JULY 2025

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CURRENT AFFAIRS MAGAZINE

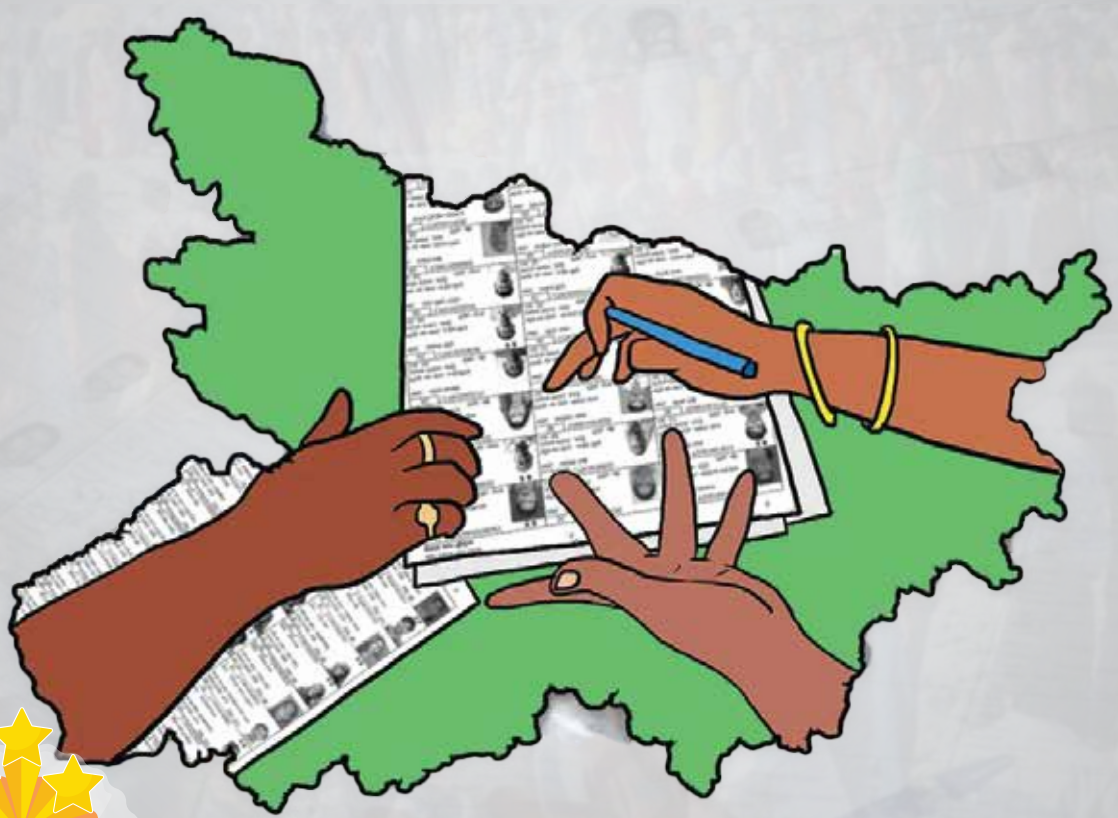
SPECIAL INTENSIVE REVISION

MANASAROVAR YATRA

JARAWA TRIBE

GENOME SEQUENCING

ADEETIE SCHEME



TOPPER'S RECOMMENDED
BEST CHOICE

Contents

PRELIMS

POLITY & GOVERNANCE

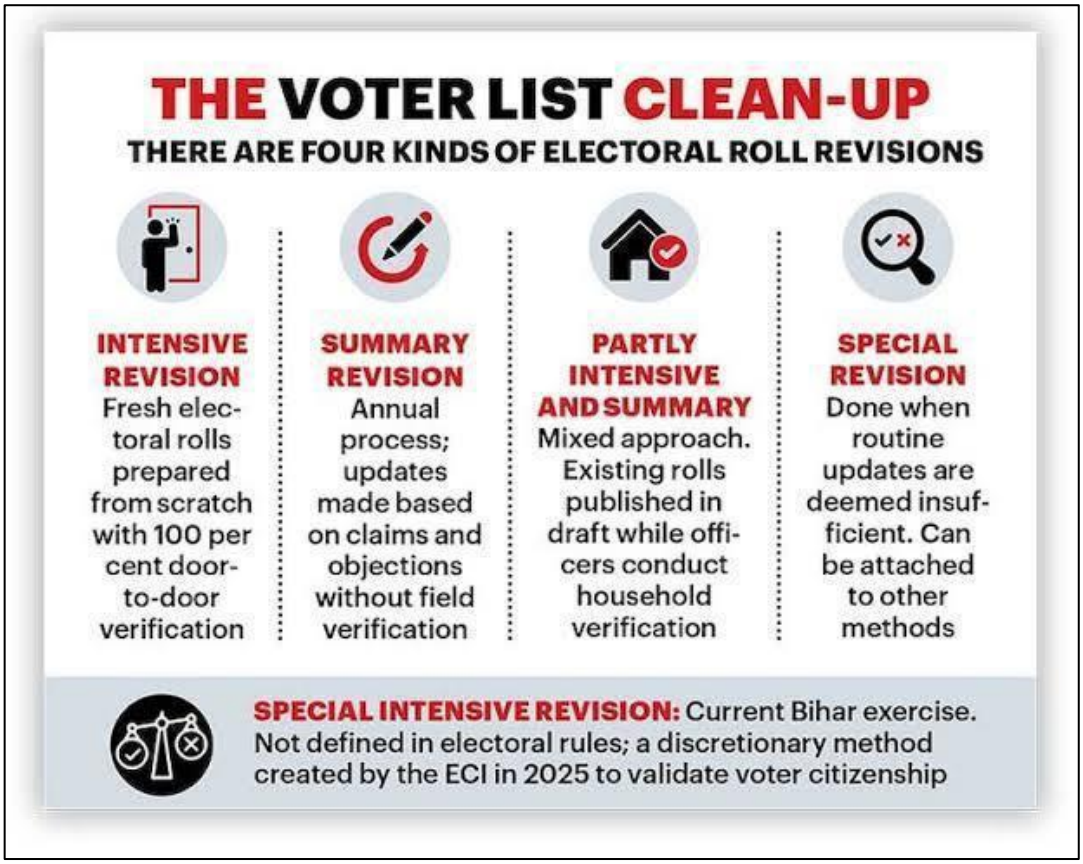
SPECIAL INTENSIVE REVISION

Context:

- The Election Commission of India (ECI) announced that more than 74% of the electors in Bihar have submitted their Enumeration Forms as part of the ongoing Special Intensive Revision (SIR) of Electoral Rolls in the State.

About Special Intensive Revision (SIR):

- A Special Intensive Revision involves door-to-door verification of electoral rolls through house-to-house enumeration.
- Conducted under Section 21(3) of the Representation of the People Act, 1950, and Article 324 of the Constitution, empowering ECI for electoral roll supervision.
- It ensures that the voter list is accurate, inclusive, and free from discrepancies by allowing new registrations, deletions, and modifications.
- Under the process, voters, especially those enrolled after 2003, must now submit documents like birth certificates or parents' proof. And, Electoral Registration Officers will decide on inclusion/deletion, with powers to refer doubtful cases under Citizenship Act, 1955.
- The Supreme Court in the Mohinder Singh Gill v. The Chief Election Commissioner Case, 1977 upheld the ECI's broad powers under Article 324 to ensure free and fair elections, including ordering re-polls if needed, and emphasized that judicial review is restricted during elections as per Article 329(b).



SESSIONS OF THE PARLIAMENT

Context:

- Ahead of the Monsoon session of Parliament, Congress Parliamentary Party chairperson has convened a meeting of the party's top leadership.

Sessions of the Parliament:

- The summoning of Parliament is specified in Article 85 of the Constitution.
- The power to convene a session of Parliament rests with the Government. The decision is taken by the Cabinet Committee on Parliamentary Affairs which is formalised by the President, in whose name MPs are summoned to meet for a session.
- The maximum gap between two sessions of Parliament cannot be more than six months. Thus, the Parliament should meet at least twice a year.
- India does not have a fixed parliamentary calendar. By convention (i.e. not provided by the Constitution), Parliament meets for three sessions in a year.
    - The Budget Session is the longest and most important session of the Parliament. The primary focus of the Budget Session is the presentation, discussion, and passing of the Union Budget, which outlines the government's revenue and expenditure plans for the upcoming fiscal year.
    - The name "Monsoon Session" derives from the fact that it coincides with the Monsoon Season (Seasonal Rains) in India. The Monsoon Session is generally held from July to September.
    - Similar to the Monsoon Session, the primary objective of the Winter Session is to transact legislative business and prioritize urgent matters and bills. The Winter Session is generally held from November to December.

NATIONAL MEDICAL COMMISSION

Context:

- The Union Cabinet has appointed Abhijat Sheth as the new Chairperson of the National Medical Commission (NMC), replacing Suresh Gangadhar, who stepped down due to health concerns.

About National Medical Commission (NMC):

- The NMC has been constituted by an act of Parliament known as National Medical Commission Act, 2019.
- It replaced the Medical Council of India (MCI) which had been the regulatory body for medical education and practice in India since 1934.
- The headquarters of the National Medical Commission is located in New Delhi.
- Committed to upholding the highest standards in healthcare education, NMC ensures the delivery of quality medical education and training across the nation.
- It consists of 33 members, including the Chairperson (who must be a medical professional), 10 ex-officio members, and 22 part-time members.

APPOINTMENT AND TRANSFERS OF HC JUDGES

Context:

- The Union government recently cleared the transfers and appointments of Chief Justices and judges of several High Courts across the country.

About appointment of judges in HCs and SC:

- Constitutional provision: The Judges of the Supreme Court are appointed by the President under clause (2) of Article 124 of the Constitution.

- Convention: Judges of the higher judiciary are appointed through the collegium system. The term "collegium" is not mentioned in the Indian Constitution but has been established through judicial pronouncements.
- Salaries and allowances: Salaries, allowances, privileges, leave, and pension of Supreme Court judges are determined by Parliament. The Salaries, Pension, and Allowances of the Supreme Court Judges are charged upon the Consolidated Fund of India.
- Post-retirement Restrictions: After retirement, a judge of the Supreme Court is prohibited from practicing law in any court in India or pleading before any government authority.

Evolution of Collegium System:

- First Judges Case (1981):
  - It declared that the “primacy” of the CJI’s (Chief Justice of India) recommendation on judicial appointments and transfers can be refused for “cogent reasons.”
- Second Judges Case (1993):
  - It introduced the Collegium system, holding that “consultation” really meant “concurrence”. It added that it was not the CJI's individual opinion, but an institutional opinion formed in consultation with the two senior-most judges in the Supreme Court.
- Third Judges Case (1998):
  - SC on the President's reference (Article 143) expanded the Collegium to a five-member body, comprising the CJI and four of his senior-most colleagues.

ATTENDANCE SYSTEM OF MGNREGS

Context:

- Years after making the digital attendance system for the MGNREGS workers mandatory, the Union government has discovered that the National Mobile Monitoring System (NMMS) platform is being misused using the gaps in the system.

About MGNREGA (Mahatma Gandhi National Rural Employment Guarantee Act):

- Launch: It is one of the largest work guarantee programmes in the world launched in 2005 by the Ministry of Rural development.
- Objective: To guarantee 100 days of employment in every financial year to adult members of any rural household willing to do unskilled manual work.
- Other requirements: At least one-third of beneficiaries have to be women. Wages must be paid according to the statutory minimum wages specified for agricultural labourers in the state under the Minimum Wages Act, 1948.
- Step towards Right to work: Guarantees any rural adult to get work within 15 days of demanding it, failing which an 'unemployment allowance' must be given.
- Role of Gram Sabha: The Act mandates Gram sabhas to recommend the works that are to be undertaken and at least 50% of the works must be executed by them.

UNIQUE IDENTIFICATION AUTHORITY OF INDIA (UIDAI)

Context:

- The Unique Identification Authority of India (UIDAI) urged people to update the biometric details of children aged between five and seven. "The fingerprints and iris biometrics of a child are not captured for Aadhaar enrolment below the age of five because these are not mature at that age," the UIDAI said in a statement.

About UIDAI:

- Establishment: The UIDAI is a statutory authority established on 12th July 2016 by the Government of India under the jurisdiction of the Ministry of Electronics and Information Technology, following the provisions of the Aadhaar Act 2016.
- Mandate: The UIDAI is mandated to assign a 12-digit unique identification (UID) number (Aadhaar) to all the residents of India.
- Features: The number is linked to the resident's basic demographic and biometric information such as a photograph, ten fingerprints, and two iris scans, which are stored in a centralised database.
- Functions: The implementation of the UID scheme entails the generation and assignment of UIDs to residents; defining mechanisms and processes for interlinking UIDs with partner databases; operation and management of all stages of the UID life cycle; framing policies and procedures for updating mechanism and defining usage and applicability of UIDs for delivery of various services, among others.

INSURANCE REGULATORY AND DEVELOPMENT AUTHORITY OF INDIA (IRDAI)

Context:

- The Insurance Regulatory and Development Authority of India (IRDAI) has constituted panels of its whole-time members to decide on the violations by certain insurers/insurance intermediaries. The move is part of the enforcement function, specifically to decide on the violations of the provisions of the Insurance Act and regulations.

About IRDAI:

- Origin: It was founded in 1999 based on recommendations of Malhotra Committee.
- Objective: It was created as a regulatory body with the aim of protecting the interests of insurance customers.
- Jurisdiction: It is a statutory body under the IRDA Act 1999 and is under the jurisdiction of Ministry of Finance.
- Source of powers: The powers and functions of the Authority are laid down in the IRDAI Act, 1999 and Insurance Act, 1938.

Major Initiatives by IRDAI:

- Bima Sugam: An online insurance marketplace for buying, selling, and servicing insurance policies as well as settling claims. It is a part of IRDAI's Bima Trinity - Bima Vistaar, Bima Vahak, and Bima Sugam.
- Saral Jeevan Bima: Provides basic protection to self-employed individuals or people in low-income groups.
- Integrated Grievance Management System: To create a central repository of grievances across the country and provides for various analyses of data indicative of areas of concern to the insurance policyholder.

UAPA

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ENFORCEMENT DIRECTORATE (ED)

Context:

- The Supreme Court of India strongly criticized the Enforcement Directorate (ED) for misusing its powers to pursue political battles.

About Enforcement Directorate (ED):

- Enforces the following laws:
  - Prevention of Money Laundering Act (PMLA), 2002
  - Foreign Exchange Management Act (FEMA), 1999

- Fugitive Economic Offenders Act, 2018
- Main Objectives:
  - Investigate cases of money laundering, foreign exchange violations, and financial fraud.
  - Attach and confiscate properties derived from illegal means.
  - Prosecute offenders in special courts under PMLA.
- Powers:
  - Conduct search and seizure, arrest, and summon individuals.
  - Attach proceeds of crime.
  - File prosecution complaints (charge sheets) under PMLA.

VICE-PRESIDENT OF INDIA

Context:

- Recently, Vice President Jagdeep Dhankhar resigned, citing health reasons. His resignation, effective immediately under Article 67(a) of the Constitution.

About Vice President of India:

- Constitutional Position:
  - The Vice President of India is the second-highest constitutional office in the country.
  - Defined under Articles 63 to 71 of the Constitution.
- Eligibility Criteria:
  - Must be an Indian citizen,
  - At least 35 years old,
  - Qualified to be a member of the Rajya Sabha,
  - Must not hold any office of profit under the Government.
- Key Functions:
  - Ex officio Chairperson of the Rajya Sabha (Council of States).
  - Acts as President of India in case of vacancy (due to death, resignation, removal, or absence) until a new President is elected (for a maximum of 6 months).
  - Does not perform executive functions unless acting as President.
- Election Process:
  - Elected by an electoral college consisting of members of both Lok Sabha and Rajya Sabha (including nominated members).
  - Voting method: Proportional representation by means of a single transferable vote and secret ballot.
  - No separate state-level representation (unlike Presidential election).
- Term and Vacancy:
  - Term: 5 years, but continues until successor takes office.
  - Can resign (under Article 67) by writing to the President.
  - In case of resignation or vacancy, Article 91 allows the Deputy Chairperson of Rajya Sabha to perform duties as presiding officer.
- Some Notable Facts:
  - The Vice President is not subordinate to the President but has a distinct role.
  - India's first Vice President was Dr. S. Radhakrishnan.
  - The Vice President can be removed by a resolution of the Rajya Sabha passed by an absolute majority and agreed to by the Lok Sabha.

INTERNATIONAL RELATIONS

WILMINGTON DECLARATION

Context:

- Quad nations—India, Japan, the United States, and Australia launched their first-ever 'Quad-at-Sea Ship Observer Mission' to enhance maritime cooperation in the Indo-Pacific. The initiative was formalized under the Wilmington Declaration during the Quad Leaders' Summit in Delaware.

About Wilmington Declaration:

- Issued by: QUAD leaders in Wilmington, USA in 2024
- Objective: It reaffirms commitment to a free, open, inclusive, and resilient Indo-Pacific, respecting rule of law, democracy, and territorial integrity.
- Other Key Initiatives Launched:
    - Quad Cancer Moonshot (focus: cervical cancer)
    - MAITRI – Maritime training in the Indo-Pacific
    - Ports of the Future Partnership for support for digital infrastructure, including undersea cables

About QUAD (Quadrilateral Security Dialogue):

- Membership: It is a strategic forum comprising India, the United States, Japan, and Australia.
- Objective: It is aimed at promoting a free, open, inclusive, and rules-based Indo-Pacific region.
- Evolution:
    - Initiated in 2007 by Japanese PM Shinzo Abe, with support from India, the US, and Australia.
    - Revived in 2017, amidst growing concerns over China's assertiveness in the Indo-Pacific.
    - Elevated to the leader-level summit format in 2021, highlighting its growing importance.

17TH BRICS SUMMIT

Context:

- The majority of the world's population is not properly represented in key global institutions, Prime Minister Narendra Modi said on Sunday, addressing fellow leaders of emerging nations at the BRICS summit in Rio De Janeiro.

About 17th BRICS Summit (2025):

- Place of summit: It was held in Rio de Janeiro, Brazil.
- Theme: Reforming Global Governance for a Multipolar World
- Key highlights of the summit:
    - Attended by leaders of Brazil, Russia, India, China, South Africa, and new members: Egypt, Ethiopia, Iran, UAE, and Indonesia.
    - Prime Minister Narendra Modi called for greater representation of the Global South in global institutions and urgent reforms in the UNSC, WTO, and international financial institutions
    - Reaffirmed commitment to inclusive multilateralism
    - Emphasized South-South cooperation and reforms in global governance architecture

About BRICS:

- Nomenclature: The acronym 'BRIC' was coined by British economist Jim O'Neill in 2001 to represent the emerging economies of Brazil, Russia, India, and China.
- Evolution: BRIC became BRICS with the inclusion of South Africa in 2010. In 2024, Iran, the United Arab Emirates (UAE), Egypt, and Ethiopia joined the group while Indonesia joined in 2025.
- Significance: BRICS accounts for about 45% of the world's population and 37.3% of global GDP, surpassing the EU's 14.5% and the G7's 29.3%.
- Key Initiatives of BRICS: New Development Bank (2014), Contingent Reserve Arrangement (CRA), BRICS Grain Exchange, BRICS Rapid Information Security Channel, STI Framework Programme (2015) etc.

GRAND COLLAR OF THE NATIONAL ORDER OF THE SOUTHERN CROSS

Context:

- On July 8, 2025, Prime Minister Narendra Modi was awarded the Grand Collar of the National Order of the Southern Cross, Brazil's highest national honour for foreign dignitaries.

About Grand Collar of the National Order of the Southern Cross:

- The Order of the Southern Cross was established in 1822 by Emperor Pedro I to commemorate Brazil's independence and coronation.
- It is awarded to foreign nationals for exceptional service to Brazil.
- It is the highest rank within the order and is conferred by presidential decree.
- It was re-established in 1932 by President Getúlio Vargas as a republican order to honor foreign heads of state and global leaders.
- It symbolizes Brazil's diplomatic goodwill, especially towards Global South.

SHANGHAI COOPERATION ORGANISATION

Context:

- The Pahalgam terrorist attack of April 22 was carried out to hurt the Jammu and Kashmir economy and to "sow a religious divide", External Affairs Minister S. Jaishankar told the Shanghai Cooperation Organisation's (SCO) Council of Foreign Ministers (SCO-CFM) meeting in China.

About Shanghai Cooperation Organisation (SCO)

- Evolution: The SCO originated from the "Shanghai Five," formed in 1996, consisting of China, Russia, Kazakhstan, Kyrgyzstan, and Tajikistan. It was established on 15th June 2001, in Shanghai, adding Uzbekistan as a sixth member.
- Members: The current SCO members include India, China, Russia, Pakistan, Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan, Iran, and Belarus. India and Pakistan both officially joined the Shanghai Cooperation Organisation (SCO) as full members in 2017.
- Headquarter: The Organization's secretariat or headquarter is located in Beijing, China.
- Decision making: It operates on a consensus-based decision-making system, where all members must agree for any resolution to pass. This mechanism, while ensuring inclusivity, can also lead to diplomatic deadlocks when national interests clash.
- Significance: It is one of the few international organisations focused on security issues and primarily consists of Asian members.
- Contribution: It is the world's largest regional organization in terms of geographic scope and population, covering approximately 24% of the world's total area (65% of Eurasia) and 42% of the world population. The member countries contribute approximately over USD 23 trillion to global GDP.

About Regional Anti-Terrorist Structure (RATS):

- Nature: It is a permanent body of the SCO and is intended to facilitate coordination and interaction between the SCO member states in the fight against terrorism, extremism and separatism.
- Functions: The main functions of SCO-RATS are coordination and information sharing.
- India's role: India is a member of the SCO and actively participates in RATS activities, including holding its chairmanship in 2021.

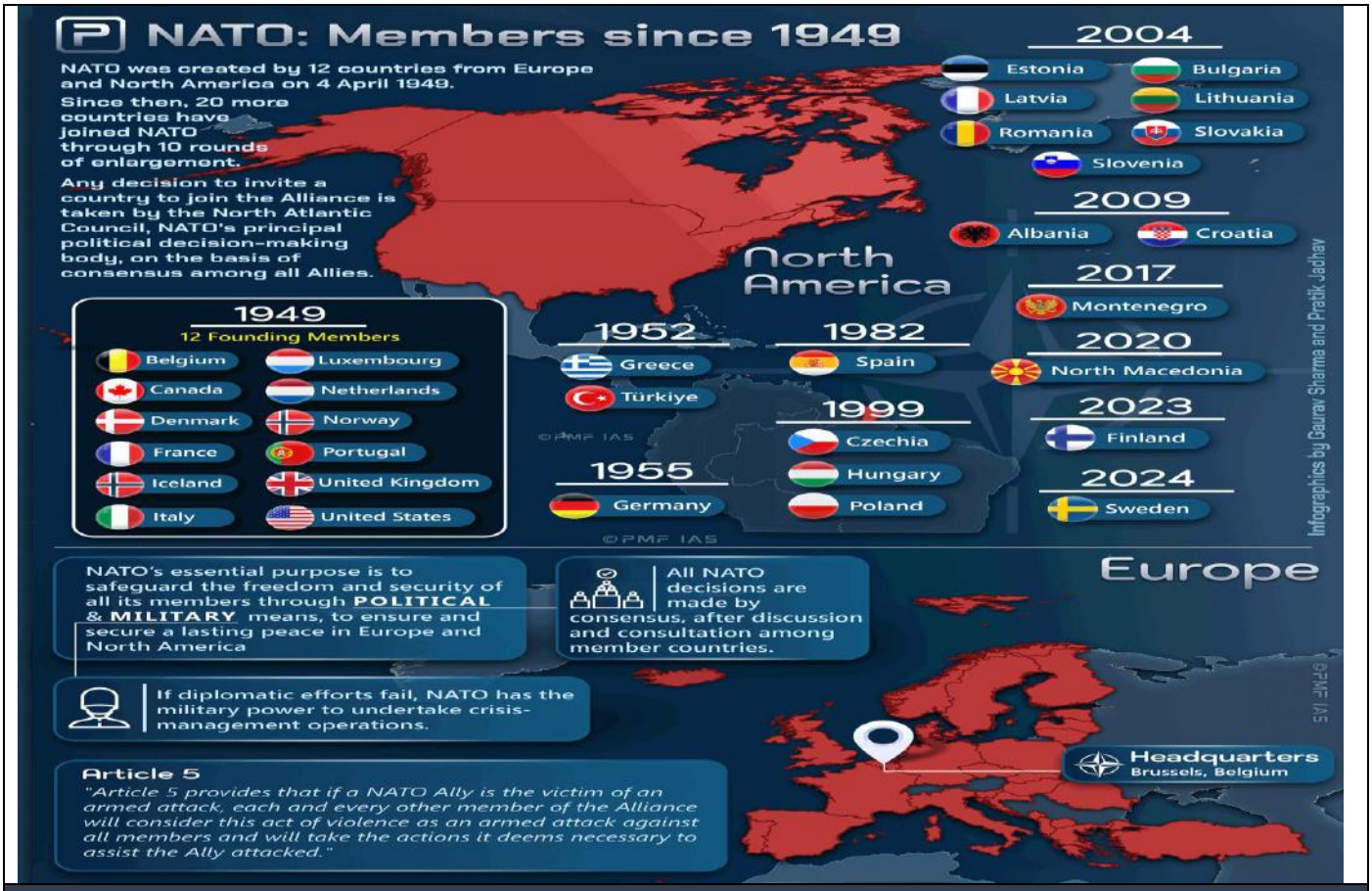
NORTH ATLANTIC TREATY ORGANISATION (NATO)

Context:

- NATO Secretary General Mark Rutte warned on Wednesday that countries such as Brazil, China and India could be hit very hard by secondary sanctions if they continued to do business with Russia.

