The IAS Gazette

A House Journal of **APTI PLUS**

MAY 2024

APTI PLUS
Academy for Civil Services Pvt. Ltd.
CREATING CIVIL SERVANTS FOR THE NATION

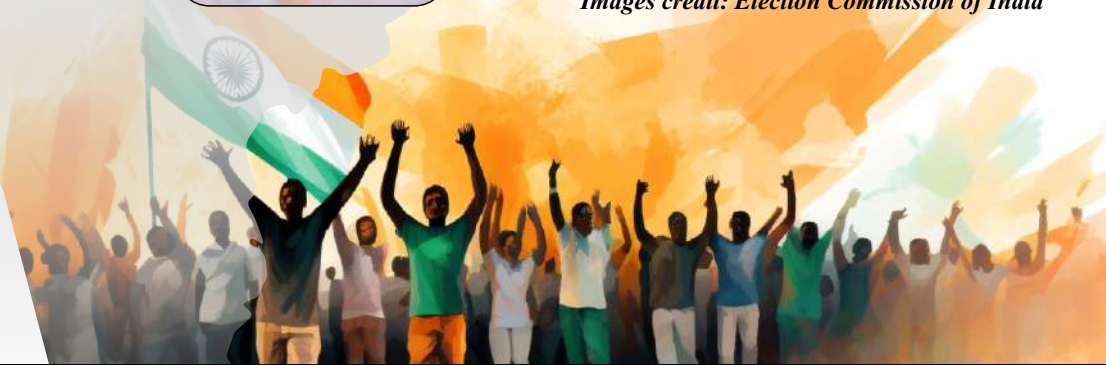
72 ND EDITION

VOTE
INDIA
GENERAL ELECTION 2024





Images credit: Election Commission of India



Other topics

- India's Stakes in the Iran-Israel Conflict
- SC Judgement in Climate Action
- WTO Farm Subsidies and Peace Clause
- Youth Suicide in India
- Zero Orbital Debris

A **MONTHLY PERIODICAL** FOR ASPIRANTS OF UPSC CSE

CONTENTS

Sources

THE HINDU · The Indian EXPRESS · livemint · ET · PIB · PRS LEGISLATIVE RESEARCH · NITI Aayog · BusinessLine · Government Reports

1. POLITY & GOVERNANCE

1.1 INDIA'S DEMOGRAPHIC DIVIDEND

Context

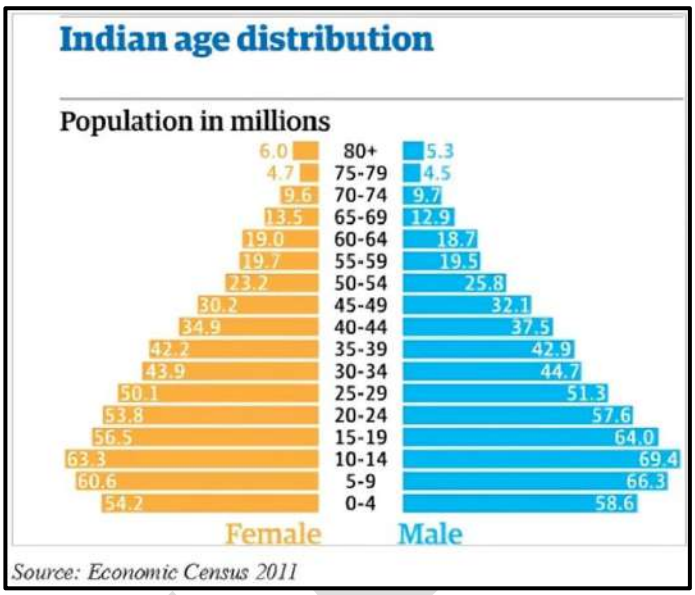
- According to the International Labour Organization (ILO) report on the employment situation, India is currently in the demographic dividend zone, it will continue to have a larger proportion of working-age people than very young and old people for another ten years, although the proportion of younger people will decline to 23% by 2036 from 27% in 2021.

Key Highlights of the ILO Report

Demographic Dividend	• India is currently in the demographic dividend zone, which is expected to continue for another decade or so. This means a **larger proportion of the population is in the working-age category, which can potentially drive economic growth.**
Declining Youth Population	• The ILO report forecasts a decline in the youth population's share in India over time. Specifically, the proportion of the youth population (likely referring to individuals in the age group below 15 years) is projected to decrease from 27% in 2021 to 23% by the year 2036.
Employment Challenges	• Despite the demographic advantage, India faces a significant challenge in providing productive employment to its youth. **Each year, around 7-8 million youths enter the labour force,** but many struggle to find suitable jobs.
High Youth Unemployment	• The report highlights a significant increase in youth unemployment over the years, with rates jumping from 5.7% in 2000 to 17.5% in 2019, indicating a more than 300% increase. • India's youth unemployment rate is high, with around 83% of the total unemployed population being youths. Lack of education, skills, and vocational training exacerbates this issue.
Education v/s Unemployment	• Contrary to the assumption that education and training naturally lead to employment, **unemployment rates are higher among educated youths.** In 2022, graduates experienced an unemployment rate of around 29%, much higher than those who cannot read and write (3.4%).
Challenges Ahead	• India needs to create jobs at a rate higher than its youth population growth to fully capitalise on the demographic dividend. The failure to do so could lead to economic stagnation and social unrest among a large, unemployed youth population.

