scams—an evolving form of cyber-enabled extortion—pose serious threats to citizen security, financial systems, and institutional credibility. The Court’s intervention marks a significant step toward establishing coordinated national action against sophisticated cyber fraud.

### Key Directions Issued by the Supreme Court

#### 1. CBI Empowered to Investigate Bankers under the Prevention of Corruption Act, 1988

- The Court authorised the CBI to examine the involvement of bank officials who may have facilitated the opening of fraudulent accounts used in digital arrest schemes.
- This ensures scrutiny of institutional vulnerabilities exploited by cybercriminal networks.

#### 2. States Asked to Grant Consent under Section 6 of the Delhi Special Police Establishment Act

- States including **Punjab, Tamil Nadu, Uttarakhand, and Haryana** have been directed to provide their statutory consent to enable a **pan-India investigation**.
- Highlights federal cooperation as essential for combating crimes that transcend jurisdictional boundaries.

#### 3. RBI Impleaded for Technical Inputs

- The Supreme Court has brought the **Reserve Bank of India** into the case, instructing it to clarify the use of **AI and machine learning tools** deployed for detecting suspicious accounts.
- The objective is to evaluate systemic safeguards and identify technological gaps.

#### 4. Mandatory Cooperation from IT Service Providers

- Technology firms, including telecom and digital service platforms, must extend full cooperation to investigators.
- Recognises the role of digital intermediaries in detecting, reporting, and preventing online fraud.

### Understanding the Concept of Digital Arrest

#### What is Digital Arrest?

- A **cyber extortion scam** where fraudsters pretend to be officials from agencies such as the **CBI, Police, or Enforcement Directorate**.
- Victims are contacted through **phone or video calls** and falsely accused of crimes, often coerced into transferring money under fear of “virtual detention.”
- Rising prevalence: Indians reportedly lost **over ₹120 crore** to these scams in the **first quarter of 2024** alone.

#### Why It Is a Serious Threat

- Uses psychological manipulation and impersonation of authority.
- Exploits digital loopholes, anonymous communication channels, and financial vulnerabilities.
- Tied increasingly to international crime syndicates and offshore call centres.

### Government Initiatives to Counter Digital Arrest and Cyber Fraud

#### 1. Indian Cyber Crime Coordination Centre (I4C)

- An attached office under the Ministry of Home Affairs dedicated to combating all forms of cybercrime.
- Supports monitoring, investigation, training, and cyber forensic capacities.

#### 2. Cyber Fraud Mitigation Centre (CFMC)

- Located within I4C, it brings together **banks, payment aggregators, telecom operators, and financial intermediaries** to coordinate real-time responses to cyber fraud.
- Facilitates rapid freezing of suspicious accounts.

#### 3. Samanvaya Platform (Joint Management Information System)

- Provides analytics and linkage analysis across states to track recurring patterns, shared modus operandi, and cross-border criminal networks.

#### 4. “Report and Check Suspect” Feature on cybercrime.gov.in

- Allows citizens to verify suspicious numbers, payment handles, and accounts against a national database maintained by I4C.
- Enhances public awareness and digital vigilance.

### Conclusion — Strengthening India’s Cyber Resilience through Judicial and Institutional Intervention

The Supreme Court’s decision reflects the increasing severity of **digital arrest scams**, which blend impersonation, technology misuse, and financial manipulation. By empowering the CBI, ensuring inter-agency coordination, and involving regulators such as the RBI, the Court aims to build a **robust national framework** against cyber extortion. As cyber threats evolve, India requires stronger **institutional monitoring, federal cooperation, citizen awareness, and technological safeguards** to protect its digital ecosystem.

### Mains Practice Question

“What are digital arrest scams, and how do the Supreme Court’s recent directions strengthen India’s institutional capacity to tackle evolving cyber fraud?”

## Illegal Immigration and the Limits of Legal Entitlements

#### ✦ Syllabus Mapping:

- **GS Paper II – Polity (Citizenship, Fundamental Rights, Judicial Review)**
- **GS Paper II – International Relations (Refugee Framework, Humanitarian Obligations)**
- **GS Paper III – Internal Security (Border Management, Illegal Migration)**

### Introduction

While examining a **Habeas Corpus petition** alleging the disappearance of certain Rohingya individuals from state custody, the Supreme Court delivered an important ruling on India’s legal position toward **illegal immigrants**. The Court reaffirmed that **welfare rights and legal entitlements within India primarily pertain to citizens**, and that individuals who enter the country unlawfully cannot claim enforceable rights unless formally recognised under law. This ruling has significant implications for ongoing debates on refugee protection, internal security, and administrative discretion.

### Supreme Court’s Key Observations

#### 1. Questioning Rohingya Classification as “Refugees”

- The Court noted that the term *refugee* cannot be applied by default; it requires **formal recognition by the Government of India**.
- Since Rohingyas have not been officially designated as refugees, they remain **illegal immigrants**, and their status precludes them from claiming legal rights within India.

#### 2. Limited Obligations Toward Illegal Entrants

- The Court acknowledged that basic **humanitarian treatment** must be extended, consistent with civilised standards.
- However, it rejected the notion that illegal entrants can invoke legal rights or constitutional protections as a matter of entitlement.

#### 3. National Priorities and Security Concerns

- The Court emphasised that **citizens’ needs**, welfare obligations, and demographic stability must take precedence.



- It highlighted the **strategic sensitivity of the northeast**, where illegal migration has historically triggered ethnic tensions, resource stresses, and security challenges.
- Maintaining border discipline is essential for safeguarding internal security and national interests.

## Legal Framework Governing Refugees and Illegal Migrants in India

### 1. International Law

- **1951 Refugee Convention & 1967 Protocol** provide definitions, rights, and protection standards for refugees.
- **India is *not* a signatory**, and therefore has no treaty-bound obligation to follow these frameworks.

### 2. Customary International Law

- India acknowledges the principle of **Non-Refoulement** (no forced return to a place of persecution) as a norm of customary law, though it is applied selectively and contextually.

### 3. Domestic Legal Structure

Without a dedicated refugee law, individuals are regulated through existing immigration statutes:

- **Foreigners Act, 1946**
  - **Registration of Foreigners Act, 1939**
  - **Passports Act, 1967**
  - **Citizenship Act, 1955**
- These laws govern entry, stay, deportation, and naturalisation.

### 4. India's Ad-Hoc Refugee Management Model

Due to the absence of a uniform legal framework, India follows a **case-by-case administrative approach** (strategic ambiguity):

- **Ministry of Home Affairs** directly oversees:
  - Tibetan refugees
  - Sri Lankan Tamil refugees
- **UNHCR India** handles asylum claims for:
  - Rohingyas
  - Afghans
  - Myanmarers
  - Several African nationalities

### 5. Communities Recognised as Refugees

India has administratively granted refugee status to:

- **Tibetans**
- **Sri Lankan Tamils**
- **Chakma and Hajong communities**, among others.

## Conclusion — Balancing Humanitarian Duties with Sovereign Control

The Supreme Court's ruling underscores a central tension in India's refugee governance: the equilibrium between **sovereign authority over migration** and **humanitarian norms**. While humanitarian treatment remains a moral and customary obligation, the Court has clarified that **legal rights cannot be claimed by individuals who enter the country illegally** without government recognition. The judgment reinforces India's current policy of **strategic ambiguity**, highlighting the need for stronger border management, clearer legal frameworks, and a balanced approach that considers national security, demographic stability, and humanitarian considerations.

## Mains Practice Question

"India lacks a dedicated refugee law and continues to rely on administrative discretion. In this context, critically analyse the Supreme Court's recent observations on the legal rights of illegal immigrants."

## Lokpal's Incomplete Architecture: Parliamentary Concerns

### ✦ Syllabus Mapping:

- **GS Paper II – Polity & Governance (Anti-Corruption Institutions, Accountability Mechanisms)**
- **GS Paper II – Constitution (Statutory Bodies, Parliamentary Oversight)**

## Introduction

A Parliamentary Committee has expressed concern over the **partial operationalisation of the Lokpal's Inquiry and Prosecution Wings**, despite explicit statutory provisions under the **Lokpal and Lokayuktas Act, 2013**. The Committee underscored that delays in fully activating these wings dilute the effectiveness of India's apex anti-corruption institution and weaken the broader framework of **institutional accountability and probity in public life**.

## Lokpal and Lokayuktas Act, 2013: Statutory Framework

The Act provides for the establishment of:

- **Lokpal** at the **Union level**, and
- **Lokayuktas** at the **State level**,

to inquire into allegations of corruption against specified public functionaries.

### Key Functional Wings under the Act

#### 1. Inquiry Wing (Section 11)

- Headed by a **Director of Inquiry**.
- Responsible for conducting **preliminary inquiries** into offences alleged against public servants under the **Prevention of Corruption Act, 1988**.
- Acts as the first institutional filter before prosecution is recommended.

#### 2. Prosecution Wing (Section 12)

- Headed by a **Director of Prosecution**.
- Entrusted with **conducting prosecution** of public servants in cases referred by the Lokpal after inquiry.
- Ensures follow-up action and legal closure of corruption cases.

## Key Findings of the Parliamentary Committee

#### 1. Inquiry Wing – Partially Functional

- Currently staffed largely through **officers on deputation**, rather than a dedicated, permanent cadre.
- Full institutional capacity, autonomy, and continuity remain lacking.

#### 2. Prosecution Wing – Not Fully Constituted

- Only a **limited number of cases** have progressed to the prosecution stage.
- As a result, a **full-fledged, independent Prosecution Wing** has not been formally established, contrary to legislative intent.

## Recommendations of the Committee

- **Time-bound Action:** Both the **Inquiry Wing and Prosecution Wing** should be **fully constituted within six months**.
- **Urgent Institutional Measures:** The Committee urged the government to take immediate administrative and financial steps to ensure functional autonomy, staffing, and infrastructure.
- **Strengthening Anti-Corruption Architecture:** Full operationalisation is essential to restore public confidence and enhance deterrence against corruption.

## About Lokpal: Composition and Structure

### Composition

- **Chairperson + up to 8 Members**
- **50% Judicial Members**
- **Chairperson:**
  - A person who *is or has been* the **Chief Justice of India**, or
  - A **Judge of the Supreme Court**
- **Judicial Member:**
  - A person who *is or has been* a **Judge of the Supreme Court** or **Chief Justice of a High Court**

### Social Representation

- At least **50% of Members** must be from:
  - **SC, ST, OBC, Minorities, and Women**

**Tenure:** 5 years or until attaining **70 years of age**, whichever is earlier.

### Financial Independence

- All administrative expenses, salaries, allowances, and pensions of Lokpal are **charged to the Consolidated Fund of India**, ensuring independence from executive control.

## Who Can File a Complaint Before Lokpal?

Complaints against public servants can be filed by:

- **Individuals**
- **Societies or Associations of Persons**
- **Trusts**
- **Companies and LLPs**
- **Statutory Boards, Corporations, and Authorities**

This wide standing provision enhances citizen participation in anti-corruption oversight.

## Broader Governance Implications

- The **Second Administrative Reforms Commission (ARC)** emphasised that anti-corruption bodies must have **independent investigative and prosecutorial powers** to be effective.
- Weak operational capacity risks reducing Lokpal to a **recommendatory body**, rather than a robust enforcement institution.
- Delays undermine India's commitments to **transparency, good governance, and rule of law**.

## Conclusion — From Statutory Mandate to Institutional Effectiveness

The Parliamentary Committee's observations highlight a critical gap between **legislative intent and administrative execution**. Without fully functional Inquiry and Prosecution Wings, the Lokpal cannot serve as an effective deterrent against high-level corruption. **Time-bound operationalisation**, adequate staffing, and institutional autonomy are indispensable for strengthening India's anti-corruption framework and upholding public trust in governance.

## Mains Practice Question

"The effectiveness of anti-corruption institutions depends not merely on their statutory existence but on their functional autonomy and capacity. In this context, analyse the issues related to the operationalisation of Lokpal's Inquiry and Prosecution Wings."

## Semaglutide Ruling and the Debate on Patent Evergreening

### ✦ Syllabus Mapping:

- **GS Paper II – Polity & Governance (Judiciary, Intellectual Property Rights, Public Health)**
- **GS Paper III – Economy (Pharmaceutical Sector, Innovation vs. Access to Medicines)**

## Introduction

The **Delhi High Court's decision** to reject an interim injunction sought by **Novo Nordisk** against **Dr Reddy's Laboratories (DRL)** marks a significant judicial reaffirmation of India's **public-health-oriented patent regime**. The case, centred on **semaglutide**, a key drug for **Type 2 diabetes and obesity**, has reignited debate on **patent evergreening**, access to affordable medicines, and the balance between innovation and competition.

## Background of the Case

- **Novo Nordisk**, a Danish pharmaceutical major, holds Indian patents on **semaglutide**, an **Active Pharmaceutical Ingredient (API)**.
- Semaglutide is marketed globally under brand names such as **Ozempic** and **Wegovy**.
- Novo Nordisk sought an **interim injunction** to restrain **DRL** from allegedly infringing its patents.
- The **Delhi High Court refused interim relief**, allowing DRL to proceed, subject to final adjudication.

## Court's Key Observations

- The Court noted that Novo Nordisk had obtained **two patents on minor variations** of semaglutide.
- Such incremental modifications, without substantial therapeutic advancement, could **amount to patent evergreening**.
- Granting an injunction at this stage could unjustifiably extend monopoly rights and restrict market competition.



## Understanding Patent Evergreening

### Concept

- Patents generally have a **20-year life**.
- **Evergreening** refers to strategies used by patent holders to **extend exclusivity** by filing secondary patents on marginal changes.

### Common Forms of Evergreening

- New salts, esters, polymorphs, or isomers
- Modified dosages or delivery systems
- Slight formulation changes without improved clinical efficacy

Such practices often delay generic entry without contributing meaningful innovation.

## Legal Framework Against Evergreening in India

### 1. Patents Act, 1970 – Section 3(d)

- Prohibits patenting of **new forms or derivatives of known substances** unless they demonstrate **significantly enhanced therapeutic efficacy**.
- Designed explicitly to prevent unjustified extension of pharmaceutical monopolies.

### 2. Patentability Standards

- Strict requirements of:
  - **Novelty**
  - **Inventive step**
- Trivial or obvious modifications fail to meet these criteria.

### 3. TRIPS and Doha Declaration

- India's patent regime is **TRIPS-compliant**.
- The **Doha Declaration on TRIPS and Public Health** affirms members' rights to protect public health and promote access to medicines.
- India uses these flexibilities to curb secondary patents that lack genuine innovation.

## Broader Implications of the Ruling

### 1. Access to Affordable Medicines

- Facilitates **timely entry of generics**, especially for high-burden diseases like diabetes and obesity.
- Reinforces India's role as the **"pharmacy of the Global South."**

### 2. Innovation vs. Public Interest

- Encourages **genuine pharmaceutical innovation**, rather than incremental patent extensions.
- Signals judicial scrutiny over attempts to prolong exclusivity without real therapeutic gains.

### 3. Legal Precedent

- Aligns with earlier landmark rulings (e.g., *Novartis v. Union of India*, 2013).
- Strengthens predictability in India's patent jurisprudence.