About NATO:

- Establishment: It was established on April 4, 1949, with the signing of the North Atlantic Treaty in Washington, D.C. by 12 founding member countries from Europe and North America.
- Objective: It was established with the primary goal of providing collective defence against potential aggression, particularly from the Soviet Union during the Cold War era. Over the years, NATO has evolved to address a range of security challenges beyond its original mandate.
- Article 5: NATO's primary mission is collective defence, as outlined in Article 5 of the North Atlantic Treaty. This article stipulates that an attack on one member country will be considered an attack on all, and the members will respond collectively.
- Original Members: The original 12 founding members of NATO were Belgium, Canada, Denmark, France, Iceland, Italy, Luxembourg, the Netherlands, Norway, Portugal, the United Kingdom, and the United States.
- Expansion: NATO has expanded since its founding, with new member countries joining in multiple rounds. The alliance currently consists of 32 member countries. Sweden joined NATO as the 32nd member.
- Military Command Structure: NATO's military command structure includes Strategic Commands (e.g., Allied Command Operations) responsible for operational planning and execution, as well as Regional Commands and Force Headquarters.



KAILASH MANASAROVAR YATRA

Context:

- The resumption of the Kailash Manasarovar Yatra in 2025, after a five-year gap, is seen as a key step in rebuilding India-China relations.

About Kailash Manasarovar Yatra:

- The Kailash Manasarovar Yatra is a sacred pilgrimage undertaken by Hindu, Buddhist, Jain, and Bon devotees to Mount Kailash and Lake Manasarovar, located in the Tibet Autonomous Region of China.
- The sites are revered as the abode of Lord Shiva and hold immense spiritual and cultural significance.
- Organized annually by the Government of India in collaboration with Chinese authorities.
- Traditionally conducted through two routes- Lipu Lekh Pass (Uttarakhand), and Nathula Pass (Sikkim)
- Involves high-altitude trekking, requiring medical fitness and acclimatization

Recent Developments:

- Suspended since 2020 due to the COVID-19 pandemic and India-China border tensions.
- Resumed in 2025, symbolizing a thaw in bilateral relations and a step towards confidence building.
- Welcomed by both Indian and Chinese leaders as a move to enhance cultural diplomacy, people-to-people ties, and bilateral cooperation.
- Coincides with the 75th anniversary of diplomatic relations between India and China.

UNESCO

Context:

- The U.S. will exit UNESCO by December 2026, citing ideological concerns, opposition to Palestine's membership, and alignment with its "America First" policy.

About UNESCO:

- Nature: UNESCO (United Nations Educational, Scientific and Cultural Organization) is a specialized agency of the UN, founded in 1945.
- Objective: It aims to promote peace and sustainable development through international cooperation in education, science, culture, and communication.
- Headquarters: Paris, France
- Members: 194 countries (as of 2025)
- Key Responsibilities:
    - Protects cultural heritage through the World Heritage Sites program
    - Promotes education for all, including literacy and girls' education
    - Supports scientific collaboration and freedom of expression
    - Works on ethical AI, climate education, and preservation of intangible cultural heritage
- Key Reports by UNESCO:
    - Global Education Monitoring (GEM) Report
    - State of the Education Report for India
    - World Trends in Freedom of Expression and Media Development
    - Global Report on Culture for Sustainable Development
    - UNESCO Science Report
    - Global Report on the Futures of Education
    - World Heritage Outlook (in collaboration with IUCN)
    - Internet Universality Indicators Report

INTERNATIONAL COURT OF JUSTICE (ICJ)

Context:

- In a historic decision, International Court of Justice (ICJ) in The Hague ruled that countries are obligated under international law to take action against climate change.

About International Court of Justice (ICJ):

- The International Court of Justice (ICJ) is the principal judicial organ of the United Nations (UN).
- Established in 1945 by the UN Charter and began functioning in 1946.
- Headquartered at the Peace Palace, The Hague, Netherlands.
- Functions:
    - The International Court of Justice (ICJ) is the principal judicial organ of the United Nations (UN).
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- Headquartered at the Peace Palace, The Hague, Netherlands.
- Landmark Cases:
  - Nicaragua v. United States (1986) – U.S. was found guilty of violating international law by supporting Contra rebels in Nicaragua.
  - Advisory Opinion on the Legality of the Threat or Use of Nuclear Weapons (1996).
  - Chagos Archipelago case (2019) – Ruled UK should end its administration of the Chagos Islands.
  - Climate Advisory Opinion (2025) – Ruled that failure to act on climate change can constitute an internationally wrongful act, making states liable for damages.

Comparison with other International Courts:

Court	Jurisdiction	Binding Judgments	Parties
ICJ	Legal disputes between states	Yes (for parties)	States only
ICC (International Criminal Court)	Crimes like genocide, war crimes	Yes	Individuals
PCA (Permanent Court of Arbitration)	Wider disputes (incl. investment)	Yes (via arbitration)	States, individuals, organizations

E-3 GROUP

Context:

- Iran held nuclear talks in Istanbul with diplomats from Britain, France, and Germany (E3 countries) to resolve the deadlock over its nuclear programme.

About E-3 Group:

- Composition: It refers to a group of three major European countries: France, Germany, and the United Kingdom
- Origin: The E3 format emerged during negotiations with Iran over its nuclear program in the early 2000s, even before the broader P5+1 (which includes the US, China, and Russia).
- Role: They act together to uphold the Joint Comprehensive Plan of Action (JCPOA), also known as the Iran nuclear deal.
- Focus: Nuclear non-proliferation, diplomacy, sanctions enforcement, and maintaining international agreements.
- Current Relevance: The E3 continues to engage Iran diplomatically to prevent nuclear escalation and uphold UN resolutions.

THAI AND CAMBODIAN BORDER DISPUTES

Context:

- Clashes between Thai and Cambodian forces near their disputed border have resulted in at least 11 deaths. The fighting has centered around contested areas near the ancient temples of Prasat Ta Muen Thom and Preah Vihear.

Preah Vihear Temple:

- An 11th-century Hindu temple dedicated to Lord Shiva, located on the Dangrek Mountains along the Thailand-Cambodia border.

- Built in the Khmer architectural style, it is a UNESCO World Heritage Site (since 2008).
- Known for its unique linear axial layout, symbolizing a spiritual ascent toward Mount Meru.
- Subject of a longstanding territorial dispute between Thailand and Cambodia.
- In 1962, the International Court of Justice (ICJ) awarded the temple to Cambodia, though tensions have continued.

Prasat Ta Muen Thom:

- A 9th to 11th-century Khmer-era temple, also dedicated to Shiva, located near the Thai-Cambodian border in the Surin Province (Thailand).
- Built along the ancient Khmer royal road linking Angkor with other sacred sites.
- Strategically located at a mountain pass, it features a sanctuary, laterite walls, and sacred lingas.
- Its borderline location has led to military and diplomatic tensions, with both Thailand and Cambodia claiming proximity rights.

Economy

CATASTROPHE BONDS (CAT BONDS)

Context:

- Given the increasing impact of climate change and natural disasters, it has become necessary for the Indian financial system to adopt the concept of Disaster Risk Insurance and the cat bonds can be an effective solution to deal with this situation.

About Catastrophe Bonds (Cat Bonds):

- They are financial instruments used to transfer the risk of natural disasters from insurers or governments to capital market investors.
- Governments, insurers, or reinsurers issue cat bonds to raise capital. If a specified natural disaster occurs (e.g., hurricane, earthquake, or flood) and meets predefined criteria, the bond's principal is used for claims or recovery. If no disaster occurs, investors receive their principal back with interest.
- They help distribute disaster risk globally, maintaining stable insurance premiums despite rising climate risks.
- While not replacing traditional disaster funds, they provide additional financial protection, especially for large-scale, low-frequency events.

Types of Bonds:

- Treasury Bonds (T-Bonds): Long-term bonds issued by the central government that offer fixed interest payments (considered low-risk due to backing by the government)
- Municipal Bonds: Issued by local governments or municipalities to fund projects such as schools, hospitals, or infrastructure (Interest earned is often tax-exempted)
- Sovereign Bonds: Issued by a country's government in foreign currencies or domestic currency (can carry higher risks if the issuing country faces economic instability)
- Corporate Bonds: Issued by companies to raise capital for various purposes, such as expansion or debt refinancing (typically offer higher yields than government bonds but come with increased credit risk)
- Zero-coupon Bonds: These bonds do not pay periodic interest. Instead, they are issued at a discount to their face value, and the full value is paid back at maturity. The difference between the purchase price and face value represents the bond's yield.
- Convertible Bonds: Bonds that can be converted into a specified number of shares of the issuing company's stock, usually at the bondholder's discretion. These bonds offer potential for capital appreciation along with regular interest payments.
- Foreign-currency Bonds: Bonds issued in a currency other than the issuer's domestic currency (subject to foreign exchange risk, where the bond's value may fluctuate due to changes in exchange rates)

ANTI-DUMPING DUTY

Context:

- India imposed or extended anti-dumping duties on various goods and over 60% of actions target Chinese imports.

Various types of duties:

- Customs Duty
  - Definition: General term for duties levied on goods when they are transported across international borders.
  - Includes: Basic Customs Duty, Countervailing Duty, Safeguard Duty, etc.
- Basic Customs Duty (BCD)
  - Imposed on: All imported goods.
  - Purpose: To protect domestic industries and generate revenue.
  - Rates: Vary depending on product category and trade agreements.
- Countervailing Duty (CVD)
  - Imposed when: A foreign country subsidizes its exports, making them cheaper.
  - Objective: Neutralize the unfair advantage and protect domestic producers.
  - Legal Basis: WTO Agreement on Subsidies and Countervailing Measures.
- Anti-Dumping Duty
  - Imposed when: Foreign goods are sold in India at a price lower than their domestic price (dumping).
  - Purpose: Protect Indian industry from predatory pricing.
  - Authority: Directorate General of Trade Remedies (DGTR).

ADEETIE SCHEME

Context:

- Launched on 15 July 2025 by the Union Minister for Power, the ADEETIE (Assistance in Deploying Energy Efficient Technologies in Industries & Establishments) scheme aims to accelerate energy-efficient technology adoption in MSMEs across India. It is implemented by the Bureau of Energy Efficiency (BEE).

About ADEETIE Scheme:

- Total Outlay: ₹1,000 crore
- Duration: FY 2025–26 to 2027–28
- Interest Subvention: 5% for Micro/Small, 3% for Medium Enterprises
- Key Objectives
  - Reduce MSME energy consumption by 30–50%
  - Promote green technologies and improve energy productivity
  - Contribute to India’s climate goals: 45% emission intensity reduction by 2030, Net Zero by 2070
- Investment Mobilization: Expected ₹9,000 crore, including ₹6,750 crore in MSME loans
- Coverage & Support:
  - Targets 14 energy-intensive sectors (e.g. steel, textiles, food processing)
  - Covers 60 industrial clusters initially, followed by 100 more
  - Offers: interest subsidies, energy audits, DPR preparation, tech identification, and implementation support
  - Dedicated portal launched: adeetie.beeindia.gov.in

CRYPTOCURRENCY

Context:

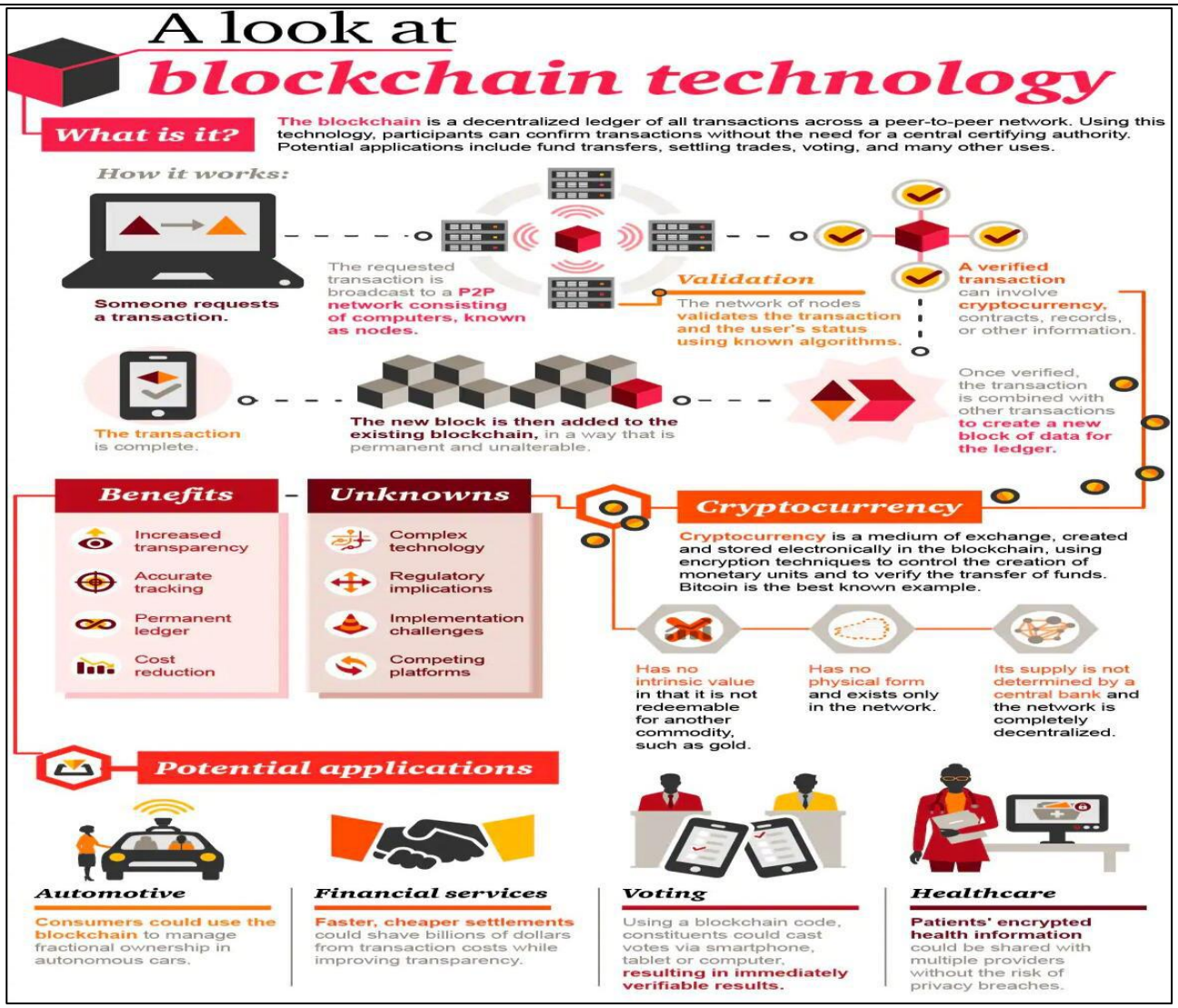
- CoinDCX, one of India's largest cryptocurrency exchanges, suffered a major security breach suffering a loss of approximately ₹378 crore ($44.2 million).

About Cryptocurrencies:

- Cryptocurrencies are digital or virtual currencies that use cryptography for security and operate on decentralized blockchain networks. They serve different purposes, from being digital money to powering decentralized applications.
- Transactions with cryptocurrency are recorded on a public digital ledger called blockchain.
- This ledger is maintained by a network of computers around the world, and each new transaction is verified and added to the blockchain by these computers.
- To use cryptocurrency, individuals or businesses must first acquire a digital wallet, which is a software program that stores the user's public and private keys.
- Users can acquire cryptocurrency through a process called "mining" which involves using computer power to solve complex mathematical equations, which validate and record transactions on the blockchain, in return for a certain amount of cryptocurrency.

Types of Cryptocurrencies:

- Payment Currencies
  - Purpose: Designed as a medium of exchange.
  - Example: Bitcoin (BTC), Litecoin (LTC), Bitcoin Cash (BCH)
  - Use case: Peer-to-peer payments, remittances, store of value.
- Stablecoins
  - Purpose: Pegged to a stable asset (like USD) to reduce volatility.
  - Examples: USDT (Tether), USDC (USD Coin), DAI
  - Use case: Trading, DeFi (Decentralized Finance), payments without volatility.
- Utility Tokens
  - Purpose: Provide access to a product or service on a blockchain platform.
  - Examples: Ethereum (ETH), BNB (Binance Coin)
  - Use case: Gas fees, platform services, staking, governance.
- Security Tokens
  - Purpose: Represent ownership in real-world assets (like stocks, bonds, or real estate).
  - Examples:btZERO, Polymath
  - Use case: Digital securities, tokenized assets, regulated investments.
  - Regulated: Often subject to securities laws.
- Governance Tokens
  - Purpose: Allow holders to vote on changes to protocols or decentralized platforms.
  - Examples: Uniswap (UNI), Aave (AAVE), Compound (COMP)
  - Use case: Voting rights in DeFi platforms and DAOs (Decentralized Autonomous Organizations).
- Privacy Coins
  - Purpose: Provide enhanced anonymity and untraceable transactions.
  - Examples: Monero (XMR), Zcash (ZEC)
  - Use case: Privacy-focused payments, censorship resistance.
- Meme Coins
  - Purpose: Originally created as jokes but gained popularity through community hype.
  - Examples: Dogecoin (DOGE), Shiba Inu (SHIB)
  - Use case: Speculative investment, tipping, social engagement.



GINI INDEX

Context:

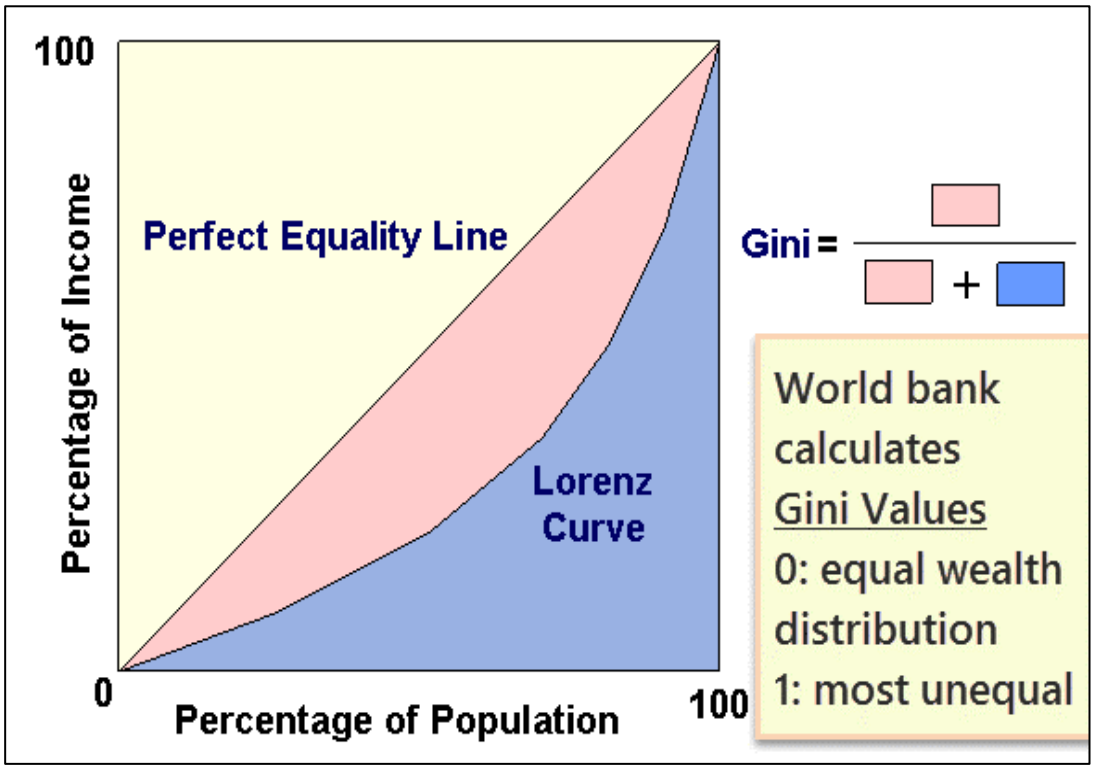
- The Gini Index ranked India among the world's more equal societies.

Forms of Inequality in India:

- Wealth Inequality:
  - A small fraction holds most of the nation's wealth.
  - The top 10% own a disproportionate share of income.
  - Informal jobs and non-taxable income make wealth inequality hard to quantify.
- Gender Inequality:
  - Women make up only 35.9% of the workforce.
  - Only 12.7% of leadership roles are held by women.
  - Startups founded by women are just 7.5% of the total.
  - Patriarchal norms result in fewer resources for girl children and less inheritance.
- Digital Inequality:
  - Only 53.9% of schools have Internet, and 52.7% have functional computers.
  - Only 25% of rural women vs 49% of rural men have internet access.
  - School closures during pollution seasons show how unequal internet access affects education.

About Gini Coefficient (Gini Index):

- Range:
  - It ranges from 0 to 1 (or 0% to 100%):
  - 0 represents perfect equality (everyone has the same income).
  - 1 represents perfect inequality (one person has all the income, others have none).
- Method of Measurement:
  - Based on the Lorenz Curve, which plots the cumulative share of income against the cumulative share of the population.
  - The Gini Coefficient is the ratio of the area between the line of equality and the Lorenz curve to the total area under the line of equality.
- Applications:
  - Used globally by economists, policymakers, and institutions like the World Bank and UNDP to assess income distribution.
  - Helps compare inequality across countries or over time.
- Limitations:
  - Does not capture non-income inequalities (e.g., gender, digital access).
  - Insensitive to the location of inequality (whether at the top or bottom of the income scale).
  - Similar Gini scores may mask very different economic structures.



GEOGRAPHY

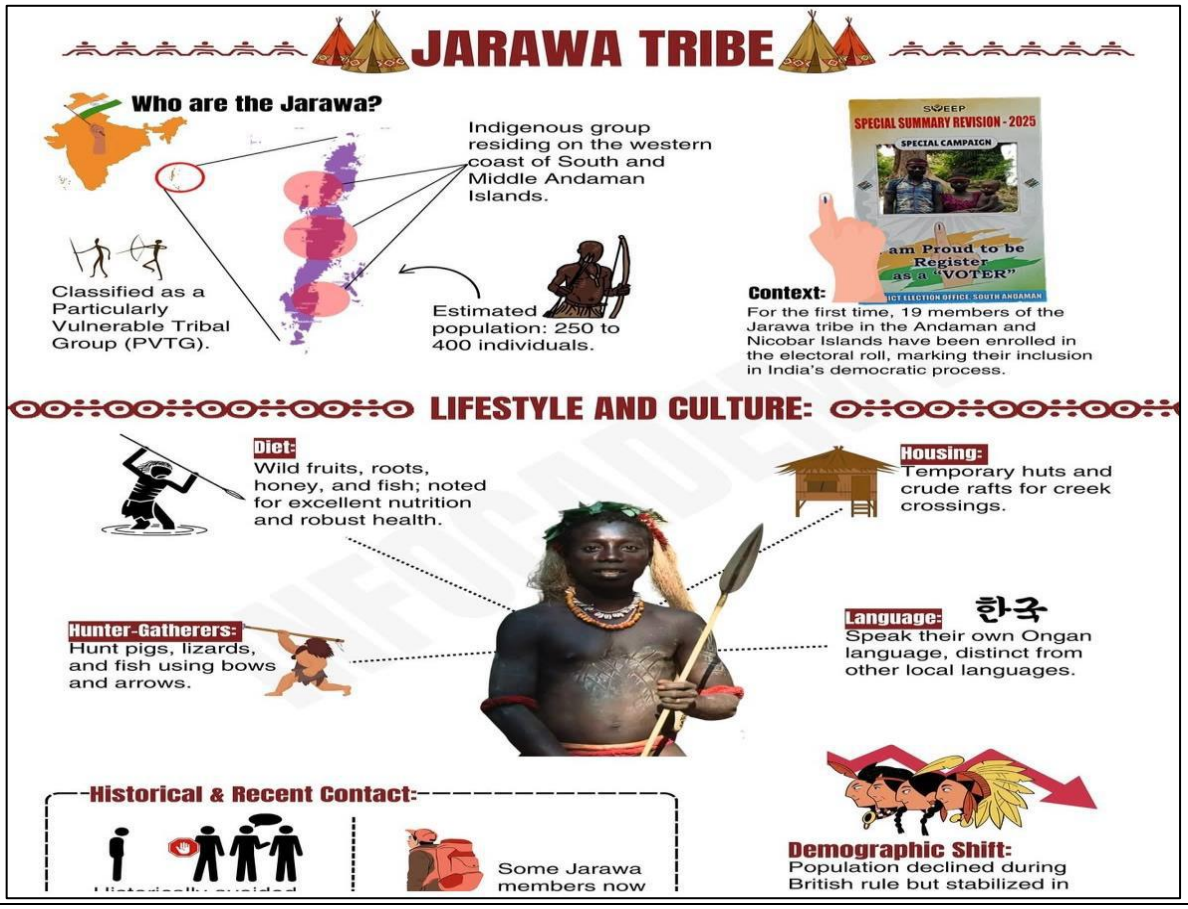
JARAWA TRIBE

Context:

- According to experts, reaching Jarawa tribe of Andaman Islands for the upcoming census will not be tough.