According to the World Bank's latest "Jobs for Resilience" report on South Asia, Job scarcity in the region, including India, is driving people to seek employment opportunities abroad.

India's Demographic Dividend



Source: Economic Census 2011

- According to the United Nations Population Fund (UNFPA), the **demographic dividend is the economic growth potential that arises when a country has a large working-age population (15-64 years old) relative to the non-working-age population (those younger than 15 or older than 64).** This shift in population age structure can happen due to declines in fertility rates and improvements in child mortality.
- It presents an opportunity for accelerated economic growth when supported by effective policies across health, education, governance, and the economy.
- India is the world's most populous country, surpassing China in 2023 according to the United Nations (UN) estimates. With over 1.428 billion people, it accounts for **roughly 17.5% of the global population.**

The growth rate of the Population is slowing down. The **National Family Health Survey (NFHS) indicates a total fertility rate (average number of children a woman has) below the replacement level of 2.1 children per woman**. The UN projects India's population to peak at around 1.7 billion in 2050 before stabilising.

Steps taken to Harness India's Demographic Dividend

Education and Skill Development:
- **Skill India Mission:** Launched in 2015, this mission aims to create a skilled workforce by providing training programs across various sectors. It targets training 500 million people by 2022 and focuses on industry-relevant skills to bridge the skill gap.
- **National Skill Development Corporation (NSDC):** Established in 2008, NSDC funds private training providers and facilitates partnerships between industry and academia. It aims to create a standardized and quality-assured skilling ecosystem.
- **Pradhan Mantri Kaushal Vikas Yojana (PMKVY):** It offers short-term, industry-aligned skill development programs for youth. It provides financial incentives to encourage participation and improve employability.
- **National Education Policy 2020 (NEP 2020):** It focuses on holistic education and emphasizes skill development. It promotes vocational training within the school curriculum and encourages critical thinking and problem-solving skills.
- **Scheme for Formalization of Micro and Small Enterprises (SFMSE):** It aims to formalize the informal sector, which employs a significant portion of the workforce. By providing skill development programs and credit facilities, it helps micro and small enterprises (MSEs) become more productive and create new jobs.

Job Creation and Entrepreneurship:
- **Make in India:** Launched in 2015, this initiative aims to attract foreign investment and promote domestic manufacturing. By creating a more business-friendly environment and focusing on sectors like automobiles and electronics, it aims to generate employment opportunities.
- **Startup India:** This initiative aims to foster a vibrant startup ecosystem in India. It provides tax benefits, simplifies regulations, and encourages incubation centers to nurture innovative new businesses with job creation potential.
- **Atmanirbhar Bharat (Self-Reliant India):** This economic stimulus program launched during the COVID-19 pandemic aims to boost domestic production across various sectors. By promoting self-reliance and reducing dependence on imports, it aims to create new job opportunities.
- **Deen Dayal Upadhyaya Grameen Kaushalya Yojana (DDU-GKY):** It focuses on skill development and placement of rural youth in various sectors. It provides residential training programs and placements in promising sectors to enhance rural employability.

Enhancing Employability for Women:
- **Stand Up India:** This initiative aims to promote women entrepreneurship by facilitating bank loans for setting up businesses. By encouraging women to participate in the workforce, it unlocks a significant portion of the talent pool.
- **Beti Bachao Beti Padhao (Save Daughter, Educate Daughter):** This social campaign aims to address gender inequality and promote female education. By empowering women with education and skills, it increases their employability and overall economic participation.

1.2 DISRUPTION OF NORMAL POLLING PROCESS

Context

- India's electoral laws have necessary security measures for dealing with disturbances and ensuring the integrity of the democratic process.

Intentional Destruction or Damage to EVMs

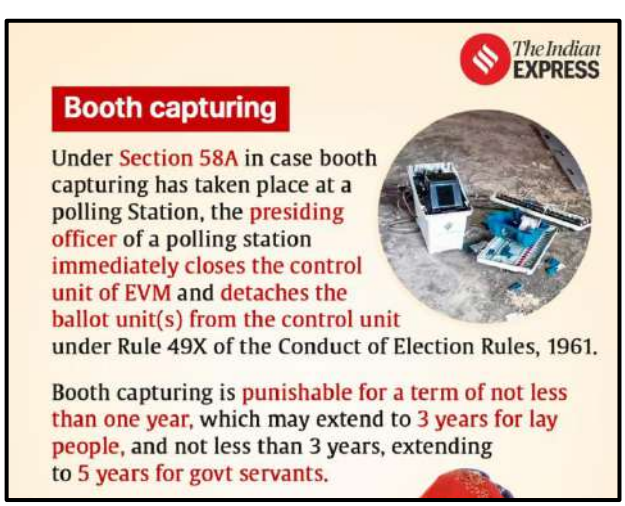
- **Section 58 of the Representation of the People Act of 1951** addresses cases involving the intentional destruction, damage, or tampering of Electronic Voting Machines (EVMs) during the voting process.
- The provision covers unauthorized actions such as unlawfully taking away an EVM, intentionally damaging or destroying an EVM or instances of mechanical failure during the voting process.