## Conclusion — Balancing Innovation and Access

The Delhi High Court's refusal to grant an interim injunction in the semaglutide case underscores India's commitment to a **public-health-centric intellectual property regime**. By resisting patent evergreening, the judiciary has reaffirmed that **monopoly rights cannot be extended through cosmetic innovations**, especially when public access to essential medicines is at stake. The ruling reinforces India's delicate but firm balance between **encouraging true innovation and safeguarding affordable healthcare**.

## Mains Practice Question

"Patent evergreening poses challenges to access to affordable medicines. In the light of the Delhi High Court's ruling on semaglutide, examine how India's patent law balances innovation with public health objectives."

## Right to Disconnect: Reimagining Labour Rights in the Digital Era

### ✦ Syllabus Mapping:

- **GS Paper II – Polity & Governance (Parliamentary Processes, Labour Welfare, Constitutional Provisions)**
- **GS Paper I – Society (Changing Nature of Work, Work-Life Balance)**
- **GS Paper III – Human Resource Development (Labour Productivity, Well-being at Workplace)**

### Introduction

A **Private Member's Bill** on the '**Right to Disconnect**' has been introduced in the **Lok Sabha**, reflecting growing concerns over employee well-being in an era of **24×7 digital connectivity**. The Bill seeks to institutionalise a worker's right to disengage from work-related communications beyond official working hours and proposes the creation of an **Employees' Welfare Authority** to enforce this right. Though private members' bills rarely become law, they play a crucial role in **agenda-setting and normative debates** in Parliament.

### What is a Private Member's Bill?

- A **Private Member's Bill** is introduced by an MP **who is not a Minister**.
- It allows legislators to raise **social, economic, or governance issues** that may not yet be prioritised by the government.
- Historically, such Bills have influenced public discourse and later policy reforms.

### Understanding the 'Right to Disconnect'

**Definition:** The **Right to Disconnect** is a legal entitlement that allows employees to **ignore work-related calls, emails, messages, or digital communications** outside prescribed working hours, including holidays, **without fear of adverse consequences**.

#### International Normative Basis

- Rooted in **Article 24 of the Universal Declaration of Human Rights (UDHR)**:  
"Everyone has the right to rest and leisure, including reasonable limitation of working hours and periodic holidays with pay."

### Rationale Behind the Bill

#### 1. Rising Work-Related Stress

- Continuous digital availability has blurred the boundary between **work and personal life**.
- Leads to **chronic stress, sleep deprivation, burnout, and mental fatigue**.

#### 2. Declining Productivity

- Empirical studies show that productivity **declines sharply beyond 50 working hours per week**.
- Overwork results in diminishing marginal returns, affecting both employees and organisations.

#### 3. Socio-Psychological Consequences

- Erosion of **work-life balance**.
- Strained family and social relationships, increased isolation.
- **Contemporary example:** The reported death of an **Ernst & Young employee in Pune (2024)** due to excessive workload brought national attention to toxic work cultures.

### Constitutional and Legal Foundations in India

The proposed right finds support in the **Directive Principles and Fundamental Rights**:

- **Article 21** – Right to life includes **dignity, mental health, and humane working conditions** (expanded interpretation by judiciary).
- **Article 39(e)** – State must ensure that **health and strength of workers are not abused**.
- **Article 42** – Mandates the State to provide **just and humane conditions of work**.

Together, these provisions create a strong constitutional basis for regulating excessive digital labour.

### Key Features Proposed in the Bill

- Establishment of an **Employees' Welfare Authority**.
- Statutory recognition of the **right to disconnect** beyond working hours and during holidays.
- Protection against **penalisation or discrimination** for exercising this right.
- Likely applicability across sectors, especially **white-collar and digitally mediated work**.

### Global Experiences and Best Practices

#### France – El Khomri Law (2017)

- First country to legally recognise the **Right to Disconnect**.
- Requires companies to negotiate after-hours communication norms with employees.

#### Australia – Fair Work Amendment, 2024

- Employees may refuse after-hours communications **unless refusal is unreasonable**.
- Balances employee rights with **emergency and operational requirements**.

These models demonstrate that the right can be **context-sensitive rather than absolute**.

### Critical Assessment and Challenges

- **Sectoral Diversity:** Emergency services, healthcare, and critical infrastructure may need exemptions.
- **Informal Sector:** Enforceability remains a challenge in India's large informal workforce.
- **Employer Concerns:** Fear of reduced flexibility and global competitiveness.
- **Implementation:** Requires clarity on working hours, grievance redressal, and penalties.

### Conclusion — Towards Humane Work in a Hyper-Connected Economy

The Private Member's Bill on the **Right to Disconnect** responds to a profound transformation in the nature of work driven by digital technologies. While flexibility and connectivity have enhanced efficiency, their unchecked use threatens **mental health, productivity, and human dignity**. Drawing upon constitutional values and global best practices, the proposed right represents a step toward **re-humanising labour relations** in India. Even if not enacted immediately, it sets the stage for future reforms in India's labour and welfare framework.

### Mains Practice Question

“In the context of increasing digitalisation of work, examine the need for a ‘Right to Disconnect’ in India. Discuss its constitutional basis and challenges in implementation.”

## Assam's Polygamy Ban: Law, Gender Justice and Reform

#### 📌 Syllabus Mapping:

- **GS Paper II – Polity & Governance (Social Justice, State Legislation, Fundamental Rights)**
- **GS Paper I – Indian Society (Marriage, Family, Social Reform)**

### Introduction

The **Assam Prohibition of Polygamy Bill, 2025**, passed by the Assam Legislative Assembly, marks a significant intervention by the State to **criminalise the practice of polygamy** with stringent penalties, including **imprisonment of up to 10 years** for contracting a second marriage during the subsistence of the first. The legislation has triggered debate on **gender justice, uniformity of matrimonial laws, constitutional morality, and social reform**.

### Understanding Polygamy

**Definition:** Polygamy refers to a system of marriage in which a person has **more than one spouse at the same time**.

#### Types of Polygamy

- **Polygyny:** A man marries more than one woman (most common form).
- **Polyandry:** A woman marries more than one man (rare, limited to specific tribal societies).

### Legal Position of Polygamy in India

#### 1. Hindu Marriage Act, 1955

- **Section 5 & Section 17:** Bigamy is prohibited.
- Second marriage during the lifetime of a spouse is **void** and **punishable**.

#### 2. Bharatiya Nyaya Sanhita (BNS), 2023

- **Section 82:** Marrying again during the lifetime of a husband or wife is punishable with:



- **Imprisonment up to 7 years**, and
- **Fine.**

### 3. Constitutional Context

- **Article 14:** Equality before law
- **Article 15:** Prohibition of discrimination
- **Article 21:** Right to life and dignity

Judicial interpretation has consistently held that **polygamy is not an essential religious practice**, but a **social custom subject to reform**.

## Assam Prohibition of Polygamy Bill, 2025

### Key Provisions

- **Complete prohibition** on contracting a second marriage during the subsistence of the first.
- **Punishment:**
  - Imprisonment up to **10 years** (more stringent than BNS).
- Applies across communities within the State.

### Legislative Intent

- Promote **gender justice** and **marital equality**.
- Prevent **exploitation of women** under personal or customary practices.
- Align state law with **constitutional morality**.

## Significance of the Law

### 1. Gender Justice

- Polygamy has been linked to:
  - Economic deprivation of women
  - Emotional insecurity
  - Unequal power relations within marriage

The Bill reinforces the constitutional vision of **substantive equality**.

### 2. Social Reform through Law

- Echoes **Dr. B.R. Ambedkar's** view that law is a legitimate tool to dismantle regressive social practices.
- Strengthens the reformist trajectory begun by post-independence personal laws.

### 3. Federal Dimension

- Demonstrates the **State's competence** in legislating on social practices under the **Concurrent List**, subject to constitutional limits.

## Concerns and Debates

### 1. Uniform Civil Code (UCC) Debate

- Raises questions about **piecemeal reforms vs comprehensive UCC** under **Article 44**.

### 2. Enforcement Challenges

- Risk of:
  - Under-reporting
  - Informal or unregistered marriages

### 3. Rights-based Concerns

- Need to ensure:
  - Due process
  - Protection against misuse of stringent penal provisions

## Way Forward

- **Legal harmonisation:** Align state laws with central criminal law to avoid inconsistency.
- **Social awareness:** Complement penal measures with education and counselling.
- **Women-centric safeguards:** Strengthen maintenance, inheritance, and matrimonial remedies.

- **Judicial oversight:** Ensure proportionality and fairness in enforcement.

### Conclusion — Law as an Instrument of Social Equality

The **Assam Prohibition of Polygamy Bill, 2025** represents a decisive move towards **gender justice and marital equality**, reinforcing the constitutional commitment to dignity and equality. While the law sends a strong normative signal against regressive practices, its success will ultimately depend on **fair enforcement, social acceptance, and complementary welfare measures**. The legislation underscores that **personal practices cannot override constitutional values**.

### Mains Practice Question

“Discuss the constitutional, legal, and social dimensions of the Assam Prohibition of Polygamy Bill, 2025. Do you think criminalisation alone is sufficient to address gender injustice associated with polygamy?”

# GOVERNANCE

## AI in Courts: Supreme Court's Cautious Approach

### ✦ Syllabus Mapping:

- **GS Paper II – Polity & Governance (Judiciary, Judicial Reforms, E-Governance)**
- **GS Paper III – Science & Technology (Artificial Intelligence, Ethical Use of Technology)**

### Introduction

While hearing a **Public Interest Litigation (PIL)** seeking guidelines to prevent misuse of **Artificial Intelligence (AI)** in courts, the **Supreme Court of India** clarified that **AI will not replace or take over judicial administration**. The Court acknowledged the growing use of **Generative Artificial Intelligence (GenAI)** in legal processes but emphasised that Indian judges remain **deeply conscious of the ethical, legal, and institutional risks** associated with its indiscriminate deployment. The observation reflects India's attempt to strike a balance between **technological assistance and judicial human discretion**.

### Concerns Associated with the Use of AI in the Judiciary

#### 1. Hallucinations and Fabricated Outputs

- **Generative AI systems** may produce *hallucinations*—confident but false outputs.
- This includes **non-existent judgments, fabricated citations, or misleading legal research**.
- **Global example:** In the **UK High Court**, lawyers submitted AI-generated arguments citing cases that did not exist, raising serious professional and ethical concerns.

#### 2. Risk of Disparate and Biased Outcomes

- AI systems trained on **biased or incomplete datasets** may:
  - Discriminate against certain individuals or groups.
  - Reinforce existing social, economic, or institutional biases.
- This conflicts with constitutional principles of **equality before law (Article 14)** and **fair procedure (Article 21)**.

#### 3. Lack of Transparency and Explainability

- Many AI models operate as “**black boxes**”, making it difficult to:
  - Understand how decisions or recommendations are generated.
  - Assess accountability and fairness.
- In a judicial context, absence of **reasoned decision-making** undermines the legitimacy of outcomes.

### Permissible and Productive Integration of AI in Judiciary

The Supreme Court did not reject AI outright but endorsed its **limited, assistive role**.

#### 1. Enhancing Access to Justice

- AI-powered **chatbots and virtual assistants** can:
  - Provide basic legal information.
  - Facilitate initial consultations, especially for underserved populations.

- Supports the constitutional goal of **access to justice**.

### 2. Improving Judicial Productivity

- AI tools assist in:
  - Automated transcription of court proceedings.
  - Efficient retrieval and summarisation of case laws.
  - Identifying cases with low merit at preliminary stages.
- **International example:**
  - **Brazil's "VICTOR" AI system** helps its Supreme Court screen appeals, improving efficiency without replacing judges.

### 3. Addressing Judicial Backlog

- AI can automate **routine administrative tasks**, such as:
  - Case listing and categorisation.
  - Document processing.
  - Predictive analytics for workload management.
- **Global example:**
  - In **Greece**, AI-enabled systems are used for faster document processing, aiding quicker case disposal.

### Indian Judicial Perspective: Human-in-the-Loop Model

- The Court implicitly supports a **"human-in-the-loop" approach**, where:
  - AI acts as a **decision-support system**, not a decision-maker.
  - Final adjudication rests solely with judges.
- This aligns with the views of legal scholars like **Ronald Dworkin**, who emphasised that law involves **moral reasoning**, not merely rule application—something AI cannot replicate.

### Way Forward: Safeguards and Governance Framework

- **Clear Guidelines:** On permissible and impermissible use of AI in courts.
- **Algorithmic Transparency:** Explainable AI models suited for public institutions.
- **Capacity Building:** Training judges and court staff in responsible AI use.
- **Ethical Oversight:** Institutional mechanisms to audit AI tools for bias and accuracy.

### Conclusion — Technology as an Aid, Not an Arbiter

The Supreme Court's observations underline a **measured and constitutionally grounded approach** to AI in the judiciary. While AI can significantly improve efficiency, access, and case management, **judicial decision-making must remain human-centric**, guided by constitutional values, empathy, and reasoned judgment. The future of judicial administration in India lies not in automation of justice, but in **augmentation of human decision-making through carefully regulated technology**.

### Mains Practice Question

"Artificial Intelligence offers opportunities to improve judicial efficiency but also raises ethical and constitutional concerns. Discuss in the context of the Supreme Court's recent observations on the use of AI in the Indian judiciary."

## Health–National Security Cess: New Fiscal Instrument

#### ✦ Syllabus Mapping:

- **GS Paper II – Polity & Governance (Parliament, Public Finance, National Security)**
- **GS Paper III – Indian Economy (Taxation, Resource Mobilisation, Defence & Health Financing)**

### Introduction

The **Lok Sabha** has passed the **Health Security–National Security Cess Bill, 2025**, marking a significant step towards **innovative fiscal mobilisation** to meet India's expanding requirements in **defence preparedness, public health systems, and overall national security**. The Bill reflects the evolving understanding that **health security and national security are deeply interlinked**, especially in the post-pandemic and geopolitically uncertain world.

### Rationale Behind the Bill

- **Rising defence and internal security challenges**, including border tensions and non-traditional threats.
- **Lessons from COVID-19**, which highlighted the need for resilient public health infrastructure as a component of national security.
- **Limitations of conventional taxation**, necessitating **earmarked and predictable funding sources**.



### Key Features of the Health Security-se-National Security Cess Bill, 2025

#### 1. Statutory Framework for a Special Excise Cess

- Establishes a **clear legal basis** for levying a **dedicated excise cess**.
- Avoids ambiguity in collection and utilisation, ensuring **legislative legitimacy and transparency**.

#### 2. Capacity-Based Excise Cess

- Cess is levied on the **manufacturing capacity** of machinery or processes used for producing **specified goods**.
- **Initial coverage: Pan masala**, a product often associated with public health externalities.
- Capacity-based taxation helps:
  - Reduce under-reporting of production.
  - Strengthen tax compliance.

#### 3. Utilisation of Cess Proceeds

- All proceeds are credited to the **Consolidated Fund of India**.
- Funds are earmarked to support:
  - **Defence preparedness**
  - **Public health systems**
  - **National security infrastructure**

This ensures parliamentary oversight over expenditure while aligning resources with strategic priorities.

### Broader Significance

#### 1. Health Security as National Security

- Reinforces the idea that:
  - Pandemics, bio-threats, and health system failures can weaken national resilience.
- Echoes global thinking, including the **WHO and UN Security discourse**, on health-security convergence.

#### 2. Fiscal Innovation

- Moves beyond conventional tax bases towards **sector-specific, behaviour-linked levies**.
- Similar to earlier cesses used for education, infrastructure, and clean energy.

#### 3. Public Health Externalities

- Targeting products like **pan masala** reflects the **“polluter pays” principle**, where industries contributing to health risks support mitigation efforts.

### Concerns and Challenges

- **Earmarking vs fiscal flexibility:** Excessive cesses may constrain budgetary discretion.
- **Regressive impact:** Indirect cesses can disproportionately affect lower-income consumers.
- **Industry resistance:** Capacity-based taxation may face legal and compliance challenges.
- **Transparency in utilisation:** Requires robust reporting to ensure funds meet stated objectives.

### Conclusion — Towards Integrated Security Financing

The **Health Security-se-National Security Cess Bill, 2025** represents a **strategic rethinking of public finance**, recognising that **defence strength and health resilience are mutually reinforcing pillars of national security**. While the Bill strengthens fiscal capacity to address emerging threats, its long-term success will depend on **transparent utilisation, periodic review, and balanced reliance on cesses** within India's broader taxation framework.

### Mains Practice Question

“Examine the rationale and significance of the Health Security-se-National Security Cess Bill, 2025. How does it reflect the changing understanding of national security in India?”

# INTERNATIONAL RELATIONS

## ITPGRFA Talks Stall on Benefit Sharing

### ✦ Syllabus Mapping:

- **GS Paper II – International Relations (Environmental Treaties, Global Governance)**
- **GS Paper III – Environment & Biodiversity (Genetic Resources, Conservation, ABS Mechanisms)**

### Introduction

The **11th session of the Governing Body of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)** concluded in **Lima, Peru**, without consensus on enhancing the **Multilateral System (MLS)** of access and benefit sharing. The inability to reach agreement underscores the long-standing tensions between demands for equitable benefit-sharing, sovereign rights over genetic resources, and global food security imperatives.

### Understanding the Multilateral System (MLS)

- The **MLS** enables shared access to genetic material from **35 key food crops** and **29 forages**, listed in **Annexure I** of the Treaty.
- These crops constitute **approximately 80% of the global plant-based diet**, making the MLS central to global agricultural research, seed improvement, and climate resilience.
- By joining the ITPGRFA, countries commit to making genetic diversity—particularly from **public gene banks**—accessible to all member states through the MLS.

### Outcome of the 11th Governing Body Session

#### 1. Stalled Negotiations on Enhancing the MLS

- Talks collapsed over disagreements on the **payment structure, scope of Annex I**, and **Digital Sequence Information (DSI)** rules.
- DSI—representing genetic information in digital form—has become a contentious issue globally, with developing countries demanding fair compensation for its commercial use.

#### 2. Compromise Proposal at the Session

A partial compromise was placed before members:

- **Adoption of a revised Standard Material Transfer Agreement (SMTA)**, with financial terms to be finalized at **GB12**.
- The **SMTA**:
  - Governs exchanges of plant genetic resources
  - Prevents misuse of shared material
  - Ensures **equitable sharing of commercial benefits** by regulating payments from companies and research institutions

#### 3. Key Issues Deferred to GB12

- **Payment mechanism** for benefit-sharing
  - **Expansion of Annex I** to include more crops
  - **Rules for Digital Sequence Information (DSI)**
- The postponement highlights persistent divides between developed and developing nations regarding access, commercial usage, and equity.

### India's Position at GB11

India strongly emphasized:

- **Protection of sovereign rights** under the Convention on Biological Diversity (CBD) and Nagoya Protocol.
- **Fair and transparent benefit-sharing**, rejecting what it termed an *opaque and premature* draft.
- Reconsideration of all unresolved issues at **GB12** before any binding commitments are made. India's stand reflects broader concerns of Global South countries regarding asymmetrical access to genetic resources without proportionate benefits.

### About ITPGRFA

- Adopted by the **FAO Conference in 2001** and enforced in **2004**.
- First **legally binding global agreement** aimed at conserving and ensuring sustainable use of crop genetic diversity.

- Objectives include:
  - Conservation of crop genetic resources
  - Sustainable use in agriculture
  - Fair and equitable sharing** of benefits
- Membership: **154 countries + European Union**, including India.

The Treaty plays a crucial role in addressing global food security, particularly in the context of climate change and rising dependence on a narrow range of crop species.

## Conclusion — Balancing Sovereignty, Equity, and Global Food Security

The Lima session highlights the complex negotiation landscape surrounding plant genetic resources. While the MLS promotes global cooperation, unresolved issues—especially **payment structures, scope expansion, and DSI governance**—continue to impede consensus. For countries like India, safeguarding **sovereign control** and ensuring **equitable benefit-sharing** remain non-negotiable. The decisions at **GB12** will be critical in shaping the future of global agricultural research and biodiversity governance.

## Mains Practice Question

“Why is the Multilateral System under the ITPGRFA facing challenges in its enhancement? Discuss India’s concerns and the implications for global food security.”

## India–Russia Partnership at 25: Key Summit Outcomes

### ✦ Syllabus Mapping:

- GS Paper II – International Relations (India’s Bilateral Relations, Strategic Partnerships, Regional Groupings)**
- GS Paper III – Economy & Security (Trade, Energy Security, Defence Production, Connectivity Corridors)**

## Introduction

The **23rd India–Russia Annual Summit**, held in **New Delhi on 06 December 2025**, marked a significant milestone—**25 years of the India–Russia Strategic Partnership** since the 2000 Declaration. The relationship, elevated to a “**Special and Privileged Strategic Partnership**” in 2010, continues to be one of India’s most enduring strategic ties. The Summit underscored efforts to **rebalance cooperation beyond defence and energy**, while adapting to changing global geopolitical and economic realities.

## Evolution of India–Russia Relations (Brief Context)

- 2000**: Declaration on Strategic Partnership
- 2010**: Upgraded to *Special and Privileged Strategic Partnership*
- Characterised by **mutual trust, strategic autonomy**, and convergence on a **multipolar world order**

## Key Outcomes of the 23rd Summit

### 1. Economic Cooperation: Programme 2030

- Adoption of the “**Programme for the Development of Strategic Areas of India–Russia Economic Cooperation till 2030.**”
- Objective: **Diversify bilateral engagement** beyond traditional sectors like defence and hydrocarbons into:
  - Manufacturing
  - Pharmaceuticals
  - Agriculture
  - Digital economy
  - Critical minerals

### 2. Trade Expansion Targets

- Bilateral trade target: USD 100 billion by 2030**
  - Current level: **USD 68.7 billion (2024–25)**
- Reflects intent to address trade asymmetry and expand **non-energy exports from India**.

### 3. Free Trade Agreement (FTA) Momentum

- Decision to **fast-track negotiations** for an **India–Eurasian Economic Union (EAEU) FTA**.
- Expected benefits:
  - Reduced tariff barriers
  - Easier movement of goods and services
  - Improved access for Indian pharmaceuticals, textiles, and engineering goods.



#### 4. Alternative Payment and Financial Mechanisms

- Agreement to **expand bilateral settlements in national currencies**.
- Emphasis on:
  - **Interoperability of payment systems**
  - Exploration of **Central Bank Digital Currencies (CBDCs)**
- Strategic aim: **Reduce dependence on Western-dominated financial systems** and enhance economic resilience.

#### 5. Energy and Nuclear Cooperation

- Russia assured **uninterrupted oil and gas supplies**, reinforcing India's **energy security**.
- Continued cooperation in:
  - **Kudankulam Nuclear Power Plant**
  - Development of **Small Modular Reactors (SMRs)**
- Aligns with India's low-carbon transition and base-load energy needs.

#### 6. Defence and Security Cooperation

- Renewed focus on:
  - **Joint R&D and co-production** under *Make in India*
  - **Technology transfer**
  - Regular **bilateral and multilateral military exercises**
- Defence partnership increasingly shifting from **buyer-seller** to **co-developer** model.

#### 7. Connectivity and Logistics Corridors

- Enhanced cooperation on strategic corridors:
  - **International North-South Transport Corridor (INSTC)**
  - **Chennai-Vladivostok Maritime Corridor**
  - **Northern Sea Route (NSR)**
- Signed **MoU on Training of Specialists for Ships Operating in Polar Waters**, strengthening **Arctic cooperation** and maritime expertise.

#### 8. Cooperation in Multilateral and Global Fora

- Russia formally joined the **India-led International Big Cat Alliance (IBCA)**.
- Reinforces collaboration in **environmental conservation and biodiversity diplomacy**.

#### 9. People-to-People and Mobility Initiatives

- MoUs on **migration and mobility** for skilled Indian professionals.
- **30-day visa-free e-tourist entry for Russian citizens**, aimed at boosting tourism and cultural exchange.
- Reflects recognition that **societal links underpin strategic partnerships**.

### Strategic Significance of the Summit

- Reinforces India's policy of **multi-alignment and strategic autonomy**.
- Helps India manage its **energy, defence, and connectivity interests** amid global uncertainties.
- Signals Russia's continued importance in India's **Eurasian and Arctic engagement**.
- Balances India's expanding partnerships with the West without abandoning traditional allies.

### Challenges and Future Outlook (Analytical Perspective)

- **Trade imbalance** still heavily energy-driven.
- Impact of **global sanctions regime** on financial and logistical cooperation.
- Need for faster execution of connectivity projects like INSTC.
- Ensuring defence diversification alongside indigenisation.

### Conclusion — Recalibrating a Time-Tested Partnership

The 23rd India-Russia Annual Summit reflects a conscious effort to **modernise and diversify a historically strong partnership**. By expanding cooperation into trade, connectivity, finance, and people-to-people exchanges, both countries seek to future-proof their relationship in a rapidly evolving global order. Sustained political commitment and effective implementation will determine whether the **2030 economic and strategic vision** translates into tangible outcomes.

### Mains Practice Question

**"The India-Russia relationship is undergoing a phase of strategic recalibration. Examine the key outcomes of the 23rd India-Russia Annual Summit and assess their significance for India's foreign policy."**

## OSCE: Mandate, Structure and Contemporary Role

✦ **Syllabus Mapping: GS Paper II – International Relations (International Organisations, Regional Security Architecture)**

### Introduction

Ukraine's assertion that it seeks "**real peace, not appeasement**" with Russia at the **Organization for Security and Co-operation in Europe (OSCE)** has brought renewed attention to the role of regional security organisations in managing conflicts in Europe. The statement underscores both the **continued relevance** and the **institutional constraints** of the OSCE in addressing high-intensity geopolitical conflicts.

### About the OSCE

#### Basic Profile

- **Secretariat:** Vienna, Austria
- **Nature:** World's largest regional security organisation
- **Participating States:** 57 countries from North America, Europe, and Asia
- **India:** *Not a participating State*

#### Decision-Making

- All participating States enjoy **equal status**.
- Decisions are taken by **consensus**, reflecting cooperative security principles but often slowing decisive action.

### Mandate and Objectives

The OSCE works for **stability, peace, and democracy** for over **one billion people**, based on the concept of **comprehensive security**, which integrates:

- **Politico-military security**
- **Economic and environmental security**
- **Human dimension** (human rights, democracy, rule of law)

Its approach relies on:

- **Political dialogue** around shared values
- **Field-level practical engagement** to prevent conflict and build trust

### Governance Structure of OSCE

#### 1. Summits

- **Highest decision-making body**
- Held at the level of **Heads of State or Government**
- Set long-term strategic direction

#### 2. Ministerial Council

- Annual meeting of Foreign Ministers
- Reviews activities and adopts decisions

#### 3. Permanent Council

- Regular decision-making body in Vienna
- Handles day-to-day political dialogue

#### 4. Forum for Security Co-operation (FSC)

- Deals with the **politico-military dimension** of security
- Focus areas:
  - Arms control
  - Confidence- and security-building measures (CSBMs)
  - Military transparency

### Contemporary Context: Ukraine–Russia Conflict

- OSCE has been a **key diplomatic platform** for dialogue on the Ukraine crisis.
- Ukraine's emphasis on "real peace" highlights:

- Rejection of compromise that legitimises aggression
- Demand for security guarantees and respect for sovereignty

### Limitations Exposed

- **Consensus rule** allows veto-like obstruction.
- OSCE lacks **enforcement powers**, relying on persuasion and norms.
- In high-intensity conflicts, its role is often confined to monitoring and dialogue.

### Significance of OSCE in International Relations

- **Norm-building institution:** Promotes democratic values and human rights.
- **Early-warning and conflict prevention:** Field missions, election observation.
- **Platform for inclusive dialogue:** Brings rival states to the same table.

### Conclusion — Dialogue without Coercion

The OSCE remains a **cornerstone of Europe's cooperative security architecture**, grounded in dialogue, consensus, and shared norms. Ukraine's recent statement reflects the organisation's continued diplomatic relevance, while also exposing its **structural limitations** in enforcing outcomes during active conflicts. In an era of renewed great-power rivalry, the OSCE's experience highlights both the necessity and the fragility of **rule-based regional security institutions**.

### Mains Practice Question

“Discuss the mandate and institutional structure of the Organization for Security and Co-operation in Europe (OSCE). In the light of the Ukraine–Russia conflict, examine its relevance and limitations as a regional security organisation.”

# INTERNAL SECURITY & DEFENCE

## Fake News Regulation: Parliamentary Concerns

### ✦ Syllabus Mapping:

- **GS Paper II – Governance (Regulation of Media, Accountability Mechanisms, Role of Parliament)**
- **GS Paper III – Internal Security (Information Warfare, Cybersecurity, Emerging Technologies)**

### Introduction

A Parliamentary Committee has presented a report in the Lok Sabha titled “**Review of Mechanism to Curb Fake News**”, warning that India's existing legal and regulatory systems are **insufficient to address the scale, speed, and technological complexity** of contemporary misinformation. With deepfakes, algorithm-driven amplification, and cross-border content flows reshaping the media ecosystem, the report calls for a **stronger, legally grounded, and technologically updated framework**.

### Existing Mechanisms to Regulate Fake News

#### 1. IT (Intermediary Guidelines and Digital Media Ethics Code) Rules, 2021

- Regulates digital news publishers and online curated content.
- Mandates grievance redressal, oversight mechanisms, and due diligence for intermediaries.

#### 2. Bharatiya Nyaya Sanhita (BNS)

- **Section 353** criminalises spreading false information or rumours with the intent to cause public harm.

#### 3. Other Legal and Regulatory Mechanisms

- **Information Technology Act, 2000** – Provides intermediary obligations and cyber offence provisions.
- **PIB Fact Check Unit** – Verifies government-related misinformation.
- **Cable Television Networks (Regulation) Act, 1995** – Regulates content on satellite channels to prevent misinformation.

### Issues Identified by the Parliamentary Committee





Subject	Issues in Current Mechanism	Committee Recommendations
<b>Absence of a Statutory Definition</b>	The term “ <b>fake news</b> ” has no legal definition, leading to ambiguity and inconsistent enforcement.	Formally <b>define fake news</b> in law; establish a committee to propose amendments to the IT Act, 2000 and Cable TV Act for stronger regulation.
<b>Regulatory Gaps</b>	<b>Safe harbour provisions</b> under the IT Act protect intermediaries from liability if they follow due diligence, limiting accountability. Algorithms often <b>prioritise sensational content</b> for monetisation.	Revisit relevant IT Act provisions to enhance accountability for platforms, especially regarding algorithmic amplification.
<b>Cross-Border Jurisdiction Issues</b>	Many misinformation sources operate internationally; legal enforcement varies across jurisdictions.	Create a dedicated <b>Inter-Ministerial Task Force</b> with MEA and legal experts to address cross-border regulatory challenges.
<b>Technological Sophistication (Deepfakes &amp; AI content)</b>	Rapid growth of <b>AI-generated videos, deepfakes</b> , and misinformation due to rising internet penetration and low digital literacy.	Explore <b>mandatory labelling</b> for AI-generated videos; consider <b>licensing norms</b> for AI content creators.