Jarawa Tribe:

- The Jarawas are one of the indigenous tribes of the Andaman Islands, known for their semi-nomadic lifestyle, reliance on forest resources, and deep connection to their natural environment.
- They are one of the world's oldest surviving tribes and are mostly hunter-gatherers, living in nomadic bands of 40-50 individuals.
- Historically, the Jarawas remained isolated from outside contact, preserving their unique cultural practices and traditions.
- The first significant friendly contact with the Jarawas occurred in April 1996, marking a turning point in their interaction with the outside world.
- The 2011 Census recorded 380 Jarawa individuals out of the 28,530 Scheduled Tribe individuals across Andaman and Nicobar Islands.



MOON DAY

Context:

- Moon Day, observed every year on July 20, commemorates the first manned Moon landing during NASA's Apollo 11 mission in 1969.

Key Features of the Moon:

- Formation: Likely formed about 4.5 billion years ago, possibly from debris after a Mars-sized body collided with Earth (Giant Impact Hypothesis).
- Phases: The Moon goes through eight phases each month, from new moon to full moon, due to its position relative to Earth and the Sun.
- Tidal Influence: The Moon's gravitational pull causes ocean tides on Earth.
- No Atmosphere: It lacks a significant atmosphere, so temperatures fluctuate drastically and no weather occurs.
- Surface: Covered with craters, mountains, and basaltic plains (called maria) formed by ancient volcanic activity.

Scientific Facts about the Moon:

- The Moon always shows the same face to Earth due to tidal locking, its rotation period equals its revolution period (~27.3 days).
- The Moon drifts 3.8 cm farther from Earth every year.
- Moon has weak gravity (about 1/6th of Earth's gravity), which affects human movement and structure building on its surface.
- It has no atmosphere or magnetic field. Thus, it can't protect from solar radiation or meteor impacts.
- It affects Earth's tides, which is caused by its gravitational pull, crucial for marine life and coastal ecosystems.
- Though not the biggest moon, it is proportionally the largest in relation to its planet.
- Water ice discovered in permanently shadowed craters near the Moon's poles—critical for future missions.

Space Missions and Exploration:

- First human landing: Apollo 11 (1969)
    - Neil Armstrong and Buzz Aldrin became the first humans to walk on the Moon.
- India's Chandrayaan-2 & 3
    - Chandrayaan-3 made India the first country to land on the Moon's south pole (August 2023).
- NASA's Artemis Program
    - Aims to return humans to the Moon and build a sustainable lunar base.

Cultural & Other Facts:

- Used in calendars: Many cultures follow lunar calendars (e.g., Islamic, Hindu).
- Visible during the day: The Moon can often be seen in daylight due to its proximity and brightness.
- Blood Moon & Supermoon: Phenomena like lunar eclipses (Blood Moon) and closest approach to Earth (Supermoon) captivate skywatchers.

ZOZILA TUNNEL

Context:

- The Zojila Tunnel, set to be India's longest road tunnel and Asia's longest bi-directional tunnel, will span over 30 km at an altitude of 11,578 feet, connecting Srinagar to Leh via Kargil and Dras.

About Zojila Tunnel Project:

- Length: Over 30 km, it will be India's longest road tunnel and Asia's longest bi-directional tunnel once completed.
- Altitude: Located at 11,578 feet in the challenging terrain of the Western Himalayas.
- Route: Connects Baltal (near Sonamarg) in Jammu & Kashmir to Minamarg in Ladakh.
- Significance:
    - Ensures all-weather connectivity between Kashmir and Ladakh (Zojila Pass remains closed ~6 months due to snow).
    - Boosts civilian and military logistics in a strategically sensitive region.
    - Promotes economic development and tourism in remote Himalayan regions.
    - Symbol of engineering excellence and nation-building in tough Himalayan terrain.
- Construction & Timeline:
    - Being executed by Megha Engineering & Infrastructures Ltd. (MEIL).
    - Scheduled for completion by 2027.
    - Over 31,000 tonnes of steel supplied by SAIL, showcasing public sector involvement.

Environment and Ecology

GREAT HORNBILL

Context:

- A recent sighting of the Great Hornbill in Ezhimala, Kannur (Kerala) has drawn attention to the ecological significance of the region.

About Great hornbill:

- Key features: Distinctive casque (helmet-like structure) on top of its beak, known for its loud calls and graceful flight despite its size.
- Habitat: Prefers dense evergreen and moist deciduous forests, commonly found in the Western Ghats, Northeast India, and parts of Southeast Asia.
- Ecological role: Acts as a key seed disperser, aiding in forest regeneration, considered an indicator species for healthy, mature forests.
- Conservation status: Listed as Vulnerable on the IUCN Red List.
- Threatened by: Habitat loss due to deforestation, hunting for casque and feathers, loss of nesting trees
- Conservation efforts: Protection under Schedule I of the Wildlife Protection Act, 1972 and community-led programs like the Hornbill Nest Adoption Program.

SARISKA TIGER RESERVE

Context:

- The Standing Committee of the National Board for Wildlife (SC-NBWL), chaired by Union Environment Minister Bhupender Yadav, has approved the proposal to redraw and rationalise the boundaries of the Sariska Tiger Reserve in Rajasthan.

About Sariska tiger reserve:

- Location: Alwar district, Rajasthan, India
- Establishment: Declared a wildlife sanctuary in 1955; became a tiger reserve in 1978 under Project Tiger
- Total area: about 1,217 sq km
- Landscape & Vegetation: Aravalli hills terrain predominantly dry deciduous forests, scrub-thorn arid forests, rocky hills, grasslands
- Key Wildlife: Tigers, leopards, striped hyena, jungle cat, sambar, chital, nilgai, wild boar
- Conservation Challenges: Mining pressures (limestone, dolomite), human settlements, and tourism impact
- Notable Features: Contains historical sites like Kankwari Fort and Pandupol Hanuman Temple

WULAR LAKE

Context:

- Wular Lake in Kashmir is experiencing a remarkable revival of its lotus blooms after almost three decades of decline.

About Wular lake:

- Location: Bandipora district, Jammu & Kashmir, India
- Type: Freshwater lake (one of the largest in South Asia)
- Formed by: Tectonic activity; fed mainly by the Jhelum River
- Area: Varies seasonally between 30 to 260 sq km
- Ecological Importance: supports biodiversity including fish, waterfowl, aquatic plants and designated as a Ramsar Wetland Site (since 1990)
- Economic & Cultural Value: Source of fishing, lotus stem (nadru) harvesting, and water for agriculture
- Conservation Issues: Heavily affected by siltation, encroachments, pollution, weed infestation, reduced water-holding capacity and loss of biodiversity
- Recent Restoration Efforts: Led by Wular Conservation and Management Authority (WUCMA) and resulted in revival of lotus bloom after 30 years in 2025

KAZIRANGA NATIONAL PARK

Context:

- In the first such survey of avians conducted recently, a team of forest officials, and conservationists recorded 43 grassland species across Kaziranga's wildlife divisions.

About Kaziranga National Park:

- Location: It is located in the State of Assam and covers 42,996 Hectare (ha). It is the single largest undisturbed and representative area in the Brahmaputra Valley floodplain.

- Conservation status: It was declared as a National Park in 1974. It has been declared a tiger reserve since 2007. It has a total tiger reserve area of 1,030 sq km with a core area of 430 sq. km.
- Heritage: It was declared a UNESCO World Heritage Site in 1985.
- Speciality: It is the home of the world's most one-horned rhinos. Much of the focus of conservation efforts in Kaziranga are focused on the 'big four' species— Rhino, Elephant, Royal Bengal tiger and Asiatic water buffalo.

NEW LICHEN IN WESTERN GHATS

Context:

- Indian scientists have discovered a new lichen species, Allographa effusosoredica, in the Western Ghats, adding the 53rd species of the genus Allographa in India and highlighting the region's rich lichen diversity.

Key Features of the Species:

- Belongs to the genus Allographa; this is the 53rd species of this genus recorded in India.
- Notable for its:
  - Crustose (crust-like) thallus
  - Effuse soredia – powdery asexual structures for reproduction
  - Presence of norstictic acid, a rare secondary metabolite in lichens
- Discovered by MACS-Agharkar Research Institute, Pune
- Identified using an integrated approach:
  - Classical taxonomy
  - Chemical profiling
  - Molecular sequencing (markers: mtSSU, LSU, RPB2 for fungus and ITS for alga)
- Closely related to Allographa xanthospora genetically, but morphologically resembles Graphis glaucescens

About Lichens:

- Symbiosis: The fungus provides structure and protection, while the alga or cyanobacterium performs photosynthesis, supplying nutrients.
- Types: Based on appearance, lichens are categorized as:
  - Crustose – crust-like
  - Foliose – leaf-like
  - Fruticose – bushy or branched
- Habitat: Found on rocks, soil, tree bark, and even harsh environments like Arctic tundras or deserts.
- Reproduction: Through spores (fungal) and structures like soredia or isidia (combined fungal-algal fragments).
- Importance:
  - Bioindicators: Sensitive to air pollution—used to monitor environmental quality.
  - Soil formation: Contribute to the weathering of rocks and formation of soil.
  - Nutrient cycle: Support ecosystems by providing food for insects and animals.
  - Medicinal use: Some species are used in traditional medicines and produce antibiotic compounds.

CORAL REEFS

Context:

- There has been a decline in Coral reefs in Lakshdweep.

About Coral Reefs:

- Coral reefs are marine ecosystems made up of calcium carbonate structures secreted by corals (marine invertebrates).
- They are found in shallow, warm, and sunlit waters typically between 30°N and 30°S latitude.
- Known as "rainforests of the sea," they support around 25% of marine biodiversity despite covering less than 1% of the ocean floor.
- Types
    - Fringing Reefs – Directly attached to a shoreline (e.g., Gulf of Mannar, India).
    - Barrier Reefs – Separated from land by a lagoon (e.g., Great Barrier Reef, Australia).
    - Atolls – Circular reefs enclosing a lagoon, often over sunken volcanoes (e.g., Lakshadweep).
- Coral Bleaching:
    - Coral bleaching occurs when corals expel symbiotic algae (zooxanthellae) due to stress, primarily from increased sea surface temperatures.
    - The algae provide food and color to corals; without them, corals appear white (bleached) and are more vulnerable to death
- Impacts of Coral bleaching:
    - Ecosystem collapse: Loss of marine species reliant on coral ecosystems.
    - Fisheries affected, threatening food security and livelihoods.
    - Reduced coastal protection from storm surges and erosion.
    - Decline in marine tourism revenue.

Global and National efforts to protect coral reefs:

- International:
    - Coral Triangle Initiative.
    - UN SDG 14 (Life Below Water).
    - IPCC reports warning against warming above 1.5°C.
- India:
    - Coral reef monitoring under ICMAM (Integrated Coastal and Marine Area Management).
    - Coral restoration projects in Gulf of Mannar, Lakshadweep, and Andaman & Nicobar.

- Laws: Coastal Regulation Zone (CRZ) Notification, Wildlife Protection Act, 1972 (Schedule I protection for coral reefs).

GOLDEN JACKALS

Context:

- Golden jackals in Kerala have shown remarkable adaptability to human-dominated landscapes, thriving beyond traditional forests in areas like agricultural lands, village edges, and peri-urban zones.

About Golden Jackals:

- Key Features:
  - Size: Medium-sized canid (8–10 kg on average)
  - Color: Golden to reddish-brown fur
  - Diet: Omnivorous and opportunistic — includes rodents, birds, fruits, insects, carrion, and human food waste
  - Behavior: Can be solitary, in pairs, or small family groups; mostly nocturnal
  - Ecological Role: Important scavenger, helps control rodent populations and clean up carrion
- Distribution:
  - Native to South Asia, Middle East, Africa, and Southeastern Europe.
  - In India, they are found across the subcontinent — from forests and grasslands to rural, agricultural, and urban fringes.
- Habitats: Golden jackals occupy a diverse range of habitats, including:
  - Dry deciduous forests, Scrublands, Grasslands and savannas
  - Mangroves and wetlands
  - Agricultural fields, Peri-urban and rural areas
- IUCN Status: Least Concern (LC)
- Conservation Concerns:
  - Human-wildlife conflict (livestock predation, urban presence)
  - Disease transmission (rabies, canine distemper)
  - Habitat loss and fragmentation

SCIENCE & TECHNOLOGY

GENOME SEQUENCING

Context:

- Researchers have successfully sequenced the complete genome of a man who lived 4,500–4,800 years ago during Egypt's Old Kingdom, marking a major breakthrough in ancient DNA research. The DNA was extracted from a well-preserved tooth found in a sealed clay vessel at Nuwayrat, south of Cairo, enabling exceptional preservation.

Key Highlights of the Findings:

- Oldest and most complete genome from ancient Egypt, offering a rare genetic snapshot from the pyramid-building era.
- Ancestry analysis shows about 80% North African and 20% West Asian (Fertile Crescent) origins, confirming long-theorized population interactions.
- Skeletal evidence suggests the man led a labor-intensive life, possibly as a potter.
- This achievement overcomes decades of failed attempts due to DNA degradation in Egypt's harsh climate.

About Genome Sequencing:

- Genome sequencing is a laboratory method used to determine the entire DNA sequence of an organism's genome. It reveals the order of nucleotides (adenine [A], thymine [T], cytosine [C], and guanine [G]), which form the genetic instructions that govern an organism's structure and function.

Types of Genome Sequencing:

- Whole Genome Sequencing (WGS):
  - Sequences the entire genome, including coding (exons) and non-coding regions (introns, regulatory sequences).
  - Offers the most comprehensive genetic information.
- Whole Exome Sequencing (WES):
  - Focuses only on the exome – the protein-coding regions (about 1–2% of the genome).
  - More cost-effective, widely used in clinical diagnosis.
- Targeted Sequencing:
  - Sequences specific genes or regions of interest.

Steps Involved in Genome Sequencing:

- Sample Collection: Tissue, blood, saliva, or (in ancient DNA) bone/teeth.
- DNA Extraction: DNA is isolated from the sample.
- Library Preparation: DNA is fragmented and tagged for identification.
- Sequencing: DNA fragments are read by sequencers (e.g., Illumina, Oxford Nanopore).
- Data Assembly: Fragments are aligned using bioinformatics tools to reconstruct the genome.
- Annotation: Identifying genes, mutations, and regulatory elements.

QS WORLD UNIVERSITY RANKINGS 2025

Context:

- Indian universities have shown notable progress in the QS World University Rankings 2025, both globally and within Asia.

Key Highlights about the QS University Ranking 2025:

- Best Institution: Massachusetts Institute of Technology (MIT) retained its position as the best institute globally for the 13th consecutive year.
- No Indian institution in top 40: IIT Delhi is now India's top-ranked institution, placed 44th in Asia, followed by IIT Bombay at 48th.
- 7 Indian institutions in Asia's top 100: IIT Delhi (44), IIT Bombay (48), IIT Madras (56), IIT Kharagpur (60), IISc (62), IIT Kanpur (67), University of Delhi (81).
- Highest jump: UPES Dehradun made the biggest leap, jumping 70 spots to 148th.

About QS World University Rankings:

- Released by: QS Quacquarelli Symonds (QS) offers unrivalled data, expertise, and solutions for the global higher education sector
- First Published: 2004
- Coverage: Over 1,500 universities worldwide
- Categories: Global, regional (Asia, Europe, etc.), subject-specific, and sustainability rankings
- Main Indicators: Academic Reputation, Employer Reputation, Faculty-Student Ratio, Citations per Faculty, International Faculty Ratio and International Student Ratio

RECLAIM FRAMEWORK

Context:

- Developed by the Coal Controller Organisation in collaboration with the Heartfulness Institute, RECLAIM framework aims to guide the mine closure and repurposing process with a focus on community participation and sustainable development.

About RECLAIM Framework:

Step	Description
R – Reach Out	Understand the community and its needs
E – Envision	Define a shared vision for the future
C – Co-Design	Plan together with all stakeholders
L – Localise	Adapt strategies to local realities
A – Act	Implement with active community participation
I – Integrate	Ensure sustainability through systems
M – Maintain	Sustain progress via local leadership

ORGANISATION FOR THE PROHIBITION OF CHEMICAL WEAPONS (OPCW)

Context:

- The Organisation for the Prohibition of Chemical Weapons (OPCW) held its 23rd Regional Meeting of National Authorities of States Parties in Asia from 1st to 3rd July 2025 in New Delhi.

About Organisation for the Prohibition of Chemical Weapons (OPCW):

- Origin: It is an intergovernmental organization established in 1997 to implement the Chemical Weapons Convention (CWC).

- Objective: Its primary mission is to promote and verify the elimination of chemical weapons and prevent their use in warfare.
- Achievement: In 2013, the OPCW was awarded the Nobel Peace Prize for its efforts in eliminating chemical weapons.
- Membership: It has over 190 member states, working towards a world free of chemical weapons.
- Headquarters: Its headquarter is located in Hague, Netherlands.

About Chemical Weapons Convention:

- Origin: Negotiations for the CWC began in 1980 at the United Nations Conference on Disarmament. The convention was drafted in September 1992 and opened for signature in January 1993. It became effective from April 1997.
- Objective: It is a multilateral treaty banning chemical weapons and requiring their destruction within the stipulated time. It makes it mandatory to destroy old and abandoned chemical weapons.
- Membership: It has 192 state parties and 165 signatories. India signed the treaty in January 1993.

INDIGENOUSLY DEVELOPED HEAVY WATER REACTORS

Context:

- The Atomic Energy Regulatory Board (AERB) has granted Nuclear Power Corporation of India Ltd. (NPCIL) licence to operate two indigenously developed 700 MWe pressurised heavy water reactors (PHWRs) at the Kakrapar Atomic Power Station (KAPS) in Gujarat.

Present status of nuclear energy in India:

- Installed capacity: ~7,500 MW
- Reactors in operation: 22 nuclear reactors
- Reactors under construction: 10+ PHWRs in fleet mode
- Technology used: PHWRs, Boiling Water Reactors (BWRs), Light Water Reactors (LWRs), Fast Breeder Reactors (FBRs)
- Target: 100,000 MW of nuclear capacity by 2047

Pressurized Heavy Water Reactor (PHWR):

- Fuel used: Natural uranium
- Moderator & Coolant: Heavy water (D_2O)
- Examples: Kakrapar (KAPS), Rajasthan (RAPS)
- Features:
    - High neutron economy
    - Suitable for India's limited uranium resources
    - Indigenous design (700 MW PHWRs are India's latest advancement)

Atomic Energy Regulatory Board (AERB):

- Formation: It is India's independent nuclear regulatory authority, and functions under the Atomic Energy Act, 1962.
- Objective: It approves siting, design, construction, commissioning, operation, and decommissioning of nuclear facilities.
- Structure: It reports to the Atomic Energy Commission (AEC), which is under the Department of Atomic Energy (DAE).

RESURGENCE OF NIPAH VIRUS IN KERALA

Context:

- Kerala has confirmed fresh cases of Nipah virus, prompting heightened vigilance in Malappuram and Palakkad, with an alert issued in Kozhikode due to risk of further spread.

About Nipah Virus:

- Cause: It is caused by an RNA virus from the family Paramyxoviridae, genus Henipavirus.
- Zoonotic: It can be transmitted from animals to humans and can also be transmitted through contaminated food or directly between people.
- Hosts: It spreads through fruit bats (genus Pteropus). It has also appeared in domestic pigs, dogs, cats, goats, horses, and sheep.
- Spread: First identified in Malaysia (1998–99). In India, outbreaks have occurred in West Bengal (2001, 2007) and Kerala (2018, 2019, 2021, 2023, and 2025)
- Fatality: The case fatality rate ranges from 40% to 75%.
- Symptoms: It includes fever, headache, drowsiness, disorientation, mental confusion, coma, and potentially death.
- Diagnosis: It can be diagnosed through real-time polymerase chain reaction (RT-PCR) from bodily fluids and antibody detection via enzyme-linked immunosorbent assay (ELISA).
- Prevention: No vaccines are presently available for humans or animals.

JAPONICA RICE

Context:

- NIPGR (National Institute of Plant Genome Research, Delhi) used CRISPR-Cas9 gene-editing in japonica rice to enhance phosphate uptake and yield.

About Japonica Rice:

- It is a group of rice varieties from northern and eastern China grown extensively in some areas of the world.
- It is an Asian rice variety that belongs within the broader sinica rice family.
- It is characterized by its short to medium grain and is harder, thicker, and stickier than traditional white rice.
- It is the primary type of rice grown and consumed in Japan and also in China, Korea, Vietnam, Indonesia.

About National Institute of Plant Genome Research (NIPGR):

- Established: 1998
- Location: New Delhi
- Autonomous Institute under the Department of Biotechnology (DBT), Ministry of Science and Technology, Government of India
- Mandate: To conduct advanced research in plant genomics and molecular biology to improve crop productivity and stress resistance.

FUEL BAN ON END-OF-LIFE VEHICLES (ELVS) IN DELHI

Context:

- The Commission for Air Quality Management (CAQM) has extended the timeline for implementing its directive to ban fuel supply to End-of-Life Vehicles (ELVs) in Delhi-NCR due to operational and technical challenges.

About Commission for Air Quality Management (CAQM):

- Nature: It is a statutory body established by the Government of India to address air pollution in the Delhi-NCR region.
- Established: October 2020 (via an ordinance; later enacted through legislation in August 2021)
- Objective: Ensure coordinated action among central and state agencies to combat air pollution and oversee the implementation of air quality improvement plans, including Graded Response Action Plan (GRAP)
- Jurisdiction: Covers Delhi and adjoining areas in Haryana, Punjab, Rajasthan, and Uttar Pradesh.
- Headquarters: New Delhi

STARLINK

Context:

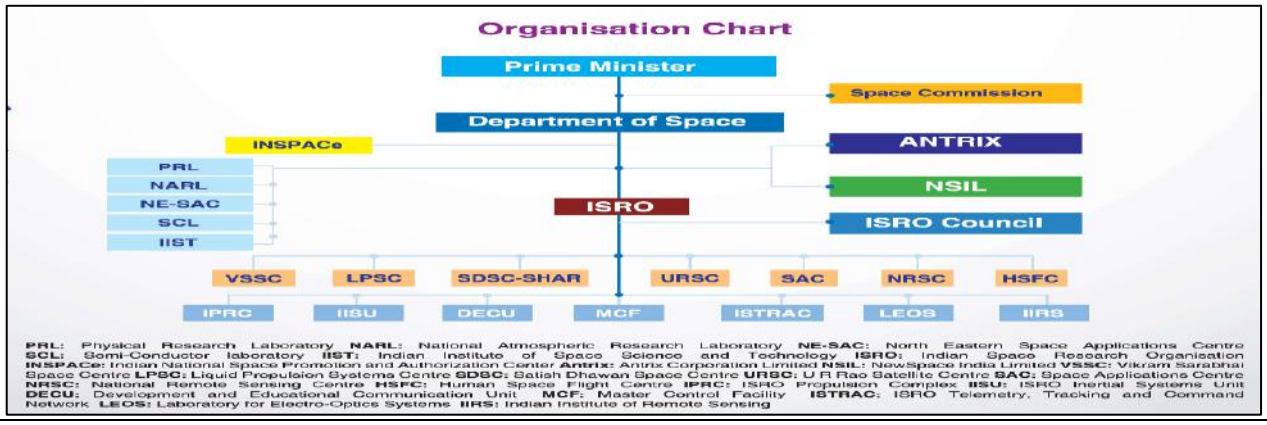
- Starlink, owned by Elon Musk, has received the final regulatory clearance to offer satellite communication services in India. The company was granted an operator license by the Department of Telecommunications (DoT) and IN-SPACe.

About Starlink:

- It operates the world's largest satellite constellation with around 7,000 satellites in orbit, aimed at offering internet services to rural and remote areas that lack reliable terrestrial broadband infrastructure.
- The service will utilize Low Earth Orbit (LEO) satellites to provide faster internet speeds and more resilient network connections compared to traditional methods.
- The company plans to roll out its services in India soon, collaborating with Airtel and Jio to offer its services in the country.

About IN-SPACe (Indian National Space Promotion and Authorization Center):

- It is an autonomous agency under the Department of Space, Government of India.
- It was established in 2020 with the primary aim of promoting private sector participation in the Indian space industry and enabling them to use India's space resources and infrastructure for various commercial purposes.
- It facilitates and promotes private sector entities in the space industry, encouraging innovation, collaboration, and technological advancement.
- It is responsible for authorizing and regulating all space activities undertaken by private players. This includes licensing and ensuring that the activities align with national security and legal frameworks.
- It works to create an environment conducive to the growth of space startups in India, helping them with resources, expertise, and technology to build their own space capabilities.
- It also looks to foster collaboration with international space agencies and companies, positioning India as a key player in the global space market.



CERN

Context:

- CERN Collider Reveals Clue to Universe's Bias Against Antimatter. This may help explain why the universe is dominated by matter despite both matter and antimatter being created in equal amounts during the Big Bang.

About CERN:

- Nature:
  - CERN (Conseil Européen pour la Recherche Nucléaire), or the European Organization for Nuclear Research, is one of the world's largest and most respected centres for scientific research in the field of particle physics.
- Key Highlights:
  - Established: 1954
  - Headquarters: Geneva, Switzerland
  - Members: 23 member states (India is an associate member since 2016)
- Major Functions:
  - Fundamental Physics Research: CERN studies the basic constituents of matter by colliding particles at high energy.
  - Large Hadron Collider (LHC): World's most powerful particle accelerator, used to discover the Higgs boson in 2012.
  - Technological Innovation: Develops advanced detectors, computing infrastructure (e.g. GRID), cryogenics, and medical applications like cancer therapy.
- India and CERN:
  - India collaborates through institutions like TIFR, BARC, and IISc.
  - Indian scientists contribute to detector development, grid computing, and engineering solutions.
  - Indian companies have supplied cryogenics, precision mechanics, and electronics to CERN.