Actions Taken in Response to Intentional Damage to EVMs

- The RO immediately informs the Election Commission (EC) and the Chief Electoral Officer (CEO) of the state about the incident.
- Based on the severity and impact of the incident, the Election Commission (EC) has the authority to declare the poll at the affected polling station void.
- Following the declaration of a void poll, the Election Commission (EC) schedules a new poll to replace the voided one.
- Contesting candidates or their agents are formally informed in writing about the new poll schedule.
- Public notices are issued by the Election Commission (EC) to inform voters about the rescheduled poll.

Booth Capturing

- Booth capturing is a serious **electoral offence defined and punished under Section 135A of the Representation of the People Act, 1951.**
- Booth capturing involves the **unauthorized seizure of a polling station to influence election outcomes** through illegal activities like blocking legitimate voters, allowing only specific supporters to vote, threatening voters, and using force.



Actions Taken in Response to Booth Capturing

- Upon detecting booth capturing or related illegal activities, the **Presiding Officer at the affected polling station takes immediate action to address the situation.**
- The Presiding Officer informs the Returning Officer (RO) about the incident, providing details of the booth capturing and associated activities.
- The RO reports the full facts of the booth-capturing incident to the Election Commission (EC) through the fastest available means of communication.
- Based on the severity and extent of booth capturing, the Election Commission (EC) has the authority to take decisive actions:

- Declaring Void Poll at the Affected Polling Station
- Scheduling a Fresh Poll
- Cancel Election in Entire Constituency

Natural Disasters or Other Disruptions

- **Section 57(1) of the Representation of the People Act, 1951, allows for the adjournment of polling due to unforeseen circumstances.** These circumstances include natural disasters (e.g., floods, storms), loss or damage to essential polling materials (such as Electronic Voting Machines (EVMs) and electoral rolls), riots, technical issues with EVMs, and other disruptive events that may impact the conduct of elections.

Actions Taken in Response to Disruptions

- The Presiding Officer adjourns the poll at the affected station and seeks immediate instructions from the Returning Officer (RO) for the constituency.
- The RO is informed about the disruption by the Presiding Officer, who provides details of the circumstances leading to the adjournment of polling.
- The RO informs the Election Commission (EC) about the disruptive circumstances and seeks approval to adjourn and reschedule the polling as necessary.
- Following approval from the Election Commission (EC), polling is adjourned and rescheduled based on the EC's decision.
- **Only voters who have not already cast their votes before the adjournment are eligible to vote** during the rescheduled poll.

Death of a Candidate

- In the event of the death of a candidate from a recognized political party after the nomination deadline but before polling begins, specific legal provisions **under Section 52 of the Representation of the People Act, 1951, govern the actions to be taken.**

Actions Taken in Response to Candidate's Death

- The Returning Officer (RO) responsible for overseeing the electoral process in the constituency promptly reports the candidate's death to the Election Commission (EC).
- Upon receiving the report of the candidate's death**, the Election Commission (EC) adjourns the poll in that particular constituency.**
- The Election Commission (EC) **notifies the concerned political party, whose candidate has passed away, to nominate a replacement candidate within a stipulated time frame, usually seven days**.
- If the list of contesting candidates for the constituency has already been published, the Election Commission (EC) prepares and publishes a new list that includes the name of the replacement candidate nominated by the political party.

1.3 SHORT ARTICLES

Postal Ballot

Context

- The Election Commission introduced postal voting for polling personnel engaged in election duties.

> The Ministry of Law and Justice amended the Conduct of Election Rules to include Persons with Disabilities (PwDs) aged 85 and above as eligible voters through postal ballots.

What are Postal Ballots?

- Postal ballots, also known as mail-in ballots, **enable registered voters to cast their votes by mail, eliminating the need to appear in person at a polling station.**
- This alternative voting method is particularly beneficial for

individuals facing limitations such as geographical distance from their home constituency, disability, work commitments, or those engaged in essential services on Election Day.

Categories of Eligible Electors for Postal Ballots

- **Service Voters:** Members of the armed forces, paramilitary forces, and government employees deployed on election duty away from their home constituencies.
- **Absentee Voters:** Individuals unable to vote in person due to work commitments, illness, or disability.
- **Electors on Election Duty:** Government officials and polling staff assigned duties at polling stations other than their own.
- **Electors under Preventive Detention:** Individuals detained under preventive custody during the election period.
- **Essential Services Personnel:** Media persons authorized by the Election Commission and those engaged in critical services such as transportation or healthcare on polling day.

How to apply for a Postal Ballot?

- Eligible voters must submit Form 12 D to the Returning Officer (RO) of their constituency, providing personal details, voter identification information, and a valid reason for opting for a postal ballot. The RO verifies eligibility and issues the postal ballot if requirements are met.

Process of Postal Voting

- **Receiving the Postal Ballot:** The RO dispatches the postal ballot containing the ballot paper, declaration form, secrecy sleeve, and return envelope to the voter's registered address.
- **Marking the Ballot:** Voters mark their preferred candidate(s) on the ballot paper within the secrecy sleeve for confidentiality.
- **Completing the Declaration Form:**Voters fill out the declaration form and seal the marked ballot paper and declaration form inside the secrecy sleeve.
- **Returning the Postal Ballot:**Voters affix postage and mail the sealed envelope to the designated address within the specified timeframe.
- **Counting of Postal Ballots:**Postal ballots are counted separately from votes cast at polling stations.