### Analysis and Contemporary Relevance

- The misinformation landscape is no longer limited to rumours—**synthetic media** and **automated bots** now play a major role in shaping public perception.
- India, with one of the world’s largest digital populations, is particularly vulnerable due to **low digital literacy, high social media usage**, and the influence of cross-border actors.
- Internationally, countries like the EU (Digital Services Act) and the US (AI-generated media guidelines) are framing stricter accountability models—suggesting directions India may learn from.

### Conclusion — Towards a Robust, Transparent, and Tech-Ready Anti-Misinformation Framework

The Parliamentary Committee’s recommendations highlight the need for a **clear legal definition, updated regulatory provisions**, and **technology-specific safeguards** to effectively curb fake news. Strengthening institutional coordination, enhancing platform accountability, and addressing challenges from deepfakes and cross-border misinformation will be crucial to protect India’s democratic processes and social harmony.

### Mains Practice Question

“India’s current legal framework is inadequate to manage the scale and technological complexity of fake news. Discuss the major gaps identified by the Parliamentary Committee and evaluate the reforms needed to strengthen India’s anti-misinformation architecture.”

## Heron Mark-II Drones: Acquisition and Indigenisation

### Introduction

India is reportedly advancing discussions to acquire more **Heron MK-II UAVs** from Israel, with an additional focus on **local manufacturing partnerships** to enhance unmanned surveillance capabilities.

### About Heron Mark-II

- Manufacturer:** Israel Aerospace Industries (IAI)
  - Category:** Medium Altitude Long Endurance (**MALE**) UAV designed for **Intelligence, Surveillance and Reconnaissance (ISR)** operations.
  - Performance:**
    - Operational altitude: **35,000 ft**
    - Speed: **150 knots**
    - Flight endurance: **up to 45 hours**
  - Technological Capabilities:**
    - Advanced EO/IR sensors
    - Communication intelligence (COMINT) suites
    - Satcom systems enabling **beyond line-of-sight missions**
- Heron MK-II significantly enhances strategic situational awareness along borders and maritime zones.

## Exercise Ekuverin: India–Maldives Joint Military Drills

### Introduction

The **14th edition** of Exercise *Ekuverin* is scheduled to take place in **Thiruvananthapuram, Kerala**, underscoring continued defence cooperation between India and the Maldives.

### About Exercise Ekuverin

- Nature:** Annual bilateral military exercise between the **Indian Army** and the **Maldives National Defence Force**.
- Origin:** Started in **2009**; the term “**Ekuverin**” means *Friends* in Dhivehi.

- **Objectives:**
    - Build interoperability for **counter-insurgency and counter-terrorism** missions
    - Joint **Humanitarian Assistance and Disaster Relief (HADR)** drills
    - Training in **semi-urban, jungle, and coastal terrain**
- This exercise strengthens maritime neighbourhood cooperation in the Indian Ocean.

# ECONOMY

## NSFI 2025–30: Deepening Financial Inclusion

### ✦ Syllabus Mapping:

- **GS Paper III – Economy (Financial Inclusion, RBI Policies, Inclusive Growth)**
- **GS Paper II – Governance (Service Delivery, Gender-Inclusive Policies)**

### Introduction

The Reserve Bank of India (RBI) has unveiled the **National Strategy for Financial Inclusion (NSFI) 2025–30**, approved by the **Sub-Committee of the Financial Stability and Development Council (FSDC)**. The strategy aims to strengthen **last-mile access**, ensure **effective usage** of financial services, and promote **equitable participation** in India's formal financial ecosystem. Built around a set of five priority goals, the strategy presents a structured roadmap for deepening financial inclusion across households and micro-enterprises.

### About NSFI 2025–30

The strategy introduces **five core goals**, collectively called “**Panch Jyoti**”, supported by **47 actionable measures**.

### The Panch Jyoti Objectives

#### 1. Ensuring Availability and Usage of Affordable Financial Services

- Focus on expanding access to a **diverse, suitable, and affordable bouquet** of financial products.
- Targets households and micro-enterprises to enhance **financial safety** and **economic security**.

#### 2. Gender-Sensitive, Women-Led Financial Inclusion

- Promotes **tailored strategies** for improving financial resilience among women.
- Addresses barriers faced by **underserved and vulnerable groups**, encouraging their participation in formal finance.

#### 3. Linking Livelihoods, Skills, and the Financial Ecosystem

- Seeks to integrate **skill development, livelihood support, and financial linkages** for sustainable income generation.
- Strengthens the ecosystem for micro-enterprises and rural households.

#### 4. Using Financial Education to Build Financial Discipline

- Focus on behavioural change through **financial literacy**, enabling informed financial decisions.
- Aims to reduce over-indebtedness and promote responsible savings and borrowing practices.

#### 5. Enhancing Consumer Protection and Grievance Redressal

- Emphasises improving the **quality of customer service**, ensuring ease of complaint resolution.
- Seeks to strengthen trust in the formal financial sector.

### Financial Inclusion in India: Progress and Indicators

#### Definition (World Bank)

Financial Inclusion means that individuals and businesses have **affordable, accessible, and responsible** financial products that meet their needs—credit, insurance, savings, payments, and more.

#### RBI's Financial Inclusion Index (FI-Index)

- Reached **67 in 2025**, recording a **24.3% improvement since 2021**.
- The index captures progress across dimensions of **banking, investments, insurance, pensions**, and other formal financial services.

### Significance of India's FI Growth

- Demonstrates stronger digital and physical access channels.
- Reflects institutional reforms, digital innovation, and expansion of financial infrastructure.

## Complementary Government Initiatives Supporting Financial Inclusion

### 1. NSFI 2019–24

- Provided the earlier roadmap for universal access, enabling foundational improvements in account penetration and credit linkages.

### 2. Pradhan Mantri Jan Dhan Yojana (PMJDY)

- Launched in 2014; facilitated opening of **over 56 crore bank accounts**.
- Major platform for direct benefit transfers and financial empowerment.

### 3. Digital India Programme

- Expanded digital infrastructure to enhance access to **online banking, UPI payments**, and other digital services.

### 4. JAM Trinity (Jan Dhan–Aadhaar–Mobile)

- Established critical public digital infrastructure enabling transparent service delivery and financial inclusion at scale.
- Helped reduce leakages and improved government-to-citizen transactions.

## Conclusion — Strengthening Inclusive Growth through Robust Financial Architecture

NSFI 2025–30 represents a forward-looking strategy aimed at deepening India's financial inclusion ecosystem. By combining **gender-focused policies, financial education, livelihood linkages**, and **customer protection**, the framework aspires to build a resilient and inclusive financial system. As India transitions to a more digitally integrated economy, achieving these goals will be central to supporting **equitable growth** and empowering financially vulnerable groups.

## Mains Practice Question

“Evaluate the key components of the National Strategy for Financial Inclusion (NSFI) 2025–30. How does it strengthen the vision of inclusive and resilient financial growth in India?”

## IBC Under Strain: Parliamentary Assessment

### ✦ Syllabus Mapping:

- **GS Paper III – Economy (Insolvency Framework, NPAs, Banking Reforms)**
- **GS Paper II – Governance (Regulatory Institutions, Tribunals, Parliamentary Oversight)**

## Introduction

The **Standing Committee on Finance**, in its **28th Report**, has raised concerns over the declining **recovery rates** under the **Insolvency and Bankruptcy Code (IBC), 2016**, even as the Code has produced notable behavioural and operational improvements within the credit system. While IBC continues to be a transformative framework for corporate insolvency resolution, persistent institutional bottlenecks and procedural delays hinder its optimal functioning. The Committee's observations provide an important opportunity to recalibrate India's insolvency ecosystem.

## Successes and Positive Behavioural Shifts under the IBC

### 1. Post-Resolution Revival and Improved Firm Performance

- Companies resolved under IBC demonstrated substantial operational revival.
- **Average sales increased by 76%** within three years after resolution.
- **Total assets grew by nearly 50%**, signalling improved organisational health and capital structure remediation.

### 2. Strengthened Credit Discipline

- Post-IBC, loan accounts exhibited a drastic reduction in overdue periods—from **248–344 days** to **30–87 days**.
- Indicates stronger borrower compliance and improved lender confidence.

### 3. Deterrence Leading to Pre-Admission Settlements

- The mere possibility of being admitted under IBC has prompted many entities to settle dues **before** formal proceedings begin.



- Reduces litigation burden and ensures faster recovery for creditors.

## Core Challenges Hindering IBC's Effectiveness

### 1. Persistent Time Overruns

- Delays caused by:
  - **Vacant positions** in NCLT/NCLAT
  - Procedural inconsistencies among Adjudicating Authorities
  - Heavy caseloads and inadequate support staff
- Often pushes cases beyond the mandated **330-day timeline**, diminishing recovery prospects.

### 2. Low Realization and High Haircuts

- Firms typically enter IBC at **advanced stages of distress**, reducing enterprise value.
- Lack of **transparent valuation processes** and inconsistent methodologies lead to excessive haircuts.
- Weak secondary markets for distressed assets also constrain competition among buyers.

### 3. Jurisdictional Conflicts and Legal Overlaps

- Frequent conflicts between IBC and laws such as the **Prevention of Money Laundering Act (PMLA), 2002**.
- Litigants often approach High Courts under **Articles 226/227**, seeking stays, thereby prolonging the resolution process.
- Inadequate clarity on jurisdictional boundaries impairs efficiency and certainty for stakeholders.

## Key Recommendations of the Parliamentary Panel

### 1. Strengthening Institutional Capacity

- Urgent creation of **additional NCLT benches** to reduce pendency.
- Notification of a comprehensive **Adjudicating Authority Rules** framework for uniformity and predictability in procedure.
- Adequate staffing and training to enhance tribunal efficiency.

### 2. Streamlining Insolvency Processes

- Expedited rollout of the **Integrated Technology Platform (iPIE)**:
  - Serves as a unified digital interface for insolvency cases.
  - Improves data accuracy, timelines, and coordination among stakeholders.
- Introduce **upfront threshold deposits** for unsuccessful resolution applicants to discourage frivolous litigation and delays.

### 3. Enhancing Value Realization and Reducing Haircuts

- Shift valuation emphasis from **liquidation value** to **enterprise value**, aligning with global best practices.
- Improve international outreach to attract **global investors** into distressed-asset markets.
- Promote **transparent e-auction platforms** to strengthen competition and fairness in resolution.

## Conclusion — Recalibrating the IBC for Faster, Fairer, and Efficient Resolution

The IBC remains a landmark reform that has reshaped India's insolvency landscape, improving credit behaviour and fostering economic accountability. However, the Committee's findings highlight the need for **institutional reinforcement, technological integration, and valuation reforms**. By addressing procedural weaknesses, reducing litigation-induced delays, and improving value realization, India can unlock the full potential of the IBC as a driver of economic efficiency, investment confidence, and financial stability.

## Mains Practice Question

“Critically examine the challenges highlighted by the Parliamentary Standing Committee regarding the Insolvency and Bankruptcy Code (IBC). Discuss how the recommended reforms can improve efficiency and recovery outcomes in India's insolvency ecosystem.”

## Rupee at 90: Causes and Policy Choices

### ✦ Syllabus Mapping:

- **GS Paper III – Economy (External Sector, Exchange Rate Management, Trade & Capital Flows)**
- **GS Paper II – Governance (Policy Responses to Economic Challenges)**

## Introduction

Despite India displaying **robust macroeconomic fundamentals**—including **8.2% GDP growth**, **inflation near 1%**, and **lower global crude prices**—the **Indian Rupee (INR)** depreciated by **over 5% in 2025**, crossing the **₹90 per USD** threshold for the first time. This paradox illustrates the complex interplay between global financial conditions, trade uncertainties, and investor behaviour.

## Understanding Rupee Depreciation

Rupee depreciation refers to a **decline in the value of INR relative to foreign currencies**, making foreign goods and services more expensive. Exchange rates are influenced by market demand-supply dynamics, investor sentiment, trade performance, and global monetary conditions.

## Primary Factors Behind the Depreciation

### 1. Uncertainty Over US–India Trade Deal

- Recent US tariffs **up to 50%** on Indian exports have raised fears of shrinking market access.
- Reduced export competitiveness impacts overall trade sentiment and undermines foreign investor confidence.

### 2. Capital Outflows by Foreign Portfolio Investors (FPIs)

- FPIs have been withdrawing funds and reallocating investments to markets offering better short-term returns.
- India is often treated as a **“liquidity source”**, prompting outflows during global risk realignment.

### 3. Rising Trade Deficit

- Higher imports of **gold, electronics, and machinery**, combined with a slowdown in exports to major partners (including the US), have widened the trade gap.
- A higher deficit increases demand for dollars, putting downward pressure on INR.

### 4. Speculative and Front-Loaded Dollar Demand

- Importers anticipating further rupee depreciation are **stockpiling dollars**, intensifying currency pressure.
- Such speculative behaviour amplifies volatility and accelerates depreciation.

## Impacts of a Weaker Indian Rupee

### A. Negative Impacts

#### 1. Imported Inflation

- India imports **90% of its crude oil** and significant quantities of edible oil.
- A weaker rupee raises import prices, increasing inflationary risk even when global prices are stable.

#### 2. Rising Subsidy Burden

- Higher import costs for **fertilizers** will inflate the government’s subsidy expenditure.

#### 3. Higher Cost of External Borrowings

- Indian firms with **dollar-denominated loans** face increased repayment and interest burdens, affecting profitability and investment capacity.

### B. Positive Impacts

**1. Boost to Export:** Depreciation makes Indian goods **cheaper in foreign markets**, enhancing export competitiveness, especially in textiles, pharmaceuticals, and IT services.

**2. Increased Remittance Inflows:** NRIs sending money home benefit from a favourable exchange rate, potentially raising remittance volumes.

## Policy Measures to Strengthen the Rupee

### 1. Monetary Policy Interventions

- RBI’s Forex Market Actions:** Direct **dollar sales** to smooth volatility and stabilise currency movement.
- Interest Rate Adjustments:** Increasing policy rates can attract more portfolio investment, improving dollar inflows.
- Currency Swap Agreements:** Bilateral swap lines with key partners provide additional foreign exchange buffers.

## 2. Fiscal and Structural Measures

- Reduce Import Dependence:** Promote domestic manufacturing in key import-heavy sectors like electronics, defence, and solar equipment.
- Boost Export Base:** Export diversification, new FTAs, and value-added export strategies can improve resilience.
- Attract Long-Term Foreign Direct Investment:** Strengthening infrastructure, improving logistics efficiency, and enhancing ease of doing business can bring stable capital inflows.
- Strengthen External Sector Resilience:** Build forex reserves, improve current account sustainability, and support industry-level competitiveness.

## Conclusion — Stabilising the Rupee Requires Both Global Management and Domestic Preparedness

The recent depreciation of the INR reflects a combination of **global uncertainty, domestic trade vulnerabilities, and investor behaviour**, rather than weak macroeconomic fundamentals. Addressing these challenges requires a multi-pronged approach involving **RBI intervention, fiscal reforms, export promotion, and investment-friendly policies**. A stable, resilient currency is essential for India's long-term economic growth and external sector stability.