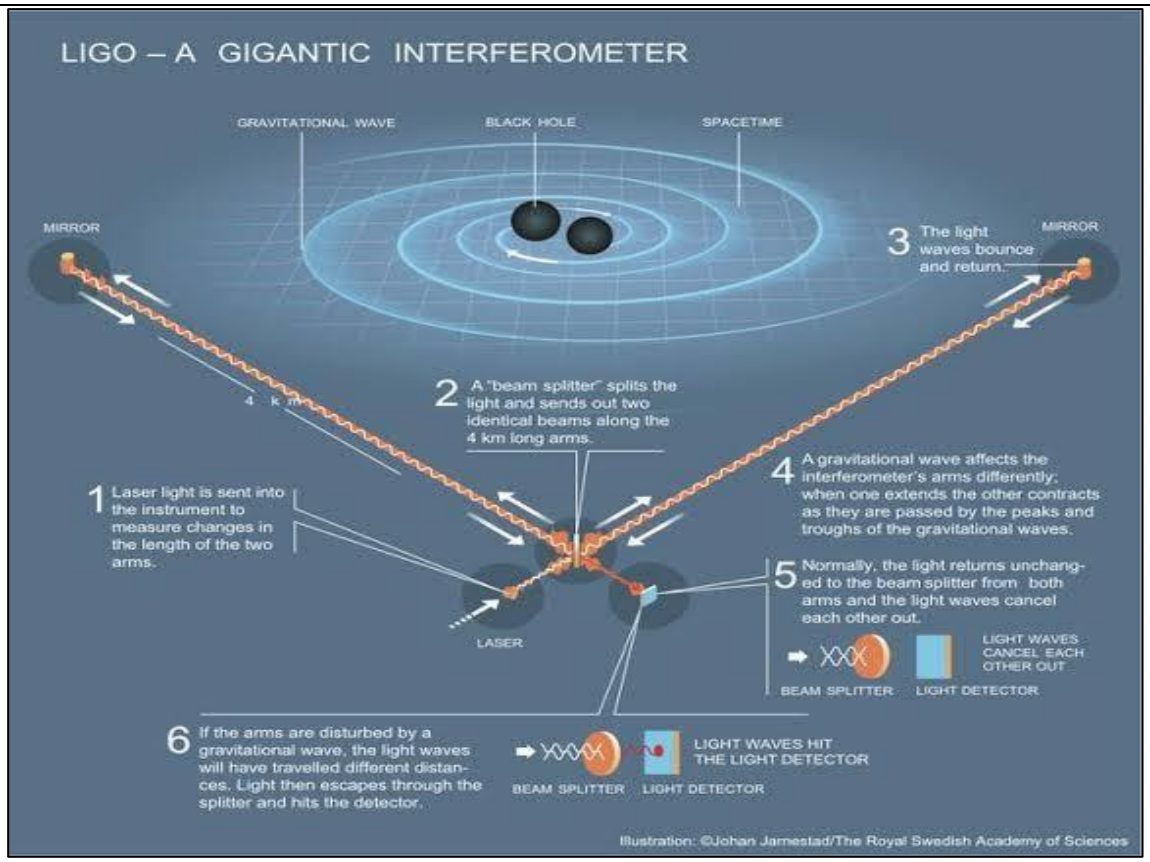
BLACKHOLE MERGER

Context:

- Scientists have detected gravitational waves from the largest black hole merger observed so far.

Key Points about the discovery:

- Gravitational waves are ripples in space-time caused by massive cosmic events like black hole mergers.
- The newly detected event involved black holes 100–150 times larger than the Sun, which challenges current theories as such sizes were not expected to exist.
- One of the black holes was spinning at extremely high speeds, nearing limits set by General Relativity.
- The event involved a merged black hole 225 times the Sun's mass, surpassing previous records.



About Black Holes:

- A black hole is a region in space where gravity is so strong that nothing—not even light—can escape it.
- Formed when massive stars collapse under their own gravity at the end of their life cycle.
- The event horizon is the boundary beyond which nothing can return.
- Black holes can be of different types: stellar-mass, intermediate, and supermassive (found at the centers of galaxies).
- According to General Relativity, black holes warp spacetime, influencing nearby matter and light.

About LIGO (Laser Interferometer Gravitational-Wave Observatory):

- LIGO is a large-scale physics experiment and observatory designed to detect gravitational waves—ripples in spacetime caused by massive accelerating objects like merging black holes or neutron stars.
- It uses laser interferometry to measure incredibly small disturbances caused by passing gravitational waves.
- In 2015, LIGO made the first direct detection of gravitational waves, confirming a major prediction of Einstein's theory of general relativity.
- The detected signal came from the merger of two black holes about 1.3 billion light-years away.

MEASLES-RUBELLA

Context:

- India has dispatched 3 lakh (300,000) doses of the Measles-Rubella (MR) vaccine to Bolivia in response to a measles outbreak, along with ancillary medical supplies.

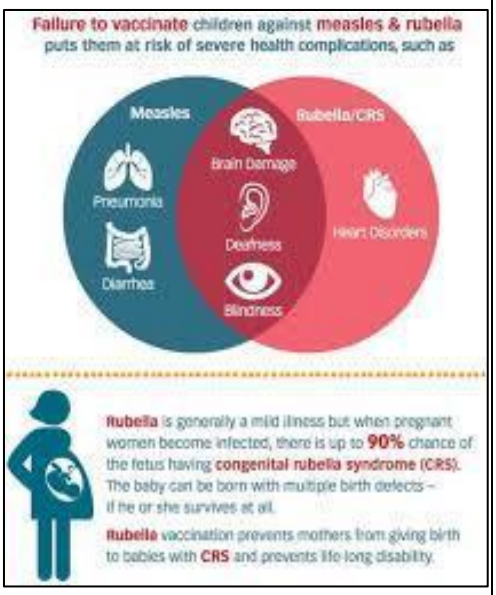
About Measles:

- Cause: Measles virus (Morbillivirus).
- Transmission: Airborne; spreads through coughs, sneezes, and contact with infected surfaces.
- Symptoms: High fever, cough, runny nose, conjunctivitis, followed by a red rash.

- Complications: Pneumonia, encephalitis, blindness, and death, especially in malnourished children.

About Rubella (German Measles):

- Cause: Rubella virus (a Togavirus).
- Transmission: Airborne; mainly affects children and young adults.
- Symptoms: Mild fever, rash, swollen lymph nodes.
- Complications: Dangerous for pregnant women; can lead to Congenital Rubella Syndrome (CRS) in the fetus, causing birth defects.



About Measles-Rubella Vaccine (MR Vaccine):

- Type: Combined live attenuated vaccine.
- Schedule: Two doses recommended — typically at 9–12 months and 16–24 months of age.
- Purpose: To eliminate both measles and rubella through immunization.

India's MR Campaign:

- Launched in 2017 to eliminate measles and control rubella.
- Targeted 410 million children aged 9 months to 15 years.
- Significant drop in cases reported due to widespread vaccination coverage.

ADVACFXALVAX

Context:

- The Indian Council of Medical Research (ICMR) has developed a promising malaria vaccine candidate named AdVacFxalVax.

About AdVacFxalVax:

- It is showing over 90% protection against Plasmodium falciparum, the deadliest malaria parasite. It is now set for further testing, trials, and commercial development in partnership with private companies.
- The vaccine uses two parts of the parasite (PfCSP and Pf34/48) to stimulate both antibody and T-cell responses.
    - It triggers two lines of defense:
    - Prevents liver infection,
    - Stops parasite spread from infected red blood cells.
- Advantages:
    - Uses alum adjuvant (safe, reliable immune booster).
    - Potential for longer-lasting protection.
    - Safe in animal trials; human trials pending.

About Malaria:

- It is a potentially life-threatening parasitic disease transmitted by the bite of infected female Anopheles mosquitoes.
- It is caused by Plasmodium parasites.
- Transmission:
    - Transmitted by the bite of infected female Anopheles mosquitoes, primarily at night.
    - Can also be transmitted via blood transfusion, organ transplant, or shared needles.

- Symptoms:
  - High fever with chills, headache, vomiting, and sweating.
  - Severe cases (especially P. falciparum) can cause cerebral malaria, organ failure, or death.
- Prevention & Control:
  - Vector control: Insecticide-treated bed nets (ITNs), Indoor Residual Spraying (IRS), larval source management.
  - Chemoprophylaxis: For travelers to endemic regions.
  - Vaccine: RTS,S/AS01 (Mosquirix) is the first malaria vaccine approved (mainly for children in Africa). India has not rolled it out nationally yet.
- Diagnosis & Treatment ;
  - Diagnosed via blood smear microscopy, Rapid Diagnostic Tests (RDTs), and PCR (in research settings).
  - Treated with antimalarial drugs such as Chloroquine, Artemisinin-based Combination Therapy (ACT), Primaquine (for P. vivax and P. ovale to kill liver-stage hypnozoites)

Malaria in India:

- India aims to eliminate malaria by 2030 under the National Framework for Malaria Elimination (NFME).
- Implemented via National Center for Vector Borne Diseases Control (NCVBDC).
- Decline in cases due to improved surveillance, treatment, and vector control.
- Endemic states: Odisha, Chhattisgarh, Jharkhand, Tripura, and parts of the Northeast.

HISTORY AND ART & CULTURE

HUL DIWAS

Context:

- Prime Minister Narendra Modi paid tribute to the tribal heroes of the Santhal Rebellion on the occasion of Hul Diwas (30 June).

About Santhal Hul:

- Feature: It was a tribal revolt and India's first structured war against British oppression, launched in 1855, two years before the 1857 Revolt, aimed at resisting economic exploitation and land alienation.
- Leadership: It was led by Sidhu and Kanhu, the revolt united 32 castes/communities, showcasing rare tribal solidarity against colonial forces.
- Causes: It was sparked by the 1832 Damin-i-Koh settlement in the Rajmahal hills, where Santhals (displaced from Bengal) faced land-grabbing, bonded labour (kamioti/harwahi), and systemic oppression by British-backed zamindars.
- Outcomes: It led to the passage of Santhal Parganas Tenancy Act, 1876 (SPT Act) and later Chota Nagpur Tenancy Act, 1908 (CNT Act).

Other Important Tribal Revolts:

- Kol Rebellion (1831–32)
  - Leader: Buddhu Bhagat
  - Region: Chotanagpur (Jharkhand)
  - Cause: British land revenue policy, encroachment by outsiders (dikus), and forced labour
- Khond Uprising (1846–55)
  - Leader: Chakra Bisoi
  - Region: Odisha
  - Cause: Resistance to British interference in tribal customs, particularly human sacrifice.
- Munda Rebellion / Ulgulan (1899–1900)
  - Leader: Birsa Munda
  - Region: Chotanagpur
  - Cause: Land alienation, Christian missionary activity, and British disruption of tribal governance.

DALAI LAMA

Context:

- The 14th Dalai Lama announced on Wednesday (July 2) "that the institution of the Dalai Lama will continue" and that the Gaden Phodrang Trust shall be the "sole authority to recognize the future reincarnation."

About the institution of Dalai Lama:

- Roots: The Institution of the Dalai Lama is rooted in Tibetan Buddhism, particularly the Gelug school.
- Belief in reincarnation: The Dalai Lama is regarded as the reincarnation (tulku) of Avalokiteshvara, the Bodhisattva of Compassion.
- Political Legacy: From the 17th century until 1959, the Dalai Lamas were also temporal rulers of Tibet, combining religious and political authority.

- Present Dalai Lama: Tenzin Gyatso is the current (14th) Dalai Lama. In 1959, after the Chinese occupation of Tibet, he fled to India and set up the Tibetan government-in-exile in Dharamshala (Himachal Pradesh).
- Relation with the Trust: He established the Gaden Phodrang Trust in 2011 in Dharamshala to oversee his legacy emphasizing that only Tibetan Buddhists—not governments—have the authority to decide.

WORLD HERITAGE LIST

Context:

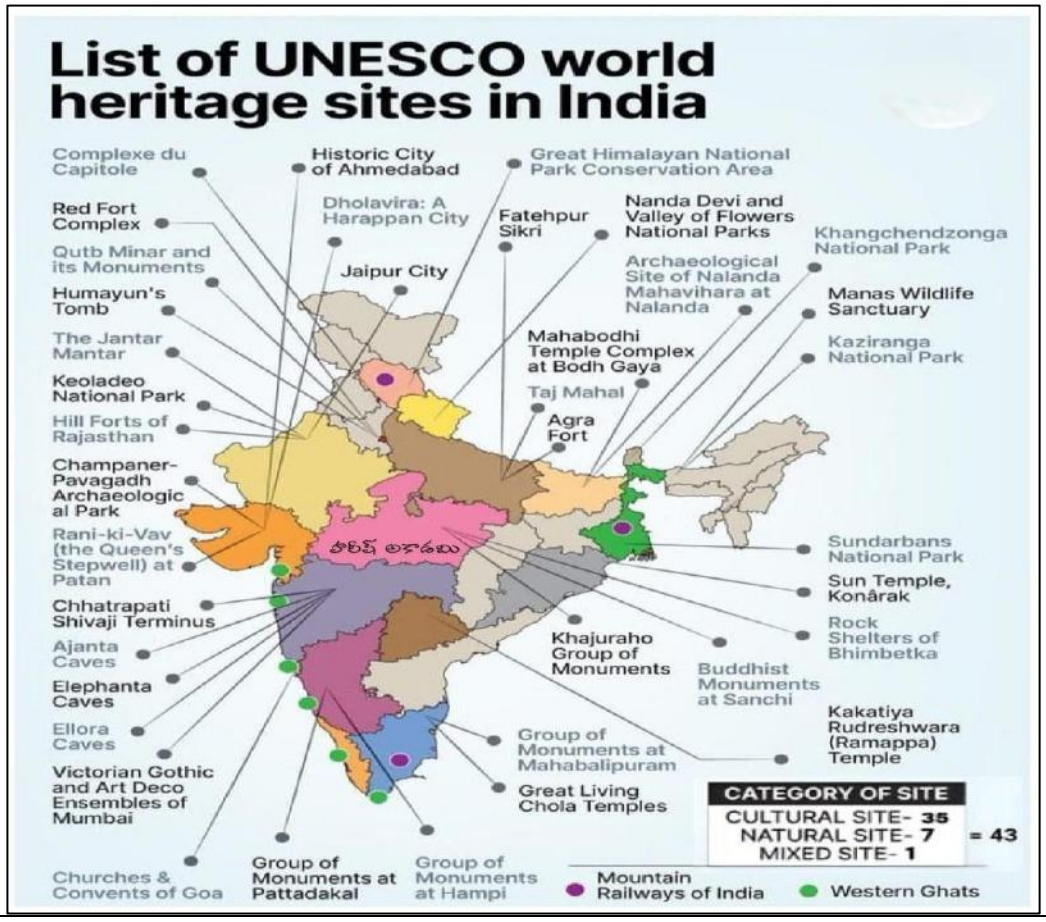
- Activist Tommy Garnett's decades of work paid off when Sierra Leone's Tiwai island landed a spot on the UN cultural agency's World Heritage list.

About Tiwai island:

- The Gola-Tiwai complex, which also includes the nearby Gola Rainforest National Park, will be Sierra Leone's first UNESCO site.
- The island, located in the Moa river, measures just 12 sq. km. and has 11 species of primates.

About World Heritage Site:

- A World Heritage Site is a location recognised by UNESCO for its "outstanding universal value".
- It is guided by Convention Concerning Protection of World Cultural and Natural Heritage (called World Heritage Convention).
- It has three categories: Cultural heritage, Natural heritage, and Mixed heritage (cultural as well as natural).
- There were 43 World Heritage Sites in India. Recently, after the addition of Maratha Military Landscapes of India in the UNESCO World Heritage List, the number of world heritage sites in India became 44.



CHANGES IN HISTORY TEXTBOOKS

Context:

- Raziyya Sultan & Nur Jahan Dropped from New Class 8 NCERT History Textbook.

Key Omissions:

- Raziyya Sultan (ruled 1236–1240): Previously described as "more able and qualified" than her brothers; now not mentioned.
- Nur Jahan: Earlier credited with having coins struck and seals issued in her name; now dropped.
- Tipu Sultan and Haidar Ali: Also removed, with NCERT stating the new books are aligned with the National Education Policy 2020 and National Curriculum Framework 2023, not older content structures.

Key Additions:

- Rani Durgavati (Gond queen): Recognized for resisting Mughal attacks under Akbar in 1564.
- Tarabai (Maratha queen): Described as a "fearless warrior queen" who resisted Aurangzeb.

About Raziya Sultan:

- Uniqueness: She was the first and only female ruler of the Delhi Sultanate.
- Reign: 1236–1240 CE
- Dynasty: Slave Dynasty (Mamluk Dynasty)
- Father: Iltutmish, who nominated her as his successor due to her capability over his sons.
- Title: Took the title "Sultan", not "Sultana," to assert equality with male rulers.
- Administration: Known for promoting merit over nobility and appointing non-Turks to key positions, which angered the Turkish nobility (Chahalgani).
- Challenges: Faced opposition from nobles for being a woman and for breaking orthodox norms.
- Downfall: Deposed and eventually killed after political instability and rebellion.

About Nur Jahan:

- Birth Name: Mehr-un-Nissa
- Title: Given the title "Nur Jahan" meaning "Light of the World" after marrying Jahangir in 1611 CE.
- Political Role:
    - Actively co-ruled with Jahangir, especially as his health declined.
    - Issued royal farmans (decrees) in her name — rare for a Mughal empress.
    - Had coins minted with her name — an extraordinary recognition of her authority.
- Administration:
    - Influenced court appointments and foreign policy.
    - Promoted trade and architecture, and supported widows and orphan girls.
- Family Influence:
    - Her father Itimad-ud-Daulah and brother Asaf Khan held key positions.
    - She arranged the marriage of her niece Mumtaz Mahal to Prince Khurram (later Shah Jahan).

About Rani Durgavati:

- Rani Durgavati (1524–1564) was a Rajput queen of the Gond kingdom of Garha Mandla in central India (present-day Madhya Pradesh).
- Born into the Chandela Rajput dynasty, she married Dalpat Shah, the Gond ruler, and took over administration after his death.
- Renowned for her courage, administrative acumen, and military leadership, she effectively governed her kingdom and strengthened its defenses.

- In 1564, she fought bravely against Mughal forces led by Asaf Khan, a general under Emperor Akbar.
- Facing defeat, she chose to die by her own dagger rather than surrender, becoming a symbol of valour and resistance in Indian history.
- She is celebrated as one of the earliest women warrior rulers to fiercely resist Mughal imperialism.

About Tarabai:

- Tarabai Bhosale (1675–1761) was a prominent Maratha queen and daughter-in-law of Chhatrapati Shivaji.
- She was the wife of Rajaram I, Shivaji's younger son, and assumed power as regent of the Maratha empire after his death in 1700.
- Tarabai is remembered for her military leadership and administration during a crucial phase of Maratha history, especially for leading resistance against the Mughal emperor Aurangzeb.
- Under her leadership, the Maratha forces regained lost territories and continued guerrilla warfare, successfully stalling Mughal advances in the Deccan.
- She is often described as a "fearless warrior queen" and was a central figure in preserving Maratha sovereignty during a period of crisis.
- Later, she also played a significant role in Maratha court politics, including efforts to maintain control during succession struggles.

PAIKA REBELLION

Context:

- Former Odisha Chief Minister expressed concerns over omission of Paikas from NCERT class 8.

About Paika Rebellion:

- Paikas were a warrior class who served the Gajapati kings of Odisha. They held land (nish-kar jagirs) in exchange for military service.
- The Paika Bidroha (Paika Rebellion) of 1817 took place nearly 40 years before the first sepoy mutiny.
- Led by Bakshi Jagabandhu, over 400 Kondh tribals and Paikas revolted.
- Rebels attacked British establishments and looted treasury offices.
- Though suppressed, resistance continued until 1825.

CHOLA DYNASTY

Context:

- Prime Minister Narendra Modi, during the Aadi Thiruvathirai festival at Gangaikonda Cholapuram, described the Chola dynasty as an "ancient roadmap" for realizing the vision of a developed India (Viksit Bharat).

About Chola Dynasty:

- Location: The Chola Dynasty was one of the longest-ruling and most powerful South Indian empires, flourishing primarily between the 9th and 13th centuries CE.
- Origin and Early Cholas:
  - The early Cholas are mentioned in Sangam literature (circa 300 BCE–300 CE), with rulers like Karikala Chola being notable.
  - The imperial phase began with Vijayalaya Chola (850 CE), who captured Thanjavur from the Pallavas and laid the foundation of the later Chola Empire.

- Administration & Governance
  - Highly centralized administration with efficient revenue collection.
  - Use of village assemblies (sabhas) and the famous Kudavolai system for elections.
  - Well-documented land grants and temple inscriptions.
- Naval Power & Foreign Trade
  - The Cholas built one of the strongest navies in ancient India.
  - Maintained active trade with Southeast Asia, China, and the Arab world.
- Art & Architecture
  - Dravidian style temple architecture reached its zenith.
  - Grand temples like Brihadeeswarar, Gangaikonda Cholapuram, and Airavatesvara Temple reflect architectural brilliance.
  - Patronized Tamil literature and bronze sculpture, especially the Nataraja icon.
- Decline:
  - Began in the late 12th century due to internal strife and rising powers like the Pandyas and Hoysalas.
  - The final blow came with Malik Kafur's invasion in the early 14th century.
- Legacy:
  - Played a major role in spreading Tamil culture and Shaivism in Southeast Asia.
  - Left behind enduring architectural, artistic, and literary contributions.

DEFENCE & SECURITY

INS UDAYGIRI DELIVERED TO INDIAN NAVY

Context:

- INS Udaygiri, the second ship of Project 17A's stealth frigates was delivered to the Indian Navy, showcasing the country's growing military manufacturing capabilities and enhancing its naval power.

About INS Udaygiri:

- Inducted on: July 1, 2025
- Built by: Mazagon Dock Shipbuilders Ltd. (MDL), Mumbai
- Feature: Successor of the Shivalik class frigates of Project 17 (P-17)
- Build Time: Built in a record 37 months from the date of launching

About Project 17A:

- Objective: Project 17 Alpha frigates (P-17A) were launched by the Indian Navy in 2019 to construct a series of stealth guided-missile frigates
- Manufactured by: Mazagon Dock Shipbuilders (MDL) and Garden Reach Shipbuilders & Engineers (GRSE)
- Speciality: Constructed with a specific stealth design, which has radar-absorbent coatings and is low-observable which can make its approach undetectable for the enemies
- Focus on Atmanirbhar Bharat: Around 75% of the orders of Project 17A have been placed on indigenous firms including MSMEs
- Current Status (as of July 2025): INS Nilgiri (first ship) and INS Udaygiri delivered
- Timeline: Entire project expected to be completed by end of 2026

DEFENCE ACQUISITION COUNCIL

Context:

- DAC Approves 10 Capital Acquisition Proposals Worth ₹1.05 Lakh Crore. These proposals fall under the Buy (Indian–Indigenously Designed, Developed, and Manufactured) (IDDM) category, supporting India's goal of self-reliance in defence manufacturing.

About Defence Acquisition Council (DAC):

- Chairperson: The Defence Minister of India is the chairperson of the DAC, which acts as the primary decision-making body for defence procurement in India.
- Function: The DAC evaluates and approves defence acquisition proposals, ensuring they align with the strategic and operational needs of the three services (Army, Navy and Air Force) and the Indian Coast Guard.
- Decision-making: It is responsible for approving procurement plans and deciding on major defence purchases, especially those related to capital acquisition, ensuring that they meet national security requirements.
- Focus: The DAC plays a crucial role in promoting self-reliance in defence production under the "Aatmanirbhar Bharat" initiative, favoring indigenous systems and technologies.

NISTAR

Context:

- The first indigenous Diving Support Vessel (DSV) 'Nistar' was formally delivered to the Indian Navy on July 8, 2025, by Hindustan Shipyard Limited (HSL) at Visakhapatnam.

Key Features and Capabilities:

- Indigenous Design and Construction: 'Nistar' is the first DSV fully designed and built in India, with approximately 75% indigenous content.
- Dimensions and Displacement: The vessel measures 118 meters in length and displaces around 10,000 tons.
- Deep-Sea Operations: Capable of saturation diving up to 300 meters and side diving up to 75 meters, enabling complex underwater missions.
- Submarine Rescue: Acts as the "Mother Ship" for Deep Submergence Rescue Vehicles (DSRVs), enabling rapid response for submarine emergencies and personnel evacuation.
- Remotely Operated Vehicles (ROVs): Equipped for diver monitoring and salvage operations at depths up to 1,000 meters.
- Strategic Importance: India is now among a select group of nations possessing such specialized rescue and diving capabilities.