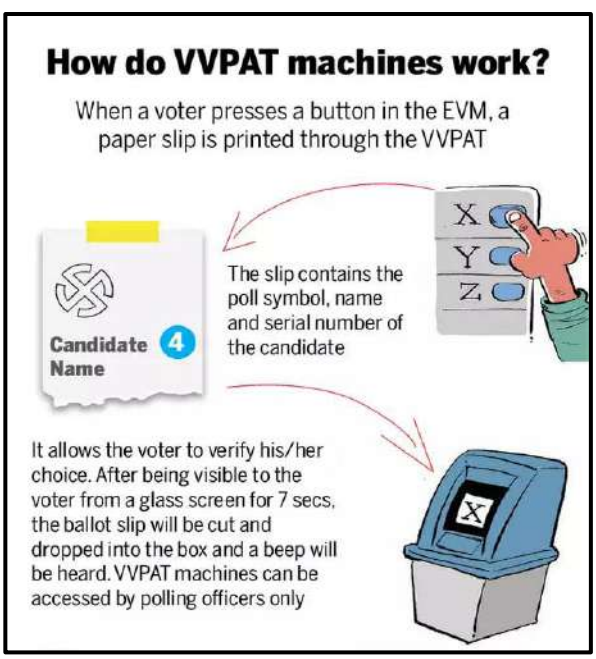
VVPAT

Context

- The demands for increased verification of VVPAT slips by political parties highlight a crucial aspect of ensuring transparency and integrity in the electoral process.

Voter Verified Paper Audit Trail (VVPAT)

- The VVPAT system was introduced by the Election Commission of India (EC) with the **objective of enhancing the transparency and integrity of the electoral process.**
- It enables voters to physically verify that their votes have been correctly recorded by providing a printed slip containing the details of the chosen candidate.



Functionality of VVPAT

- **Attachment to EVMs:** VVPAT machines are connected to Electronic Voting Machines (EVMs).
- **Printing of Paper Slip:** After a voter casts their vote using the EVM, the VVPAT machine prints a paper slip displaying the chosen candidate's name,

symbol, and serial number.

- **Verification Process:** The paper slip is displayed behind a glass window for the voter to verify. The verification must occur within a limited viewing time.
- **Secure Storage:** Once verified, the paper slip drops into a secure compartment within the VVPAT machine, preserving it as a backup for auditing purposes.

Purpose of VVPAT

- **Physical Verification:** Enables voters to physically verify that their votes have been accurately recorded by the EVM.
- **Backup for Audits:** Serves as a reliable backup in case of disputes or recounts, facilitating the verification of election results.
- **Enhanced Trust:** Increases voter confidence in the electoral process by providing a tangible record of their votes.

Introduction and Adoption of VVPAT

- The concept of VVPAT was discussed with political parties in 2010, followed by prototype development and field trials to refine the design based on feedback.
- The **EC approved the design of VVPAT machines in 2013** after receiving recommendations from expert committees and stakeholders. VVPATs were piloted in selected polling stations before nationwide adoption by June 2017.

Cases related to the Voter Verifiable Paper Audit Trail (VVPAT)

- **Subramanian Swamy v/s Union of India (2013):** In this case, the Supreme Court held that the 'paper trail' is a key requirement of free and fair elections. The court directed the Election Commission of India to introduce the VVPAT mechanism.
- **N Chandrababu Naidu v/s Union of India (2019):** The petitioners sought a direction that a minimum of 50% randomized VVPAT paper slip verification of EVM shall be conducted in every General and Bye-Election. The Supreme Court increased the mandatory VVPAT verification from one to five polling booths in each Assembly Segment.
- **EVM-VVPAT Case (2024):** The Supreme Court reserved its judgment in the Electronic Voting Machine (EVM)-Voter-Verifiable Paper Audit trail (VVPAT) case. The court called for "sanctity" to be maintained in the electoral process while asking the Election Commission to explain in detail the steps of cross-verifying VVPAT slips with EVMs.

Demand for Widened Verification of VVPAT Slips

Political parties, especially the opposition, have expressed concerns about the adequacy of current VVPAT verification practices:

- **Ensuring Election Integrity:** Increased verification of VVPAT slips is deemed essential to guarantee the accuracy and fairness of election results, thereby strengthening public trust in the electoral process.
- **Transparency and Trust:** Political parties emphasize the need for a more robust verification process to address doubts or suspicions about EVM functionality, ensuring transparency and maintaining trust in democratic elections.

Election Commission's Position and Operational Challenges

The Election Commission has responded to demands for increased VVPAT verification while highlighting practical constraints:

- **Logistical Challenges:** The EC faces logistical hurdles such as time constraints, manpower availability,and infrastructure limitations in conducting extensive verification of VVPAT slips.
- **Result Delays:** Counting a higher percentage of VVPAT slips could potentially delay the declaration of election results, which is critical in electoral processes.

NCERT Revision

Context

- The National Council of Educational Research and Training (NCERT) has revamped the Class 12 history syllabus.

Key Changes made by the NCERT

Indigenous Origin of Harappans

- The revised syllabus emphasizes Rakhigarhi in Hisar (Haryana) as a crucial site for the Harappan Civilization, suggesting that the Harappans were native to this region. This challenges previous notions that portrayed the Harappans as migrants or immigrants to the Indian subcontinent, implying that the roots of this civilization lie within South Asia itself.