## Mains Practice Question

“Despite strong macroeconomic fundamentals, the Indian Rupee has weakened significantly in 2025. Analyse the major drivers of the depreciation and suggest policy measures to strengthen India's external sector stability.”

## Goldilocks Economy: RBI's Delicate Balance

✦ **Syllabus Mapping: GS Paper III – Indian Economy (Monetary Policy, Inflation, Growth, Macroeconomic Stability)**

### Introduction

The **Reserve Bank of India (RBI)** has reduced the **repo rate by 25 basis points to 5.25%**, signalling confidence in India's current macroeconomic conditions. This move is being interpreted as an indication of a “**Goldilocks Economy**”—a phase where economic growth is strong yet stable, inflation remains subdued, and employment conditions are favourable. Such a phase is considered rare and desirable, especially in a volatile global economic environment.

### What is a Goldilocks Economy?

#### Definition

A **Goldilocks Economy** refers to an **ideal macroeconomic condition** that is:

- **Not too hot** (avoiding high inflation or asset bubbles), and
- **Not too cold** (avoiding recession or stagnation), but “**just right**”, with balanced growth and price stability.

The term draws from the *Goldilocks fairy tale*, symbolising optimal balance.

### Key Characteristics of a Goldilocks Economy

- **Balanced Economic Growth:** Growth is robust but sustainable.
- **Low and Stable Inflation:** Prices rise slowly, preserving purchasing power.
- **Near-Full Employment:** Productive utilisation of labour without wage-price spirals.
- **Policy Space for Central Bank:** Enables accommodative or neutral monetary policy.

### Indicators Suggesting Goldilocks Conditions in India

#### 1. Growth Momentum

- **Projected GDP growth: ~ 7.3%**, among the highest globally.
- Driven by domestic demand, infrastructure spending, and services sector resilience.

#### 2. Benign Inflation

- **Inflation around 2%**, significantly below RBI's upper tolerance limit of 6%.
- Indicates effective supply-side management and easing global commodity pressures.

#### 3. Monetary Policy Signal

- **Repo rate cut to 5.25%** reflects RBI's assessment that:



- Inflation risks are contained.
- Growth requires policy support, not restraint.

### Role of the Monetary Policy Committee (MPC)

- RBI's **MPC** balances:
  - **Growth objectives**, and
  - **Price stability mandate** under the RBI Act, 1934.
- In a Goldilocks phase, MPC can:
  - Encourage credit flow.
  - Support investment and consumption.
  - Avoid aggressive tightening or excessive stimulus.

### Why is a Goldilocks Economy Significant?

#### Economic Significance

- Encourages **private investment** and long-term planning.
- Enhances **consumer confidence**.
- Improves fiscal sustainability through higher revenues without inflationary pressures.

#### Policy Significance

- Provides room for:
  - Structural reforms.
  - Counter-cyclical fiscal planning.
- Reduces vulnerability to external shocks.

#### Global Context

- At a time when many advanced economies face **high inflation or low growth**, India's Goldilocks phase strengthens its position as a **global growth engine**.

### Risks and Caveats

- **External shocks:** Geopolitical tensions, oil price spikes, global financial tightening.
- **Complacency risk:** Overstimulus may trigger inflation or asset bubbles.
- **Uneven growth:** Informal sector and employment quality still need attention.

### Conclusion — A Window of Opportunity

The RBI's repo rate cut reflects confidence that India is currently experiencing a **Goldilocks phase**—marked by strong growth and low inflation. However, such periods are **transient**, not permanent. Sustaining this balance will require prudent monetary policy, responsible fiscal management, and continued structural reforms. If leveraged wisely, this phase offers India a crucial **window of opportunity** to strengthen its long-term economic foundations.

### Mains Practice Question

“What is a Goldilocks Economy? Examine the indicators that suggest India is currently witnessing such a phase and discuss the policy opportunities and risks associated with it.”

## Finfluencers and Market Integrity

#### ✦ Syllabus Mapping:

- **GS Paper II – Governance (Regulatory Bodies, Consumer Protection)**
- **GS Paper III – Indian Economy (Capital Markets, Financial Literacy, Market Integrity)**

### Introduction

The **Securities and Exchange Board of India (SEBI)** has recently **barred a prominent financial influencer (finfluencer)** from participating in the securities market after finding evidence of **illegal gains from unregistered advisory services**. This action reflects SEBI's growing concern over the **unregulated influence of social media on retail investors**, particularly in an era where digital platforms increasingly shape financial decision-making.

## Who are Finfluencers?

### Definition

**Finfluencers** are social media influencers who create and disseminate content related to:

- Stock markets
- Mutual funds
- Personal finance and wealth management
- Cryptocurrencies and derivatives

They typically operate on platforms such as **YouTube, Instagram, Telegram, and X (Twitter)**, often commanding large followings and influencing investment behaviour, especially among **first-time and young investors**.

### Key Concern

- Many influencers blur the line between **financial education** and **investment advice**, leading to potential misinformation and market manipulation.

## Regulatory Framework Governing Finfluencers in India

### SEBI (Investment Advisers) Regulations, 2013

#### 1. Mandatory Registration

- Any person providing **investment advice for consideration** must register with SEBI as:
  - **Investment Adviser (IA)**, or
  - **Research Analyst (RA)**.
- Registration ensures:
  - Minimum qualification standards
  - Disclosure of conflicts of interest
  - Accountability and compliance with ethical norms

#### 2. Restrictions on Unregistered Finfluencers

- Unregistered influencers:
  - **Cannot provide personalised or specific investment advice.**
  - **Cannot make performance guarantees or claims** about securities.
  - Are limited to general financial education without inducement or recommendations.

## Why SEBI's Action is Significant

#### 1. Protection of Retail Investors

- Retail participation in Indian markets has surged in recent years.
- Unverified advice can lead to:
  - Financial losses
  - Herd behaviour
  - Increased volatility

SEBI's action reinforces the principle of **"informed and fair participation"**.

#### 2. Preserving Market Integrity

- Paid promotions and undisclosed conflicts may distort price discovery.
- Crackdown on finfluencers strengthens **transparency and trust** in capital markets.

#### 3. Adapting Regulation to the Digital Age

- Traditional financial regulation is being extended to **new-age digital intermediaries**.
- Aligns with global trends where regulators are increasingly scrutinising **online financial advice ecosystems**.

## Challenges in Regulating Finfluencers

- **Jurisdictional complexity:** Cross-border digital platforms complicate enforcement.
- **Distinguishing education from advice:** Grey areas persist.
- **Rapid content creation:** Regulatory response often lags behind viral content.

### Way Forward

- **Clearer Guidelines:** Distinct classification between financial education and advisory services.
- **Digital Monitoring:** Use of technology to track misleading content.
- **Financial Literacy:** Empowering investors to critically evaluate online advice.
- **Platform Accountability:** Greater responsibility on social media platforms to flag unregistered advisory content.

### Conclusion — Balancing Innovation with Regulation

SEBI's action against an unregistered finfluencer underscores the need to **balance digital innovation with robust investor protection**. While influencers can play a positive role in spreading financial awareness, unchecked advisory activities risk undermining market integrity and harming retail investors. A **clear regulatory perimeter, effective enforcement, and enhanced financial literacy** are essential to ensure that the influence of social media strengthens, rather than destabilises, India's financial markets.

### Mains Practice Question

“The rise of finfluencers has transformed retail investor behaviour in India. Discuss the regulatory challenges they pose and evaluate the role of SEBI in ensuring investor protection in the digital era.”

# AGRICULTURE

## Rising Fertilizer Use: Policy Concerns

### ✦ Syllabus Mapping:

- **GS Paper III – Agriculture (Inputs, Fertilizer Policy, Soil Health, Subsidy Reforms)**
- **GS Paper II – Governance (Parliamentary Committees, Policy Recommendations)**
- **GS Paper III – Economy (Import Dependency, Strategic Minerals, Industrial Policy)**

### Introduction

A recent report of the **Parliamentary Standing Committee on Chemicals and Fertilizers** presents a mixed picture of India's fertilizer sector. While the country is moving steadily toward improving domestic capacity, the report highlights critical challenges—**record consumption, heavy import dependence, ageing manufacturing units, technological gaps, and persistent malpractices**. The committee emphasizes the need for **robust policy interventions**, modernization, and diversification to ensure long-term fertilizer security, especially in an era marked by geopolitical uncertainties.

### Key Concerns and Recommendations of the Parliamentary Committee

#### 1. Domestic Production Gaps and Need for Capacity Expansion

##### Concern

- Fertilizer consumption in India surged to an **unprecedented 708 LMT in 2024–25**.
- Domestic output remains insufficient:
  - **Urea:** 307 LMT
  - **Phosphatic & Potassic (P&K):** 211.21 LMT
- This mismatch increases vulnerability to **external price shocks**, especially during geopolitical disruptions.

##### Recommendation

- Set up a **high-level Task Force** to devise a time-bound expansion strategy.
- Strengthen domestic production through schemes like:
  - **New Investment Policy (NIP), 2012**
  - **New Urea Policy (NUP), 2015**
- Introduce **fiscal incentives** for enhancing P&K capacity.

#### 2. Ageing Industrial Infrastructure

##### Concern

- Out of 33 urea plants:
  - **27 plants are older than 25 years**
  - **7 plants exceed 50 years**



- Results in **high operating costs** and lower energy efficiency.

### Recommendation

- Establish a **special modernization task force** to upgrade plants using advanced, energy-efficient technologies.
- Promote low-emission manufacturing practices.

## 3. High Import Dependence for Critical Raw Materials

### Concern

- India relies heavily on imports for essential raw materials:
  - **95% dependence on Phosphate**
  - **100% dependence on Potash**
- Strong reliance on foreign licensors (Netherlands, US, Italy, Japan) for plant technologies and processes.
- Domestic reserves (low-grade phosphate ore & deep-seated potash) remain underutilized.

### Recommendation

- Secure **long-term supply agreements** and promote **global joint ventures** with resource-rich nations.
- Promote **indigenization of fertilizer process technology** through a dedicated national task force and increased R&D funding.
- Accelerate domestic exploration under the **Critical & Strategic Minerals** framework (MMDR Act, 2023).

## 4. Promoting Alternatives and Ensuring Ethical Practices

### Concern

- Insufficient availability of drones for **Nano-fertilizer application**, delaying large-scale adoption.
- Continued **black marketing and diversion** of subsidized fertilizers, despite Aadhaar authentication norms.
- Imbalanced fertilizer use contributes to **soil degradation, nutrient deficiencies**, and declining soil organic carbon.

### Recommendation

- Launch a **PLI scheme for agricultural drones** to mainstream nano-fertilizer deployment.
- Establish strict enforcement protocols:
  - nationwide testing laboratories,
  - grievance redressal systems,
  - real-time monitoring of subsidized fertilizer movement.
- Promote **balanced fertilization**, crop diversification, organic and natural farming, and greater use of **bio-fertilizers** to improve soil health.

## Conclusion — Towards Sustainable, Secure, and Self-Reliant Fertilizer Systems

The Parliamentary Committee's recommendations reflect India's urgent need to transition from a **consumption-driven** to a **self-reliant and efficiency-driven** fertilizer ecosystem. Strengthening domestic capacity, reducing import dependence, modernizing ageing plants, and promoting balanced nutrient management are essential for agricultural sustainability. As India moves toward long-term food security, aligning fertilizer policy with **technology adoption, soil health, strategic mineral security, and robust regulatory oversight** will be pivotal.

## Mains Practice Question

"India faces rising fertilizer consumption alongside persistent import dependence and systemic malpractices. Critically evaluate the Parliamentary Committee's recommendations for strengthening India's fertilizer ecosystem."

## Food Irradiation: Science and Safety

### ✦ Syllabus Mapping:

- **GS Paper III – Food Processing & Food Security (Food Preservation Technologies, Post-Harvest Management)**
- **GS Paper III – Science & Technology (Applications of Nuclear & Radiation Technologies)**

## Introduction

Food irradiation is increasingly recognised as a **safe, effective, and science-backed food processing technique** for enhancing food safety, reducing post-harvest losses, and ensuring food security. Backed by extensive global research and endorsed by reputed scientific bodies such as the **American Medical Association (AMA)**, the technique has demonstrated **no toxicological, nutritional, or microbiological risks** when used within prescribed limits. In the Indian context, food irradiation aligns with goals of **reducing wastage, improving farmer incomes, and strengthening food value chains**.

## What is Food Irradiation?

Food irradiation is a **physical (non-thermal) process** in which food or agricultural commodities—either **pre-packaged or in bulk**—are exposed to a **controlled dose of ionising radiation** to achieve specific beneficial outcomes.

### Underlying Scientific Principle

- Radiation interacts primarily with **water molecules**, which constitute a major component of food as well as the cells of insects and microorganisms.
- This interaction causes **radiolysis** (splitting of water molecules), generating reactive species that damage the DNA of pests and pathogens, thereby inhibiting their survival and reproduction.

## Mechanism of Action of Ionising Radiation

Ionising radiation acts through **two fundamental processes**:

### 1. Primary Processes

- Direct deposition of energy leads to:
  - Formation of **ions**
  - Creation of **excited molecules**
- These effects occur immediately upon radiation exposure.

### 2. Secondary Processes

- Involve interactions among products formed during primary processes.
- Influenced by factors such as:
  - **Water content**
  - **Oxygen availability**
  - **pH of food**

### Radiolytic Products

- The chemical compounds formed through these processes are known as **radiolytic products**.
- Scientific evidence confirms that these products cause **negligible chemical changes** and are comparable to compounds formed during conventional food processing methods like cooking or drying.

## Significance of Food Irradiation

### 1. Enhanced Food Safety

- Effectively kills or inactivates:
  - Insect pests
  - Parasites
  - Pathogenic and spoilage microorganisms
- Reduces food-borne illnesses without using chemical preservatives.

### 2. Reduction in Post-Harvest Losses

- **Inhibits sprouting** (e.g., potatoes, onions).
- **Delays ripening**, extending shelf life of fruits.
- Particularly valuable for India, where post-harvest losses remain high.

### 3. Preservation of Nutritional and Sensory Quality

- Does not significantly alter taste, texture, or nutritional value.
- Considered superior to many chemical fumigation techniques.

### 4. Support to Food Security and Trade

- Helps meet **phytosanitary requirements** for export markets.
- Reduces dependence on chemical pesticides and fumigants.

## Food Irradiation in India

### Policy and Institutional Support



# IQRA IAS

## AN INSTITUTE FOR CIVIL SERVICES

- The **Ministry of Food Processing Industries (MoFPI)** promotes food irradiation infrastructure under the:
  - **Integrated Cold Chain & Value Addition Infrastructure Scheme**
  - Part of the **Pradhan Mantri Kisan Sampada Yojana (PMKSY)**

### Current Status (as of August 2025)

- **16 project proposals** approved for setting up **multi-product food irradiation units**.
- **9 units are operational**, contributing to improved storage and preservation capacity.

### Strategic Importance

- Complements cold chain infrastructure.
- Supports farmers, food processors, and exporters.
- Aligns with India's emphasis on **safe, sustainable, and technology-driven food systems**.

### Concerns and Misconceptions (Brief Analysis)

- **Public apprehension** often stems from confusion between irradiation and radioactivity.
- Irradiated food **does not become radioactive**.
- Global bodies such as **WHO, FAO, IAEA**, and **AMA** have repeatedly affirmed its safety.

### Conclusion — Science-Backed Technology for Safe and Sustainable Food Systems

Food irradiation stands out as a **robust, scientifically validated food processing technique** that enhances food safety, reduces losses, and supports food security without compromising health or nutrition. With growing infrastructure support under PMKSY and increasing global acceptance, food irradiation can play a critical role in **modernising India's food processing sector**, provided awareness, regulatory clarity, and capacity-building are strengthened.

### Mains Practice Question

"Food irradiation is often misunderstood despite strong scientific validation. Discuss its working mechanism, benefits, and relevance for strengthening food security and food processing in India."

## ETHICS

### Bhagavad Gita: Ethical Compass for Modern Times

#### 📌 Syllabus Mapping:

- **GS Paper IV – Ethics, Integrity & Aptitude (Moral Thinkers, Ethical Concepts, Values in Administration)**
- **GS Paper I – Indian Culture (Ancient Scriptures, Philosophical Texts)**
- **GS Paper II – Governance (Ethical Leadership, Public Service Values)**

### Introduction

The **Bhagavad Gita**, embedded within the **Mahabharata** and composed in Sanskrit around **200 BCE**, stands as one of the most profound philosophical treatises in world literature. Presented as a dialogue between **Arjuna** and **Lord Krishna**, it offers enduring guidance on duty, morality, and human conduct. Recently, its inscription in the **UNESCO Memory of the World International Register** underscores its global intellectual and cultural relevance. The ethical teachings of the Gita continue to offer clarity on dilemmas faced in contemporary governance, leadership, and personal life.

### Contemporary Ethical Relevance of the Bhagavad Gita

#### 1. Action Free from Attachment (Nishkam Karma)

- The Gita emphasises **performing one's duty without clinging to outcomes**.
- It contrasts **Nishkam Karma** (selfless action) with **Sakama Karma** (action motivated by personal gains).
- This principle builds **ethical objectivity**, reducing stress from expectations and encouraging commitment to responsibility.
- Contemporary relevance: Public servants, judges, administrators, and leaders are expected to act impartially without personal or political bias—echoing Krishna's emphasis on duty-driven conduct.

#### 2. Harmonising Individual Duty and Social Welfare (Lokasamgraha)

- The Gita highlights the importance of aligning personal obligations with **collective well-being**.





- Lokasamgraha refers to maintaining **social order, harmony, and universal welfare**.
- Thinkers like **Tilak** interpreted this concept as active engagement in society rather than ascetic withdrawal.
- Relevance today: Policymaking, governance, community leadership, and social service require balancing individual roles with **broader societal interests**.

### 3. Cultivating Emotional Stability (Sthita-Prajna)

- Sthita-prajna denotes a **person of stable wisdom**, capable of emotional restraint and mental resilience.
- Such individuals remain undisturbed by praise or criticism, gain or loss, joy or sorrow.
- In a world of rapid change and crises, this teaching encourages **mental health, adaptability, and balanced decision-making**—essential attributes for administrators.

### 4. Ethical Leadership and Duty (Svadharmā)

- The Gita emphasizes **Svadharmā**, or performing one's rightful duty with sincerity.
- It guides leaders to act with **responsibility, fearlessness, accountability, and moral purpose**.
- Modern application: Civil servants navigating ethical dilemmas must choose principles over convenience, much like Arjuna was guided to uphold righteousness (dharma).

### 5. Other Ethical Values

- **Decisiveness**: The Gita equates clarity of purpose with strong leadership, warning against indecision.
- **Humility**: Recognition of one's limitations and openness to learning.
- **Self-discipline**: Control over impulses and desires, supporting ethical behavior.
- **Universalism**: The Gita's teachings transcend caste, creed, or geography, making it a **global ethical text**.

### Conclusion — A Universal Ethical Framework for Modern Times

The **Bhagavad Gita**, far from being a mere religious scripture, serves as a **timeless guide to moral clarity**, emotional strength, and responsible leadership. Its teachings on **selfless action, social harmony, mental resilience**, and **ethical duty** resonate strongly in contemporary governance, public service, and personal decision-making. As highlighted by the Vice President, the Gita continues to offer a **universal ethical compass** in a world marked by moral ambiguity and rapid transformation.

### Mains Practice Question

“Discuss the contemporary relevance of the ethical teachings of the Bhagavad Gita, especially in the context of public administration and leadership.”

# ENVIRONMENT & ECOLOGY

## Bioremediation for Ecological Restoration

### ✦ Syllabus Mapping:

- **GS Paper III – Environment & Ecology (Pollution Control, Climate Mitigation, Sustainable Technologies)**
- **GS Paper III – Science & Technology (Biotechnology, Microbial Applications, Innovation in Environmental Management)**

### Introduction

As India faces escalating pollution challenges—from industrial waste to oil spills and heavy metal contamination—**bioremediation** is emerging as a **cost-effective, eco-friendly, and scalable** solution for environmental restoration. Unlike conventional chemical or mechanical clean-up methods that are often expensive and disruptive, bioremediation leverages naturally occurring biological processes to detoxify polluted ecosystems. Its relevance is growing particularly in urban waterways, degraded soils, and industrial sites.

### Understanding Bioremediation

#### What is Bioremediation?

Bioremediation refers to the use of **living organisms**—such as microbes, plants, fungi, and even certain animals—to break down, neutralize, or remove contaminants from soil, water, or air.

It addresses pollutants such as **oil, pesticides, plastics, sewage, and heavy metals** through biological action.

### Types of Biological Agents Used

- **Phytoremediation:** Using plants to absorb or degrade contaminants
- **Biostimulation/Microbial Remediation:** Using indigenous or introduced microbes
- **Mycoremediation:** Using fungi to break down persistent pollutants
- **Biomanipulation:** Using animals (e.g., fish species) to balance aquatic ecosystems

### Types of Bioremediation Approaches

#### 1. In Situ Bioremediation

- Treatment takes place **at the original contamination site**.
- Example: Application of oil-degrading bacteria like **Oilzapper** directly on oil spills.
- Advantages: Minimal disturbance and lower cost.

#### 2. Ex Situ Bioremediation

- Contaminated material is **excavated and treated elsewhere**.
- Common methods:
  - **Biopiles**
  - **Bioreactors**
  - **Composting**
- Suitable for sites where contaminants are deeply embedded or require controlled conditions.

### Significance of Bioremediation

#### 1. Low-Cost and Energy-Efficient

- Traditional remediation technologies rely on chemicals, excavation, or heavy machinery, all of which are expensive.
- Bioremediation provides a **low-energy, low-cost** alternative, ideal for resource-constrained regions.

#### 2. Promotes Ecosystem Restoration

- Biological treatments are **non-invasive**, working with existing ecological processes rather than against them.
- Helps restore soil fertility, purify water, and revive stressed ecosystems without additional damage.

#### 3. Leverages India's Microbial Wealth

- India's rich microbial biodiversity, including many **locally adapted microbial strains**, strengthens the country's capacity to develop home-grown bioremediation solutions.

### Challenges in Implementing Bioremediation

#### 1. Ecological Risks

- If improperly regulated, microbes—especially **genetically modified organisms (GMOs)**—may disrupt ecological balance.
- Requires strict biosafety protocols.

#### 2. Slow Remediation Rates

- Biological processes take longer compared to chemical treatments, making industries and municipalities prefer faster, though less sustainable, solutions.

#### 3. Absence of Standardised National Protocols

- India lacks unified guidelines for bioremediation practices and microbial product approval.
- This regulatory gap inhibits large-scale adoption and private sector investment.

### India's Efforts to Promote Bioremediation

#### 1. Clean Technology Programme (DBT)

- The **Department of Biotechnology** funds research and deployment of bioremediation technologies under this programme.

## 2. Institutional Collaborations

- Organisations like **CSIR–NEERI**, **IITs**, and leading universities are advancing microbial and material technologies for detoxifying soils, industrial effluents, and oil spills.

## 3. TERI's Fermentation Technology Research Centre

- A cutting-edge fermentation facility enabling **large-scale production of microbial formulations** used for environmental clean-up operations.

## Conclusion — A Sustainable, Science-Driven Approach to Restoring Ecosystems

Bioremediation offers India a sustainable pathway for addressing pollution by combining **cost efficiency**, **ecological integrity**, and **indigenous innovation**. While challenges such as slow treatment rates and regulatory gaps persist, expanding R&D support, establishing national standards, and adopting bio-based technologies at scale can significantly enhance India's environmental restoration capabilities. As climate and pollution pressures intensify, bioremediation stands out as a critical tool in India's long-term ecological resilience strategy.

## Mains Practice Question

“Discuss the significance of bioremediation in addressing India's pollution challenges. What measures are needed to promote safe, efficient, and large-scale adoption of bioremediation technologies?”

## Invasive Alien Species: A Growing Ecological Threat

### ✦ Syllabus Mapping:

- GS Paper III – Environment & Ecology (Biodiversity Conservation, Invasive Species, Climate Change)**
- GS Paper III – Economy (Impact on livelihoods, ecosystem services, economic losses)**

## Introduction

A new study published in **Nature Sustainability** raises serious alarms about the escalating spread of **Invasive Alien Species (IAS)** across India. These non-native organisms—whether plants, animals, or microbes—rapidly colonize new environments, disrupt ecosystem functions, and impose heavy ecological and economic costs. The study highlights India's growing ecological vulnerability and the need for systemic institutional responses.

## What are Invasive Alien Species (IAS)?

IAS are **non-native species** introduced intentionally or unintentionally into ecosystems where they do not naturally occur. Once established, they:

- Spread aggressively
- Outcompete native species
- Alter ecosystem processes
- Disrupt livelihoods and local biodiversity

Examples: **Lantana camara**, **Prosopis juliflora**, **Chromolaena odorata**, **Ageratina adenophora**, **Mikania micrantha**, **Xanthium strumarium**, etc.

## Key Highlights of the Study

### 1. Alarming Expansion of IAS

- Every year, nearly **15,500 km<sup>2</sup>** of natural landscapes in India are newly colonised by at least one invasive species.
- Invasive plants have **doubled their distribution** in ecologically fragile zones such as the **Western Ghats, Himalayas, and the Northeast**.

### 2. Widespread Presence Across Ecosystems

- Nearly **two-thirds of India's natural ecosystems** now host **11 or more** major invasive species.
- Dominant invaders include:
  - Lantana camara**,
  - Chromolaena odorata**,
  - Prosopis juliflora**, etc.

### 3. Climate Change as a Key Driver

- Wet-biome invaders** (e.g., *Ageratina adenophora*, *Mikania micrantha*) are spreading due to:
  - Rising temperatures
  - Declining soil moisture



- **Dry-biome invaders** (e.g., *Xanthium strumarium*) expand more rapidly with **increased rainfall**, showing climate-linked shifts in invasion patterns.

## Impacts of Invasive Alien Species

### 1. Livelihood Disruptions

- *Prosopis juliflora* blocks access to **pasturelands, firewood sources, and water bodies**, reducing rural resource availability.
- Can cause **respiratory ailments**, worsening public health in affected regions.

### 2. Threat to Wildlife

- By **2022**, invasive species had altered more than **100,000 sq km** of **tiger habitats**, impacting prey availability and ecological balance.

### 3. Loss of Native Biodiversity

- Example: **Lantana camara** suppresses native vegetation in the **Western Ghats**, reducing diversity and altering forest structure.

### 4. Economic Burden

- India's cumulative losses due to IAS between **1960–2020** amount to nearly **USD 127.3 billion**—reflecting impacts on agriculture, forestry, water systems, and health.

## Way Forward

### 1. Establish a National Mission on IAS

- India lacks a **unified institutional framework** and **national-level database** on invasive species.
- A mission-mode programme is essential for coordination, data integration, and rapid response.

### 2. Prevention and Border Management

- Strengthen checks on **trade, travel, and shipping pathways** where alien species often enter.
- Implement stricter monitoring of **ballast water**, cargo imports, and live plant/animal trade.

### 3. Community Participation

- Local and indigenous communities—who bear the brunt of IAS impacts—must be empowered in:
  - Restoration efforts
  - Early detection
  - Monitoring and removal campaigns

### 4. Adopt Global Best Practices

- Example: **New Zealand's Mandatory Pest Risk Analysis**, which evaluates all new imports for potential invasion risks.
- India could adopt similar predictive tools to prevent high-risk species from entering ecosystems.

## Conclusion — Protecting Biodiversity Through Preventive, Scientific, and Community-Centric Action

Invasive Alien Species are emerging as one of the most significant threats to India's biodiversity, ecological security, and rural livelihoods. The findings from *Nature Sustainability* reinforce the urgency for **scientific monitoring, strengthened regulatory mechanisms, and community-led ecological restoration**. A coordinated national strategy—anchored in prevention, early detection, and ecosystem-based management—is vital to safeguard India's natural heritage.

## Mains Practice Question

“Invasive Alien Species pose a major threat to India's ecological and economic stability. Discuss the drivers, impacts, and policy measures required to manage the spread of IAS in the context of recent scientific findings.”

## Ozone Recovery: Signals from Antarctica

### ✦ Syllabus Mapping:

- **GS Paper III – Environment & Ecology (Ozone Depletion, Climate Change, International Treaties)**
- **GS Paper I – Geography (Atmosphere, Stratosphere, Ozone Layer Dynamics)**

### Introduction

According to recent scientific assessments, the **Antarctic ozone hole closed earlier than expected in 2025**, marking an encouraging milestone in the long-term recovery of the ozone layer. This seasonal depletion phenomenon, which recurs every Southern Hemisphere spring, showed a **smaller peak size of just over 21 million sq km**, significantly below the **2006 record of 29 million sq km**. The development is widely viewed as evidence of the sustained success of global environmental agreements such as the **Montreal Protocol**.

### Understanding the Antarctic Ozone Hole

#### Seasonal Behaviour

- The ozone hole forms annually from **August to November**, coinciding with the **Southern Hemisphere's spring**.
- It represents a dramatic thinning of **stratospheric ozone**—the protective “good” ozone layer located between **10–40 km** altitude.

#### Role of Stratospheric Ozone

- Acts as a shield by absorbing **harmful UV-B radiation** from the Sun.
- Essential for maintaining human health, ecosystem stability, and climatic balance.

### Causes of Ozone Layer Depletion

#### 1. Ozone-Depleting Substances (ODS)

- Key culprits include:
  - **Chlorofluorocarbons (CFCs)**
  - **Halons**
  - **Hydrochlorofluorocarbons (HCFCs)**
  - **Methyl bromide**
- These chemicals rise to the stratosphere, where UV radiation breaks them apart, releasing **chlorine and bromine atoms** that catalytically destroy ozone molecules.

#### 2. Meteorological and Atmospheric Drivers

- **Polar Vortex:** A stable, frigid atmospheric circulation over Antarctica traps ODS-laden air, intensifying the depletion process.
- **Extreme Cold:** Facilitates formation of **Polar Stratospheric Clouds (PSCs)**, enabling chemical reactions that accelerate ozone destruction.

#### 3. Return of Sunlight

- During early spring (September–October), sunlight re-enters the polar region, driving the **photochemical reactions** that cause rapid ozone loss.

### Impacts of Ozone Depletion

#### 1. Health Consequences

- Increased cases of:
  - **Skin cancer**
  - **Cataracts**
  - **Reduced immune response**
- Higher UV-B exposure also intensifies skin ageing and other health disorders.

#### 2. Ecological Impacts

- **Lower plant productivity**, affecting agricultural and natural ecosystems.
- **Disruption of marine food chains**, particularly affecting phytoplankton—the foundation of oceanic ecosystems.

## International Efforts to Protect the Ozone Layer

### 1. Vienna Convention (1985)

- The foundational framework for global cooperation on ozone science, monitoring, and policy coordination.
- Notable for establishing the scientific basis for later binding agreements.

### 2. Montreal Protocol (1987)

- A landmark treaty that sets binding global targets for ODS phase-out.
- Universally ratified and considered one of the most successful environmental treaties.
- Achieved **over 98% reduction** in ODS production and consumption since 1990.

### 3. Kigali Amendment (2016)

- Extends the Montreal Protocol to regulate **Hydrofluorocarbons (HFCs)**—potent greenhouse gases used as replacements for ODS.
- Demonstrates the intersection of **ozone protection** and **climate mitigation**.

## Conclusion — A Positive Indicator of Global Environmental Cooperation

The early closure and reduced size of the Antarctic ozone hole in 2025 testify to the power of **scientific diplomacy, multilateral agreements, and long-term environmental policy**. While continued vigilance is necessary—especially in monitoring unexpected atmospheric changes—the steady recovery of the ozone layer reaffirms the effectiveness of global collective action. The success of the Montreal Protocol offers a hopeful template for addressing contemporary climate challenges.

## Mains Practice Question

“The recovery of the ozone layer is often cited as a model for global environmental governance. Discuss the scientific and policy factors behind this success and examine their relevance for contemporary climate challenges.”

## CCUS Roadmap: India's Net-Zero Strategy

### 📌 Syllabus Mapping:

- **GS Paper III – Environment & Ecology (Climate Change Mitigation, Net-Zero Strategies)**
- **GS Paper III – Science & Technology (Clean Energy Technologies, R&D Policy)**

## Introduction

In a significant step toward achieving **India's net-zero commitments**, the **Department of Science & Technology (DST)** has released the country's **first comprehensive Research and Development Roadmap for Carbon Capture, Utilisation and Storage (CCUS)**. The roadmap outlines a **phased, technology-driven transition** that integrates CCUS across existing and future industrial systems, recognising its critical role in decarbonising sectors where emissions are otherwise difficult to abate.

## Understanding CCUS

**Carbon Capture, Utilisation and Storage (CCUS)** refers to a suite of technologies that:

- Capture **carbon dioxide (CO<sub>2</sub>)** from large point sources such as power plants and industrial facilities, or directly from the atmosphere.
- **Utilise** captured CO<sub>2</sub> for industrial processes, fuels, chemicals, or materials.
- **Store** CO<sub>2</sub> safely in geological formations, deep-sea sediments, or other secure repositories.

CCUS complements renewable energy by addressing **residual and legacy emissions**.

## Three-Phase R&D Roadmap for CCUS

### Phase I: End-of-Pipe (EP) Solutions for Existing Industries

- Deploy **current or improved CCUS technologies** at the end of industrial processes.
- Focuses on retrofitting **existing high-emission facilities** such as thermal power plants, cement, steel, and refineries.
- Enables immediate emission reduction without overhauling industrial infrastructure.

### Phase II: CCUS-Compliant Design (CCD) in New Industrial Plants

- Integrate **advanced CCUS technologies at the design stage** of new manufacturing units.



- Ensures that future industrial capacity is “**capture-ready**”.
- Reduces long-term costs compared to retrofitting and aligns industrial growth with climate goals.

### Phase III: CCUS-in-One-Pot (COP) Strategy with Emerging Technologies

- Incorporates **next-generation CCUS solutions**, such as:
  - **Photo-catalytic**
  - **Bio-catalytic**
  - **Electro-catalytic** CO<sub>2</sub> conversion technologies
- Applies to **new low-emission industrial manufacturing systems**.
- Aims for **deep decarbonisation** and near-zero emission industrial processes.

### Role of CCUS in Climate Change Mitigation

#### 1. Decarbonising Hard-to-Abate Sectors

- Critical for industries like **iron & steel, cement, chemicals**, and fertilisers where process emissions cannot be eliminated solely through renewables.

#### 2. Enabling Low-Carbon Power and Hydrogen

- CCUS can be deployed on **coal, gas, biomass, or waste-based power plants**.
- Facilitates **blue hydrogen** production by capturing CO<sub>2</sub> from hydrogen manufacturing processes.

#### 3. Carbon Dioxide Removal (CDR) from the Atmosphere

- **Bioenergy with Carbon Capture and Storage (BECCS):**
  - Uses biomass-based energy with CCUS to achieve **net-negative emissions**, provided biomass sourcing is sustainable.
- **Direct Air Carbon Capture and Storage (DACCS):**
  - Captures CO<sub>2</sub> directly from ambient air, addressing historical emissions.

Both BECCS and DACCS rely on foundational CCUS technologies.

### Significance for India

- Supports India’s **Net-Zero by 2070** commitment.
- Enables balanced energy transition while ensuring **industrial competitiveness and energy security**.
- Encourages indigenous innovation and **Make-in-India** in climate technologies.
- Bridges the gap between **economic development and environmental responsibility**.

### Challenges and Way Forward (Analytical Perspective)

- **High Cost and Energy Intensity:** Requires sustained public funding and private participation.
- **Storage Safety and Regulation:** Need for robust legal frameworks for long-term CO<sub>2</sub> storage.
- **Infrastructure Requirements:** Pipelines, monitoring systems, and geological surveys are essential.
- **Public Acceptance:** Transparent risk communication is necessary.

### Conclusion — From Incremental Capture to Transformational Decarbonisation

The DST’s CCUS R&D roadmap marks a strategic shift from incremental emission control to **systemic industrial decarbonisation**. By combining near-term retrofitting with long-term transformational technologies, India is laying the groundwork for a **science-led, economically viable pathway to net zero**. Successful implementation will depend on sustained R&D investment, policy coherence, and strong industry–academia collaboration.

### Mains Practice Question

“Carbon Capture, Utilisation and Storage (CCUS) is increasingly viewed as indispensable for achieving net-zero targets. Discuss the significance of India’s new CCUS R&D roadmap and evaluate the challenges in its large-scale deployment.”

# BIOTECH & HEALTH

## GLP-1 Drugs: New Guidance on Obesity

### Syllabus Mapping:

- **GS Paper II – Health (WHO Guidelines, Public Health Challenges, Non-Communicable Diseases)**
- **GS Paper III – Science & Technology (Biotechnology, Drug Mechanisms, Emerging Therapies)**

### Introduction

The **World Health Organization (WHO)** has released its first **Global Guideline** on the use of **GLP-1 receptor agonist medicines** for treating obesity. The recommendations—issued with a conditional endorsement—integrate pharmacotherapy within a **holistic obesity-management strategy**, emphasising lifestyle interventions and professional guidance. This signals the growing recognition of obesity as a **chronic, complex, and high-burden global disease** requiring structured long-term management.

### WHO's Key Recommendations

- WHO **conditionally recommends** GLP-1-based therapies for adults with obesity, but only as part of a broader treatment framework that includes:
  - **Healthy dietary practices**
  - **Regular physical activity**
  - **Behavioural and psychological support**
- The guideline focuses on **three GLP-1 medicines** approved for long-term obesity treatment:
  - **Liraglutide**
  - **Semaglutide**
  - **Tirzepatide**

These medicines have shown significant weight-loss effects and improved metabolic outcomes in clinical studies.

### About GLP-1 Drugs (GLP-1 Receptor Agonists)

#### Mechanism of Action

- These drugs mimic **Glucagon-Like Peptide-1 (GLP-1)**, a hormone naturally secreted from the intestine after meals.
- They work through multiple pathways:
  - **Increase insulin release** when blood sugar rises
  - **Reduce glucagon secretion**, lowering hepatic glucose production
  - **Slow gastric emptying**, leading to prolonged satiety
  - **Suppress appetite**, resulting in reduced caloric intake

#### Therapeutic Uses

- Widely used for **Type 2 Diabetes Mellitus** to improve glycaemic control.
- Increasingly used for **obesity management**, particularly in individuals unable to achieve significant weight loss through lifestyle interventions alone.

### Understanding Obesity and Its Global Burden

#### Definition

- Obesity refers to unhealthy accumulation of body fat, significantly raising the risk of **heart disease, stroke, Type 2 diabetes, osteoarthritis, and certain cancers**.
- Clinically defined as **Body Mass Index (BMI)  $\geq 30$  kg/m<sup>2</sup>**.
- **BMI formula:**  
$$\text{BMI} = \text{weight (kg)} \div [\text{height (m)}]^2$$

#### Epidemiological Burden

- Affects **over 1 billion people globally**.
- Responsible for approximately **3.7 million deaths in 2024** due to associated non-communicable diseases.
- **India-specific data (NFHS-5, 2019–21):**
  - **24% of women** and **23% of men** are obese.
- Highlights the rising prevalence of lifestyle-related diseases and the need for comprehensive health policy responses.

## Conclusion — Towards Integrated Obesity Management through Evidence-Based Therapeutics

The WHO's latest guideline reflects the evolving global consensus that obesity requires **medical, behavioural, and policy-level interventions**. While GLP-1 agonists offer an effective pharmacological option, their use must complement broader **lifestyle changes, health education, and clinical monitoring**. As obesity rates rise globally and in India, integrating such evidence-based therapies into national health strategies will be vital in reducing the burden of non-communicable diseases.

## Mains Practice Question

“Discuss the significance of WHO's global guidelines on GLP-1 medicines for obesity management. How can India integrate these recommendations within its public health framework?”

## HIV/AIDS in India: Progress and Challenges

### ✦ Syllabus Mapping:

- **GS Paper II – Health, Governance (Disease Control Programmes, Public Health Policies)**
- **GS Paper III – Science & Technology (Virology, Biomedical Interventions)**

## Introduction

The **Ministry of Health & Family Welfare (MoHFW)**, through the **National AIDS Control Organization (NACO)**, commemorated **World AIDS Day 2025** on December 1. India has been marking this day annually since **1992**, reaffirming its long-standing commitment to combating **HIV/AIDS** through prevention, treatment, awareness, and legal protection. The event provides an opportunity to reflect on epidemiological trends, policy achievements, and remaining challenges.

## Understanding HIV and AIDS

### 1. What is HIV?

- The **Human Immunodeficiency Virus (HIV)** is a **retrovirus** that specifically targets **CD4+ T-cells**, weakening the body's immune defence.
- **CD4 cells**, a subtype of white blood cells, are vital for immune function; their depletion leaves the body vulnerable to opportunistic infections.

### 2. Retrovirus Mechanism

- Retroviruses contain **RNA** as their genetic material.
- Upon infecting a host cell:
  - Viral RNA is reverse-transcribed into **DNA**.
  - The new DNA integrates into the **host genome**.
  - The cell then produces additional viral particles, enabling the infection to spread.

### 3. AIDS

- **Acquired Immunodeficiency Syndrome (AIDS)** represents the **most advanced stage** of HIV infection.
- Characterised by severe immunosuppression and life-threatening infections or cancers.

### 4. Modes of Transmission

- Unprotected sexual contact
- Sharing contaminated needles
- Transfusion of infected blood
- Mother-to-child transmission during pregnancy, delivery, or breastfeeding

### 5. Treatment Framework

- **Antiretroviral Therapy (ART)** is the cornerstone of management.
- Early diagnosis and regular treatment help reduce viral load, prevent progression to AIDS, and lower transmission risk.

## HIV Status in India: Trends and Progress

### Current Burden

- Over **2.5 million** individuals are living with HIV.
- National prevalence stands at **0.20%**, significantly below the global average of **0.7%**.

### Declining Trends (2010–2024)



- Annual new infections declined by **48.7%**.
  - AIDS-related deaths decreased by **81.4%**.
- This reflects the sustained impact of prevention campaigns, ART expansion, and improved surveillance systems.

## Government Measures to Combat HIV/AIDS

### 1. National AIDS and STD Control Programme (NACP) Phase V

- A **Central Sector Scheme** aiming to eliminate AIDS as a public health threat by **2030**.
- Focuses on awareness generation, treatment access, stigma reduction, and support services for high-risk groups.

### 2. Adoption of the 95–95–95 Targets

- Upgraded from the earlier **90–90–90** global target.
- Goals:
  - **95%** of people living with HIV know their status
  - **95%** of those diagnosed receive uninterrupted ART
  - **95%** of those on ART achieve **viral suppression**
- These targets align India with global best practices to control transmission and improve life expectancy.

### 3. Mission Sampark

- A targeted initiative to **identify and bring back people lost to follow-up** into the ART network.

### 4. HIV/AIDS (Prevention and Control) Act, 2017

- Provides **legal safeguards** against discrimination.
- Mandates confidentiality, informed consent, and protection of rights for persons affected by HIV.

## Conclusion — India's Steady Progress, With a Long-Term Goal of Ending AIDS

India's HIV response demonstrates consistent improvement marked by declining infection rates, expanded treatment access, strong legal protections, and community-focused interventions. Observing World AIDS Day 2025 reaffirms India's resolve to achieve the **2030 elimination target** through a combination of **medical treatment, legal safeguards, behavioural interventions, and robust monitoring**. Continued efforts are essential to sustain gains, address stigma, and ensure no individual is left behind in the national HIV response.

## Mains Practice Question

“Assess India's progress in combating HIV/AIDS and evaluate how government initiatives such as NACP Phase V and the 95–95–95 targets contribute to the goal of eliminating AIDS by 2030.”

## Rising Medicine Prices: Parliamentary Alarm

### 📌 Syllabus Mapping:

- **GS Paper II – Governance & Social Justice (Health Policy, Regulatory Bodies)**
- **GS Paper III – Economy (Pharmaceutical Sector, Pricing Policy, Market Regulation)**

## Introduction

The **Standing Committee on Chemicals and Fertilizers** has issued a critical report highlighting the **sharp rise in medicine prices** and its severe implications for common citizens. Despite India's reputation as the “pharmacy of the world,” domestic affordability remains a major challenge. The Committee attributes the problem to **excessive profiteering**, gaps in the regulatory framework, and slow progress in long-discussed reforms. The report calls for urgent institutional, legal, and policy interventions to safeguard access to essential medicines.

## Key Findings of the Report

### 1. Excessive Profit Margins Inflate Retail Prices

- Many widely used medicines carry **markups ranging from 500% to 1800%**, placing them beyond the reach of ordinary consumers.
- Profit is added at multiple stages—manufacturer, stockist, distributor, retailer—without transparency, enabling unchecked price escalation.

### 2. Limited Scope of Price Control Under Current Policy

- Only drugs listed in the **National List of Essential Medicines (NLEM)** are subject to price caps under the **DPCO, 2013**.

- The remaining **non-scheduled drugs**—which constitute a large share of commonly used medicines—face **no regulation on initial pricing**, allowing manufacturers to set very high Maximum Retail Prices (MRPs).

### 3. Lack of Transparency: No Access to Real Cost Data

- The government and the **National Pharmaceutical Pricing Authority (NPPA)** do not have access to **Price to Stockist (PTS)** or other real cost metrics.
- Absence of cost visibility prevents effective monitoring of profit margins at different points in the supply chain.

### 4. Delay in Trade Margin Rationalisation (TMR)

- **TMR**, which caps profit margins for each component of the supply chain, was piloted earlier for **cancer medicines** and significantly reduced prices.
- Despite success, it has not been instituted as a full-fledged policy, leading to persistent overpricing.

## Key Recommendations of the Parliamentary Committee

### 1. Institutionalising Trade Margin Rationalisation

- Make **TMR a permanent legal mechanism** to prevent arbitrary inflation of drug prices.
- Ensure uniform application across therapeutic categories.

### 2. Regulating Prices of Non-Scheduled Drugs

- Introduce oversight mechanisms, even for drugs outside NLEM, to prevent runaway MRPs.
- Create an early-warning system to detect unusual price spikes.

### 3. Strengthening Regulation of High-Cost Medical Devices

- Closely monitor retail pricing of **coronary stents**, ensuring full adherence to NPPA-fixed prices.
- Consider lowering price ceilings further to improve affordability.

### 4. Ensuring Transparency in Cancer Drug Pricing

- Mandate real-time price reporting by:
  - Pharmaceutical companies
  - Hospitals
  - Online pharmacies
- Regulate online platforms to verify authenticity of medicines and ensure fair pricing.

## Drug Regulatory and Institutional Framework in India

### 1. Department of Pharmaceuticals (DoP)

- Functions under the **Ministry of Chemicals and Fertilizers**.
- Responsible for pharmaceutical policy formulation and sectoral oversight.

### 2. National Pharmaceutical Pricing Authority (NPPA)

- Independent regulator under DoP.
- Implements and enforces the **Drugs (Prices Control) Order, 2013**.
- Ensures compliance with price ceilings and prevents profiteering.

### 3. Drugs (Prices Control) Order (DPCO), 2013

- Regulates prices of essential medicines based on the **National List of Essential Medicines (NLEM)**.
- Ensures availability of critical drugs at fair prices.

### 4. National Pharmaceutical Pricing Policy (NPPP), 2012

- Lays down the principles for essential medicine pricing, balancing affordability with pharma sector viability.

## Conclusion — Strengthening Affordability, Transparency, and Regulatory Oversight in India's Pharma Market

The Committee's report reveals a **systemic pricing challenge** that compromises equitable access to healthcare. Unregulated profit margins, insufficient transparency, and policy delays undermine affordability, especially for life-saving medicines. Implementing **Trade Margin Rationalisation**, expanding price oversight beyond NLEM, and enhancing NPPA's regulatory capacity are imperative for achieving **citizen-centric, affordable healthcare**. These reforms align with India's broader commitment to **Universal Health Coverage** and sustainable development.

### Mains Practice Question

"Escalating medicine prices indicate deep structural weaknesses in India's pharmaceutical pricing system. Discuss the lacunae highlighted by the Parliamentary Committee and suggest reforms to ensure affordable access to essential drugs."

## Drug Pricing Crisis: Citizens at the Centre

### 📌 Syllabus Mapping:

- **GS Paper II – Governance & Social Justice (Health Policy, Regulatory Bodies, Access to Medicines)**
- **GS Paper III – Economy (Pharmaceutical Sector, Market Regulation, Pricing Policies)**

### Introduction

The **Standing Committee on Chemicals and Fertilisers** has raised serious concerns regarding the **sharp escalation in medicine prices** across the country. The Committee's findings highlight systemic issues such as **excessive profit margins**, delayed policy reforms, and regulatory blind spots that hinder affordable access to essential drugs. The report underscores the urgent need for **transparent pricing, robust regulation**, and stronger consumer protection mechanisms to ensure equitable healthcare.

### Key Findings of the Report

#### 1. Excessive Profit Margins Make Medicines Unaffordable

- Many frequently used medicines exhibit markups between **500% and 1800%**, pushing them beyond the reach of ordinary citizens.
- Profit accumulation occurs at multiple levels of the supply chain, contributing to high MRPs.

#### 2. Inadequate Price Regulation for Non-Scheduled Drugs

- Only drugs listed in the **National List of Essential Medicines (NLEM)** fall under compulsory price control through the **DPCO, 2013**.
- The majority of medicines—classified as **non-scheduled drugs**—face **no initial price regulation**, allowing companies to freely set high MRPs.

#### 3. Lack of Transparency in Drug Pricing

- Critical costing information, such as **Price to Stockist (PTS)**, is not accessible to the government or the NPPA.
- This opacity prevents regulators from understanding the true cost structure and monitoring excessive commercial margins.

#### 4. Delay in Implementing Trade Margin Rationalisation (TMR)

- TMR, which caps profit margins along the supply chain, proved effective during pilot implementation for **cancer drugs**, significantly lowering prices.
- Despite its demonstrated success, TMR has not been institutionalised as a **permanent and legal policy tool**.

### Key Recommendations of the Parliamentary Committee

#### 1. Institutionalise Trade Margin Rationalisation

- Make **TMR a statutory, long-term mechanism** to curb inflated drug prices.
- Ensure uniform implementation across distributors, retailers, and manufacturers.

#### 2. Introduce Oversight for Non-Scheduled Drugs

- Establish a regulatory framework to monitor and cap prices of commonly used non-NLEM medicines.
- Prevent arbitrary MRPs that burden households.



### **3. Improve Regulation of High-Cost Medical Devices**

- Monitor **cardiac stent prices** to ensure compliance with NPPA's fixed ceiling rates.
- Explore opportunities to **further reduce stent costs**, improving accessibility.

### **4. Ensure Transparency in Cancer Drug Pricing**

- Create a real-time pricing database incorporating inputs from:
  - Pharmaceutical companies
  - Hospitals
  - Online pharmacies
- Regulate e-pharmacies to ensure **authentic medicines** and prevent predatory pricing.

## **Drug Regulatory and Institutional Framework in India**

### **Department of Pharmaceuticals (DoP)**

- Part of the **Ministry of Chemicals and Fertilizers**.
- Responsible for formulation and coordination of pharmaceutical policies.

### **National Pharmaceutical Pricing Authority (NPPA)**

- An independent regulator under the DoP.
- Enforces the **Drugs (Prices Control) Order, 2013**, ensuring compliance with NLEM-based price ceilings.

### **Drugs (Prices Control) Order (DPCO), 2013**

- Provides the legal mechanism for price regulation of essential medicines.

### **National Pharmaceutical Pricing Policy (NPPP), 2012**

- Lays the strategic foundation for ensuring that essential medicines remain affordable and accessible to the population.

## **Conclusion — Ensuring Affordability and Transparency in India's Pharmaceutical Market**

The Parliamentary Committee's findings bring to light deep-rooted structural issues in India's drug pricing ecosystem. A combination of **high margins, limited price regulation, and lack of transparency** has compromised equitable access to essential medicines. The recommended reforms—including TMR institutionalisation, stronger pricing oversight, and enhanced regulatory capacity—are critical to realising the goals of **Universal Health Coverage** and ensuring that healthcare remains affordable for all sections of society.

### **Mains Practice Question**

**"Rising medicine prices expose systemic weaknesses in India's drug pricing framework. Discuss the challenges identified by the Parliamentary Committee and propose measures to ensure affordable access to essential medicines."**

# **SCIENCE & TECHNOLOGY**

## **Understanding the Three Stages of Artificial Intelligence**

### **✦ Syllabus Mapping:**

- **GS Paper III – Science & Technology (AI, Emerging Technologies, Ethics in Technology)**
- **GS Paper II – Governance (Technology for Public Service Delivery, Policy Implications)**

### **Introduction**

Artificial Intelligence (AI) has evolved rapidly, transforming every sector—from healthcare to governance. For analytical clarity, AI development is commonly divided into **three conceptual stages: Artificial Narrow Intelligence (ANI), Artificial General Intelligence (AGI), and Artificial Superintelligence (ASI)**. Each stage represents a leap in cognitive capability and raises distinct opportunities and ethical concerns for society, policy-making, and global governance.

### Stages of Artificial Intelligence

#### 1. Artificial Narrow Intelligence (ANI) — *Task-Specific Systems*

- Also called “**Weak AI**”, ANI performs **specialized functions** but is incapable of general reasoning.
- It operates within predefined parameters and cannot transfer knowledge across domains.
- **Examples:**
  - Voice-based virtual assistants (Siri, Alexa)
  - Recommendation engines of Netflix/Amazon
  - Medical image classification systems
- **Contemporary relevance:** ANI powers most current AI applications and contributes to digital governance, smart policing, agriculture advisories, and financial analytics.

#### 2. Artificial General Intelligence (AGI) — *Human-Like Cognitive Ability*

- Known as “**Strong AI**”, AGI is envisioned as a machine capable of performing **any intellectual task** that a human can.
- Distinguished by its ability to **comprehend, learn, reason, and generalize** across fields.
- As of today, **true AGI does not exist**; existing models emulate certain human-like tasks but lack self-awareness and holistic reasoning.
- **Significance in public discourse:**
  - Raises questions on **ethics**, job displacement, accountability, and global competition.
  - International bodies like UNESCO and OECD emphasise governance frameworks for future AGI development.
- **Thinker perspective:** AI ethicist *Nick Bostrom* argues AGI could reshape civilization and therefore requires careful alignment with human values.

#### 3. Artificial Superintelligence (ASI) — *Beyond Human Capability*

- A theoretical stage where AI would **exceed human intelligence** across all domains—creative, emotional, analytical, and problem-solving.
- ASI could solve complex challenges like climate modelling, disease eradication, or space exploration, but also raises fears of loss of human control.
- **No ASI system exists**, and discussions remain speculative, primarily in academic and policy circles.
- **Risks identified by scholars:**
  - Lack of alignment with human ethics
  - Potential concentration of power
  - Global security challenges
- Global debates stress the need for **AI governance**, safety research, and international regulatory cooperation before such capabilities emerge.

### Conclusion — From Automation to Intelligence: Charting the AI Trajectory

The evolution from **ANI to AGI and ASI** reflects a spectrum of technological capability—from narrow task automation to potential superhuman intelligence. While ANI already shapes governance and economic systems, AGI and ASI present transformative possibilities alongside ethical, societal, and regulatory challenges. Understanding these stages is vital for designing **responsible AI policies**, building human-AI synergy, and ensuring technological advancements align with **public interest and democratic values**.

### Mains Practice Question

“Differentiate between ANI, AGI, and ASI. Discuss the ethical and governance challenges associated with the higher stages of Artificial Intelligence.”

## Quantum Roadmap: India’s 2047 Vision

#### 📌 Syllabus Mapping:

- **GS Paper III – Science & Technology (Emerging Technologies, Innovation Ecosystems)**
- **GS Paper II – Governance (Public-Private Partnerships, Policy Frameworks)**
- **GS Paper III – Economy (Technology-led Growth, Start-ups, Global Competitiveness)**

### Introduction

In alignment with the long-term vision of **Viksit Bharat @2047**, **NITI Aayog**, in collaboration with **IBM**, has unveiled a strategic roadmap titled “**Transforming India into a Leading Quantum-Powered Economy**.” The roadmap aims to position India among the **top three global quantum economies by 2047**, leveraging indigenous capabilities, a strong talent base, and targeted policy interventions. It reflects India’s intent to move from being a technology adopter to a **technology standard-setter** in the quantum domain.

### Core Vision and Targets of the Roadmap

- Build a **home-grown quantum computing and services ecosystem**.
- Capture a **significant share of the global quantum market**, particularly in **software and services**.



- **Incubate at least 10 globally competitive quantum startups**, each:
  - Exceeding **USD 100 million in revenue**, and
  - Capturing **over 50% of global value** in quantum software and services by **2035**.

This approach emphasises **economic value creation**, not merely research leadership.

## Current Status of Quantum Technology in India

### 1. Talent Advantage

- India ranks **second globally** (after the EU) in graduates from **quantum-relevant disciplines**, with around **91,000 trained individuals**.
- This provides a strong base for scaling research, engineering, and commercial deployment.

### 2. Emerging State-Level Ecosystems

- **Karnataka**: Established the **Quantum Research Park (QuRP)** to support R&D and industry collaboration.
- **Andhra Pradesh**: Launched the **Amaravati Quantum Valley (AQV)** to attract investments and startups.
- Such sub-national initiatives foster **competitive federalism** in frontier technologies.

## Key Recommendations of the Roadmap

### 1. Rapid Expansion of the Quantum Workforce

- Develop a **deployment-ready workforce** spanning:
  - Scientists
  - Deep-tech engineers
  - Industry professionals
- Timeline: **2–3 years**, focusing on applied skills rather than purely academic training.

### 2. Prioritisation of High-Impact Quantum Use-Cases

Focus on **Top 3–5 opportunity areas**, including:

- **Secure communication** (quantum cryptography, QKD)
- **Health and pharmaceuticals** (drug discovery, molecular simulation)
- **Cryogenics** (critical for quantum hardware)
- **Financial services** (risk modelling, portfolio optimisation)
- **Logistics and supply chains** (complex optimisation problems)

This selective approach avoids dilution of resources and accelerates impact.

### 3. Accelerating Lab-to-Market Transition

- Simplify procedures for:
  - Research collaboration
  - Technology validation
  - Commercialisation of academic research
- Target: **Reduce lab-to-market timelines to under 2 years**, addressing a traditional weakness of India's innovation ecosystem.

### 4. Leadership in Global Standards

- Actively engage with **international standard-setting bodies** in quantum technologies.
- Ensure Indian innovations are **globally interoperable** and gain early access to global markets.
- This mirrors India's approach in **digital public infrastructure** (e.g., UPI).

### 5. Making India the Preferred Domicile for Deep-Tech Startups

- Create regulatory, fiscal, and market incentives so that **over 90% of Indian quantum startups remain domiciled in India**.
- Addresses the issue of "**innovation flight**", where startups relocate abroad for funding or ease of business.

## Understanding Quantum Technology

**Definition:** Quantum technology leverages principles of **quantum mechanics**, particularly:

- **Quantum superposition**
- **Quantum entanglement**





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These enable computational and sensing capabilities far beyond classical systems.

### Four Major Vectors of Quantum Technology

1. **Quantum Computing** – Solving complex problems exponentially faster
2. **Quantum Communication** – Ultra-secure communication using **Quantum Key Distribution (QKD)**
3. **Quantum Sensing & Metrology** – High-precision measurements (navigation, medical imaging)
4. **Quantum Materials** – New materials enabling next-generation devices

### Broader Significance for India

- **Strategic Autonomy:** Reduces dependence on foreign critical technologies.
- **Economic Transformation:** Positions quantum tech as a driver of high-value, knowledge-based growth.
- **Geopolitical Relevance:** Enhances India's standing in global technology governance.
- **Synergy with National Initiatives:** Complements the **National Quantum Mission**, Digital India, and Make in India.

### Conclusion — From Talent-Rich to Technology-Leading Nation

The NITI Aayog-IBM quantum roadmap reflects a shift from **research-centric ambition to market-driven execution**. By focusing on workforce readiness, priority sectors, startup retention, and global standard-setting, India seeks to transform its quantum potential into **economic and strategic leadership**. If implemented effectively, this roadmap can place India firmly among the world's leading quantum economies well before 2047.

### Mains Practice Question

“Quantum technology is emerging as a strategic and economic frontier. Discuss how the NITI Aayog-IBM roadmap can help India transition from a talent-rich nation to a global quantum economy leader by 2047.”

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