F-35B FIGHTER JET

Context:

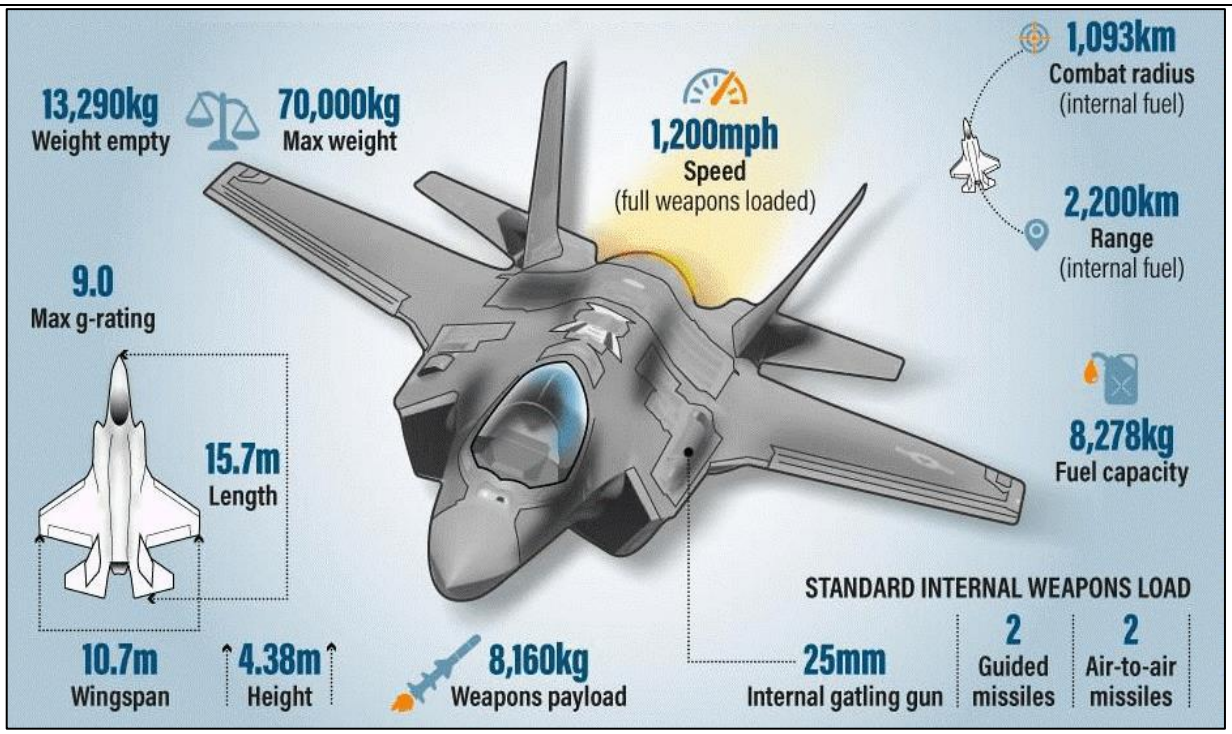
- The F-35B, from the Royal Navy's aircraft carrier HMS Prince of Wales, had to land in Kerala due to an emergency. Repairs were carried out by Air India's MRO facility.

About F-35B Lightning II:

- Manufacturer: Lockheed Martin (USA)
- Type: Stealth multirole fighter (Variant of F-35)
- Operator: U.S. Marines, U.K. Royal Navy, Italy, and others
- Key Feature: Short Take-Off and Vertical Landing (STOVL) capability – can operate from aircraft carriers without catapults
- Speed: ~1.6 Mach
- Avionics: Advanced sensor fusion, helmet-mounted display, AESA radar
- Stealth: Designed to evade radar detection using stealth shaping and coatings
- Armament: Air-to-air missiles, air-to-ground bombs, internal gun, and external pylons

Key Features of Fifth-Generation Fighter Aircraft:

- Stealth Technology: Radar-evading design and materials
- Advanced Avionics: Integrated sensors, electronic warfare systems, and sensor fusion
- Supercruise: Ability to cruise at supersonic speeds without afterburners (in some variants)
- Maneuverability: High agility using thrust-vectoring and fly-by-wire systems
- Network-Centric Warfare: Real-time data sharing with other platforms and command centers
- Situational Awareness: Helmet-mounted displays, 360° battlefield view



Examples of Fifth-Generation Jets:

- F-22 Raptor (USA)
- F-35 Lightning II (A/B/C variants) (USA)
- Chengdu J-20 (China)
- Sukhoi Su-57 (Russia)
- HAL AMCA (India – under development)

MIG-21

Context:

- After 62 years of service, the Indian Air Force will retire its last MiG-21 fighter jets in September 2025, with a ceremonial farewell at Chandigarh. The jets, operated by No. 23 Squadron (Panthers), will be replaced by indigenous Tejas Mk1A aircraft.

About MiG-21:

- Nature: The MiG-21 (Mikoyan-Gurevich 21) is a Soviet-origin supersonic jet fighter aircraft that became a critical part of India's air defence architecture during the Cold War and beyond.
- Induction in India: Introduced into the Indian Air Force (IAF) in 1963, the MiG-21 was the first supersonic fighter jet of India.
- Origin: Designed by the Soviet Union (USSR) during the 1950s.
- Versions in India: MiG-21FL, MiG-21M, MiG-21bis, MiG-21 Bison (upgraded version with modern avionics and radar)
- License Production: India manufactured MiG-21s under license via Hindustan Aeronautics Limited (HAL).

NISAR

Context:

- India and the United States have successfully launched the NASA-ISRO Synthetic Aperture Radar (NISAR) Earth observation satellite on July 30, 2025, from the Satish Dhawan Space Centre in Sriharikota.

About NISAR:

- NISAR (NASA-ISRO Synthetic Aperture Radar) is a joint Earth observation satellite by ISRO and NASA.
- Launching in July 2025, it is the world's most powerful Earth-observation satellite, built at a cost of $1.5 billion.
- Designed to track changes on Earth in near real-time, especially in land, ice, and vegetation.
- Uses two types of Synthetic Aperture Radar (SAR):
    - L-band SAR (from NASA) – penetrates deeper into vegetation and ice.
    - S-band SAR (from ISRO) – for high-resolution surface mapping.
- Operates in two frequency bands simultaneously, allowing 3D imaging and detection of subtle changes over time (e.g., landslides, glacial movement, earthquakes, etc.).
- Will help in studying:
    - Deformation of Earth's crust (e.g., due to earthquakes, volcanoes)
    - Glacial dynamics and melting
    - Forest biomass and carbon cycle
    - Groundwater level changes
    - Agricultural changes
    - Disaster impact analysis

GOVT. INITIATIVES, SCHEMES AND POLICIES, ORGANISATION

PM DHAN-DHAANYA KRISHI YOJANA (PM-DDKY)

Context:

- The Indian government has launched the PM-DDKY, an ambitious umbrella scheme that merges 36 existing agricultural schemes to revitalize farming in 100 low-performing districts across India.

Key Features of PM-DDKY:

- Nature: Integration of 36 Schemes across 11 departments with involvement from states and private partners.
- Focus Areas include:
  - Increasing crop productivity through sustainable practices.
  - Promoting crop diversification toward climate-resilient and high-value crops.
  - Expanding irrigation and water-use efficiency.
  - Boosting rural credit and strengthening storage at panchayat/block levels.
- Target Districts: 100 districts selected based on low crop productivity, cropping intensity, and weak credit flow. Each state/UT has at least one district.
- District Committees: Local "Dhan-Dhaanya Samitis" will design and monitor farm-level plans with support from progressive farmers.
- Monitoring: A digital dashboard will track progress across 117 indicators, guided by NITI Aayog and central nodal officers.
- Objectives:
  - Enhance agricultural productivity and farmer incomes
  - Promote natural and organic farming
  - Strengthen water and soil conservation
  - Develop district-level agricultural resilience

GREAT NICOBAR ISLAND INFRASTRUCTURE PROJECT

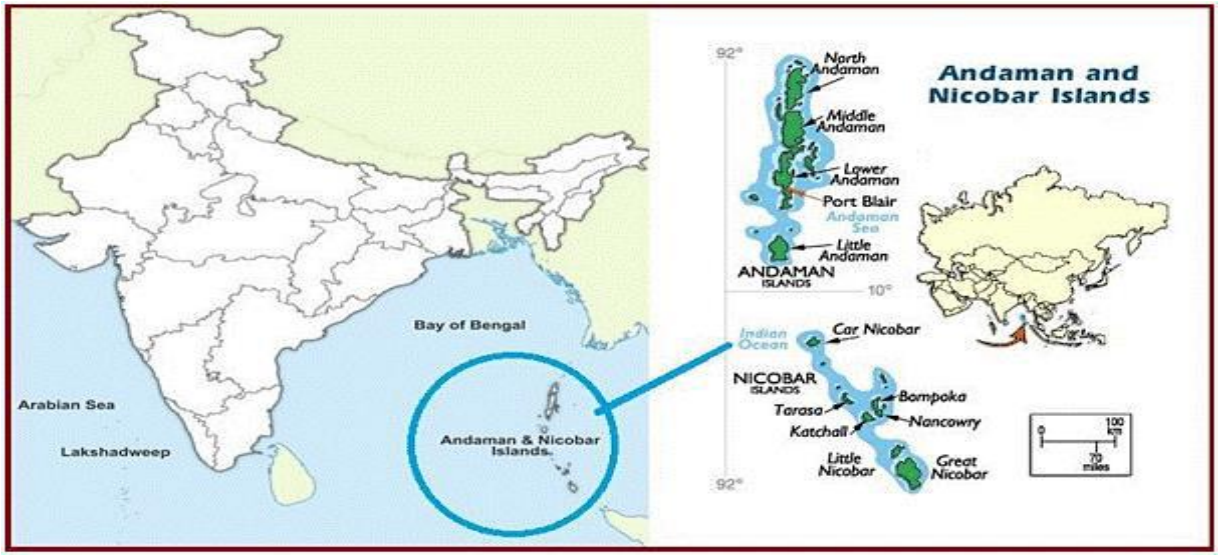
Context:

- The Great Nicobar Island infrastructure project has sparked criticism for inadequately addressing seismic risks in its Environmental Impact Assessment (EIA), despite the region's vulnerability to major earthquakes.

About Great Nicobar Island Project:

- Location: Great Nicobar Island, located in the Bay of Bengal near the Malacca Strait
- Project Components:
  - International Container Transshipment Terminal (ICTT)
  - Greenfield Airport
  - Power Plant
  - Township for workers and residents
- Implementing Agency: Andaman and Nicobar Islands Integrated Development Corporation (ANIIDCO), with support from the central government
- Environmental Concerns:
  - The island is an ecologically fragile zone, rich in biodiversity and tribal heritage
  - Alleged underestimation of seismic risks, lack of transparency, and insufficient consultation

- Potential impact on coral reefs, mangroves, tribal communities, and wildlife habitats



DHRUVA POLICY

Context:

- The Dhruva Policy (Digital Hub for Reference and Unique Virtual Address) is a landmark initiative by the Department of Posts to transform how addresses are created, shared, and managed in India.

Key Components of Dhruva Policy:

- DIGIPIN
  - A 10-character alphanumeric digital code.
  - Maps every address to a unique 4x4 meter grid using geospatial coordinates.
  - Designed to replace traditional PIN codes with hyper-local precision.
  - Developed indigenously with open-source, interoperable architecture.
- Digital Address Layer
  - Allows users to create personalized digital address handles
  - Consent-based sharing and revocation of address details.
  - Enables privacy, customization, and real-time address updates—similar to UPI.
- Used for
  - E-commerce deliveries, social welfare targeting, emergency services, telecom rollout, utility management, and personal address management.

Core Benefits of the policy:

- Accuracy: Eliminates ambiguity in legacy addresses.
- Inclusion: Serves both urban and rural populations; multilingual support.
- Governance: Aids in scheme targeting, disaster response, and infrastructure planning.
- Commerce: Reduces delivery failures in logistics and e-commerce.
- Privacy: User-controlled access and sharing of address data.

MISCELLANEOUS

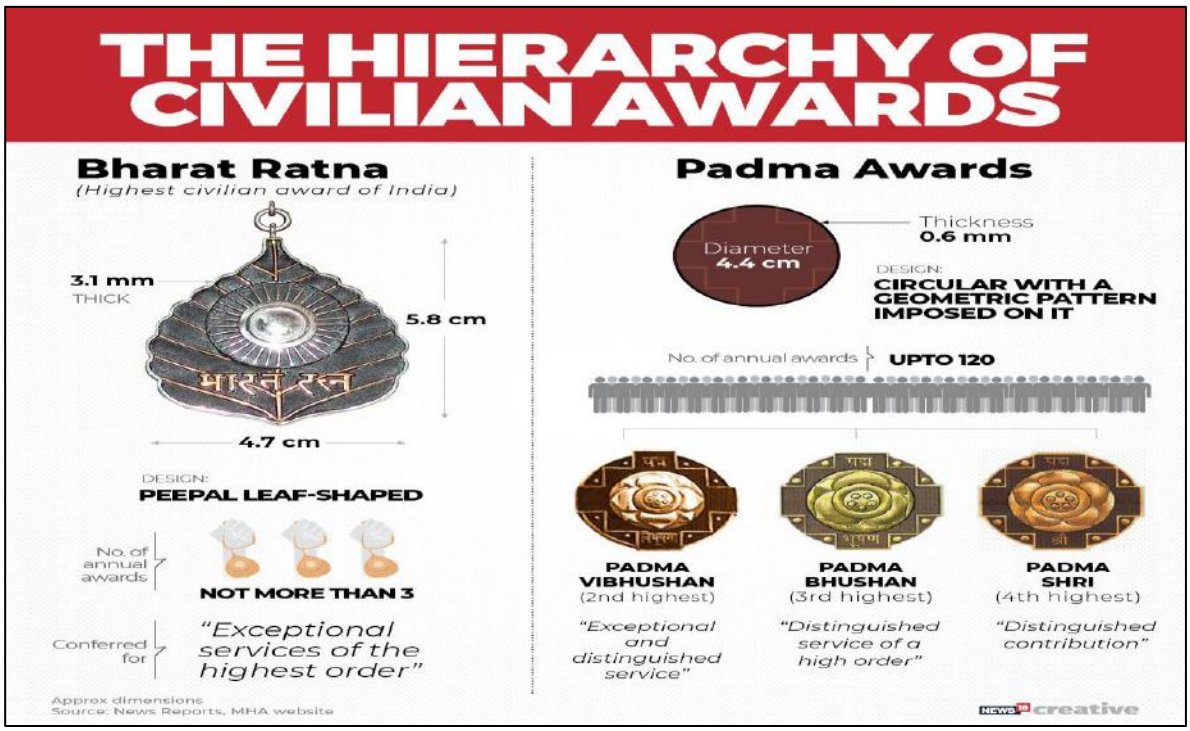
BHARAT RATNA

Context:

- Parliamentarians across party lines are petitioning the Union government to accord the Bharat Ratna to the Dalai Lama who recently celebrated his 90th birthday.

About Bharat Ratna Award:

- It is India's highest civilian award, granted by President to individuals for outstanding service across any field, irrespective of race, occupation, position, or gender. It was instituted by former President Dr. Rajendra Prasad on January 2, 1954.
- Article 18(1) of the Indian Constitution prohibits awardees from using 'Bharat Ratna' as a title, prefix or suffix to their name. However, they are allowed to include 'Awarded Bharat Ratna by the President' or 'Recipient of Bharat Ratna Award' in their biodata, visiting cards, letterheads, etc.
- The recommendations for the award are made by the Prime Minister of India to the President of India. Recipients receive a Sanad (certificate) signed by the President along with a medallion.
- Notably, the award does not come with any monetary grant. The award is also open to non-Indians, as demonstrated by the likes of Mother Teresa, Khan Abdul Ghaffar Khan, and Nelson Mandela.
- A maximum of three awards can be given each year, with an exception occurring this year 2024 and in 1999 when five and four individuals received the honour respectively.
- Dr. Sarvapalli Radhakrishnan, Dr. CV Raman, and Chakravarti Rajagopalachari were the first recipients of the Bharat Ratna in 1964.



DR. SHYAMA PRASAD MOOKERJEE

Context:

- The Ministry of Culture has launched a two-year nationwide commemoration to honour Dr. Syama Prasad Mookerjee.

About Dr. Shyama Prasad Mookerjee:

- Legacy: He played a crucial role in shaping India's political landscape post-independence and his contributions to education, governance, and national integration continue to inspire political leaders and citizens alike.
- Educational Reforms: Dr. Mookerjee was the youngest Vice-Chancellor of Calcutta University, where he made significant contributions to improving the educational system.
- Political Leadership: As the founder of the Bharatiya Jana Sangh (which later evolved into the Bharatiya Janata Party) in 1951, Dr. Mookerjee promoted the idea of "One Nation, One Flag, One Constitution" and staunchly opposed Article 370, which granted special status to Jammu and Kashmir.
- Industrial and Economic Vision: As India’s first Minister for Industry and Supply, Mookerjee contributed significantly to the establishment of the Indian industrial sector, emphasizing self-reliance and indigenous development.

MAINS

PAPER 1

EARTHQUAKES

Context:

- The recent earthquakes in Myanmar, Thailand, Tibet followed by recent in Delhi, exposed the nations vulnerability to it.

About Earthquakes:

- Earthquake is the sudden shaking of the ground caused by the passage of seismic waves through Earth's rocks.
- Earth's major earthquakes occur mainly in belts coinciding with the margins of tectonic plates.
- The earthquakes are divided into three zones: shallow, intermediate, and deep based on their depth which range between 0 – 700 km.
    - Shallow earthquakes have a focus 0 – 70 km deep.
    - Intermediate earthquakes have a focus 70 – 300 km deep.
    - Deep earthquakes have a focus 300 – 700 km deep.

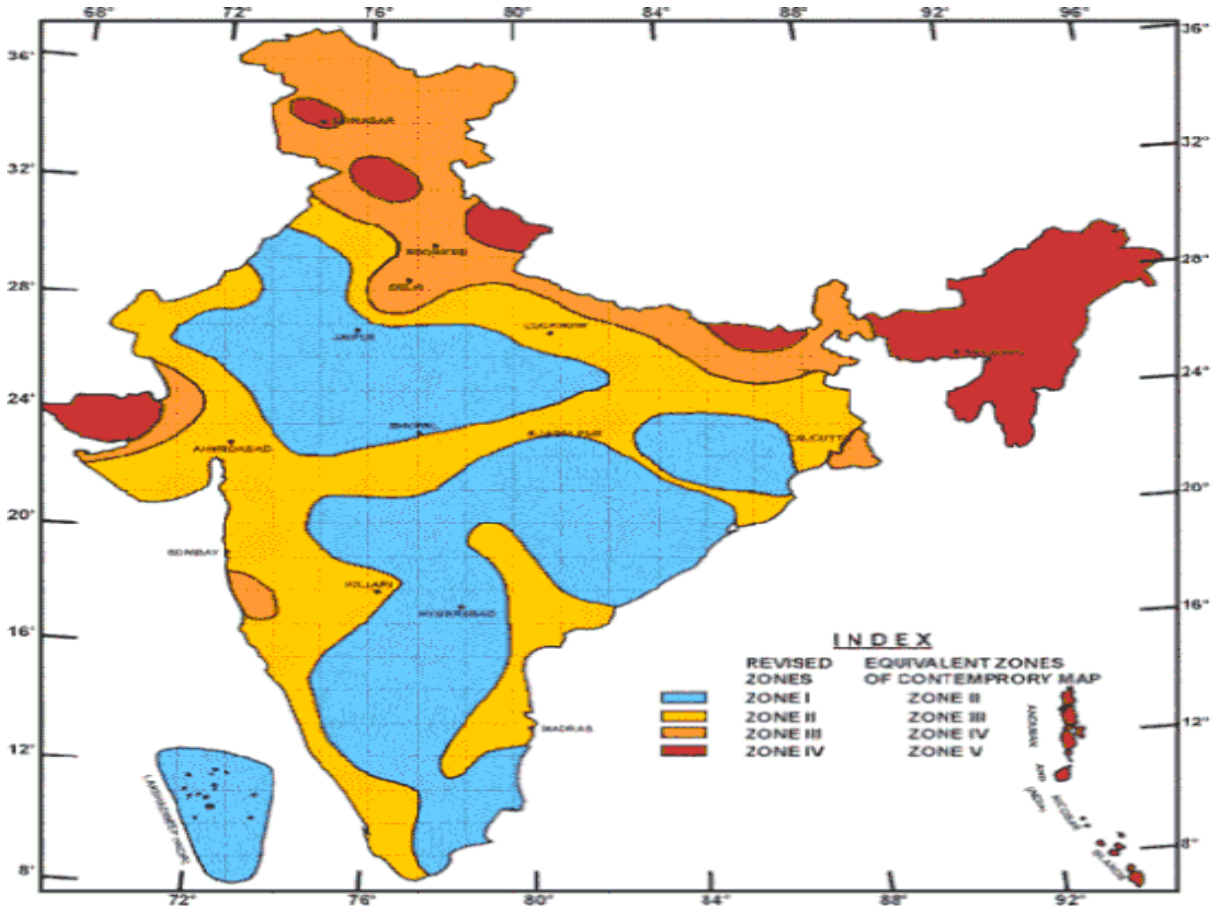
Position of India:

- India's seismic risk arises from the northward drift of the Indian Plate, colliding with the Eurasian Plate at 4–5 cm per year
- This collision forms the Himalayas, a region overdue for a "Great Himalayan Earthquake" (magnitude 8 or higher).
- Examples:
    - Bhuj earthquake (2001): Magnitude 7.7, over 20,000 deaths.
    - Nepal earthquake (2015): Magnitude 7.8, widespread devastation.

4 seismic zones of India (as per Bureau of Indian Standards):

- Zone II – Low Risk
    - Characterised by low seismic activity, with earthquakes rarely exceeding magnitude 4.9.
    - Covers much of southern India, including Karnataka, Tamil Nadu, Kerala, and parts of central India such as Madhya Pradesh.
    - This zone faces minimal earthquake hazards compared to other regions.
- Zone III – Moderate Risk
    - Experiences moderate seismic activity, with earthquakes typically between magnitude 5.0 and 6.0.
    - Includes regions such as- Western and central India, including Mumbai, Pune, and nearby areas, Coastal states like Andhra Pradesh and Odisha, parts of the Indo-Gangetic plains, including Delhi and Bihar.
- Zone IV – High Risk
    - Marked by frequent and strong seismic events, generally ranging from magnitude 6.0 to 6.9.
    - Major areas include- The Himalayan belt, covering Himachal Pradesh and Uttarakhand, Delhi, highlighting its significant seismic vulnerability, Regions in Kashmir, Punjab, and western Uttar Pradesh.
- Zone V – Very High Risk

- Identified as the most seismically active zone in India, where earthquakes often reach magnitude 7.0 or above.
- Comprises- the entire northeastern states, including Assam, Nagaland, Manipur, Mizoram, and Arunachal Pradesh, Northern Jammu and Kashmir, the Kutch region in Gujarat, parts of the Andaman and Nicobar Islands, which are also prone to tsunamis due to tectonic subduction activity.



Issues in Preparedness:

- Rapid urbanisation exacerbates the risk.
- Construction of buildings in liquefaction-prone soils, and poorly designed high-rises without structural retrofitting.
- Lack of public awareness
- Poor enforcement of seismic codes. For example in the recent earthquake in Myanmar, enforced codes were not implemented which have worsened the quake toll in 2025.

Way Forward:

- Rigorous enforcement of seismic codes for all new and existing structures.
- Retrofitting older buildings using steel jacketing, base isolation, and pile foundations. (Bangkok Uses high-strength concrete (30–40 MPa) and ductile detailing for earthquake resistance)
- Avoid construction on floodplains and liquefaction-prone zones. (example in Brahmaputra floodplain)
- Expand early warning systems to rural Zone V areas for timely evacuation.
- Public education campaigns on earthquake safety, kits, and drills.
- National dialogue involving urban planners, structural engineers, and local governments to mainstream seismic resilience in urban policy.

SOIL NUTRITION MANAGEMENT

Context:

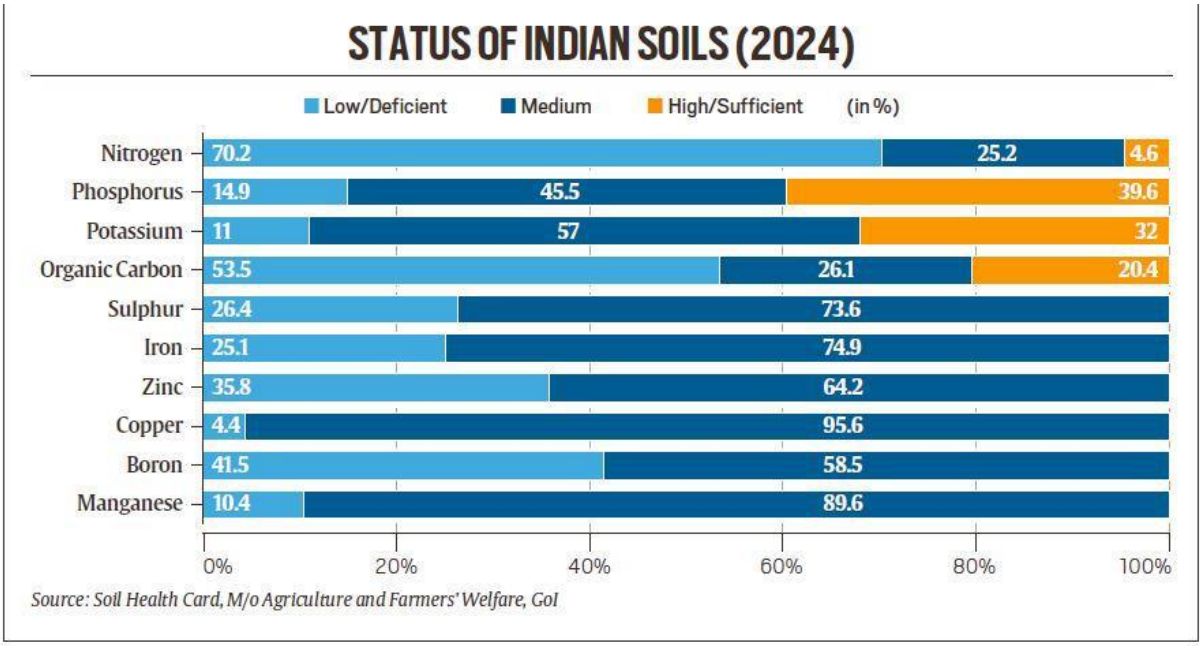
- Despite India's achievements in food production and poverty reduction, malnutrition among children remains persistently high. To improve both crop and human nutrition, India needs a paradigm shift from merely agriculture production to soil management.