Critical Thinking and Further Research
NCERT's revision of the syllabus encourages critical thinking among students regarding the relationship between Harappans and Vedic people, indicating openness to ongoing research and scholarly debate on these topics. This reflects a commitment to fostering a nuanced understanding of ancient Indian history based on contemporary archaeological, genetic, and scholarly research.

Pre-Aryan Settlement

- NCERT's revisions propose that the Harappan Civilization existed in Rakhigarhi before any significant migration of Aryans. This challenges the widely accepted Aryan Invasion/Migration Theory, which suggests that Aryans migrated to the Indian subcontinent and displaced indigenous populations.

Archaeological and Genetic Evidence

- The revisions include genetic details from Archaeological Survey of India (ASI) excavations at Rakhigarhi, highlighting the continuity of genetic roots from the Harappan period to the present South Asian population. This genetic evidence indicates a substantial contribution of the Harappan population to the genetic makeup of modern-day Indians, reinforcing the indigenous nature of the Harappan Civilization.

Rejection of Aryan Migration Theory

- The revised textbook rejects the idea of large-scale immigration of Aryans based on observed genetic and cultural continuity in South Asian populations. This challenges the dominant Aryan Invasion/Migration Theory and prompts a reassessment of historical narratives surrounding the origins of Indian civilization.

Continuity of Indian Genetic History

- The revisions stress the continuity and absorption of various populations into Indian society, including those from bordering and distant regions. This narrative supports the concept of a continuous and dynamic Indian genetic history, debunking the notion of discontinuity or replacement of indigenous populations by incoming groups.

Deletions and Contextual Adjustments

- Certain deletions from the textbook, such as references to breaks between Early Harappan and Harappan civilizations, aim to align the narrative with current archaeological and genetic findings. This ensures that the revised syllabus reflects the most up-to-date understanding of the Harappan Civilization and its significance in Indian history.

Paharia Tribe

Context

- The seed bank initiative led by the Pahariya tribe in Jharkhand represents a remarkable effort towards achieving seed independence and enhancing food security within tribal communities.

Background

- Tribal farmers in Jharkhand, particularly the Pahariya tribe, historically faced significant challenges due to their dependency on external sources for seeds. This reliance often resulted in exploitative practices

by moneylenders or traders, who provided seeds at high-interest rates and demanded excessive seed returns.

- Community-led seed banks were established in mid-2019. This initiative was a collaborative effort involving non-profit organisations.

What is a Seed Bank?

- Seed banks store seeds under controlled conditions (low temperature and humidity) to prolong their viability for extended periods, sometimes decades or even centuries.
- It stores seeds for various purposes, including:
  - **Conservation:** Preserving genetic diversity of plant species, especially rare or threatened ones.
  - **Food Security:** Ensuring access to seeds for future agricultural needs, particularly important varieties adapted to local conditions.
  - **Research:** Providing seeds for scientific studies on plant breeding, disease resistance, and other areas.

Seed Banks at the World Level	Seed Banks in India
• **Global Seed Vault:**Located in Svalbard, Norway, this internationally funded facility is the world's largest seed bank, focusing on long-term conservation of crop diversity • **International Rice Research Institute (IRRI):**Holds a vast collection of rice seeds in the Philippines, crucial for ensuring global rice security. • **Centres of the Consultative Group on International Agricultural Research (CGIAR):** A network of international agricultural research centres maintains various seed banks for different crops and regions.	• **Indian Seed Vault**: It is located in Ladakh, jointly built by the Defence Institute of High Altitude Research and the National Bureau of Plant Genetic Resources, and is the second largest seed bank in the world. • **National Bureau of Plant Genetic Resources (NBPGR):**Large collection of indigenous and exotic crop seeds. • **State Agricultural Universities (SAUs):** Many SAUs across India maintain seed banks focusing on regionally important crops. • **Community-Led Seed Banks:** Empower local communities to conserve their traditional seed varieties and achieve seed sovereignty.

About the Pahariya Tribe

- The Pahariya tribe, primarily inhabiting the hilly regions of **Jharkhand and parts of West Bengal,** has a rich cultural heritage deeply connected to their environment.
- **Livelihood:**Traditionally practising shifting agriculture (slash-and-burn cultivation) in forested hills, growing crops like maize, millet, and pulses for subsistence.
- **Language:**The Paharia tribe primarily speaks Malto, a Dravidian language. However, depending on their location, some communities might also converse in Bengali or Hindi.
- **Beliefs and Rituals:** Their animistic belief system revolves around nature worship and spirits, with specific rituals associated with agriculture, hunting, and other aspects of their lives. Some of their deities:
  - **Bara Deo:**The supreme god, often associated with the sky and rain.
  - **Deshwali:** The earth goddess, responsible for fertility and agriculture.
  - **Vandevta:** The guardian spirit of the forests, ensuring the well-being of wildlife and forest produce.
  - **Paharia Sing:** Clan deities specific to individual Paharia subgroups.
- **Social Structure:** Living in small settlements known as 'tolas,' they have a hierarchical social structure with village elders and leaders playing important roles in decision-making.

- **Art and Craft:**Pahariya artisans are known for their unique handicrafts, including bamboo crafts, basketry, and traditional ornaments.
- **Body Tattoo:** Women practice face and body tattooing, which holds deep cultural significance as social markers of marital status, social standing, or clan affiliation.

'Voluntary Code of Ethics' for Social Media Platforms

Context

- The Election Commission of India requested social media platform X (formerly Twitter) to remove certain election-related posts, citing violations of the Model Code of Conduct under a voluntary ethics code.

Background

- During the Lok Sabha elections, the Election Commission of India (EC) took action against social media platforms, including X (formerly Twitter), citing violations of the Model Code of Conduct (MCC). The MCC sets guidelines to ensure fair and ethical conduct during elections, including restrictions on certain types of political content.

Voluntary Code of Ethics

Purpose

- The **Voluntary Code of Ethics was established in 2019 to promote responsible behaviour and transparency by social media platforms during elections.** It serves as a framework for platforms to adhere to electoral laws and guidelines set by regulatory authorities like the EC.

Key Provisions

- **Awareness Campaigns:** Platforms undertake campaigns to educate users about electoral laws and guidelines to prevent misuse of digital platforms for election-related content.
- **Grievance Redressal Channel:**Dedicated channels are established for prompt resolution of complaints related to election-related content reported by the EC or other stakeholders.
- **Notification Mechanism:**A system is set up for the EC to notify platforms about potential violations of electoral laws, enabling platforms to take timely action.
- **Pre-Certification of Political Advertisements:**All political advertisements are required to be pre-certified by relevant committees to ensure compliance with guidelines and prevent the dissemination of misleading or inappropriate content.
- **Transparency in Political Advertisements:**Platforms commit to transparency by clearly labelling political advertisements and disclosing information about sponsors to users.

EC's Action and Compliance

- **Requests for Post Removal:**The EC requested social media platforms, including X, to remove specific posts that violated the MCC during the election period. These violations typically involve spreading unverified information, making baseless allegations, or targeting candidates based on personal matters.
- **Platform Compliance:**X complied with the EC's requests by removing or withholding posts that were deemed to violate electoral guidelines. This demonstrates the platforms' commitment to cooperating with regulatory authorities to maintain the integrity of the electoral process.

Platform's Response

- Despite complying with the EC's requests, X expressed disagreement with the actions, particularly emphasising the importance of freedom of expression in political discourse. X's Global Government Affairs team advocated for transparency by urging the EC to publish all future takedown orders.

Central Civil Services (Conduct) Rules 1964

Context

- The recent comments by India's Ambassador to Ireland while defending the current Prime Minister of India and indirectly criticising the previous governments have raised concerns about potentially breaching the Central Civil Services (Conduct) Rules 1964.

Background

- The recent incident involving India's Ambassador to Ireland comments made in response to an editorial by The Irish Times, where the Ambassador defended the current Prime Minister of India and indirectly criticized the previous Government. This action has raised concerns about a possible breach of the Central Civil Services (Conduct) Rules 1964, which govern the conduct and behaviour of civil servants, including Indian Foreign Service (IFS) officers like ambassadors.

Key Highlights of Central Civil Services (Conduct) Rules 1964

- **Scope and Applicability:** It applies to all persons appointed to civil services or posts related to Union affairs in India. The rules outline the standards of behaviour, integrity, and professionalism expected from government servants.
- **Integrity and Devotion to Duty:**Government servants are expected to uphold high standards of integrity, honesty, and dedication in performing their duties.
- **Political Neutrality:**Civil servants are required to maintain political neutrality and refrain from engaging in activities that can be perceived as partisan or biased towards any political entity.
- **Professional Conduct:**Conduct should be guided by principles of fairness, impartiality, and commitment to public service.

Specific Rules Relevant to the Ambassador's Conduct

Neutrality and Political Commentary

- Government servants, including IFS officers serving as ambassadors, are expected to refrain from engaging in public political commentary that could compromise their neutrality.
- Expressing personal opinions or making statements that reflect political bias is generally discouraged to maintain the dignity and impartiality of the civil services.

Professionalism in Representing India Abroad

- Diplomats represent the Government of India and are expected to uphold the nation's interests with professionalism and discretion.
- Comments made in public forums or media should align with diplomatic norms and guidelines to avoid controversy or misinterpretation.

Violations of the Central Civil Services (Conduct) Rules 1964 can lead to disciplinary proceedings against the concerned civil servant, depending on the severity and nature of the breach. Actions inconsistent with the rules can impact the credibility and effectiveness of diplomatic missions, potentially affecting bilateral relations and public perception.

Aadharshila

Context

- The launch of the Aadharshila curriculum by the Ministry of Women and Child Development (MWCD) for children aged 3-6 years in anganwadis (rural childcare centres) is a significant initiative aimed at improving early childhood care and education (ECCE) across India.

States have the flexibility to adapt the Aadharshila curriculum to suit local cultural contexts and address regional educational needs. This localized approach ensures relevance and effectiveness across diverse communities.

Key Components of Aadharshila Curriculum

- **Duration and Structure:** Aadharshila is structured as a comprehensive 48-week curriculum, specifically tailored for children aged 3-6 years. This duration is crucial for laying down a strong educational foundation before children transition into formal schooling.
- **Curriculum Focus:**The curriculum emphasizes holistic development, encompassing academic, social, emotional, and physical growth. It strikes a balance between structured academic activities and unstructured play-based learning, which is essential for young children's development.
- **Play Calendar:**Aadharshila introduces a structured play calendar spanning 48 weeks, divided into distinct phases:
  - **Initiation (4 weeks):**Introducing children to academic activities to initiate them into thelearning process.
  - **Exploration (36 weeks):**The majority of the curriculum is dedicated to exploring various aspects of learning through activities like storytelling, rhymes, arts, crafts, and interactive sessions, fostering curiosity, creativity, and social skills.
  - **Reinforcement and Observation (8 weeks):**This phase reinforces previous learning and encourages observation of children's progress and performance.
- **Age-Appropriate Activities:** The curriculum offers age-appropriate activities tailored to different developmental stages within the 3-6 year age range. It provides detailed guidelines on materials required for effective implementation.
- **Developmental Objectives:** Aadharshila curriculum is designed to achieve specific developmental milestones, including: o Developing listening skills and vocabulary
  - Boosting imagination, creativity, and problem-solving abilities
  - Enhancing the ability to follow instructions and participate in group activities
  - Facilitating social development, including communication, sharing, and collaboration
  - Fostering self-esteem, confidence, and a positive attitude towards learning.

According to the Annual Status of Education Report (ASER) 2022, there has been a significant increase in school enrollment, reaching 98.4% for the age group 6-14 in rural areas.

1.4 SNIPPETS

Declaration of Assets by Candidates

- The Supreme Court stated that candidates are not required to disclose every movable property owned by them or their dependents during election nominations.
- The Court rejected the notion of voters having an absolute right to know every detail about a candidate's life, upholding the candidate's right to privacy on irrelevant matters.
- The judgment clarified that there is no strict rule for determining which assets require disclosure, with each case evaluated based on unique circumstances.
- Candidates contesting elections must declare sources of income for themselves, spouses, and dependents. Non-disclosure of income sources constitutes a corrupt practice under the law, potentially leading to disqualification.

Registration of Births and Deaths

- The Union Ministry of Home Affairs has proposed new birth registration rules that require parents to declare their religion separately, instead of just recording the family's religion.
- The proposal was introduced under the Registration of Births and Deaths (Amendment) Act, 2023.
- The birth registration form has been expanded to include additional details such as Aadhaar numbers, mobile and email IDs of parents (if available), and comprehensive address information.
- The birth data might be used to update various government databases like the National Population Register (NPR), voter rolls, Aadhaar cards, and ration cards.
- Digital birth certificates issued through this system will serve as a unified proof of date of birth for accessing various services, including educational admissions.
- The Registrar General of India (RGI) will maintain a national database of registered births and deaths. Data sharing between RGI and state governments is mandatory.
- The data will be used to create reports on demographics like sex ratio at birth, infant mortality, and inform government policies.

WADA Anti-doping Report

- The recent report by the World Anti-Doping Agency (WADA) highlighting India's high number of anti-doping violations in 2022 underscores the need for comprehensive efforts to address doping in sports.
- India reported over 100 positive results, surpassing larger countries like China, the USA, and Russia.
- WADA was established in 1999 following the "Declaration of Lausanne," by the International Olympic Committee (IOC).
- Its primary objective is to promote, coordinate, and monitor efforts worldwide to combat the use of prohibited substances and methods in sports.

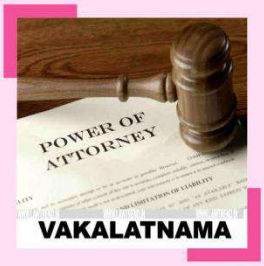
Curative Pleas

- A curative petition is the absolute last resort for someone seeking justice after all other legal options have been exhausted.
- Curative jurisdiction was established by the Supreme Court in the case of Rupa Hurra v/s Ashok Hurra (2002) to address gross errors or miscarriages of justice not rectified through ordinary legal routes.
- The power to entertain curative petitions is derived from Article 137 of the Constitution, which grants the Supreme Court the authority to review its own judgments to prevent miscarriages of justice.
- The petitioner must establish a genuine violation of fair court procedures during their case, such as being denied a chance to be heard or facing procedural irregularities.
- The petition is originally reviewed by a bench of three most senior judges, as well as the original judges (if any are available). They determine if the petition fits the criteria and deserves further review.
- Curative petition decisions are normally decided in chambers (the judge's private workplace) unless an open hearing is specifically requested.

Doctrine of Harmonious Construction

- The Doctrine of Harmonious Construction is a fundamental principle in legal interpretation, particularly for statutes (written laws).
- It ensures that different provisions within a law, or even across different laws, are interpreted in a way that avoids conflict and promotes a unified understanding.
- It was first applied in the Indian context in the case of Shankari Prasad v/s Union of India (1951).
- The Supreme Court, in Commissioner of Income Tax v/s Hindustan Bulk Carrier (2003), laid down specific principles guiding the application of harmonious construction.
- Re Kerala Education Bill (1951) case emphasised the need to harmonise Fundamental Rights with Directive Principles, giving effect to both where possible.
- The Doctrine ensures that statutes are interpreted in a manner that respects their coherence and consistency, promoting fairness and justice in legal interpretation.

Vakalatnama



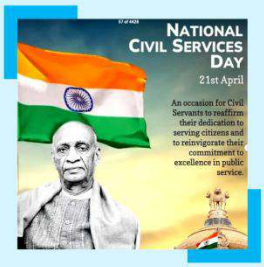
- Vakalatnama derived from "Vakalat" (authority) and "Nama" (document), signifying a document of representation.
- It is a legal document authorising a lawyer to represent a client in court proceedings.
- It formally delegates authority from a client to a lawyer, allowing them to act on the client's behalf in court.
- It is signed by an individual requiring legal representation in a specific case (or cases) before a particular court (or courts).
- Not required for all legal services (e.g., legal opinions, notices, document drafting).
- Clients can revoke a Vakalatnama anytime following the proper legal process.

Easementary Rights

- An easement is a right granted to one property owner (Dominant Owner) to use another's land (Servient Owner) for a specific purpose, benefitting the Dominant Owner.
- Easements ensure full enjoyment of a property by enabling access, essential resources (light, air, water), or passage.
- Granting an easement doesn't transfer land ownership.
- Governed by The Indian Easements Act, 1882 for creation, modification, or termination.
- The Easements Act ensures clear definition, enforceability, and legal principles for easements, promoting orderly property use.

Supreme Court VVPAT Judgment

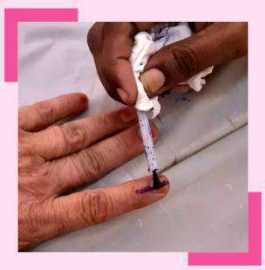
- The judgment highlighted that the existing practice of counting VVPAT slips from five randomly selected Assembly constituencies or segments remains unchanged.
- The court directed the Election Commission (EC) to seal and store Symbol Loading Units (SLUs) for 45 days post-election results declaration. SLUs are critical memory units used to load election symbols onto VVPATs.
- Candidates who secure second or third place in elections are now permitted to request verification of the burnt memory semi-controllers in 5% of EVMs per Assembly segment of each Parliamentary constituency.
- This verification process involves engineers from the EVM manufacturers, and candidates must submit a written request and cover the associated expenses. If tampering is detected during verification, the expenses will be refunded.



APTI PLUS

National Civil Services Day

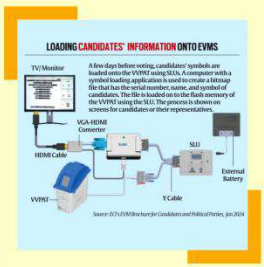
- National Civil Service Day in India is celebrated annually on April 21.
- The day marks an important event on April 21, 1947, when Sardar Vallabhbhai Patel addressed newly appointed civil servants. His address emphasised the critical role of civil servants as the "steel frame of India" in shaping and administering the nation post-independence.



APTI PLUS

Indelible Ink

- The Representation of the People Act (RoPA) 1951 mandates the use of indelible ink to mark voters' fingers to prevent duplicate voting, reinforcing the legal framework for conducting free and fair elections.
- Indelible ink contains silver nitrate, which remains colourless until exposed to ultraviolet light, ensuring the ink's visibility and resistance to removal.
- The chemical composition of the ink ensures that it remains visible on voters' fingers for up to 72 hours, even when exposed to water, soap, and other cleansing agents.
- Karnataka Government Undertaking "Mysore Paints & Varnish Ltd." is the sole manufacturer of indelible ink in India, producing a substantial quantity for each election cycle to meet electoral requirements.



APTI PLUS

Symbol Loading Unit (SLU)

- The Supreme Court directed the Election Commission (EC) to seal and store Symbol Loading Units (SLUs) for 45 days post-election results declaration. SLUs are critical memory units used to load election symbols onto VVPATs.
- The SLU is employed to upload contesting candidates' symbols onto VVPAT machines by connecting it to a laptop or computer with a symbol-loading application, which uploads a file containing candidates' names, serial numbers, and symbols.
- A district election officer supervises the symbol-loading process with SLUs to verify accuracy and integrity, and the SLUs are then turned over to the officer for safekeeping until voting is completed.
- After voting, SLUs are returned to engineers from EVM manufacturers (such as Bharat Electronics Ltd - BEL or Electronics Corporation of India Ltd - ECIL) for reloading symbols onto VVPATs in other constituencies.
- SLUs are efficiently reused across multiple phases of elections to optimize their utilization in preparing VVPATs for different constituencies.

APTI PLUS

Unopposed Election of a Candidate

- The Representation of the People Act, 1951, under Section 53(3), allows for a candidate to be declared elected unopposed if the number of candidates remaining after the withdrawal of nominations is less than the number of seats to be filled.
- In the Surat Lok Sabha constituency, following the rejection of opposition candidates' nomination papers and withdrawals, just one contender remained eligible, resulting in an uncontested election.
- Since 1951, 35 candidates have won Lok Sabha elections unopposed.
- The number of unopposed wins has varied over general election years, with peaks seen in specific election cycles, such as the 1957 general elections, when seven candidates won unopposed.

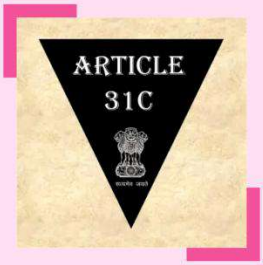
APTI PLUS

National Centre For Good Governance (NCGG)

- