



MAINS ARTICLE

GS-II

- **DEPUTY SPEAKER OF LOK SABHA**
- ARTICLE 142 OF THE INDIAN CONSTITUTION
- PRECONCEPTION ANAEMIA
 MANAGEMENT
- RECALIBRATING INDIA MALDIVES RELATION
- INDIA'S STRATEGIC PRIORITIES
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- CABINET APPROVES HIKE IN MSP FOR 14 KHARIF CROPS
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- ENVIRONMENTAL AND MARITIME SECURITY RISKS FROM SUNKEN CARGO VESSELS
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DISCLAIMER

The current affairs articles are segregated from prelims and mains perspective, such separation is maintained in terms of structure of articles. Mains articles have more focus on analysis and prelims articles have more focus on facts.

However, this doesn't mean that Mains articles don't cover facts and PT articles can't have analysis. You are suggested to read all of them for all stages of examination.

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SECTION -A MAINS ISSUES

DEPUTY SPEAKER OF LOK SABHA

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Context

The post of Deputy Speaker of the Lok Sabha has remained vacant since the commencement of the 17th Lok Sabha in 2019, raising concerns about constitutional non-compliance, disruption of parliamentary conventions, and the erosion of democratic principles. With no indication of appointment in the 18th Lok Sabha either, this issue has gained renewed importance.

Constitutional Mandate vs Political Reality: Understanding the Deputy Speaker Vacancy

- Constitutional Provisions Governing the Deputy Speaker:
 - Article 93: Provides for the election of a Speaker and a Deputy Speaker "as soon as may be".
 - Article 94: Specifies conditions under which these offices become vacant.
 - Article 180(1): Allows the Deputy Speaker to act as Speaker when the Speaker's post is vacant.
- Interpretation of "As soon as may be"
 - Though no specific timeline is prescribed, the phrase signifies urgency and necessity, not discretion.
 - Misuse of this ambiguity leads to prolonged vacancy, distorting constitutional intent.

Role and Significance of the Deputy Speaker

More than a Substitute:

 Presides in the absence of the Speaker and exercises equal powers.

- > Chairs vital parliamentary committees such as:
 - House Budget Committee
- Private Member's Bills Committee
- Neutral Arbiter in Sensitive Deliberations
- Expected to function above partisan interests, ensuring fair conduct of parliamentary proceedings.

Parliamentary Conventions and Democratic Ethics

- Convention of Allocating the Post to Opposition: Traditionally, while the Speaker is from the ruling party, the Deputy Speaker is offered to the Opposition to ensure power-sharing and harmony.
- Violation of Established Norms: Denial to offer the post to the Opposition undermines bipartisanism and damages consensus-building.

Procedural Norms Under Lok Sabha Rules

- Rule 8 of Rules of Procedure and Conduct of Business (1952)
 - The Speaker is required to fix the date of election for the Deputy Speaker.
 - Election occurs when a motion proposing a name is adopted by the House.
- Inconsistency with Internal Procedure
 - ▶ **Non-adherence** to Rule 8 further violates internal governance norms of the Lok Sabha.

Implications of a Prolonged Vacancy

 Constitutional Vacuum: Risk of institutional crisis if Speaker resigns or is incapacitated without a Deputy in place.

- Centralization of Power: Concentrates parliamentary control with the ruling party, breaching the balance of power mandated by a Westminster-style democracy.
- Erosion of Accountability: Weakens legislative scrutiny, especially over the executive, and diminishes Opposition voice.

Way Forward

- **Codify Timeline for Appointment**: Introduce legislation or amend House rules to **stipulate a specific timeframe** for election of the Deputy Speaker.
- Uphold Democratic Conventions: Institutionalize the practice of allocating the Deputy Speaker's post to the Opposition to strengthen cooperative federalism and democratic dialogue.
- Judicial Review: Supreme Court may be approached to issue directions interpreting "as soon as may be" in Article 93 to ensure time-bound compliance.

ARTICLE 142 OF THE INDIAN CONSTITUTION

Context

In a *suo motu* writ petition (2023) following a controversial Calcutta High Court judgment, the Supreme Court invoked its extraordinary jurisdiction under **Article 142 of the Constitution** to withhold sentencing of a man convicted under the **POCSO Act**. This case presents a landmark deviation from conventional sentencing, focusing instead on the victim's welfare, long-term rehabilitation, and systemic reform.

Article 142 of the Indian Constitution:

- Article 142(1) of the Constitution of India endows the Supreme Court with the extraordinary power to pass any decree or order as may be necessary for doing "complete justice" in any cause or matter pending before it.
- This provision empowers the Supreme Court to transcend the constraints of statutory law when the rigid application of law results in injustice.
- Scope and Purpose of Article 142
 - Nature of Power: Article 142 confers a discretionary, inherent power exclusively on the Supreme Court to ensure that justice is not thwarted by procedural or legislative limitations.
 - ➤ Objective: The provision is intended to enable the Court to dispense substantive justice in its fullest measure, beyond mere technical compliance with the law.
 - Jurisdictional Limitation: This power can be exercised only in cases that are pending adjudication before the Supreme Court.
 - Judicial Restraint: While broad, this power is not unfettered and must be exercised judiciously, respecting the constitutional framework and the basic structure doctrine.

Judicial Philosophy Underlying Article 142

 Constitutional Values: Article 142 embodies the constitutional ethos of equity, fairness, and human dignity.

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- **Judicial Empathy:** The Court's exercise of this power reflects an awareness of social realities and victim sensitivities, highlighting a victim-centric paradigm.
- **Balancing Act:** It reconciles the demands of law enforcement with the imperative to prevent further harm to vulnerable parties.
- Ethical Responsibility: The Court assumes a proactive role in safeguarding justice that transcends formal legalism without overstepping constitutional bounds.

Landmark Precedents Illustrating the Use of Article 142

- Union Carbide Corporation Case
 - Utilized Article 142 to facilitate an equitable and comprehensive settlement of claims arising from the Bhopal gas tragedy.
 - Ensured that justice was delivered to the victims by overcoming procedural and statutory limitations.

• Ayodhya Verdict (2019)

- Applied Article 142 to achieve a balanced and peaceful resolution of the long-standing Ayodhya land dispute.
- Directed equitable distribution of disputed land rights to maintain social harmony and justice.

POCSO Sentencing Case (2024–2025)

- Exercised Article 142 to modify the mandatory sentencing prescribed by the POCSO Act, considering the welfare and rehabilitation of the victim.
- Emphasized a victim-centric approach by balancing statutory mandates with humanitarian concerns.

Constitutional and Legal Significance:

- **Flexibility in Justice Delivery:** Article 142 provides the Supreme Court with the flexibility to address gaps and unforeseen hardships not envisaged by legislative enactments.
- Complements Legislative Framework: It acts as a constitutional safety valve to correct miscarriages of justice arising from rigid statutory interpretations.
- Safeguard Against Judicial Overreach: Despite its breadth, the power is circumscribed by principles of judicial propriety and respect for separation of powers.
- Reflection of Constitutional Morality: It promotes the overarching constitutional vision of justice, liberty, and equality, especially for marginalized and vulnerable groups.

Limitations and Safeguards

- Article 142 cannot be invoked to:
 - Contravene explicit statutory provisions or infringe upon fundamental rights.

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- ► Usurp the legislative or executive functions vested under the Constitution.
- Its invocation must be justified on the grounds of necessity to achieve complete justice.
- The power should be exercised sparingly to avoid setting unwarranted precedents and maintain judicial legitimacy.

Protection of Children from Sexual Offences (POCSO) Act, 2012:

Background and Objective

- Objective: To protect children (<18 years) from offences of sexual assault, sexual harassment, and pornography, while safeguarding the interests of the child at every stage of the judicial process.
- International Mandate: Enacted following India's ratification of the UN Convention on the Rights of the Child, 1992.
- Legal Vacuum: Prior to this Act, there was no specific legislation to address sexual offences against children.

Salient Features of the Act

- ► Child-Centric Definition: A "child" is defined as any person below the age of 18 years.
- Gender-Neutral Legislation: Recognises that both male and female children can be victims of sexual offences.
- Comprehensive Categorisation of Offences: Includes penetrative sexual assault, nonpenetrative assault, sexual harassment, and using a child for pornography.
- ➤ Child-Friendly Procedures: In-camera trials, use of video recording, and non-intimidating environments during investigation and trial.
- Time-Bound Process: Investigation must be completed within 2 months, and the trial within 6 months from the date of filing the charge sheet.
- Special Courts: Requires setting up of dedicated POCSO courts in every district for swift adjudication.
- Presumption of Guilt in Certain Cases: Shifts the burden of proof onto the accused under specific circumstances.

Important Provisions:

- Mandatory Reporting (Sections 19–22): It is compulsory for any person who has knowledge of or suspects an offence under this Act to report it to the local police or Special Juvenile Police Unit. Failure to report is punishable.
- Confidentiality of Victim's Identity (Section 23): Strictly prohibits the disclosure of any detail that might reveal the identity of the child, including name, address, photograph, family background, or school.

PYQ:

- Q: "Discuss the significance of Article 142 in the context of the Supreme Court's power to do complete justice. How has this provision been used in landmark cases? (2016)
- Q: "Analyze the scope and limitations of the Supreme Court's powers under Article 142. How does this article ensure the enforceability of the Court's decrees and orders? (2019)

PRECONCEPTION ANAEMIA MANAGEMENT

Context

Recent medical observations by leading practitioners highlight a persistent and overlooked challenge in India's maternal health system — **undiagnosed and untreated anaemia among women prior to conception**. Despite notable improvements in maternal mortality, the prevalence of anaemia among women of reproductive age poses serious threats to maternal and neonatal outcomes.

Magnitude of the Problem

- **Prevalence of Anaemia:** Over **57% of Indian women aged 15–49** suffer from anaemia (NFHS-5, 2019–21).
- Preconception Phase Neglect: Public health interventions have largely focused on pregnancy and childbirth, ignoring the preconception phase critical for maternal and fetal health outcomes.

Consequences of Preconception Anaemia

- Adverse Pregnancy Outcomes:
 - Preterm birth
 - > Low birth weight
 - Preeclampsia
 - Postpartum haemorrhage
 - Increased maternal and perinatal mortality
- Systemic Underdiagnosis:
 - ► Symptoms like fatigue and weakness are often normalized or ignored, delaying diagnosis.
 - Lack of regular screening during adolescence and pre-marital stages.

Policy and Programmatic Gaps

- Focus Skewed Towards Antenatal Care (ANC): Current public health policies emphasize ANC over preconception health.
- Implementation Gaps in Anaemia Control Programmes:
 - Anaemia Mukt Bharat (AMB) remains pregnancycentric.

 Low community awareness and weak adolescent engagement in interventions.

Need for a Paradigm Shift

- Reframing Public Health Discourse: Move from "Are you ready for motherhood?" to "Is your body ready for pregnancy?"
- Lifecycle Approach to Women's Health: Focus on early adolescence to preconception as part of a continuous care framework.
- **Strengthening Primary Health Systems:** Integration of **haemoglobin testing** into routine health checkups for girls and women from adolescence.

Way Forward:

- Integrate Preconception Care in RMNCH+A Framework: Add specific targets for anaemia screening and Iron-Folic Acid (IFA) supplementation in premarital and pre-pregnancy periods.
- Mandatory Haemoglobin Check-ups at Adolescent Level: Institutionalize school-based anaemia testing and weekly IFA supplementation.
- Community-Level Awareness Campaigns: Utilize ASHA, ANM, and Anganwadi workers to raise awareness about pre-pregnancy health.
- Strengthening Data Systems: Implement realtime anaemia tracking dashboards using Health Management Information Systems (HMIS).
- Link Anaemia Management with POSHAN Abhiyaan & School Health Programme: Converge nutrition, hygiene, and deworming strategies for holistic anaemia prevention.

Anaemia

- Defined as Hb <12 g/dL in non-pregnant women;
 <11 g/dL in pregnant women.
- Caused by **iron deficiency**, **poor nutrition**, infections (malaria, hookworm), and **menstrual blood loss**.
- Leads to **impaired cognitive and physical performance**, poor pregnancy outcomes.

Anaemia Mukt Bharat (AMB)

- Launched in **2018** under the **Intensified National Iron Plus Initiative**.
- Targets reducing anaemia prevalence by 3% per year among children, adolescents, and women.
- Covers 6 beneficiaries, including adolescent girls (10–19) and women of reproductive age (20–49 years).
- Strategies include:
 - ► Weekly Iron-Folic Acid supplementation.
 - ► Biannual deworming.
 - > Behavioural change communication.
 - ► Fortification of foods.

Maternal Mortality Ratio (MMR)

- Currently at **93 per 1,00,000 live births** (SRS 2019–21).
- SDG Target: Reduce global MMR to <70 per 1,00,000 live births by 2030.
- Anaemia is a **leading indirect cause** of maternal deaths in India.

PYQ:

Q: "The need for cooperation among various service sectors has been an inherent component of India's health service system." Examine the role of the 'Ayushman Bharat' Scheme in this context. (2019)

RECALIBRATING INDIA-MALDIVES RELATION

Context

Maldivian Foreign Minister **Abdulla Khaleel** is on a threeday official visit to India. During the visit, he will participate in the **Second High-Level Core Group (HLCG)** meeting with Indian External Affairs Minister **Dr. S. Jaishankar** to review the progress of the **India–Maldives Comprehensive Economic and Maritime Security Partnership**, which was launched during Maldivian President **Mohamed Muizzu's** visit to India.

Strategic Significance of India–Maldives Relations

- Geostrategic Location of Maldives: Situated in the Indian Ocean, Maldives lies along vital Sea Lanes of Communication (SLOCs), making it crucial for India's maritime security and trade connectivity.
- 'Neighbourhood First' and SAGAR Policy: India considers Maldives an essential partner under its Neighbourhood First policy and the Vision SAGAR (Security and Growth for All in the Region), which seeks cooperative maritime governance.
- MAHASAGAR Initiative: The India–Maldives vision document aligns with India's newer maritime doctrine MAHASAGAR (Mutual and Holistic Advancement for Security and Growth Across Regions)—an advanced articulation of regional maritime cooperation.

Recent Political and Diplomatic Tensions

- Leadership Change in Maldives (2023): President Mohamed Muizzu—seen as having a pro-China orientation—demanded the withdrawal of Indian military personnel, straining bilateral ties.
- Reset in Relations: However, during his October 2023 visit to India, Muizzu signaled intent to repair and strengthen ties, and the adoption of the vision document marked a diplomatic reset.

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 High-Level Engagements: Khaleel's third visit to India in 2024 reflects continuity in political dialogue and willingness for institutionalised strategic partnership despite past tensions.

Key Dimensions of the India–Maldives Comprehensive Partnership:

- Economic Cooperation: Focus on developmental assistance, infrastructure, and tourism, with India extending lines of credit and grant assistance for major projects including airports, roads, and water sanitation.
- Maritime Security Cooperation: Joint naval exercises, coast guard training, hydrography cooperation, and maritime domain awareness initiatives are part of India's capacity-building efforts.
- Implementation Mechanism HLCG: The High-Level Core Group mechanism monitors implementation, ensures accountability, and facilitates coordinated execution of bilateral projects.

Significance of the Partnership:

- The India–Maldives maritime and economic partnership reinforces India's strategic presence in the Indian Ocean amidst China's expanding footprint (e.g., under the Belt and Road Initiative).
- It enables India to promote rules-based maritime order, counter piracy, trafficking, and illegal fishing, and maintain peace and stability in the IOR (Indian Ocean Region).

Challenges:

- China's Influence: Maldives continues to engage with China economically, and any power imbalance may impact Indian interests.
- **Domestic Political Factors:** Political rhetoric in the Maldives may be used to **mobilize nationalist sentiments against India**.
- Security Perception: Withdrawal of Indian military presence may limit real-time strategic response capabilities in the region.

Way Forward:

- Maintain high-level diplomatic channels to reinforce trust and institutional partnerships.
- Ensure **timely and transparent implementation** of ongoing projects to build public support.
- Enhance **people-to-people exchanges** through education, tourism, and health diplomacy.
- Leverage multilateral platforms like IORA and Colombo Security Conclave to sustain multilateral regional cooperation.

PYQ:

Q: Discuss the political developments in the Maldives in the last two years. Should they be of any cause for concern to India? (2013)

INDIA'S STRATEGIC PRIORITIES AMID GLOBAL SECURITY THREATS

Context

The U.S. Defence Intelligence Agency's Worldwide Threat Assessment Report 2025 has outlined how India perceives its key security concerns, placing China as its "primary adversary" and Pakistan as a secondary but persistent threat. The report sheds light on India's military posture, ongoing defense modernization, global strategic partnerships, and nuclear capabilities.

India's Security Perception and Defence Focus

- China as the Primary Adversary: The report notes that India views China as its foremost military and strategic challenge, particularly in the Indo-Pacific and the Himalayan border regions.
- Pakistan as a Managed Threat: Despite incidents like Operation Sindoor in April 2024, Pakistan is considered an ancillary threat. India focuses on deterrence and management, especially due to cross-border terrorism.
- Leadership and Modernisation Goals: PM Modi's priorities are centered around asserting India's global leadership, enhancing regional influence, and accelerating military modernisation under the Atmanirbhar Bharat and Make in India missions.

Defence Modernisation and Nuclear Capabilities

- Missile Development: India conducted tests of Agni-I Prime (MRBM) and Agni-V MIRV, reflecting progress in nuclear deterrence and second-strike capabilities.
- Nuclear Triad Strengthening: India commissioned its second nuclear-powered submarine, boosting its seabased deterrence capability and fulfilling nuclear triad aspirations.
- Indigenous Defence Capability: Continued emphasis on building a self-reliant defense ecosystem, reducing reliance on foreign procurement—especially from Russia—and focusing on supply chain resilience.

Geopolitical Engagements and Strategic Diplomacy

- India-China Border Dynamics: The October 2024 disengagement agreement at Depsang and Demchok reduced tensions post-Galwan (2020), but the LAC demarcation issue remains unresolved.
- India–Russia Relations: Despite the global shift, India maintains ties with Russia for economic cooperation and military logistics, while being cautious of growing Sino-Russian alignment.
- Strategic Multilateralism: India is deepening engagement through Quad, BRICS, SCO, and ASEAN, aiming to assert influence in the Indo-Pacific and counterbalance China.

Way Forward

India needs to:

- Resolve legacy border disputes, particularly with China and Pakistan, to avoid prolonged military standoffs.
- Continue investing in indigenous defense technologies to mitigate future geopolitical shocks.
- Ensure that its strategic diplomacy balances major power relations without jeopardizing its autonomy.
- Collaborate more deeply on cyber, space, and Aldriven warfare domains to stay future-ready.

PYQ:

Q: "The China-Pakistan Economic Corridor (CPEC) is viewed as a cardinal subset of China's larger OBOR (One Belt One Road) initiative. Give a brief description of CPEC and outline the reasons why India considers it a threat to its sovereignty and territorial integrity." (2017)

INDIA, PAKISTAN, AND THE NEW CRYPTO GEOPOLITICS

Context

A Trump-linked firm, World Liberty Financial Inc. (WLFI), has entered into a strategic cryptocurrency partnership with Pakistan, signaling Islamabad's digital pivot and prompting concerns in India over geopolitical and financial ramifications in the absence of a national crypto strategy.

Trump's Crypto Push, Pakistan's Digital Pivot & India's Strategic Dilemma

Emergence of the US-Pakistan Crypto Nexus

- Trump's Strategic Shift on Crypto: The second Trump administration has pivoted towards aggressive promotion of cryptocurrencies, reversing earlier skepticism. Key actions include:
 - Issuance of two executive orders bolstering national blockchain strategy.
 - Establishment of a Strategic Bitcoin Reserve.
 - Creation of a US Digital Asset Stockpile.
- WLFI-Pakistan MoU: WLFI, with ties to the Trump family, signed an MoU with the newly formed Pakistan Crypto Council. Key objectives:
 - Promoting financial inclusion through blockchain.
 - Monetising rare earth assets via digital tokens.
 - Establishing stablecoins for trade and remittance facilitation.
 - Positioning Pakistan as a regional crypto hub.

Pakistan's Crypto Strategy: Intent and Instruments

- Institutional Reforms: Pakistan appointed Bilal bin Saqib as crypto advisor to the PM and head of the Pakistan Crypto Council.
- Diaspora Diplomacy: Pakistan's diaspora engagement, particularly in the US, is being leveraged to push crypto diplomacy and revive ties with the Trump administration.
- Economic Potential: Despite weak economic fundamentals, Pakistan estimates a domestic crypto user base of 25 million and a market value of \$2 billion.

n India's Policy Vacuum on Cryptocurrencies

- Incoherent Regulatory Approach: India taxes crypto assets (30% capital gains, 1% TDS) but lacks a formal regulatory framework.
- Judicial Concerns: The Supreme Court, in a crypto fraud case, flagged the risks of policy ambiguity and legal vacuum.
- Missed Strategic Opportunities: India has the largest crypto user base globally (100+ million), yet there is no coordinated effort toward regulation or technological adoption.

Geopolitical and Security Implications

- Cross-Border Terror Financing Risks: Cryptocurrencies can be exploited for illicit flows, terror financing, and money laundering — especially without central bank oversight.
- Digital Strategic Leverage: Just as Pakistan leveraged nuclear technology to alter South Asian security dynamics, crypto could offer it similar asymmetric advantages if India remains passive.
- US Dollar Supremacy through Digital Means: Trump's strategy to back dollar-linked stablecoins while banning CBDCs aims to maintain US monetary dominance — with geopolitical implications for India and other regional economies.

Way Forward:

- Develop a National Crypto Policy: Draft a comprehensive law covering crypto asset classification, taxation, KYC/AML norms, investor protection, and innovation promotion.
- Set up a National Blockchain Innovation Council: Include members from RBI, SEBI, MEITY, NITI Aayog, and private sector experts to design and implement a national digital asset strategy.
- Leverage India's Tech Diaspora: Engage Indian-origin innovators and entrepreneurs in the crypto and fintech sectors globally to build partnerships and influence digital policy norms.

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- Enhance Cross-Border Crypto Surveillance: Strengthen regulatory coordination with FATF, Interpol, and G20 financial task forces to monitor and curb crypto misuse.
- Accelerate CBDC Deployment: While Trump's US rejects CBDCs, India should fast-track the RBI's Digital Rupee to improve financial inclusion and digitise payments securely.

PYQ:

Q: "What are the main objectives of India's digital economy initiatives? Discuss the challenges in adopting digital payments and cryptocurrencies in India." (2021)

CABINET APPROVES HIKE IN MSP FOR 14 KHARIF CROPS

Context

The Cabinet Committee on Economic Affairs (CCEA), chaired by the Prime Minister, has approved the Minimum Support Prices (MSP) for 14 Kharif crops for the 2025–26 marketing season. This step aligns with the government's commitment to offer remunerative prices and promote crop diversification under the vision of doubling farmers' income.

Minimum Support Price (MSP)

- MSP is not a statutory or constitutional right; it is an administrative mechanism.
- No legal obligation exists on the government to procure all crops at MSP, except for crops under Public Distribution System (PDS) and welfare schemes.
- MSP policy operates under the broader umbrella of government efforts to ensure price support and food security under the Directive Principles of State Policy (Article 38, 39(b)).

Nodal Institutions Involved

- Commission for Agricultural Costs and Prices (CACP): Recommends MSPs. It is an attached office of the Ministry of Agriculture and Farmers Welfare.
- Cabinet Committee on Economic Affairs (CCEA): Final authority to approve MSPs.
- Food Corporation of India (FCI) and state agencies: Key procurement bodies implementing MSP procurement for rice and wheat.

Coverage of Crops Under MSP

- 22 Mandated Crops:
 - 14 Kharif Crops: Paddy, maize, bajra, jowar, ragi, tur, urad, moong, groundnut, soyabean, sunflower, cotton, sesamum, nigerseed.

- 6 Rabi Crops: Wheat, barley, gram, lentil, mustard, safflower.
- > 2 Commercial Crops: Copra and raw jute.
- **Sugarcane**: FRP (Fair and Remunerative Price), not MSP, is declared for sugarcane.

Cost Concepts Used by CACP

- A2: Actual paid-out costs incurred by farmers.
- A2+FL: A2 plus imputed value of family labour.
- **C2**: A2+FL + rent and interest on owned land and capital assets (used as a reference cost).
- **MSP returns** are primarily calculated over **A2+FL**, though **C2** acts as a benchmark for ensuring viability.

Objectives and Significance

- It ensures price stability and remunerative returns for farmers.
- It acts as a risk-mitigation tool against market fluctuations.
- It aids in fulfilling the goals of food security and selfsufficiency.
- It promotes **crop diversification** and encourages cultivation of pulses and oilseeds.
- It serves as a **buffer against rural distress**, particularly during inflationary or deflationary phases.

Major Concerns and Challenges

- Limited Coverage and Implementation
 - Only rice and wheat benefit from extensive procurement.
 - ➤ For other crops, MSP exists only on paper; procurement infrastructure is weak or absent.
- Low Awareness and Access:
 - Majority of small and marginal farmers are unaware of MSP or lack access to procurement centres.
 - Shanta Kumar Committee (2015): Only 6% of farmers benefit directly from MSP.

Regional and Crop Imbalance

- Punjab-Haryana-centric procurement leads to monoculture of rice and wheat.
- This exacerbates groundwater depletion, overuse of fertilisers, and environmental degradation.
- Role of Intermediaries
 - Farmers depend on APMC middlemen and commission agents, who often exploit them by offering lower prices or extracting commissions.
- Fiscally Unsustainable
 - Massive government expenditure for procurement, storage, and distribution under the PDS.
 - Leads to food grain stocks exceeding buffer norms, causing storage losses and food wastage.

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Reform Proposals and Way Forward

- Rationalise MSP Mechanism
 - Link MSP only to food security crops and expand to underrepresented regions and crops (like pulses, oilseeds, millets).
- Diversify Crop Basket
 - Provide incentives and procurement support for coarse grains and climate-resilient crops to promote nutritional and ecological sustainability.
- Strengthen Procurement Infrastructure
 - ► Enhance the reach of **procurement centres** in eastern and central India.
 - Ensure real-time payment systems and direct benefit transfers to farmers.
- Reduce Dependence on Middlemen
 - Encourage Farmer Producer Organisations (FPOs), cooperatives, and direct market linkages.
- Legal Guarantee for MSP (Debated)
 - While some stakeholders demand a legal guarantee for MSP, others argue it would distort the market and fiscal health unless backed by reforms.

Commission for Agricultural Costs and Prices (CACP):

Background and Evolution

- **Established**: 1965 as Agricultural Prices Commission.
- Renamed: Commission for Agricultural Costs and Prices (CACP) in 1985.
- ► **Governing Ministry**: Ministry of Agriculture & Farmers' Welfare, Government of India.
- Statutory Status: Though functioning under a Ministry, the CACP itself does not enjoy statutory status under any specific Act (i.e., it is not a constitutional or statutory body in the strict sense).

D Objective and Mandate

- To recommend Minimum Support Prices (MSPs) to incentivize farmers to increase production.
- Promote use of modern technology and ensure efficient resource allocation.
- Enhance agricultural productivity and ensure price assurance in face of market volatility.

Cabinet Committee on Economic Affairs (CCEA):

n Introduction & Background

 Nature: One of the key standing committees of the Union Cabinet.

> Chairperson: The Prime Minister of India

 Role: Central decision-making body for matters with economic, financial, and policy implications for the country.

Key Functions and Responsibilities

- It approves large-scale investments and public expenditure proposals.
- It reviews economic trends, inflation, trade, industrial and fiscal policies.
- It coordinates economic policy-making across ministries.
- It promotes Public-Private Partnerships (PPPs) and facilitates private sector participation.
- It approves disinvestment, FDI proposals, and strategic economic reforms.
- It oversees implementation of major schemes like PLI, NEP, and NMP.

PYQ:

- Q: What are the direct and indirect subsidies provided to farmers in India? Discuss the issues raised by the World Trade Organization (WTO) in relation to these subsidies. (2023)
- Q: In what way could replacement of price subsidy with Direct Benefit Transfer (DBT) change the system of subsidies in India? Discuss. (2015)

WMO: CLIMATE OUTLOOK FOR 2025–2029

Context

The World Meteorological Organization (WMO) has released its latest decadal climate prediction, indicating a high probability that global temperatures will remain at or near record levels during the period 2025–2029. The projections underscore the increasing likelihood of breaching the 1.5°C warming threshold, even if temporarily, with significant implications for ecosystems, human livelihoods, and the achievement of the Paris Agreement objectives.

Key highlights of report:

Decadal Climate Projections and Global Warming Trends

- Probabilistic Temperature Forecasts for 2025– 2029
 - There is an 80% probability that at least one year between 2025 and 2029 will surpass 2024, which currently holds the record for the warmest year.

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 An 86% probability exists that at least one year in the same period will record a global mean temperature of over 1.5°C above pre-industrial levels (1850–1900 baseline).

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- There is a 70% probability that the five-year mean global warming during 2025–2029 will exceed 1.5°C, up from 47% in the 2024–2028 forecast.
- Central estimate for 20-year global warming (2015–2034): 1.44°C with a confidence interval of 1.22°C to 1.54°C.
- ► Importance of the 1.5°C Threshold in Climate Agreements
 - The Paris Agreement (2015) aims to limit global temperature rise to well below 2°C, ideally to 1.5°C, above pre-industrial levels.
 - Temporary breaches of the 1.5°C threshold are expected to become increasingly frequent and are viewed as precursors to potentially irreversible climatic tipping points.

Regional Climate Implications and Specific Projections

- Arctic Amplification and Its Global Consequences
 - Arctic warming during November–March (2025–2029) is projected to exceed three and a half times the global mean, with temperature anomalies estimated at +2.4°C over the 1991– 2020 average.
 - The amplification accelerates polar ice melt, contributing to sea-level rise and disruption of global weather systems.
- Decline in Sea Ice Cover
 - Model simulations indicate reductions in sea ice concentration in key Arctic seas—Barents, Bering, and Sea of Okhotsk—during March months across the forecast period.
 - This trend exacerbates the albedo effect, further intensifying global warming.
- > Shifts in Global Precipitation Patterns
 - Wetter-than-average conditions are projected in Sahel, Northern Europe, Alaska, and Northern Siberia.
 - Conversely, drier-than-average conditions are forecast for the Amazon Basin, with serious consequences for the region's carbon sink function and biodiversity.
 - South Asia is expected to witness above-average precipitation, although intra-seasonal variability will persist, complicating agricultural planning.

Projected Impacts and Socioeconomic Consequences

Intensification of Climate-Related Disasters

- The continued rise in global temperatures is likely to cause more frequent and severe heatwaves, floods, droughts, glacial retreat, and sea-level rise.
- These phenomena directly affect food security, water availability, disaster preparedness, and public health infrastructure.
- Developmental and Economic Disruptions
 - Adverse climate conditions threaten progress on multiple Sustainable Development Goals (SDGs), notably:
 - SDG 13 Climate Action
 - SDG 2 Zero Hunger
 - SDG 6 Clean Water and Sanitation
 - Impacts are disproportionately severe in vulnerable and low-income regions, exacerbating existing inequalities.

Institutional Response and Global Climate Governance

- > Role of WMO and IPCC in Climate Monitoring
 - The World Meteorological Organization (WMO) synthesizes forecasts from global climate centres to assist policymakers with evidencebased decision-making.
 - The Intergovernmental Panel on Climate Change (IPCC) defines global warming in terms of 20-year averages and provides central estimates along with confidence intervals for long-term tracking.
- Relevance of COP30 and Nationally Determined Contributions (NDCs)
 - The upcoming COP30 will play a pivotal role in evaluating updated Nationally Determined Contributions (NDCs).
 - These revised commitments are essential to align national actions with the 1.5°C and 2°C goals under the Paris Agreement framework.

Implications for India

India is acutely vulnerable to climate change due to its **dependence on monsoon cycles**, **glacial water sources**, and **coastal settlements**.

- Erratic precipitation could disrupt agricultural productivity and affect rural livelihoods.
- Accelerated glacier melting in the Himalayas threatens water security for major river systems.
- Rising sea levels endanger coastal infrastructure, biodiversity, and human habitations, especially in cities like Mumbai, Kolkata, and Chennai.

Policy Recommendations

• Enhancing Climate Resilience in Agriculture

9

10 4th WEEK: MAY, 2025

- Promotion of climate-smart agriculture, droughtresistant crop varieties, and robust irrigation infrastructure.
- Urban Climate Adaptation Measures
 - Integration of heatwave action plans, urban afforestation, and sustainable drainage systems into city planning.
- Strengthening Climate Institutions and Finance
 - Investment in domestic climate modeling and early warning systems (e.g., IMD, NCMRWF).
 - Increased international climate finance for mitigation and adaptation under the principle of common but differentiated responsibilities.
- Diplomatic Engagement and Global Advocacy
 - India must assert leadership by advocating climate justice at COP30 while implementing its updated NDCs (2022), including commitments to non-fossil energy sources and emissions intensity reduction.

Paris Agreement (2015):

- An international treaty adopted under the United Nations Framework Convention on Climate Change (UNFCCC).
- **Objective:** To hold global average temperature increase well below 2°C, and preferably to 1.5°C.
- **Mechanism**: Countries submit and update NDCs every five years.
- India's 2022 NDC targets include 45% emissions intensity reduction and 50% cumulative electric power from non-fossil sources by 2030.

Arctic Amplification:

- A phenomenon where the Arctic warms faster than the global average due to positive feedback mechanisms like the ice-albedo effect, changes in cloud formation, and atmospheric heat transport.
- Consequences include accelerated sea-level rise and shifts in global climate patterns.

Nationally Determined Contributions (NDCs):

- National-level pledges under the Paris Agreement.
- India's updated NDC includes major initiatives such as the National Hydrogen Mission, International Solar Alliance, and LiFE (Lifestyle for Environment) campaign.

PYQ:

Q: "Describe the major outcomes of the 26th session of the Conference of the Parties (COP) to the UNFCCC. What are the commitments made by the international community to combat the global warming? Explain." (2022)

ENVIRONMENTAL AND MARITIME SECURITY RISKS FROM SUNKEN CARGO VESSELS

Context

Containers from a sunken Liberian-flagged cargo ship have begun washing ashore along Kerala's coast, especially in Thiruvananthapuram, Kollam, and Alappuzha. The incident has raised serious concerns over chemical spills, marine pollution, and threats to the livelihood of coastal fishing communities due to hazardous cargo like calcium carbide.

Nature of the Maritime Incident

- Shipwreck Details: A Liberian-flagged vessel sank off the Kochi coast, reportedly carrying over 640 containers, including 13 with hazardous chemicals such as calcium carbide, known to release acetylene gas when in contact with water.
- GeographicSpread:Atleast29containerswashedashore across Kollam, Alappuzha, and Thiruvananthapuram, with Varkala and Chirayinkeezhu taluks reporting four additional containers.

Public Health and Environmental Concerns

- Chemical Spill Risk: Containers reportedly included calcium carbide, which can produce highly flammable acetylene gas, posing risk of explosion, inhalation toxicity, and marine contamination.
- **Oil Spill:** The vessel was carrying **over 450 metric tonnes** of **diesel and furnace oil**, leading to a significant **marine oil spill**. Oil is spreading through the coastal ecosystem, threatening marine life and biodiversity.

Impact on Local Livelihoods

- Fisheries Disruption: Fishing communities, particularly in Thiruvananthapuram, have reported fear over chemical contamination of water, resulting in market rejection of seafood, endangering livelihoods and food security.
- Social Anxiety and Economic Insecurity: Local residents are wary of seafood consumption, and tourismdependent micro-enterprises (tea stalls, beach vendors) are facing reduced footfall, leading to economic uncertainty.

Administrative and Legal Response

- Public Safety Measures: Police and Coast Guard officials have cordoned off container zones, prohibiting access within 200 metres, and issued public advisories against touching debris or containers.
- Customs and Surveillance: The Customs Department, in collaboration with the Indian Coast Guard and Marine Preventive Units, is conducting shoreline

surveillance and monitoring the situation.

 Legal Provisions Invoked: Authorities have cited laws prohibiting unauthorised removal or pilferage of nonduty-paid goods, and coordinated removal procedures have been initiated with customs clearance.

Way Forward:

- Strengthen Coastal Surveillance Systems: Enhance Automatic Identification Systems (AIS) and real-time cargo tracking for all commercial ships approaching Indian waters.
- Mandatory Cargo Disclosure and Classification: Enforce compulsory real-time disclosure of all hazardous cargo through Port State Control regulations under International Maritime Organization (IMO) norms.
- Integrated Coastal Disaster Response Plan: State and central disaster management agencies must develop and periodically update a Coastal Hazard Response Framework, integrating NDRF, SDRF, Customs, and Environmental Agencies.
- Livelihood Compensation and Environmental Monitoring: Launch scientific water quality assessments, provide temporary fishing bans with financial compensation, and establish mobile health units for affected coastal populations.
- Review of Chemical Container Transport Policy: Revisit the Merchant Shipping Act and rules under the Environment (Protection) Act to improve handling, labeling, and movement of hazardous cargo in maritime logistics.

Calcium Carbide

- **Use:** Industrial chemical used for acetylene gas production.
- **Hazard**: Reacts with water to form flammable acetylene gas and calcium hydroxide.
- **Relevance:** Listed under hazardous substances in **Environmental Protection Rules, 1986**.

Indian Coast Guard (ICG)

- **Mandate:** Coastal security, marine pollution response, and maritime law enforcement.
- *Legal Authority:* Governed under the **Coast Guard** Act, 1978.
- **Recent Role:** Active containment and risk assessment in Kerala container spill.

Marine Pollution under UNCLOS

- **UNCLOS Article 194:** Obligation on states to prevent, reduce, and control pollution of the marine environment.
- *Relevance to India:* Signatory to United Nations Convention on the Law of the Sea (UNCLOS).

PYQ:

Q: Coastal sand mining, whether legal or illegal, poses one of the biggest threats to the environment. Analyse the impact of sand mining along the Indian coasts, citing specific examples. (2018)

TAMIL NADU'S SPACE INDUSTRIAL POLICY 2024

Context

Tamil Nadu Cabinet, chaired by Chief Minister M.K. Stalin, approved the **Space Industrial Policy 2024**. With this, Tamil Nadu became the third Indian state—after Karnataka and Gujarat—to roll out a state-specific space sector policy aimed at facilitating private sector participation and enhancing space-based economic development.

Significance of Tamil Nadu's Space Policy in India's Decentralized Space Governance

D Background and Context

- The **Indian Space Policy 2023**, introduced by the Union Government, provides a national-level framework to liberalize the space economy by enabling private participation.
- States are now formulating complementary policies to align with national goals and tap into localized strengths.

Tamil Nadu's Strategic Position in Space Ecosystem

- > Existing ISRO Infrastructure:
 - ISRO Propulsion Complex (IPRC), Mahendragiri (Tirunelveli): Specializes in earth-storable and cryogenic engines for launch vehicles.
 - **Kulasekarapattinam Spaceport** (Thoothukudi): India's second spaceport under development to facilitate launches of small satellites.
- > Space Startups and R&D Ecosystem:
 - Emergence of startups working on cutting-edge technologies like reusable launch vehicles, inspace manufacturing, and satellite data analytics.
 - Space Technology Incubation Centre (STIC) at NIT Tiruchirappalli, supporting ISRO-aligned innovations.

Trigger for the Policy:

 Recommendation by IN-SPACe (Indian National Space Promotion and Authorisation Centre), a central body under the Department of Space, to formulate a regional policy.

- Tamil Nadu's existing Aerospace and Defence Industrial Policy (2021) had already identified the space sector as a priority.
- The state has over 250 ISRO vendors, forming a strong industrial base.

Key Objectives and Targets of the Policy

- Investment Target: ₹10,000 crore over the next five years.
- Employment Generation: Estimated 10,000 direct and indirect jobs.
- Industrial Development:
 - Support for **R&D** and global capability centres.
 - Creation of Space Bays—designated zones offering tailored incentives for firms investing below ₹300 crore.
 - Support for space industrial park developers with housing subsidies (10% capped at ₹10 crore).
 - **25% capital subsidy** (capped at ₹5 crore) for green/sustainable initiatives.

Policy-Driven Governance Integration

- Emphasis on deploying space technologies for improving public services and governance in areas like:
 - Disaster management
 - Fisheries and agriculture
 - Urban planning and municipal administration
 - * Transport, revenue, and healthcare delivery

Strategic Relevance:

- Tamil Nadu's policy aligns with India's transition from a government-monopolized space domain to a multi-stakeholder ecosystem.
- Decentralized space governance helps exploit state-specific comparative advantages (e.g., skilled workforce, vendor base, geographical access to sea for launches).

Industrial and Technological Implications

- Boosts indigenous capabilities in high-tech manufacturing, satellite component fabrication, and propulsion systems.
- Encourages integration of Tier-2/3 suppliers into global value chains via public-private collaboration.

• Governance and Public Services

The integration of space applications for realtime monitoring, planning, and decision-making augments data-driven governance at the state level.

Major Developments in India's Space Sector

Advancements in Space Science Missions

 Chandrayaan-3 (2023): Soft landing on the lunar south pole; landmark in India's lunar exploration capabilities.

GSSCOR

- Aditya-L1 (2023): India's first solar observatory placed at the Lagrange Point L1; aims to study solar winds, storms, and coronal mass ejections.
- XPoSat (2024): India's first polarimetry mission to study the polarization of cosmic X-rays from black holes and neutron stars.

Human Spaceflight Programme – Gaganyaan

- TV-D1 Abort Test (2023): Successful demonstration of Crew Escape System, a key milestone for human spaceflight safety.
- Astronaut Training: Four candidates selected and undergoing rigorous training in India and abroad.
- Mission Timeline:
 - Uncrewed mission: Late 2024
 - Crewed mission: Targeted for 2025
- Significance: Will make India the 4th country with independent human spaceflight capability (after USA, Russia, China).

Commercialization and Privatization Efforts

- NewSpace India Limited (NSIL):
 - Took over all commercial remote sensing satellite services in May 2024.
 - Commercial arm of ISRO for marketing and monetization of space assets.
- Private Sector Growth:
 - Agnikul Cosmos: Successfully launched SoRTeD-01, an indigenous semi-cryogenic launch vehicle from a private launch pad.
 - Skyroot Aerospace and Bellatrix Aerospace among other major private players.

PYQ:

Q: Discuss India's achievements in the field of Space Science and Technology. How the application of this technology has helped India in its socioeconomic development? (2016)

48-HOUR BANDH IN MANIPUR

Context:

The 48-hour bandh enforced by the Meitei organisation **Coordinating Committee on Manipur Integrity (COCOMI)** in May 2025 brought normal life to a standstill in Manipur's Imphal Valley. The bandh was called to protest the **alleged covering of the state's name "Manipur" from a government bus**, reportedly by Central security personnel. The incident triggered a widespread emotional and political response, reflecting deeper tensions tied to ethnic identity, federal relations, and state governance.

Key Issues Emerging from the Incident:

Identity Politics and Symbolism

- The removal of the word "Manipur" was perceived as a symbolic erasure of the state's historical and cultural identity.
- Civil resistance, including the re-pasting of "Manipur/ Kangleipak" on vehicles, shows the role of symbolic representation in ethnic mobilisation.
- This reflects growing assertiveness of regional identities in the face of perceived central neglect or interference.
- Ethnic Fragility and Social Polarisation
 - ➤ The bandh occurred against the backdrop of ongoing ethnic tensions between the Meitei and Kuki-Zo communities since 2023.
 - Such incidents have the potential to reignite latent ethnic grievances and further deepen fault lines.
 - ➤ Women protestors and local groups enforcing shutdowns illustrate grassroots involvement in identity mobilisation.
- Crisis of Governance under President's Rule
 - The state is currently under President's Rule (since Feb 2025) following the resignation of former CM N. Biren Singh amid ethnic violence.
 - Absence of elected government has weakened institutional legitimacy and public trust in law enforcement and administration.
 - The demand for resignation of key administrative and police officials indicates public dissatisfaction with bureaucratic accountability mechanisms.
- Civil Society's Expanding Role
 - COCOMI has emerged as a powerful voice for Meitei interests, often engaging in mobilisation, pressuring the administration, and defining public narratives.
 - The bandh illustrates the evolving role of civil society as a counterbalance to state authority in conflict-ridden regions.

Governance and Administrative Implications:

• Central-State Relations

- The intervention of Central security forces in a sensitive ethnic region without contextual sensitivity can undermine cooperative federalism.
- It raises questions about command hierarchy, civilmilitary coordination, and respect for state symbols under Central Rule.
- Rule of Law vs. Popular Sentiment
 - The bandh, while peaceful in parts, led to restrictions on vehicular movement, closure of essential services, and disruption of public life.
 - This reflects a classic governance dilemma between maintaining public order and accommodating popular sentiment in ethnically sensitive areas.

• Administrative Accountability

- The government's formation of a twomember inquiry committee shows procedural responsiveness.
- However, it also highlights the fragile trust between the state machinery and its people, especially when security forces are seen as actors of symbolic violence.

Strategic and Policy-Level Concerns

- Internal Security
 - Ethnic mobilisation over symbolic issues can escalate into broader conflict in already volatile environments.
 - Ensuring sensitivity among security forces and public officials in **multi-ethnic zones** is critical for peace maintenance.
- Importance of Communication and Transparency
 - ► The delay or failure in clarifying the incident by authorities further inflamed tensions.
 - It underscores the need for proactive public communication strategies, particularly when managing inter-community relations.

• Role of Festivals in Peacebuilding

- The Shirui Lily Festival, held after a two-year gap, could have served as an opportunity for cultural reconciliation.
- However, the controversy surrounding it reflects how even neutral cultural spaces are politicised amid unresolved ethnic issues.

Way Forward

• Prompt and Transparent Inquiry:

- Expedite and publish the findings of the inquiry committee in a transparent manner.
- Fix responsibility where due, particularly if the action was taken without authority or in breach of protocol.

Rebuilding Public Trust

 Re-establish communication with civil society groups like COCOMI through structured dialogue platforms.

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- Reinforce the cultural pride of all ethnic groups through inclusive state narratives and public campaigns.
- Administrative Sensitisation
 - Mandate ethno-cultural sensitisation training for security forces and bureaucrats deployed in Manipur and similar regions.
 - Institutionalise grievance redressal mechanisms involving local community stakeholders.
- Restoring Democratic Processes
 - > Expedite the restoration of an elected government

in Manipur to rebuild **institutional trust** and **legitimacy**.

 Encourage multi-community forums for joint decision-making, particularly on issues involving public symbolism and representation.

PYQ

Q: Ethnic conflicts in North-East India pose a serious challenge to the internal security of the country." Discuss with reference to recent developments. (2020)





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SECTION -B QUICK BYTES

KEELADI EXCAVATION

Context

K. Amarnath Ramakrishna, the lead archaeologist of the Keeladi excavations, has declined the ASI's request to revise his **2023 final report**. The ASI had questioned the proposed **early dating of the site (8th–5th century BCE)**, seeking corrections and reassessment. Ramakrishna defended the original findings, citing established stratigraphy, AMS dating, and procedural integrity.

About

- **Location:** Keeladi (also spelled Keezhadi), near Sivaganga district, Tamil Nadu. It is situated along the Vaigai River.
- **Dating and Chronology:** Radiocarbon dating places the Keeladi settlement between the 6th century BCE and 1st century CE.
 - This pushes back the Sangam era by approximately 300 years, indicating early urbanization in South India.
 - ► **Keeladi** is associated with the **Sangam Age** and early urbanization in South India.
- Major Findings: Over 18,000 artifacts have been unearthed, including:
 - > Brick structures and drainage systems.
 - Pottery with over 120 potsherds inscribed in Tamil-Brahmi script.
 - Tools and ornaments made of gold, copper, ivory, and semi-precious stones.
 - Evidence of industries such as weaving, dyeing, and bead-making.

- ► Terracotta toys and game pieces, indicating recreational activities.
- AMS (Accelerator Mass Spectrometry) dating from carbon samples indicating habitation as early as 8th century BCE.



Figure No.: 01

ГАСТ ВОХ

Archaeological Survey of India (ASI)

Founded: 1861

- The Archaeological Survey of India (ASI) under the Ministry of Culture is the premier organization for archaeological researches and protection of the cultural heritage of the nation.
- The prime concern of ASI is the maintenance of ancient monuments, archaeological sites, and remains of national importance.
 - Besides it regulates all archaeological activities in the country as per the provisions of the Ancient Monuments and Archaeological Sites and Remains Act, 1958.

- It also regulates the Antiquities and Art Treasure Act, 1972.
- ASI regularly publishes the reports of sites excavated under the aegis of Director General, ASI.

UPSC PYQ

Q: With reference to the difference between the culture of Rigvedic Aryans and Indus Valley people, which of the following statements is/are correct? (2017)

- (1) Rigvedic Aryans used the coat of mail and helmet in warfare whereas the people of Indus Valley Civilization did not leave any evidence of using them.
- (2) Rigvedic Aryans knew gold, silver and copper whereas Indus Valley people knew only copper and iron.
- (3) Rigvedic Aryans had domesticated the horse whereas there is no evidence of Indus Valley people having been aware of this animal.

Select the correct answer using the code given below:

(a) 1 and 2 only	(b) 3 only
------------------	------------

(c) 1 and 3 only (d) 1, 2 and 3

300TH BIRTH ANNIVERSARY OF AHILYABAI HOLKAR

Context

May 31, 2025, marks the **300th birth anniversary** of Ahilyabai Holkar (1725–1795), the revered ruler of the Holkar dynasty of Malwa. Known for her administrative acumen, military leadership, and patronage of temple architecture, her birth is being widely commemorated across India.

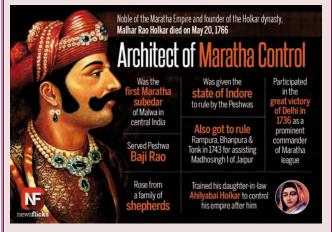
About

- Ahilyabai was born in Chondi village of Ahmednagar to the village head Mankoji Shinde, who ensured that his daughter received an education.
- She ruled the Malwa region from 1767 to 1795, succeeding her father-in-law Malhar Rao Holkar after the demise of her husband Khanderao Holkar in the Battle of Kumbher and her son Malerao.
- Her rule marks the zenith of the Holkar dynasty within the Maratha Confederacy.
- Administrative Contributions:
 - She rejected gender bias and ascended the throne as a female monarch, gaining support from the Peshwa.
 - She was known for dispensing justice, setting up daily public courts, and abolishing purdah for herself.

- Delegated military authority to Tukoji Rao Holkar and modernized her army by employing European expertise.
- Architectural and Cultural Patronage:
 - Rebuilt and renovated major Hindu temples, including the Kashi Vishwanath Temple (Varanasi) and Grishneshwar Temple (near Aurangabad).
 - ► Made Maheshwar her capital, promoting textile crafts and initiating the Maheshwari saree tradition.
 - ► Constructed wells, ghats, forts, and rest houses across India—from Somnath to Rameswaram.
- Legacy and Recognition:
 - She is known as Punyashlok Ahilyadevi, venerated for her piety, vision, and inclusive governance.
 - Honored through institutions such as Devi Ahilya Vishwavidyalaya (DAVV), Indore, and Ahilyabai Holkar Airport.
 - > Subject of literary works including Lokmata Ahilyabai.

The Holkar Dynasty:

- The Holkar dynasty belongs to the **Hindu Maratha** family.
- The history of the Holkar dynasty is traced back to the village of Holegaon on the banks of the Nira River.
- They got their name from the **Holegaon village**.
- **Malhar Rao Holkar** has considered the Holkar dynasty founder in 1732.
- Initially, Holkars ruled as kings under the Maratha Empire.
- Later in 1818, the Indore state became a princely state under the protectorate of the British Empire.



SEVEN SUMMITS CHALLENGE

Context

Vishwanath Karthikey Padakanti, a 16-year-old from Hyderabad, has become the youngest Indian and the second youngest globally to complete the prestigious **7 Summits Challenge**. He achieved this feat by successfully scaling Mount Everest on 2025, marking a remarkable milestone in Indian mountaineering.



Seven Summits Challenge:

- The **Seven Summits Challenge** refers to climbing the highest mountain peak on each of the seven continents.
- These include:
 - ► Asia Mount Everest (8,848 m)
 - South America Aconcagua (6,962 m)
 - North America Denali (6,190 m)
 - ► Africa Kilimanjaro (5,895 m)
 - ► Europe Mount Elbrus (5,642 m)
 - > Antarctica Mount Vinson (4,892 m)
 - Australia (Oceania) Puncak Jaya/Carstensz Pyramid (4,884 m) or Mount Kosciuszko (2,228 m) depending on classification.
- Significance for India:
 - Vishwanath Karthikey is now the youngest Indian to complete this challenge, surpassing Kaamya Karthikeyan who achieved it at age 17.
 - The youngest globally remains Jordan Romero (USA) who achieved it at 15 years.
 - It reflects India's growing prominence in adventure sports and extreme endurance disciplines.

KARNATAKA SPEAKER REVOKES SUSPENSION OF MLAS

Context

Karnataka Legislative Assembly Speaker U.T. Khader revoked the **six-month suspension of 18 MLAs**, originally penalized for disorderly conduct in the House. The revocation followed expressions of remorse by the legislators and political consultations among ruling and opposition leaders.

Suspension of MLAs

- The Speaker of the Legislative Assembly is empowered to maintain order and take action against members under the Assembly's Rules of Procedure.
 - Under Article 212 of the Indian Constitution, courts cannot inquire into the validity of proceedings in the legislature.
 - The Speaker derives powers to maintain decorum and order in the House under Rules of Procedure and Conduct of Business of the respective State Assembly.
 - The suspension of members is within the Speaker's powers to ensure orderly functioning of the legislature.
- The House can also pass a motion to suspend a member for a specified period by majority vote.
- Constitutional and Legal Basis
 - Article 208: Allows State Legislatures to make rules for regulating their procedure and conduct of business.

- ► Article 194: Grants privileges to State Legislatures and their members, including disciplinary control.
- Rules of Procedure and Conduct of Business (of the concerned Legislative Assembly): Define when and how suspension can be initiated.
- Judicial View
 - Raja Rampal Case (2007): The Court upheld that legislatures have the power to expel or suspend members, but such actions must adhere to the principle of proportionality and procedural fairness.
 - SC in Lok Prahari v. Union of India (2018): Recognized the House's power to suspend members but maintained that excessive or arbitrary suspensions may violate principles of natural justice and can be reviewed.
 - SC in Patil v. Speaker, Maharashtra (2022): Held that suspension beyond the ongoing session was unconstitutional as it deprived the constituency of representation.

UPSC PYQ

Q: Consider the following statements: (2019)

- (4) The Speaker of the Legislative Assembly shall vacate his/her office if he/she ceases to be a member of the Assembly.
- (5) Whenever the Legislative Assembly is dissolved, the Speaker shall vacate his/her office immediately.

Which of the statements given above is/are correct?

(a) 1 only	(b) 2 only
------------	------------

(c) Both 1 and 2 (d) Neither 1 nor 2

TRANSFER OF 21 HIGH COURT JUDGES

Context

The Supreme Court Collegium recommended a major reshuffle involving the **transfer of 21 judges across various High Courts** in India and **elevation of three High Court judges** to the Supreme Court. The recommendations aim to address three existing vacancies in the apex court and enhance efficiency and regional balance in High Court functioning.

Supreme Court Collegium:

- The **Supreme Court Collegium** is a **five-member body** headed by the Chief Justice of India and comprising the **four senior-most judges** of the Supreme Court.
- It is responsible for the appointment and transfer of judges of the High Courts and recommendations for appointment to the Supreme Court.

- The Collegium system is a judicial innovation evolved through judgments in the Three Judges Cases (1981, 1993, 1998) and is not established by the Constitution or any statute.
- **Constitutional Provisions:**
 - Article 124: Appointment of Judges to the Supreme Court
 - Article 217: Appointment and conditions of the office of High Court Judges
 - Article 222: Transfer of a Judge from one High Court to another
- These powers are exercised by the President of India in consultation with the CJI and other relevant authorities.

UPSC PYQ

- Q: With reference to the Constitution of India, consider the following statements: (2019)
 - (6) The President of India can appoint a person who is not a Member of Parliament as a Minister.
 - (7) The Supreme Court of India is the guardian of the Constitution.
 - (8) The Supreme Court of India has the power to review its own judgments.

Which of the statements given above is/are correct?

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

BIENNIAL RAJYA SABHA POLLS

Context

The **Election Commission of India** has announced the schedule for the **biennial elections** to fill eight **Rajya Sabha seats**—six from Tamil Nadu and two from Assam—as part of the periodic replacement of one-third of the members of the Upper House.

Rajya Sabha: Constitutional and Functional Status

- Constitutional Provision: Established under Article 80 of the Constitution.
- Maximum Strength: 250 members (currently 245).
- 233 elected by State and UT legislatures.
- 12 nominated by the President for contributions in literature, science, art, and social service.

Biennial Elections:

- Purpose: To replace one-third of the members who complete their 6-year term.
- Nature of House: Rajya Sabha is a permanent body; it cannot be dissolved.

- Election Mechanism:
 - Indirect Elections: Members are elected by the elected members of the State Legislative Assemblies using proportional representation by means of a single transferable vote (STV).
 - Elections for UTs: Elected by members of electoral colleges (e.g., Delhi, Puducherry, J&K).
 - Bye-Elections are held if a seat falls vacant before the end of the term. The member elected serves only the remainder of the original term.
- Eligibility (As per Article 84):
 - Must be a citizen of India.
 - Must be 30 years of age or above.
 - Must subscribe to an **oath or affirmation** under the Third Schedule.
 - > Must fulfill qualifications as prescribed by Parliament.
- Grounds for Disqualification:
 - > Holding an office of profit under government.
 - Being insolvent, unsound of mind, or a foreign citizen.
 - Disqualified under the **Tenth Schedule** (antidefection law).

UPSC PYQ

- Q: With reference to the election of the President of India, consider the following statements: (2017)
 - (1) The value of the vote of each MLA varies from State to State.
 - (2) The value of the vote of MPs of the Lok Sabha is more than the value of the vote of MPs of the Rajya Sabha.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

UNIFIED PENSION SCHEME

Context

The **Ministry of Railways** issued a directive to all 17 railway zones instructing them to ensure proactive communication with employees regarding the available options under the **Unified Pension Scheme (UPS)**.

What is UPS?

 The Central Government has launched the Unified Pension Scheme (UPS), which provides government workers with a steady pension based on their length of service and most recent basic salary drawn.

• Key-Features:

- Assured pension: For a minimum qualifying service of 25 years, 50% of the average basic salary drawn for the past 12 months prior to superannuation. Up to a minimum of ten years of service, this compensation is to be commensurate with shorter service periods.
- ► Assured family pension: 60% of pension of the employee immediately before her/his demise.
- Assured minimum pension: After at least ten years of service, @10,000 per month in superannuation.
- Inflation indexation: On assured pension, on assured family pension and assured minimum pension. Dearness Relief based on All India Consumer Price Index for Industrial Workers (AICPI-IW) as in case of service employees.
- Lump sum payment at superannuation in addition to gratuity: 1/10th of monthly emoluments (pay + DA) as on the date of superannuation for every completed six months of service. This payment does not diminish the quantum of secured pension.
- **Eligibility:** UPS applies to all those who retired under the NPS from 2004 onwards
- Unlike the Old Pension Scheme (OPS), where employees made no contributions, UPS requires employees to contribute 10% of their basic salary and DA, while the government contributes 18.5%. A portion of the government's contribution (8.5%) goes into a guarantee reserve fund to manage any shortfalls.

Four laws and FOO(of the in Dath and laws (100) of colors)	IPS combines elements of both
 ast salary as a pension for life, without needing to contribute during their service. Inflation Protection: Included dearness relief to counter inflation. Family Pension: Extended to dependents. and the government (14% of salary) contribute. Investment Choices: Contributions are invested in market-linked securities such as equities and bonds, affecting the final pension amount. Risk: Pension amount depends on market performance, leading to uncertainty. 	DPS and NPS. Guarantees a pension of 50% of the average basic salary of the last 2 months before retirement. Indexation: Pension amount adjusted based on the All ndia Consumer Price Index for industrial Workers (AICPI-IW). Contributions: Employees ontribute 10% of their salary, nd the government contributes 8.5%.

UPSC PYQ

- Q: With reference to the National Pension System (NPS), consider the following statements: (2017)
 - (1) It is a scheme launched by the Government of India to provide retirement benefit to all citizens.
 - (2) Under the NPS, the employee contributes to his retirement account while the employer may also contribute.
 - (3) The employee can withdraw 60% of the corpus as lump sum and rest is compulsorily used to purchase an annuity.

Which of the statements given above are correct?

- (a) 1 and 2 only (b) 2 and 3 only
- (c) 1 and 3 only (d) 1, 2 and 3

GOVERNMENT RESTORES RODTEP

Context

The **Ministry of Commerce and Industry** has reinstated **RoDTEP benefits** for Advance Authorisation holders,

SEZs, and EOUs from June 1, 2025. This reverses the earlier withdrawal and aims to boost export competitiveness, especially for sectors like pharmaceuticals.

About RoDTEP Scheme:

- Launched: January 1, 2021.
- Objective: To refund embedded taxes/duties not reimbursed under any other schemes (e.g., electricity duty, VAT on fuel, Mandi tax).
- **Basis:** Aligned with **WTO norms**; replaces **MEIS** (Merchandise Exports from India Scheme).
- Legal Framework: Section 5 of the Foreign Trade (Development and Regulation) Act, 1992.

• Eligibility and Beneficiaries:

- Initially covered all sectors; later excluded AAs, SEZs, and EOUs from February 6, 2025.
- These exclusions have now been reversed, restoring parity among exporters operating under various schemes.
- Appendix 4RE (updated as per Finance Act, 2025) contains new HS code-linked rates.
- **Export Promotion Schemes Involved:**
 - Advance Authorisation (AA): Allows duty-free import of inputs for export production.

- Special Economic Zones (SEZs): Deemed foreign territory for trade operations; incentivized through fiscal concessions.
- Export-Oriented Units (EOUs): Set up for 100% export with duty-free inputs under EPCG/FTPs.

INTER-SERVICES ORGANISATIONS RULES, 2025

Context

The Government has notified Rules under the **Inter-Services Organisations (Command, Control and Discipline) Act, 2023,** to enhance joint-ness and command efficiency among the Armed Forces. These Rules empower commanders of ISOs to exercise discipline and administrative control over personnel, enabling streamlined functioning and faster resolution of disciplinary cases.

About the Rules

- The rules have been framed under the Inter-Services Organisations (Command, Control and Discipline) Act, 2023.
- Aim to enhance effective command, control, and functioning of Inter-Services Organisations (ISOs), promoting greater jointness among the Indian Armed Forces.
- Purpose:
 - Strengthen coordination and integration between the Army, Navy, and Air Force within ISOs.
 - > Ensure efficient administration and discipline.
 - Avoid duplication in disciplinary proceedings and enable swift resolution.
- Key Provisions:
 - > Disciplinary and Administrative Powers:
 - Commander-in-Chief (CiC) of a Joint Services Command (JSC),
 - Officer-in-Command (OiC) of an Inter-Service Establishment,
 - Commanding Officer (CO) of an Inter-Services Unit,
 - All hold full disciplinary and administrative authority over personnel attached to their respective ISOs.
 - Residuary Powers: Any matters not explicitly covered under the powers of CiC, OiC, or CO shall be referred to the Central Government.
 - Constitution of ISOs:
 - The Central Government can constitute ISOs headed by a CiC or OiC.
 - These organisations comprise personnel from at least two of the three services: Army, Navy, and Air Force.

- Superintendence:
 - The Central Government maintains overall superintendence over ISOs.
 - It can issue directives based on national security, general administration, or public interest.
- Role of Commanding Officer (CO): The CO commands a unit, ship, or establishment within the ISO framework.

KATCHATHEEVU ISLAND DISPUTE

Context

Tamil Nadu Chief Minister M.K. Stalin stressed that reclaiming **Katchatheevu Island** is essential to permanently resolve the hardships faced by the state's fishermen. He highlighted various welfare initiatives and urged the Union Government to facilitate the release of fishermen arrested in Sri Lankan waters.

About Katchatheevu

- Katchatheevu is a 285-acre uninhabited island located in the **Palk Strait** between India and Sri Lanka.
- Geographical coordinates:
 - Approximately 33 kilometers northeast of Rameswaram (India).
 - Approximately 62 kilometers southwest of Jaffna (Sri Lanka).
- The island is unsuitable for permanent habitation due to the absence of potable water.
- The only permanent structure on the island is St. Anthony's Church, an early 20th-century Catholic shrine, where annual festivals are conducted by Indian and Sri Lankan priests.

• Historical Context

- ► The island is believed to have been formed by volcanic activity in the 14th century.
- Historically, it was under the jurisdiction of the Jaffna Kingdom (Sri Lanka) and later came under the control of the Ramnad Zamindari, administered by the Nayak dynasty of Madurai (India).
- During British colonial rule, it was administered as part of the Madras Presidency.

Legal and Diplomatic Developments

- ► 1974: Under the Indo-Sri Lankan Maritime Boundary Agreement, India formally recognized Sri Lanka's sovereignty over Katchatheevu.
- ► 1976: A subsequent agreement restricted fishing in each other's Exclusive Economic Zones (EEZs), with Katchatheevu located near the maritime boundary, leading to ambiguity over fishing rights.
- The 1974 agreement allowed Indian fishermen to access the island for non-commercial purposes, such as resting,

drying nets, and attending religious festivals, but did not explicitly permit fishing.



United Nations Convention on the Law of the Sea (UNCLOS), 1982

- UNCLOS is an international treaty that establishes a comprehensive legal framework governing marine and maritime activities.
- It is commonly known as the Law of the Sea.
- The convention defines state jurisdiction and rights over maritime zones, providing differentiated legal status to each zone.
- It serves as the primary framework for coastal state governance of offshore areas and regulates navigation and marine resource management.
- Although widely ratified, UNCLOS interpretations remain contested in certain regions, notably the South China Sea and East China Sea.

UPSC PYQ

Q: With reference to the United Nations Convention on the Law of the Sea, consider the following statements:

- (1) A coastal state has the right to establish the breadth of its territorial sea up to a limit not exceeding 12 nautical miles, measured from baselines determined in accordance with the convention.
- (2) Ships of all states, whether coastal or landlocked, enjoy the right of innocent passage through the territorial sea.
- (3) The Exclusive Economic Zone shall not extend beyond 200 nautical miles from the baseline from which the breadth of the territorial sea is measured.

Which of the statements given above are correct?

(b) 2 and 3 only

(a) 1 and 2 only

(c) 1 and 3 only (d) 1, 2 and 3

SHORT SELLING

Context

The Securities and Exchange Board of India (SEBI) has proposed significant changes to India's short-selling

framework, including allowing short-selling for all stocks (except those in the trade-to-trade segment), eliminating mandatory disclosure requirements, and modifying enforcement norms related to settlement failures.

Short Selling:

- Short selling is a trading strategy where an investor borrows a stock, sells it on the market, and buys it back later at a lower price to return it, profiting from the price decline.
- It's a mechanism for price discovery and allows hedging and speculation.
- Current Framework in India (as per SEBI rules):
 - It is allowed only in stocks listed in the Futures and Options (F&O) segment.
 - Naked short selling (without borrowing shares) is prohibited.
 - Institutional investors must disclose short sales upfront.
 - Retail investors must disclose by end of the trading day.
 - The settlement failures result in penalties (0.05% of the shortage value).
 - Exchanges publish weekly short-sale data scripwise.

Key Proposed Changes by SEBI (2025 Draft Proposal):

- Wider Scope: It allows short-selling in all stocks except T2T (Trade-to-Trade) segment stocks, expanding the universe for short-sale strategies.
- It eliminates mandatory disclosures of short sales by both institutional and retail investors.
- Stock exchanges will no longer need to enforce delivery failure penalties once direct payout mechanisms to investors are fully implemented.
- Non-Short-Sale Clarification: Securities purchased in earlier settlements but pending delivery in demat will not be treated as short sales.

ГАСТ ВОХ

- Naked Short Selling: Selling a stock without actually borrowing it—prohibited in India.
- T2T Segment: Trade-to-Trade stocks must be settled on a delivery basis only; no intra-day trading or short selling is allowed.
- **Settlement Cycle**: Currently T+1 in India (trade date plus one working day).
- SEBI's Role: Regulates capital markets; responsible for fair practices, investor protection, and market efficiency.

UPSC PYQ

Q: In the context of Indian economy, non-financial debt includes which of the following? (2020)

- (4) Housing loans owed by households
- (5) Amounts outstanding on credit cards
- (6) Treasury bills

Select the correct answer using the code given below:

- (a) 1 only
- (b) 1 and 2 only
- (c) 3 only
- (d) 1, 2 and 3

BHARAT FORECAST SYSTEM (BFS)

Context

India is poised to become the first nation to operationalize a fully indigenous high-resolution global weather forecasting system—**Bharat Forecast System (BFS)**—developed by **IITM, Pune**. Operating at a **6-km resolution**, BFS enhances prediction accuracy for **cyclones, extreme rainfall**, and **localized disasters**, surpassing the existing 12-km model.

Bharat Forecast System (BFS):

- It is developed by Indian Institute of Tropical Meteorology (IITM), Pune.
- It operates at a 6-kilometre resolution globally (particularly across the tropical belt: 30°N to 30°S).
- It is known also as the High-Resolution Global Forecast Model (HGFM).
- It marks **India's self-reliance** in numerical weather prediction, with **no foreign dependency**.
- It will **replace the current 12-km GFS model** used by India.
- Features and Benefits:
 - It enhances prediction of cyclone tracks, landfall intensity, extreme rainfall, and weather extremes.
 - It is capable of providing sub-block level forecasts, which are useful for localised disaster response.
 - It open-access system—freely available to researchers and global meteorological institutions.
 - It is built using scientific capacity entirely within India, with informal collaboration with ECMWF.
- Institutional Involvement: It is developed by IITM, under the Ministry of Earth Sciences (MoES). It is supported by India Meteorological Department (IMD) for integration into operational forecasting.

GOOGLE'S AI MATRYOSHKA STRATEGY

Context

Google introduced a **"Matryoshka" AI strategy** that integrates foundational AI models into all its platforms and services.

What is AI Matryoshka?

- Al Matryoshka is Google's Al-first restructuring strategy, unveiled at the Google I/O Developers Conference 2025.
- It is named after the Russian nested Matryoshka dolls, symbolizing the layered integration of artificial intelligence across all levels of Google's technology ecosystem—from infrastructure to end-user applications.
- Significance:
 - This architecture represents a paradigm shift in how AI is embedded:
 - ➤ Al is no longer an add-on; it is the core brain behind all tools and services.
 - It reflects a move toward agentic Al—systems that can autonomously reason, decide, and interact in real-time with users, developers, and enterprises.

GENE-EDITED SHEEP IN INDIA

Context

India's **first gene-edited sheep** was developed by SKUAST-Kashmir using **CRISPR-Cas9 technology, targeting** the *myostatin* **gene** to enhance muscle mass by 30%. As no foreign DNA was introduced, the sheep is non-transgenic and aligns with India's evolving biotech regulatory norms.

What is Gene Editing and How is it Different from Genetic Modification?

- Gene editing, especially using CRISPR-Cas9 (Clustered Regularly Interspaced Short Palindromic Repeats), allows scientists to precisely modify the DNA within an organism without introducing foreign DNA.
- This makes gene-edited organisms non-transgenic, unlike genetically modified (GM) organisms that involve the insertion of external genes (often from other species).
- The **gene-edited sheep does not contain any foreign DNA**, making it eligible for faster regulatory approval under India's emerging biotech policy framework.
- What Was Edited? The Myostatin Gene
 - The myostatin gene (MSTN) is a natural inhibitor of muscle growth in mammals.
 - In this sheep, the gene was disrupted (knocked out) using CRISPR-Cas9, which resulted in 30% more muscle mass compared to normal sheep.
 - This gene mutation is naturally present in some European breeds like Texel but absent in Indian breeds.

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 Result: The gene-edited lamb, while weighing the same at birth, became 100 grams heavier than a non-edited lamb by three months of age, indicating better meat yield without compromising on wool production.

Regulatory Considerations

 India is in the process of revising its biotech regulatory framework to differentiate between transgenic GMOs and gene-edited organisms.

Gene-Edited vs GM Livestock			
Feature	Gene-Edited (CRISPR)	Genetically Modified (GM)	
DNA Source	No foreign DNA	Involves foreign DNA	
Regulation	Likely lighter	Heavily regulated	
Time to Approval	Shorter	Longer due to safety concerns	
Public Acceptance	Moderately better	Controversial	
Example in India	This gene- edited sheep	Bt Brinjal (GM, yet not approved)	

- In 2022, the Environment Ministry exempted certain types of gene-edited crops (SDN-1 and SDN-2) from stringent GMO rules, hinting at similar changes for livestock.
- Global Context: USA, China, and the EU are already experimenting with gene-edited livestock for traits like disease resistance, leaner meat, and environmental adaptability.
- In 2021, the US FDA approved the first gene-edited pigs for food and medical use.
- India's breakthrough reflects its ambition to be globally competitive in precision agriculture and biotech innovation.

UPSC PYQ

- Q: With reference to the recent developments in science, which one of the following statements is not correct? (2020)
 - (a) Functional chromosomes can be created by joining segments of DNA taken from cells of different species.
 - (b) Pieces of artificial functional DNA can be created in laboratories.
 - (c) A piece of DNA taken out from an animal cell can be made to replicate outside a living cell in a laboratory.
 - (d) Cells taken out from plants and animals can be made to undergo cell division in laboratory petri dishes.

NATURE STUDY SOLVES 160-YEAR-OLD GENETIC PUZZLE OF MENDEL'S PEA TRAITS

Context

A landmark 2025 study published in *Nature* has identified the genetic basis of all seven traits studied by Gregor Mendel in pea plants, including the last unresolved ones—pod colour, pod shape, and flower position. Using advanced genomic tools, the discovery resolves a 160-year-old mystery and opens new avenues for crop improvement and sustainable agriculture

Historical Background:

- Gregor Mendel, an Austrian monk, conducted experiments on Pisum sativum (pea plant) and discovered seven discrete traits, establishing the Laws of Inheritance:
 - ► Law of Segregation
 - Law of Independent Assortment
 - Law of Dominance
- His work, published in 1866, was ignored until rediscovered in 1900 by Hugo de Vries, Carl Correns, and Erich von Tschermak.

Seven Traits Studied by Mendel:

Trait	Dominant	Recessive
Seed Shape	Round	Wrinkled
Seed Colour	Yellow	Green
Flower Colour	Purple	White
Pod Shape	Inflated	Constricted
Pod Colour	Green	Yellow
Flower Position	Axial	Terminal
Plant Height	Tall	Dwarf

2025 Scientific Breakthrough:

• Key Unresolved Traits Now Decoded:

- > Pod Colour: Linked to deletions near the ChIG gene.
- ► **Pod Shape** and **Flower Position**: Associated with complex genetic regions and modifier loci.
- Technologies Used:
 - Sequencing of 60 terabases of DNA across 697 pea accessions.
 - Use of Genome-Wide Association Studies (GWAS) and Transcriptome Analysis.

TR1 CELLS AND MALARIA

Context

A recent study in *Science Immunology* has revealed that **TR1 cells**, a subtype of CD4+ T-helper cells, play a dominant role in the immune response to **malaria**, challenging the previous belief that **TH1 cells** were the primary responders. This discovery could lead to new approaches for developing vaccines and therapies for malaria and other challenging infections.

TR1 Cells

- TR1 Cells (Type-1 Regulatory T cells) are a subset of CD4+ T cells known for their immunosuppressive functions, primarily mediated by the secretion of IL-10 (Interleukin-10).
- These cells are important for tolerogenic immune responses, maintaining immune homeostasis, and preventing excessive inflammation.
- However, TR1 cells are present in low frequencies in peripheral blood (~1-10% of memory CD4+ T cells), making their ex vivo isolation and expansion a challenging task.

Clinical Applications & Preclinical Models:

- Tolerogenic TR1 Cell Therapy (T-allo10):
 - A clinical-grade product called T-allo10 has been developed by co-culturing allo-HSCT (Allogeneic

Hematopoietic Stem Cell Transplantation) donor **CD4+ T cells** with **DC-10 cells** from the transplant recipient.

- This therapy aims to prevent Graft-versus-Host
 Disease (GvHD) by promoting alloantigen-specific tolerance.
- T-allo10 is currently undergoing Phase I clinical trials to assess its potential in preventing graft rejection and promoting immune tolerance in transplant patients.

Applications in Clinical Settings

• Preventing GvHD:

- Graft-versus-Host Disease (GvHD) is a major complication in allogeneic stem cell transplantation. TR1-enriched cell therapy can induce immune tolerance and prevent GvHD.
- T-allo10 Cells: Co-culture of recipient monocytederived DCs with donor CD4+ T cells has shown promising results in preventing GvHD in preclinical studies.
- Anti-Leukemia Therapy:
 - TR1-like CD4IL-10 cells have been tested for anti-leukemia effects, particularly in AML patients undergoing allo-HSCT. The engineered cells target leukemia cells while maintaining immune tolerance.