Significance of soil nutrients:

- Soil micronutrient deficiencies not only impair agricultural productivity but also degrade the nutritional quality of crops.
- Crops grown on nutrient-deficient soils often mirror those deficiencies, leading to a silent but pervasive form of malnutrition in humans.
- For Example: Zinc deficiency in soils translates into low zinc content in cereals like wheat and rice, which in turn is linked to childhood stunting — a condition that affects the physical development, long-term cognitive health, as well as the professional life of a person.

Status of Indian Soils:

- Of more than 8.8 million soil samples tested under the Soil Health Card Scheme in 2024, less than 5 per cent have high or sufficient nitrogen (N), only 40 per cent have sufficient phosphate (P), 32 per cent have sufficient potash (K) and just 20 per cent are sufficient in soil organic carbon (SOC).



Significance of soil organic carbon:

- SOC is a critical parameter defining the physical, chemical, and biological properties of soil.
- Soil organic carbon (SOC) is the carbon stored in the organic matter of soil.
- SOC is essential for nutrient cycling, water retention, and carbon sequestration, which helps mitigate climate change.
- As per the Indian Institute of Soil Science (IISC), SOC in the range of 0.50- 0.75 per cent is adequate.
- Status of soil organic carbon is low in India.

Imbalanced Use of Fertilisers in India:

- In many regions, nitrogen (N) is overused, while phosphorus (P) and potassium (K) are underused.
- Punjab: N use exceeds recommendations by 61%, P use is 8% less than recommended and K use is 89% less
- Similar nutrient imbalance patterns are seen in several other states.

- The Imbalanced Fertiliser Use leads to suboptimal agricultural productivity.
- Nationwide, the fertiliser-to-grain response ratio has declined significantly from 1:10 in the 1970s to a mere 1:2.7 in 2015.

Issues with Granular Urea Application:

- Only 35-40% of nitrogen is absorbed by crops.
- Remaining nitrogen is released into the atmosphere as nitrous oxide, a GHG 273 times more potent than CO_2.
- It also leaches into groundwater as nitrates, contaminating drinking water.
- Imbalanced fertiliser use is contributing to environmental pollution rather than boosting yields.

Recommendations:

- Move from blanket fertiliser application to science-based, soil-specific, and crop-specific fertilisation.
- Strengthen Soil Health Card Scheme with real-time digital integration and farmer advisory.
- Incentivise use of potash, phosphate, sulphur, and micronutrient fortified fertilisers.
- Promote organic manures and biofertilisers to improve SOC levels.
- Recognise soil health as a public health imperative, not just an agricultural concern.
- Develop, implement, and scale region-specific, data-driven soil nutrition solutions
- Enhance crop productivity and nutritional quality

PAPER 2

NATIONAL SPORTS POLICY (NSP) 2025

Context:

- The Union Cabinet has approved the National Sports Policy (NSP) 2025, aiming to transform India into a global sporting powerhouse, with a strategic focus on success at events like the 2036 Olympic Games.

Key Features of NSP 2025:

- Landmark shift: Replaces 2001 Policy and marks a major shift in India's sports strategy after more than two decades.
- Stakeholders: Developed in collaboration with Central Ministries, State Governments, NITI Aayog, sports federations, athletes, and the public.
- Objective: Targets enhanced performance in global competitions, especially the 2036 Olympics and promotes health, social inclusion, and economic growth through sports.

Pillar	Focus Areas
Excellence on the Global Stage	Talent scouting, elite pathways, leagues, coaching, infrastructure, and athlete support.
Sports for Economic Development	Promotes sports tourism, local manufacturing, international events, start-ups, and private investment.
Sports for Social Development	Encourages inclusion of women, weaker sections, PwDs, and revival of traditional games.
Sports as a People's Movement	Drives mass participation, volunteerism, and diaspora engagement.
Integration with Education	Embeds sports into the school curriculum as per NEP 2020, enabling dual-career paths.

Evolution of Sports Ecosystem in India:

- Not a focal area post-independence: Post the British Raj, India's prime focus was on rebuilding the nation by addressing poverty, health, and education. Therefore, sectors like sports did not feature prominently in the national agenda.
- All-India Council of Sports: It was established in 1954 to advise on sports matters, support federations, and fund elite athletes. However, allocations were modest, resulting in athletes missing international.
- Dedicated Department of Sports: It was established in 1982 under the Ministry of Human Resource Development.
- First National Sports Policy: India had launched its first National Sports Policy (NSP) in 1984.The NSP 1984 aimed to improve infrastructure, promote mass participation, and raise standards in elite sports. It also stressed the importance of integrating sports with education, which was formalised in the 1986 National Education Policy.

- Revision of Sports Policy: In 2000, India created a dedicated Ministry of Youth Affairs and Sports (MYAS). A revised National Sports Policy was launched in 2001, setting clearer goals for mass participation and international excellence.
- Creation of NSDC: In 2011, the National Sports Development Code (NSDC) was introduced, aiming to regulate and professionalise National Sports Federations (NSFs). It addressed governance, anti-doping, age fraud, betting, gender issues etc. but as always, implementation remained the hurdle.
- New Schemes:
    - Target Olympic Podium Scheme (2014) identifies and support elite athletes who can win medals at the Olympics and other international events. It is administered by Sports Authority of India (SAI)
    - Khelo India Scheme (2017) aims to revive sports culture at the grassroots level and build a strong framework for talent identification and development. It conducts annual Khelo India Youth Games (KIYG) and University Games and provides scholarships for talented athletes (₹5 lakh/year for 8 years).

Challenges associated with India's Sports Ecosystem:

- Misgovernance: India's sports governance suffers from politicisation, red tape, and lack of professionalism. Mismanagement cases. E.g.- Wrestling Federation of India sexual harassment case (2023).
- Disproportionate focus on cricket: Cricket dominates more than 80% of India's sports market leaving very less space for other sports.
- Low athlete representation: Although India sent its largest-ever Olympic contingent of 117 athletes to the Paris 2024 Games, the number remains significantly lower than countries like the U.S. (594) and France (572).
- Discrimination based on gender: About 50% of girls drop out of sports (six times higher than boys) due to safety concerns, lack of role models, and body image issues.
- Overemphasis on academics: Indians usually prioritize academics over sports as a career and treat sports as extracurricular activity, not essential.

Way forward:

- Focus on grassroots talent identification: by launching structured scouting programs in rural, tribal, and underserved regions and leveraging initiatives like Khelo India and Fit India Movement to create a bottom-up approach.
- Strengthen sports infrastructure: by developing inclusive and accessible sports facilities at the district and block level.
- Gender Equality in Sports: by providing safe and inclusive spaces for girls and women in sports and establishing grievance redressal mechanisms for the same.
- Use of new technologies: by using AI, wearables, and data analytics for performance tracking and injury prevention.

INCLUSION OF WORD SECULAR IN INDIAN CONSTITUTION

Context:

- The remarks by Vice-President Jagdeep Dhankar criticising the inclusion of the word "secular" in the Preamble to the Constitution have led to controversy.

About Secularism:

- Meaning: Secularism refers to the separation of religion from the State. Secularism is crucial for any democratic country to function effectively because it prevents misuse of State power by religious majorities.
- Added through Amendment: 42nd Constitutional Amendment, 1976 (during the emergency) had introduced the word 'secular' in the Preamble. But secularism is inherent in the Constitution.
- Constitutional Provisions Related to Secularism:
    - Preamble- Declares India as a 'Secular' nation.
    - Article 14- Equality before law and equal protection of laws.
    - Articles 15- Prohibits discrimination on grounds of religion, race, caste, sex or place of birth.
    - Article 16- Prohibit discrimination in public employment on the basis of religion, race, caste, sex, descent, place of birth and residence.
    - Article 25- Freedom of conscience and right to freely profess, practice, and propagate religion (subject to public order, morality, health).
    - Article 26- Freedom to manage religious affairs.
    - Article 27- No compulsion to pay taxes for promotion of any particular religion.
    - Article 28- No religious instruction in state-funded educational institutions.
    - Article 29-30- Provides cultural and educational rights to the minorities.

Key Supreme Court Judgments on Secularism:

- Berubari Union Case (1960): The Supreme Court held that the Preamble is not a part of the Constitution and does not confer any substantive powers. It is only a key to understanding its provisions.
- Kesavananda Bharati Case (1973): A 13-judge bench ruled that secularism is a basic feature of the Constitution, which cannot be amended or abrogated by Parliament. The judgment stated that the State shall not discriminate against any citizen solely on the ground of religion.
- Minerva Mills Case (1980): While primarily addressing constitutional amendments during the Emergency, the Court recognised "socialism" as a constitutional ideal. It highlighted that Part IV (Directive Principles of State Policy) outlines the socialistic goals that the State must aim to achieve to ensure social, economic, and political justice.
- S.R. Bommai Case (1994): The Supreme Court reaffirmed that secularism is a basic feature of the Constitution. The case, dealing with Centre-State relations and dismissal of state governments, upheld that no government can violate the secular fabric of the nation.

Difference between Indian and Western Model of Secularism

- Separation between state and religion: In the West, secularism is conceived as complete separation of state and religion. But in India secularism, the state is not separate from religion, rather the state sees all religions as equal.
- Engagement between state and religion: While the Western idea maintains strict separation, Indian secularism believes in positive aid to religion. Thus, we have the state supporting religious minority institutions, state passing laws to stop harmful religious practices, etc. The State is aided in administration by religious virtues and values.
- Diversity: The Western model of secularism is not suited for India because India has a great variety in religion unlike the West which is largely having one majority religion. Diverse customs and practices are also promoted by the State in the Indian model.
- Inter as well as intra-religious matters: Indian concept of secularism is broader than western concept as it covers inter-religious conflicts as well as reforming religions from within. Example: Laws against animal sacrifices, devadasi system, etc.

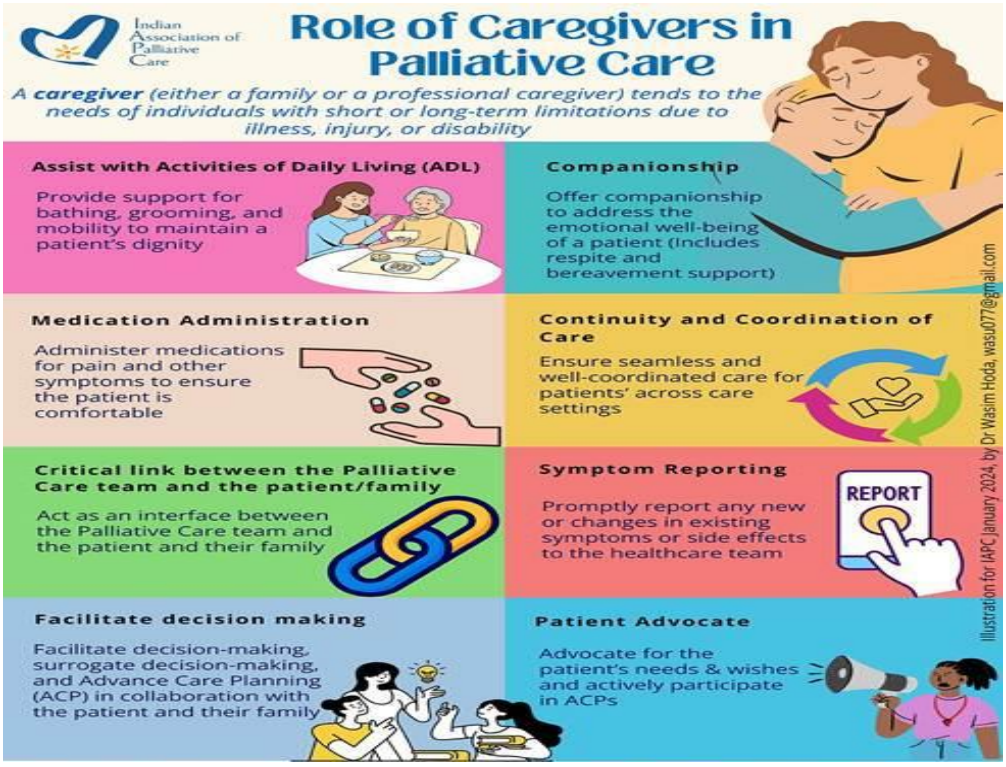
PALLIATIVE CARE IN INDIA

Context:

- The inclusion of palliative care in the National Health Policy of 2017 in India marked a pivotal step in addressing the gap. Each year, approximately 7.2 million Indians need palliative care, yet systemic inefficiencies hinder its effective delivery.

About Palliative Care:

- Definition: It is a form of specialised care addressing a person's physical, emotional, social and spiritual needs, remains a critical, yet underappreciated, component of health care. Unlike curative treatment that is aimed at eradicating disease, palliative care focuses on alleviating pain, reducing suffering, and improving quality of life — for patients and their families.
- Status at global level: According to WHO, about 40 million people globally require palliative care each year, with 78% of them living in low and middle-income countries. However, only 14% of those in need receive such care.
- Status in India: About 7-10 million people require palliative care annually, only 1%-2% have access to it. While India's doctor-population ratio of 1:834, surpasses the WHO recommended norm of 1:1000, the availability of medical practitioners specialising in palliative care is disproportionately low.



Need for Palliative Care in India:

- Rising elderly population: India's elderly population is projected to reach 192 million by 2031 and 340 million by 2050 (UNFPA, 2023).
- Higher proportion of NCDs: Non-communicable diseases (NCDs) account for 65% of all deaths, with rising cases of cancer, diabetes, and chronic respiratory illnesses (ICMR, 2022).
- Changing family structures: due to globalisation and urbanisation have weakened traditional caregiving mechanisms, increasing demand for formal palliative care.
- Budgetary constraints: No separate budget is allocated for the implementation of the National Palliative Care Program, palliative care is part of the 'Mission Flexipool' of National Health Mission (NHM).

- Limited Awareness: There is a lack of awareness and understanding about palliative care among the general public and healthcare professionals. Many people in India are not aware of the benefits of palliative care or confuse it with end-of-life care.
- Lack of Attention Towards Paediatric Care: About 98% of children facing moderate to severe suffering during their end of life reside in lower and middle-income countries like India.

Measures to Strengthen Palliative Care in India:

- Integration into overall health infrastructure: Palliative care can be integrated into primary healthcare and medical training by strengthening the implementation of the NPPC at the state level with adequate funding, human resources, infrastructure etc.
- Emulating successful models: Expand community-based models like the Kerala Model, which provides 70% of India's palliative care services.
- Increasing awareness: Campaigns can be launched to reduce stigma by enhancing the education and training of palliative care professionals and volunteers at various levels and settings.
- Use of PPP: Public-private partnerships should be encouraged for service expansion by adapting global best practices to suit India's socio-economic context.

MATERNAL HEALTH STATUS IN INDIA

Context:

- As per the Sample Registration System (SRS) 2019-21, India's MMR stands at 93 deaths per 1,00,000 live births, marking progress from 103 (2017-19).

About Maternal Mortality rate (MMR):

- The maternal mortality rate (MMR) represents the number of maternal deaths per 100,000 live births during a specific time period.
- A high MMR indicates poor access to quality healthcare, inadequate management of pregnancy complications, and broader social and economic inequalities.

Maternal Health Data in India:

- MMR in India has declined over the years — it was 103 in 2017-19, then 97 in 2018-20 and now 93 in 2019-21. Further, to understand the maternal mortality situation better, States have been categorised into three:
    - "Empowered Action Group" (EAG) States that comprise Bihar, Jharkhand, Madhya Pradesh, Chhattisgarh, Odisha, Rajasthan, Uttar Pradesh, Uttarakhand and Assam;
        - E.g.- Assam (167), MP (175)
    - "Southern" States which include Andhra Pradesh, Telangana, Karnataka, Kerala and Tamil Nadu
        - E.g.- Kerala (20), Telanagana (45), Tamil Nadu (49)
    - Other" States that cover the remaining States/Union Territories.
        - E.g.- Maharashtra (38), Gujarat (53), Punjab (98)

Causes: The 'Three Delays Model'

- Delay in Recognising Danger and Seeking Help
    - The husband and other family members often experience inertia, thinking that all deliveries are a natural process and so the mother-to-be can wait.
    - Also they may not have enough money or other issues at the family level that prevent them from going to a hospital.
- Delay in Reaching Healthcare Facilities

- Due to geographic remoteness, poor transport infrastructure or an overnight journey for a mother-to-be to reach a health facility. Many women die on the way.

- Delay in Receiving Adequate Care at the Facility
  - Shortage of specialists (66% vacancies in CHCs)
  - Poor infrastructure such as lack of blood banks, functional OTs.

Steps Taken:

- Empowered neighbourhood mothers and women's self-help-groups have resulted in a remarkable change
- Accredited Social Health Activists (ASHA) networking with Auxiliary Nurse Midwives (ANM) since 2005 (when the National Rural Health Mission (NHRM) was launched)
- Dial 108 for ambulance service, free referral transport under NHM
- The concept of the operationalisation of a minimum four FRUs [first referral units] per district of two million population,
- Audit and accountability for care quality

Way Forward:

- Focus on basic Antenatal care, institutional delivery, staff recruitment
- Strengthen FRUs, blood banks, emergency transport
- Fine-tune emergency obstetric care, invest in training
- Implement maternal death surveillance and response (MDSR) effectively
- Fill human resource gaps (especially specialists)
- Expand infrastructure with accountability
- Enhance community education and women empowerment

PHONE TAPPING

Context:

- Recent rulings by Madras and Delhi High Courts have brought to the fore divergent judicial views on when and how such surveillance can be justified.

About Phone Tapping:

- Phone tapping is the process of secretly listening to or recording conversations conducted over telephone or digital communication channels. It is a form of surveillance employed by law enforcement or intelligence agencies.
- Purpose:
  - To prevent crimes such as terrorism, corruption, organised crime, espionage, and cybercrimes.
  - To gather evidence during investigations against suspects.
  - To ensure national security, public order, or sovereignty of the country.
  - Used in exceptional circumstances where other means of information gathering are inadequate or impossible.

Legal framework for phone tapping in India:

- Indian Telegraph Act, 1885

- Section 5(2) allows central and state governments to intercept messages "on the occurrence of public emergency or in the interest of public safety".
- Grounds must align with reasonable restrictions under Article 19(2):

- Information Technology Act, 2000
  - Governs interception of emails, WhatsApp, and digital communication
- Indian Post Office Act, 1898
  - Permits interception of postal correspondence.

Judicial Interpretations:

- PUCL vs Union of India (1997)
  - the Supreme Court examined the constitutional validity of Section 5(2) of the Telegraph Act.
  - SC upheld Section 5(2) but imposed strict procedural controls:
    - Only Home Secretary (Centre or State) can approve interception.
    - Must be reviewed by a three-member committee (Cabinet Secy, Law Secy, Telecom Secy).
    - Valid for 2 months, subject to renewal.
    - Tapping must be a last resort if the objective can't be achieved by other means.
    - Incorporated into Rule 419A of Telegraph Rules.
- P. Kishore v. Secretary to Government Case, 2018
  - Madras HC Quashed MHA's phone-tapping order in a bribery case
  - Court's Rationale:
    - Tax evasion or bribery does not amount to "public emergency
    - Referred to a 2011 PIB notification: Tax evasion alone doesn't justify tapping.
    - it violated SC's 1997 PUCL safeguards; hence, evidence inadmissible

Way Forward:

- Enact a dedicated Surveillance Regulation Law with clear definitions and safeguards.
- Introduce judicial oversight mechanism for approving interception orders.
- Implement data minimization, necessity, and proportionality principles.
- Strengthen institutional accountability for misuse or procedural violations.
- Public transparency through periodic disclosures and independent audits.

CHILD TRAFFICKING

Context:

- Recently, over 271 girls were rescued in Bihar, 153 of them trafficked into orchestras, the remaining 118 forced into the flesh trade. The Patna High Court took cognizance of the issue and directed the Bihar Government to act urgently to ban employment of minors in such orchestras.

About Child Trafficking:

- As per the UN Palermo Protocol, child trafficking involves the recruitment, transportation, transfer, harboring, or receipt of children for exploitation, including forced labour, sexual abuse, and slavery.

Common forms of child trafficking:

- Sexual exploitation: This can include abusing children for commercial sexual exploitation or the production of child sexual abuse material.
- Forced labour: When children work under harsh conditions in various sectors, including agriculture, factories, mining or as domestic workers.
- Begging and petty crimes: Putting children to beg on streets or commit other crimes, such as theft.
- Children in armed conflict: Children are recruited as fighters, sexually exploited, or kept in domestic servitude during a conflict.
- Child marriage: Girls are married off to third parties for money or social status, often as part of harmful traditional practices.
- Illegal adoption: Trafficking babies and children for illegal adoption for their exploitation, often through deception or coercion of their parents or guardians.

Reasons behind child trafficking:

- Child trafficking thrives in environments of family dysfunction, lack of parental care, poverty, inequality and inadequate child protection.
- Traffickers often target children from extremely poor households or those who have been abandoned.
- Conflict, economic challenges and environmental disasters make children, especially unaccompanied and separated migrant children, increasingly vulnerable to trafficking.
- Traffickers also use online platforms, social media and the dark web to approach, exploit and control children, taking advantage of modern technology to evade detection and disseminate exploitative content. Unsupervised use of the internet and social media by children, often without appropriate safeguards, can further expose them to traffickers

Impacts on victims and society:

- Victims often suffer lifelong health issues, severe trauma-related disorders, anxiety, depression and difficulties in social integration.
- Child trafficking undermines healthy societal structures and perpetuates cycles of poverty and exploitation.
- It destroys childhood and can trap trafficked children in a cycle of violence and exploitation when they become parents themselves; it disrupts education and hinders community development.

Laws against child trafficking:

- The Immoral Traffic (Prevention) Act, 1956
- The Juvenile Justice (Care and Protection of Children) Act, 2015
- The Protection of Children from Sexual Offences (POCSO) Act, 2012
- The Bonded Labour System (Abolition) Act, 1976
- The Child and Adolescent Labour (Prohibition and Regulation) Act, 1986 (Amended in 2016)
- Provisions under the Bharatiya Nyaya Sanhita (BNS), 2023

Lacunae in the laws:

- Laws are comprehensive but poorly enforced
- Conviction rates remain low
- Most cases filed as "missing persons" or "kidnapping"
- Anti-Human Trafficking Units (AHTUs) underfunded
- Investigations that concern multiple States often collapse due to jurisdictional confusion and bureaucratic delay.
- When girls are rescued, many are sent right back to the same families that sold them.

Steps Towards Prevention: The "PICKET" Strategy

- P – Policy: Clear, zero-tolerance policies against child exploitation.
- I – Institutions: Dedicated units to monitor, prosecute and rehabilitate
- C – Convergence: Inter-agency cooperation with shared digital data.
- K – Knowledge: Grassroots awareness and survivor-informed intelligence.
- E – Economy: Make trafficking financially unviable through seizure and penalties.
- T – Technology: Use AI, heatmaps, tracking software to detect patterns and routes.

Way Forward:

- School and Community-Based Prevention
    - Schools must monitor student attendance consistently.
    - If a child is absent for an extended period, it should trigger alerts and mandatory reporting
    - Panchayats must maintain migration registers to track children leaving or arriving in villages.
- Strengthening Transport Vigilance
    - Railway Protection Force (RPF) should continue to monitor vulnerable corridors and conduct awareness campaigns at stations.
    - This model must extend to inter-State bus routes, local terminals and private carriers.
    - Transport department staff should be trained to spot signs of trafficking and report suspicious activity.
- Reforming Anti-Human Trafficking Units (AHTUs)
    - This model must extend to inter-State bus routes, local terminals and private carriers. Transport departments must train their staff to identify signs of trafficking.
- Strengthening Labour and Justice Mechanisms

- The Labour Department must be mandated to inspect, report and act.
- Prosecution must be time-bound and rehabilitation must be long-term and state-supervised.
- Children must not be sent back to the environments that enabled their exploitation.
- Victim compensation schemes must be activated and implemented without delay.

PENDENCY OF CASES

Context:

- India's judicial system is facing a severe backlog, with over 5 crore pending cases across the Supreme Court, High Courts, and subordinate courts, raising concerns over timely justice delivery.

Litigation Pendency in India:

- Pendency means undecided, undetermined case by court of law. Pending cases are increasing day by day this shows the incapability of the judiciary to deliver justice on time.
- The Right to Fair and Speedy trial is guaranteed as fundamental right under Article 21 (Right to life and personal liberty) of the Constitution of India, 1950, delay in justice delivery system infringe this right.
- Law commission stated that the delay in decision is as old as the law itself. The inordinate delay results in the miscarriage of justice and increases the cost of litigation.

Status of Litigation Pendency in India:

- Over 4.6 crore cases are pending in district and subordinate courts.
- 63.3 lakh in High Courts and 86,700 in the Supreme Court.
- Civil cases at the district court level are the most delayed, with only 38.7% resolved within a year; nearly 20% drag on for over 5 years.
- India has 15 judges per 10 lakh population; even at full strength, it would be only 19, against the Law Commission's 1987 recommendation of 50.
- The judicial system is operating at 79% of sanctioned strength.
- Between 2021 and March 2025, National Lok Adalats resolved over 27.5 crore cases, including 22.21 crore pre-litigation cases.

Reasons for Delay in Deciding Cases in India:

- Shortage of Judges and Court Infrastructure
  - India has an extremely low judge-to-population ratio — about 11 judges per million, compared to 107 per million in the US.
  - Vacancies across all levels remain unfilled for long periods, affecting timely case disposal.
  - Subordinate courts alone require over 5,000 new courtrooms and nearly 40,000 staff positions to support existing and additional judicial officers
  - Many courts lack basic infrastructure, trained staff, or digital case management systems, resulting in inefficiency and delays.
- Administrative and Procedural Inefficiencies
  - Lack of case management tools and uniform use of IT systems means cases are not tracked or prioritised efficiently.
  - Judges often deal with both civil and criminal matters, reducing specialisation and slowing case analysis.
  - Frequent transfers, absenteeism, and strikes by advocates disrupt the judicial schedule.
  - Traditional, manual processes still dominate many courtrooms, lacking automation and speed.
- High Volume of Cases and Low Disposal Rates

- A rising number of cases filed daily, coupled with a slow disposal rate, especially in subordinate courts, contributes to pendency.
- Government is the largest litigant, accounting for nearly half of all pending cases, often with ministries or departments suing one another.
- Large volumes of frivolous or repetitive cases, and Public Interest Litigations (PILs) filed without genuine public interest, further clog the system.

- Frequent Adjournments and Litigation Misuse
  - Deliberate adjournments by lawyers or litigants, even in trivial matters, delay proceedings significantly.
  - Abuse of procedural tools and filing of false or frivolous cases take up valuable court time.
- Legal and Social Factors
  - Increasing legal awareness and growing rights-consciousness among citizens has led to higher litigation rates.
  - There is a rise in criminal cases, particularly crimes against women, increasing the burden on police, judiciary, and prisons.
  - Constant amendments to laws and complex, overlapping legislations require more judicial time to interpret and apply.
- Lack of Alternative Dispute Resolution (ADR) Promotion
  - Insufficient push towards mechanisms like mediation, arbitration, or conciliation keeps minor disputes in the court system.
  - A lack of awareness and institutional support for ADR increases dependency on formal litigation.

Impact of Pendency of cases on the Judicial System:

- Justice delayed is justice denied. Delay in case disposal undermines the right to life and liberty under Article 21 of the Constitution
- Even simple civil matters take years to resolve; many criminal cases have remained pending for over 15 years, with undertrial prisoners languishing in jails.
- Prolonged pendency leads to overcrowded prisons, often exceeding 150% of their capacity.
- Undertrials, many not yet proven guilty, remain incarcerated for extended periods, infringing their basic human rights and dignity.
- Lengthy delays discourage people from seeking legal remedies, leading to loss of faith in the system.
- Many resort to extra-legal methods like bribery or informal settlements to avoid slow judicial processes, indirectly fostering corruption.

Way Forward:

- Expanding Court Capacity
  - Increase Working Days & Shifts: Extend court functioning hours, including holidays, by introducing morning/evening shifts and additional benches
  - Fast Track Courts: Expand the fast-track court model beyond criminal cases to include civil and commercial matters.
- Filling Vacancies and Appointing Ad-Hoc Judges
  - Vacancy Backlog: Expedite the appointment of judges at all levels, especially in subordinate courts.
  - Ad-Hoc Appointments: Utilize provisions under Articles 127 and 128 of the Constitution for appointing retired or eligible judges to tackle backlog.
- Strengthening Court Administration

    - Appointment of Court Managers: Deploy trained professionals to assist judges in administrative tasks, allowing them to focus solely on adjudication.
    - Trained Support Staff: Skilled clerical and technical staff should be recruited for efficient court management.
- Effective Case and Time Management
    - Time-Bound Disposal: Set time limits for routine matters, supported by annual action plans and monitoring systems.
    - Discouraging Adjournments: Enforce Order 17 of the Civil Procedure Code strictly—limit adjournments to three and impose penalties for delays.
    - Avoiding Frivolous Litigation: Filter out baseless cases early through stringent scrutiny by the judiciary.
- Leveraging Technology
    - Digital Courts: Continue and expand e-filing, virtual hearings, online document submission, and real-time tracking of case status.
    - Use of AI: Deploy Artificial Intelligence for routine, repetitive, and pattern-based cases (e.g., traffic fines, cheque bounce cases).
- Alternative Dispute Resolution (ADR)
    - Mediation, Arbitration, Lok Adalats: Promote out-of-court settlements to reduce litigation load
    - Success of Lok Adalats: Between 2021 and March 2025, Lok Adalats resolved over 27.5 crore cases, including 22.21 crore pre-litigation and 5.34 crore pending cases.

PAPER 3

CONTRACTUALIZATION IN INDIA'S FORMAL MANUFACTURING

Context:

- According to the Annual Surveys of Industries (ASI), the share of contract labour in the manufacturing workforce doubled from 20% in 1999-2000 to 40.7% in 2022-23, cutting across all industries.

About Contractual jobs:

- Contractual jobs involve working for a specific period or on a project basis, as defined by a contract between the employer and the employee.
- These jobs can be full-time or part-time, and their duration can vary significantly.
- Contractual work offers flexibility for both employers and employees, allowing them to address specific needs or projects without long-term commitments.

Issues of contract labours:

- The primary motivation behind contractualisation is not to enhance skills or adaptability but to reduce labour costs and bypass legal obligations under core labour laws.
- Contract labourers in India face numerous challenges, including unequal pay, job insecurity, lack of social security benefits, and vulnerability to exploitation.
- These issues stem from a combination of factors such as weak implementation of labor laws, lack of awareness among workers, and the inherent nature of contract employment, which often prioritizes flexibility over worker welfare.
- Contract workers earn on average 14.5% less than regular workers. The wage gap widens to 31% in large enterprises, indicating systemic exploitation. In some industries, employers spend 50–85% less on contract labour compared to regular employees.
- Being hired through contractors, these workers often fall outside the ambit of key protections under laws like the Industrial Disputes Act, making them more vulnerable to unfair dismissals and poor working conditions.
- Short-term contracts lead to high labour turnover and discourage investment in skill development or on-the-job training, harming both the workers' long-term employability and firm-level innovation.

Impacts:

- Principal-Agent Problem refers to the misalignment of goals between two parties (in this case, the employer (principal) and the contractor (agent)). Contractors may prioritize their own profits over the employer's quality standards, leading to poor supervision and inefficient labour use.
- In contract work, workers may shirk responsibilities leading to moral hazard, knowing that accountability is diffused between the employer and the contractor.
- Contractual jobs are usually short-term, leading to high turnover rates. This deters employers from investing in skill development or innovation, negatively affecting long-term productivity.
- Labour productivity (measured as real net value added per worker) is 31% lower in Contract Labour-Intensive (CLI) enterprises compared to Regular Labour-Intensive (RLI) enterprises.
- In small enterprises (less than 100 workers), the gap widens to 36%, due to greater dependence on contract workers

- Medium enterprises (100–300 workers) show a 23% gap, while labour-intensive sectors face the worst—a 42% productivity deficit.
- Capital-Intensive CLI Enterprises: Capital-intensive firms rely more on machines than human labour. In such firms, contract workers may still be productive because they're used in supportive roles. These firms show a 17% productivity gain, but they form only 20% of formal manufacturing.

Laws Governing Contractual Labour in India:

- Contract Labour (Regulation and Abolition) Act, 1970: Regulates the employment of contract labour and seeks its abolition in certain cases. Ensures basic welfare provisions like canteen, first-aid, and wages but implementation is weak.
- Code on Industrial Relations, 2020 (yet to be fully implemented): Allows for fixed-term employment directly by employers and mandates social security benefits for non-permanent workers, attempting to formalise contract roles without third-party contractors.
- Factories Act, 1948 and Minimum Wages Act, 1948 apply to all workers including contractual ones, but enforcement remains inadequate.
- Building and Other Construction Workers Act offers some safeguards for contract workers in construction.

Way Forward:

- Implement Labour Code on Industrial Relations (2020)
    - The central government, in 2020, introduced a labour code on industrial relations, which aims to provide greater flexibility in hiring and firing. The code allows firms to hire non-regular workers on fixed-term contracts directly without third party contractors, though it also seeks to curb the exploitation of non-permanent workers by mandating the provision of basic statutory employment benefits.
    - However, as the labour code awaits implementation, labour unions warn that the increased flexibility in hiring non-regular workers could accelerate informalisation and further erode quality of jobs in the formal sector.
- Incentivising Longer Fixed-Term Contracts:
    - Policymakers could offer concessions in social security contributions to firms adopting longer-duration contracts.
    - Could also provide subsidised access to government skilling programs to firms.
    - This would promote workforce stability, skill development, and address union concerns over precarious employment.

THALI INDEX

Context:

- The publication of the survey of household consumption expenditure for 2023-24 by the National Statistics Office in January 2025 has been followed by a flurry of estimates of poverty in India. One among them is the 'Thali Index', which takes the focus away from calorie-based estimates to measure poverty.

About Thali Index:

- Central to Indian way of living: Given the centrality of the thali in Indian life, it would be appropriate to treat it as the metric by which to measure the standard of living. This implies measuring the standard of living in terms of food.
- Provides alternative to calorie-based poverty: It critiques poverty measurement based solely on calorie intake and physiological needs, calling it outdated and inadequate in capturing real-life deprivation. It serves as a practical tool for evaluating poverty and guiding food subsidy policies.

- Shows widespread poverty: In 2023-24, up to 40 per cent of the rural population could not afford two thalis a day. In urban India, up to 10 per cent of the population could not afford two thalis a day. These findings indicate that levels of food deprivation are much higher than what are implied by the poverty estimates.

Brief review of poverty estimation in India:

- Dadabhai Naoroji's book 'Poverty and Unbritish Rule in India' (1901): It made the earliest estimation of poverty line. It was based on the cost of a subsistence or minimum basic diet such as rice, dal, vegetables, ghee, vegetable oil, and salt.
- National Planning Committee (1938): It assessed poverty based on a minimum standard of living perspective in which nutritional requirements were implicit.
- Planning Commission Expert Group (1962): It formulated the separate poverty lines for rural and urban areas (₹20 and ₹25 per capita per year respectively).
- VM Dandekar and N Rath (1971): It made the first systematic assessment of poverty in India, based on National Sample Survey (NSS) data. It was derived from the expenditure that was adequate to provide 2250 calories per day in both rural and urban areas.
- Alagh Committee (1979): It was constituted by the Planning Commission, and it constructed a poverty line for rural and urban areas on the basis of nutritional requirements and related consumption expenditure.
- Lakdawala Committee (1993): It calculated poverty based on calorie consumption as earlier.
- Tendulkar Committee (2009): It shifted from calorie-based poverty line to one based on actual private consumption expenditure, including health and education. It introduced a uniform poverty line basket for both rural and urban areas (earlier, calorie norms were different for each). It computed poverty lines for 2004-05 at a level that was equivalent, in Purchasing Power Parity (PPP) terms to Rs 33 per day.
- Rangarajan Committee (2014): It was set up in the backdrop of national outrage over the Planning Commission's suggested poverty line of ₹22 a day for rural areas. It restored calorie norms (2400 kcal rural, 2100 kcal urban) and added norms for protein and fat intake. However, it considered basic non-food expenses more comprehensively (education, housing, clothing, etc.).

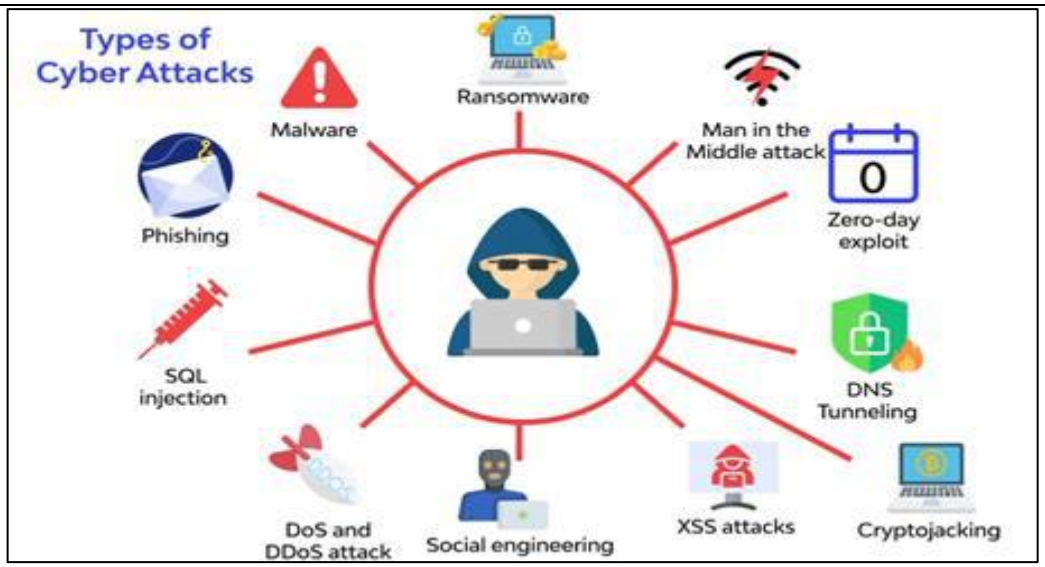
CYBER-CRIMES IN INDIA

Context:

- Cybercrime has become one of the most critical and pressing concerns across India over the past couple of years, with Delhi being the hotspot. According to Lokniti-CSDS Survey, Delhi residents have lost over ₹700 crore in 2024 to cybercrime.

About Cyber-crimes:

- Cybercrime refers to criminal activities that utilize computers and networks as either the primary tools or the targets.
- These illegal acts can be driven by a variety of motives, including financial gain, political agendas, or personal revenge.
- It aims to protect against the unauthorized access to data and misuse of technologies.
- According to a CERT-In report, over 3.94 lakh cyber security incidents were reported in 2020 in India, an increase of 63% from the previous year.



Types of Cyber-crimes:

- Stalking: Cyber stalking is use of the Internet or other electronic means to stalk someone
- Hacking: "Hacking" is a crime, which entails cracking systems and gaining unauthorized access to the data stored in them.
- Phishing: Phishing refers to the receipt of unsought emails by customers of financial institutions, asked them to enter their username, password or other personal information to access their account for some reason.
- Squatting: Cyber-squatting is the act of registering a famous domain name and then selling it for a fortune.
- Software Piracy: It is an illegal reproduction and distribution of software for business or personal use. This is considered to be a type of infringement of copy right and a violation of a license agreement.
- Cyber pornography: This would include pornographic websites; pornographic magazines produced using computers (to publish and print the material) and the Internet (to download and transmit pornographic pictures, photos, writings etc).
- Sale of illegal articles: This would include sale of narcotics, weapons and wildlife etc., by posting information on websites, auction websites, and bulletin boards.
- Cyber-terrorism: Cyber-terrorism is the adaptation of terrorism to computer resources, whose purpose is to cause fear in its victims by attacking electronic resources.
- Cyber Defamation: This occurs when defamation takes place with the help of computers and / or the Internet. E.g. someone publishes defamatory matter about someone on a website or sends e-mails containing defamatory information to all of that person's friends.

Impacts of Cyber-crimes:

- Financial Losses: Cybercrimes like online scams, phishing, and ransomware attacks can lead to significant financial losses for individuals. According to the report, 27% victims in Delhi lost ₹10,001–₹50,000, and 14% lost over ₹50,000.
- Data Breaches and Identity Theft: Individuals are increasingly vulnerable to data breaches where their personal information is stolen and used for fraudulent activities.
- Emotional Distress: Cyberbullying, online harassment, and stalking can cause severe emotional and psychological harm.
- Disruptions to Operations: Cyberattacks can disrupt business operations, leading to downtime, loss of productivity, and potential legal and regulatory challenges.

- Intellectual Property Theft: Businesses face the risk of cybercriminals stealing valuable intellectual property, impacting their competitive edge.
- Threats to Critical Infrastructure: Cyberattacks on critical infrastructure, such as power grids, transportation systems, and financial institutions, can have serious consequences for national security and public safety.
- Trust Deficit: Erodes public trust in digital banking and government systems.

Challenges in monitoring cyber-crimes:

- Server Location and Laws of Different Countries makes it difficult to track the culprits.
- Inadequate cyber police staffing and training.
- Outdated investigation tools in many states.
- Digital illiteracy and socio-economic divide in access to cyber safety tools.
- Use of phones/whatsapp to send and receive messages, concerns the government because the communications sent via such devices and applications are encrypted and could not be monitored and consequently hinders the country's efforts to fight terrorism and crime.

Steps Taken by Government to Strengthen Cybercrime Mechanism:

- Indian Cyber Crime Coordination Centre (I4C) set up under MHA for comprehensive handling of cybercrime.
- Seven Joint Cyber Coordination Teams (JCCTs) formed in cybercrime hotspots to enhance inter-state coordination.
- National Cyber Forensic Laboratory (Investigation) established in Delhi to assist state police in cyber forensic analysis,
- National Cyber Forensic Laboratory (Evidence) established in Hyderabad to support evidence analysis under IT and Evidence Acts.
- National Cyber Crime Reporting Portal (cybercrime.gov.in) launched for public reporting, with focus on crimes against women and children.
- Citizen Financial Cyber Fraud Reporting System operational with Helpline 1930; saved ₹2400+ crore in 7.6 lakh complaints.
- SIM/IMEI Blocking: Over 5.8 lakh SIM cards and 1.08 lakh IMEIs blocked to curb cyber frauds.
- Cyber Hygiene Training provided to 6800 govt officials and 35,000 NCC cadets
- Awareness Initiatives include: SMS alerts, social media (Cyber Dost), radio campaigns, MyGov promotions, etc.

WAYS IN WHICH AI IS TRANSFORMING INDIA

Context:

- TeamLease data shows AI use across industries stood at 48% in FY2024 in India, with manufacturing alone rising from 8% to 22% in just one year.

About Artificial Intelligence:

- Definition: Artificial Intelligence (AI) refers to the simulation of human intelligence in machines that are programmed to think and learn like humans, enabling them to perform tasks that typically require human intelligence, such as learning, problem-solving, and decision-making.
- Characteristics: The ideal characteristic of artificial intelligence is its ability to rationalize and take actions that have the best chance of achieving a specific goal.
- Components: Machine Learning is a subset of AI that involves the development of algorithms that allow computers to learn from data without being explicitly programmed. Deep Learning is a subset

of ML that uses artificial neural networks to learn from data in a way that is similar to how the human brain learns.

- Governance of AI in India: NITI Aayog, has issued some guiding documents on AI Issues such as the National Strategy for AI and the Responsible AI for All report.

Types of Artificial Intelligence:

- Reactive AI: It uses algorithms to optimize outputs based on a set of inputs. E.g.- Chess playing AI are reactive systems that optimize the best strategy to win the game.
- Limited Memory AI: It can adapt to past experiences or update itself based on new observations or data. Often, the amount of updating is limited, and the length of memory is relatively short. E.g.- Autonomous vehicles can read the road and adapt to novel situations, even learning from past experience.
- Theory-of-mind AI: They are fully adaptive and have an extensive ability to learn and retain past experiences. These types of AI include advanced chat-bots that could pass the Turing Test, fooling a person into believing the AI was a human being.
- Self-aware AI: As the name suggests, become sentient and aware of their own existence. Still, in the realm of science fiction, some experts believe that an AI will never become conscious or alive.

Applications of Artificial Intelligence:

- Healthcare: It can enhance diagnosis accuracy, personalized treatment, streamline healthcare operations, accelerate medical research and innovation, etc. E.g.- Recently, ICMR issued a guiding document- "The Ethical Guidelines for Application of AI in Biomedical Research and Health care" for AI application in the health sector.
- Education: AI could open new possibilities for innovative and personalised approaches catering to different learning abilities. E.g.- IIT Kharagpur has collaborated with Amazon Web Services to develop the National AI Resource Platform (NAIRP).
- Judiciary: It can be used to improve legal research and analysis, automate documentation and case management, enhance court processes, online dispute resolution, etc. E.g.- SUVAS is an AI system that can assist in the translation of judgments into regional languages.
- Cybersecurity: It can be used to detect and prevent cyber threats, identify anomalous activities, analyze large volumes of data for patterns and vulnerabilities, enhance network and endpoint security, automate threat response, etc.

Opportunities for India in AI:

- Economic Transformation: AI has the potential to significantly boost productivity, efficiency, and innovation across sectors like healthcare, education, agriculture, and manufacturing.
- Skill Development: With strategic planning, AI can generate new job opportunities, particularly in AI development, data science, and allied industries.
- Global Leadership Potential: India can position itself as a voice for the Global South in shaping inclusive and ethical global AI norms.
- Public Service Delivery: AI can enhance governance through improved service delivery, predictive policymaking, and efficient public resource management.
- Data-Driven Innovation: With vast public datasets, India can drive indigenous innovation, provided governance mechanisms ensure data security and equitable access.

Challenges in India's AI Journey:

- Absence of a Comprehensive National AI Strategy: Current initiatives like the IndiaAI Mission lack strategic clarity and democratic oversight.

- Governance Gaps: Without clear regulatory frameworks, risks such as bias, discrimination, surveillance, and loss of accountability may arise.
- Workforce Displacement: Automation threatens jobs, especially in sectors like IT, where firms like TCS, Infosys, and Wipro are already shedding roles.
- Technological Dependence: Lack of indigenous AI capabilities increases vulnerability to global tech dependencies and geopolitical risks.
- Socio-Economic Inequalities: Without inclusive planning, AI adoption may deepen digital divides and marginalisation.
- Energy & Infrastructure Demands: AI is highly energy-intensive, exacerbating challenges related to power and water resources.

Way Forward:

- Formulate a National AI Strategy: Develop a democratically debated, Cabinet-endorsed AI policy to guide ethical and inclusive AI adoption.
- Establish a Parliamentary Standing Committee: on AI & Emerging Technologies to ensure legislative oversight and public accountability.
- Inclusive Stakeholder Engagement: Involve industry, academia, civil society, workforce representatives, and policymakers to build consensus.
- Regulatory & Ethical Frameworks: Prioritise safeguards against bias, discrimination, data misuse, and monopolistic practices.
- Reskilling & Workforce Transition: Invest in large-scale skilling programs to prepare citizens for AI-driven economic shifts.
- Leverage India's Global Position: Actively participate in shaping global AI governance through platforms like the Global Partnership on AI.
- Focus on Indigenous Innovation: Strengthen domestic AI research, reduce technological dependencies, and ensure data sovereignty.

GENETICALLY MODIFIED (GM) CROPS

Context:

- Prime Minister Narendra Modi's call for "Jai Anusandhan" (Hail Innovation), backed by a ₹1 lakh crore Research, Development, and Innovation (RDI) fund, aims to transform Indian agriculture. However, this vision needs the commercial adoption of genetically modified (GM) crops, which have been stuck in regulatory mechanism.

About GM crops:

- Definition: These are plants whose DNA has been altered using genetic engineering techniques. These are also referred as genetically engineered (GE) plants, transgenic crops, living modified organisms (LMOs) or biotech crops.
- Origin: GM crops were first introduced in the USA in 1994 with the Flavr Savr tomato, which had been genetically modified to slow tomato's ripening process, delaying softening and rotting.
- Global status: As of 2023, over 200 million hectares of GM soyabean, maize, canola, and more are in cultivation across 76 countries. USA, Brazil, Argentina, India, and Canada are the five top GM-growing countries, together accounting for approximately 90% of area of the GM cultivation.
- Development processes:
    - Gene Gun Approach: DNA-coated metal particles arebombarded into plant cells

- Agrobacterium Approach: Bacterium Agrobacterium tumefaciens transfers the desired gene into plant cells.
- Electroporation: Used when the plant tissue does not contain cell walls. In this technique, electric pulses are used to create miniature pores in the plant cell through which the DNA enters.
- Microinjection: Used to directly inject foreign DNA into cells.

GM crops in India:

- Regulation: Genetic Engineering Appraisal Committee (GEAC) approves large-scale use and release of GMOs. It was established under Environment (Protection) Act, 1986 and it functions in the Ministry of Environment, Forest and Climate Change (MoEF&CC).
- Major GM crops in India:
  - Bt Cotton: The only GM crop approved for commercial cultivation in India (since 2002). It is resistant to cotton bollworm. In India, the adoption of Bt cotton has led to significant increases in cotton production, making the country a leading global producer.
  - Bt Brinjal: It was approved by GEAC in 2009 but later environment ministry imposed a moratorium, citing the need for more studies and public consultations.
  - GM Mustard Crop (DMH-11): It was developed by Centre for Genetic Manipulation of Crop Plants (Delhi University). However, it has not been released for commercial cultivation yet.

Benefits of GM crops:

- Control diseases: GM crops can be engineered to resist pests and diseases, reducing the need for chemical pesticides. E.g.- Bt cotton produces its own insecticide, effectively controlling bollworm infestations.
- Can sustain climate change: GM crops can be designed to withstand extreme weather conditions, a critical advantage in the face of climate change. E.g.- Drought-tolerant maize varieties can maintain yields under water-stressed conditions.
- Address hidden hunger: Biofortification through genetic modification can enhance the nutritional value of crops. E.g.- Golden Rice, enriched with beta-carotene, aims to address Vitamin A deficiency in developing countries.
- Higher shelf life: GM technology can be used to develop crops with extended shelf life, significantly reducing post-harvest losses.
- Developing new vaccines: Plants can be genetically modified to produce vaccines, antibodies, and other pharmaceutical compounds. This approach, known as "biopharming," could potentially reduce the cost and increase the accessibility of certain medicines.

Challenges associated with GM crops:

- Loss of biodiversity: There's concern about potential gene flow to wild relatives, which could create "superweeds" resistant to herbicides.
- Safety issues: While numerous studies have found GM foods safe for consumption, concerns persist about potential long-term health effects. E.g.- StarLink corn controversy.
- Commercialisation of farming: While GM crops can increase yields and farmer incomes, as seen with Bt cotton in India, there are concerns about market concentration and farmer dependence on seed companies.
- Ethical issues: Altering the genetic makeup of crops is inherently unethical, disrupting the natural order of things. This can be linked to concerns about religious or cultural beliefs about what is considered acceptable manipulation of nature.

Way Forward:

- Transparency towards trials: by establishing an online portal where all trial data and results are published in real-time.
- Public-Private Partnerships: by creating a framework for collaborative research between public institutions and private companies. This can help balance profit motives with public interest and ensure that GM technology addresses local agricultural needs.
- Strengthen regulatory framework: to create a clear, science-based approval process for GM crops by establishing an independent biotechnology regulatory authority with representation from various stakeholders.

INDIA'S ENERGY TRANSITION

Context:

- India's energy demand is rapidly increasing and is expected to double by 2030 (IEA). To meet this sustainably, India targets 500 GW of non-fossil fuel capacity by 2030 and net-zero emissions by 2070, aligning with its Paris Agreement commitments.

India's Energy Status (As per Energy Statistics India 2025):

- Total Electricity Generation in FY 2023-24 was approx. 15,20,000 GWh (Renewable + Non-Renewable combined)
- Total Renewable Energy Potential (March 2024) is 21,09,655 MW (Wind Power: 11,63,856 MW, Solar Energy: 7,48,990 MW and Large Hydro: 1,33,410 MW)
- Per-capita consumption of energy has increased from 14,682 Mega Joule/person during FY 2014-15 to 18,410 Mega Joule/person during FY 2023-24.
- Top contributors of renewable energy:
    - Rajasthan: 20.3%
    - Maharashtra: 11.8%
    - Gujarat: 10.5%
    - Karnataka: 9.8%

Lacunas in India's Power Sector:

- 20%-30% of electricity generated lost in transmission and distribution.
- Around 75% electricity is from coal leading to high GHG emissions.
- Infrastructure gaps such as outdated grids, frequent outages, and electricity theft in tier 2 & 3 cities.

Role of AI in energy sector:

- Machine learning models can predict generation and demand fluctuations, helping grid operators maintain balance.
- Smart grids can detect faults, reduce transmission losses, and integrate renewables efficiently.
- AI-powered systems adjust energy supply based on real-time usage, significantly reducing wastage and costs.
- AI also supports consumer-side energy efficiency by encouraging behaviours that reduce peak-hour strain and promote off-peak usage.

Challenges associated:

- Outdated infrastructure, high electricity theft, and frequent outages mainly in tier 2 and 3 cities.
- Fragmented data systems hinder the use of AI in energy forecasting and grid optimisation.

- Financial barriers particularly in smaller utilities as they struggle to meet the high upfront costs and limited government support.
- Lack of supportive policy frameworks and guidelines dampens the investments in AI technologies.
- Shortage of AI and data analytics experts limits the sector's ability to leverage AI solutions, while growing cybersecurity risks.

Global best practices:

- Barcelona: Smart meters for real-time energy management.
- Los Angeles: Cloud-based analytics for predictive distribution.
- Germany: Specialised machine learning training for energy professionals.
- UK: Retraining programmes for workers impacted by automation.
- Copenhagen: Consumer empowerment through energy-saving initiatives.
- New York: Strong cybersecurity protocols for data safety.

Way Forward:

- Invest in smart grids, meters, and cloud platforms.
- Formulate clear guidelines and incentives for AI adoption.
- Develop a skilled workforce in AI and data analytics.
- Protect critical energy data systems from cyber-attacks.
- Addressing ethical concerns such as fairness and job impacts along with community engagement and workforce reskilling.

Conclusion:

- A collaborative effort involving government support, private investment, and community engagement will be key to ensuring that AI's benefits are sustainable and accessible across urban and rural areas.

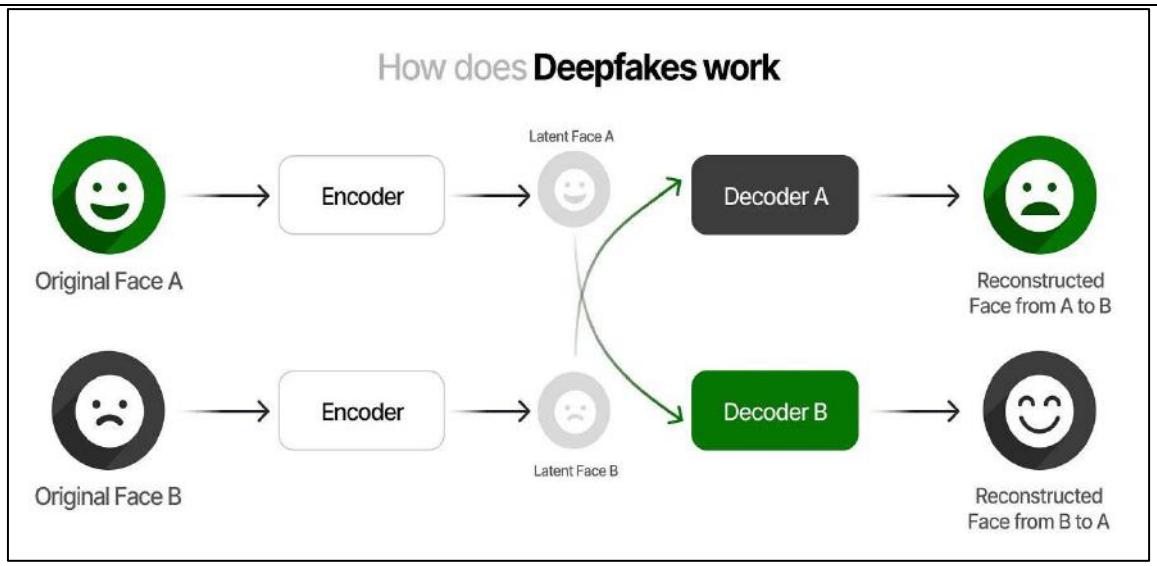
DEEPFAKES: THREATS AND REGULATIONS

Context:

- Denmark has proposed extending copyright protections to individuals' facial features, appearance, and voice to avoid the misuse of Deepfake.

About Deepfake:

- Deepfakes are a form of synthetic media which depict believable and realistic videos, pictures, or audio of events that never happened — they show real people doing or saying things that they never did or said.
- The volume of deepfake content online has risen dramatically in recent years, and deepfakes have become increasingly difficult to spot.



Mechanism of generating deepfake:

- Deepfake uses Artificial Intelligence (AI) to create fake photos, videos, or audio that look and sound real.
- It mainly uses Generative Adversarial Networks, which is a type of AI that learns patterns from large amounts of data.
- The goal of GAN is to create new data instances that resemble a given training dataset. They consist of two neural networks, a generator and a discriminator, that compete against each other in a "game" to produce increasingly realistic data.

Uses of Deepfakes:

- Entertainment: Deepfake technology can be used in the film and entertainment industry for special effects and digital enhancements.
- Virtual Assistants and Avatars: AI-generated avatars can be employed as virtual assistants for advertising/marketing, providing a more engaging and interactive user experience.
- Education and Training: Deepfakes can be utilized for educational purposes, creating realistic simulations and training scenarios for various professions, such as healthcare, law enforcement, and customer service.
- Dubbing and Localization: Deepfake technology can assist in dubbing content into different languages while preserving the natural lip movements and facial expressions of the original actors.
- Accessibility: Deepfakes can be used to improve accessibility for individuals with disabilities. For example, a sign language interpreter's movements could be replicated using deepfake technology to make content more accessible for the deaf community.

Threats imposed by deepfakes:

- Misinformation and Fake News: Deepfakes can be used to create deceptive videos or audio recordings, contributing to the spread of misinformation and fake news, making it challenging to discern truth from fiction.
- Privacy Concerns: Deepfakes can violate individuals' privacy by superimposing their faces onto explicit or compromising content without consent, leading to personal and professional consequences.
- Identity Theft: Deepfake technology poses a risk of identity theft by creating convincing fake videos or audio recordings impersonating individuals. This raises concerns about identity theft, privacy violations, and potential harm to an individual's personal and professional reputation.

- Cybersecurity Risks: The creation and distribution of deepfake content can be facilitated by cybercriminals, leading to increased risks of cyberattacks, including phishing, social engineering, and other malicious activities.
- Reputation Damage: Deepfakes could be used to manipulate content related to businesses, celebrities, politicians causing reputational damage, financial losses, and legal consequences.
- National Security Concerns: Deepfakes could be leveraged for spaying or to create fake videos depicting political leaders making statements or engaging in activities that never occurred, potentially leading to diplomatic tensions or security issues.
- Erosion of Trust: As deepfake technology becomes more sophisticated, there is a risk of eroding public trust in media and information sources.
- Legal and Ethical Challenges: Determining responsibility, accountability, and legal consequences for the creation and dissemination of deepfake content.

Status of deepfakes in India:

- NASSCOM (2024): India saw a 400% rise in reported deepfake crimes between 2022-24.
- Europol predicts 90% of online content could be synthetically generated by 2026.

Legal Framework associated with deepfakes in India:

- Major laws include:
    - IT Act 2000: No specific mention, but deepfakes may be prosecuted under:
        - Section 66E: Violation of privacy.
        - Section 67: Obscene content.
        - Section 469 IPC: Forgery for harming reputation.
    - Proposed Digital India Act 2025
        - Plans to define and regulate AI-generated content, including deepfakes.

Way Forward:

- Define deepfake legally and penalise malicious usage.
- Develop AI tools for detection and watermarking of authentic content.
- Public education on verifying digital content.
- Promote responsible AI development with safeguards against misuse.

Conclusion:

- Deepfake technology is a double-edged sword. While it holds potential for creative industries, its misuse poses serious threats to society, governance, and security. India needs a robust legal, technological, and ethical framework to address deepfake challenges effectively.

BIOFUELS

Context:

- As part of a global initiative to switch to renewable energy sources and reduce fossil fuel consumption, attention has increasingly been focussed on biofuel production, wherein bioethanol has emerged as a promising alternative.

About Biofuels:

- Biofuel is fuel derived from biomass (organic matter from plants or animals) that can be used for energy production.
- Sources:
    - First generation: Sugarcane, beet juice, corn, rice, maize, other grains.
    - Second generation: Agricultural waste like stalks, husks, wood, bagasse.

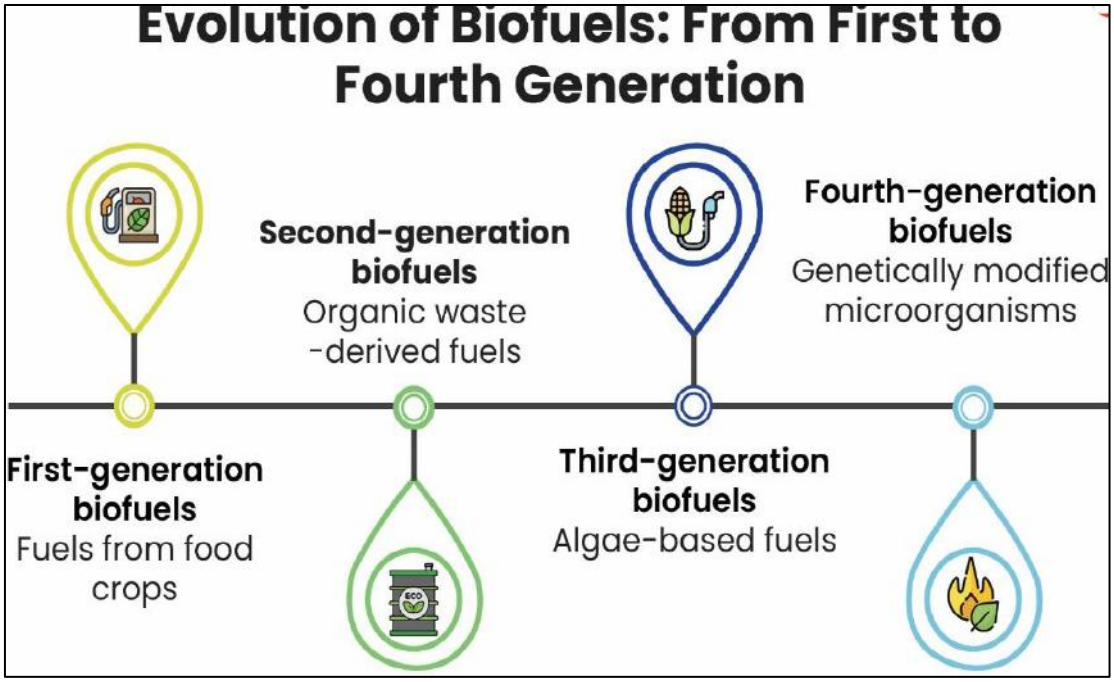
- Third generation (emerging): Algae-based biofuels.

Types of Biofuels:

- Bioethanol: A biofuel produced by fermenting sugars and starches from crops like corn, sugarcane, and wheat. It can also be produced from cellulosic biomass like grasses and wood.
- Biodiesel: A biofuel made from vegetable oils, animal fats, or recycled grease through a process called transesterification.
- Biogas: A biofuel produced from the anaerobic digestion of organic matter like animal waste, food waste, and sewage. It mainly consists of methane and carbon dioxide.
- Biohydrogen: A biofuel produced from various biomass sources through processes like gasification and aqueous phase reforming.

Significance of Biofuels:

- Unlike fossil fuels, biofuels are derived from renewable biomass sources like plants and algae, making them a sustainable alternative.
- When burned, biofuels generally produce fewer greenhouse gas emissions compared to fossil fuels, contributing to efforts to mitigate climate change.
- Biofuels offer a domestically produced alternative to imported fossil fuels, enhancing a nation's energy independence and reducing vulnerability to global oil market fluctuations.
- Biofuel production can create jobs in rural areas, revitalize agricultural economies, and provide farmers with new markets for their crops.
- Beyond greenhouse gas reductions, biofuels can lead to lower emissions of other pollutants like sulfur dioxide and air toxics, improving air quality.
- Biofuels, particularly ethanol and biodiesel, are suitable for use in existing vehicles, making them a practical option for decarbonizing the transportation sector.
- Biofuels can be produced from various waste and residue materials, contributing to waste management and resource efficiency.



Ethanol as liquid fuel:

- Properties
  - Remains liquid between -114°C to 78°C.
  - Flash point: 9°C (easy ignition).

- Energy density is lower than petrol, but it burns well, giving similar mileage.
- Use in vehicles
  - E5 blend (5% ethanol) works without engine changes.
  - E10 or E15 may need minor tuning but no major modification.
- Formation
  - Microorganisms like yeast and E. coli bacteria convert sugars into ethanol.
  - Ethanol becomes toxic for these organisms above 10% concentration, so extra purification is needed.
  - Co-fermentation (using multiple microbes) helps improve production.
- Challenges
  - Azeotropic ethanol contains approximately 4.4 per cent water. As water is not miscible with petrol and typically settles as sludge at the bottom of vehicle fuel tanks.
  - When high ethanol blended fuel is added, water dissolves into the ethanol fraction, rendering the fuel unsuitable for use in unmodified engines.

FOREST RIGHTS

Context:

- Recently, the Chhattisgarh Forest department has issued a letter designating itself as the nodal agency for implementing community forest resource rights (CFRR) under the Forest Rights Act (FRA), 2006.

About community forest resource:

- The community forest resource area is the common forest land that has been traditionally protected and conserved for sustainable use by a particular community.
- The community uses it to access resources available within the traditional and customary boundary of the village; and for seasonal use of landscape in case of pastoralist communities.
- Each CFR area has a customary boundary with identifiable landmarks recognised by the community and its neighboring villages.
- These landmarks are well-known to the community and neighbouring villages, ensuring that everyone understands where one community's CFR ends and another begins.
- CFR areas are not limited to one type of forest category. They can include any land with forest characteristics that the community traditionally uses. It may include forest of any category – revenue forest, classified & unclassified forest, deemed forest, DLC land, reserve forest, protected forest, sanctuary and national parks etc.

About Community Forest Resource (CFR) Rights:

- The Community Forest Resource rights under Section 3(1)(i) of the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) provide for recognition of the right to "protect, regenerate or conserve or manage" the community forest resource.
- Along with Community Rights (CRs) under Sections 3(1)(b) and 3(1)(c), it Includes nistar rights and rights over non-timber forest products (NTFPs) and ensures sustainable livelihoods of the community.
- These rights give the authority to the Gram Sabha to adopt local traditional practices of forest conservation and management within the community forest resource boundary.
- Nistar rights, refer to the rights granted to villagers and agriculturists to remove forest produce for their bona fide domestic use from forest coupes.

Importance of CFR rights:

- Aimed at undoing the "historic injustice" meted out to forest-dependent communities due to curtailment of their customary rights over forests, the FRA came into force in 2008.
- It recognises the community's right to use, manage and conserve forest resources, and to legally hold forest land that these communities have used for cultivation and residence.
- It is of greater significance inside protected forests like national parks, sanctuaries and tiger reserves as traditional dwellers then become a part of management of the protected forests using their traditional wisdom.

Issues in implementation:

- Forest departments refusing to recognise the legitimacy of gram sabhas
- They are denying funds to CFRR-holding gram sabhas
- A 2024 joint letter of Ministry of Tribal Affairs with the Environment Ministry required CFR management plans to conform to the National Working Plan Code (NWPC) and even suggested the involvement of foresters in their preparation. This violates the FRA's letter and spirit.

Way Forward:

- According to the National Working Plan Code, a working plan prescribes maximising timber yield whereas in contrast, forest management by gram sabhas will likely pursue multiple livelihood needs, for which the NWPC provides little guidance. Hence, reject NWPC Compliance for CFR Plans.
- Government should follow gram sabha plan as it provides experiences of the community and also adapts to climate change.
- Provide funds, training, and legal protection to gram sabhas for effective CFRR implementation.
- Forest Department must discard a timber-oriented science in favour of a different science of a people-friendly forest management.

Types of forests:

- Revenue Forests: Forest lands recorded under the revenue department.
- Classified Forests: Officially notified as forests under government records.
- Unclassified Forests: Not officially notified but recognised locally as forests.
- Deemed Forests: Lands not formally classified as forests but treated as such based on Supreme Court directions (Godavarman case).
- DLC Land: Forest land diverted for non-forest use but vested with communities under District Level Committee decisions.
- Reserve Forests: Highly protected forests under the Indian Forest Act where activities are restricted.
- Protected Forests: Less strict than reserve forests but still under state protection.
- Sanctuaries and National Parks: Protected areas for wildlife, but FRA recognises traditional rights of communities even here.

MINERAL GOVERNANCE

Context:

- Recently, the Ministry of Mines has reclassified minor minerals Barytes, Felspar, Mica, and Quartz as major minerals. These minerals are essential for various new technologies, energy transition, spacecraft industries, the healthcare sector, etc.

About major minerals:

- The major minerals cover fuel minerals consisting of coal, lignite, petroleum & natural gas and other major minerals i.e. metallic minerals including atomic minerals and non-metallic minerals.

- Central govt make rules for regulating the grant of lease for mining.

About minor minerals:

- Minor minerals are defined under the Mines and Minerals (Development and Regulation) (MMDR) Act, 1957, as building stones, gravel, ordinary clay, and ordinary sand.
- The regulation and management of minor minerals fall under the purview of state governments.
- Minor minerals play a crucial role in infrastructure, manufacturing and local economies. They are primarily sourced from riverbeds, floodplains, hills, coastal areas, deserts, and open quarries across various states.
- The Central Government also has the authority to declare any other mineral to be a minor mineral. It has thus far notified around 31 minerals as minor minerals such as Gypsum, Mica, Quartz, Clay-based minerals, Sand, etc.
- Extraction typically takes place on a small to medium scale and is governed by state authorities.

Regulations of minerals:

- Under the Indian Constitution, states are vested with the power to make laws on mines and minerals under List II (State List) of the Seventh Schedule.
- However, under List I (Union List), the Central Government can also make laws on the regulation of mines and minerals by declaring it in the public interest.
- Under MMDR Act in 1957, Section 15 of the Act delegates the rule-making power to the state governments in relation to minor minerals. It empowers states to frame rules for granting leases, issuing permits, and fixing and collecting rent and royalties from the holders of mining leases and permits.
- The minor minerals are also regulated under laws related to pollution, wildlife and biodiversity protection, etc.
- In response, the Ministry of Environment, Forest, and Climate Change (MoEFCC) issued Sand Mining guidelines in 2016 and 2020, and the Ministry of Mines released a Sand Mining Framework in 2018.

Recent Changes:

- The Ministry of has shifted minerals Barytes, Felspar, Mica and Quartz from the list of minor minerals to the category of major minerals.
- Quartz, Felspar and Mica are found in pegmatite rocks, which are an important source of many critical minerals such as Beryl, Lithium, Niobium, Tantalum, Molybdenum, Tin, Titanium, Tungsten, etc. These minerals have vital role in various new technologies, in energy transition, spacecraft industries, healthcare sector, etc.
- Similarly, Baryte has various industrial applications which is used for oil and gas drilling, electronics, TV screens, rubber, glass, ceramics, paint, radiation shielding and medical applications.
- Baryte is used to make high density concrete to block x-ray emissions in hospitals, power plants, and laboratories.

Key judicial pronouncements:

- Deepak Kumar vs State of Haryana (2012)
  - Made environmental clearance mandatory for minor mineral mining even below 5 hectares.
  - Recommended mining plan prior to clearance.
- Himmat Singh Shekhawat vs State of Rajasthan (2014)
  - NGT invalidated MoEFCC notification exempting projects under 5 hectares from clearance.

- Satendra Pandey vs Union of India (2018)
    - NGT struck down 2016 notification that diluted environmental clearance norms for areas below 25 hectares.

Challenges:

- Illegal and unscientific mining persists despite regulations and judicial interventions.
- Hotspots of illegal sand mining are Tamil Nadu, Maharashtra, Andhra Pradesh, Punjab and Madhya Pradesh.
- Mining leads to lowering of groundwater levels in riparian areas, pollution of nearby land and water bodies and disruption of aquatic ecosystems.
- Mining also leads to loss of soil fertility in agricultural fields.
- Mining also leads to violent clashes between miners and law enforcement.

Way Forward:

- Strengthen enforcement against illegal mining.
- Harmonise regulations with a model framework across states.
- Adopt sustainable alternatives for construction materials.
- Ensure environmental safeguards are integrated into mining policies.
- Uphold Public Trust Doctrine: State as trustee to manage resources in public interest.

MELTING OF GLACIERS AND VOLCANIC ERUPTIONS

Context:

- A new study presented at the 2025 Goldschmidt Conference in Prague warned that melting glaciers can trigger more frequent and explosive volcanic eruptions, especially in West Antarctica.

About Glaciers:

- Glaciers are massive, slow-moving bodies of ice and snow that form on land and flow under their own weight.
- Glaciers move due to gravity and the internal deformation of the ice. They can move relatively slowly, but over time, this movement shapes the landscape.
- Glaciers are categorized as either alpine (mountain) glaciers or continental glaciers (ice sheets).
- Glaciers form in areas where snowfall accumulates faster than it melts or evaporates over many years, eventually compacting into ice.

Locations of major glaciers:

- Asia: Himalayas (Siachen, Gangotri, Yamunotri), Karakoram (Baltoro)
- Antarctica: Lambert Glacier (world's largest)
- Arctic: Greenland Ice Sheet
- South America: Patagonian glaciers (Perito Moreno)
- Europe: Alps (Aletsch Glacier)

Major reasons behind melting of glaciers:

- Global warming: Rising temperatures accelerate ice melt.
- Black carbon deposition: Soot reduces albedo, increasing heat absorption.
- Industrial pollution: Alters atmospheric chemistry, impacting snowfall and melt rates.
- Changes in precipitation patterns: Reduced snowfall and increased rainfall accelerate melting.

Link between glaciers and volcanoes:

- Melting glaciers reduce the pressure exerted by ice on underground magma chamber
- This allows gases and magma to expand, potentially resulting in explosive eruptions.

- Greatest risk regions:
  - West Antarctica: ~100 volcanoes buried under ice that may melt in coming decades
  - Other regions: North America, New Zealand, Russia.
- Study of Chile's Mocho Choshuenco volcano showed thick ice suppressed eruptions during last ice age (26,000–18,000 years ago). Melting 13,000 years ago led to explosive eruptions due to pressure release and magma expansion.
- Changes in rainfall, also driven by climate change, can infiltrate underground and react with magma systems, triggering eruptions.

Way forward:

- Strengthen climate change mitigation efforts to limit global warming and reduce glacier melt rate.
- Enhance glacial monitoring systems for early warning of eruptions and GLOFs.
- International cooperation for research and disaster preparedness in glacier-rich volcanic regions.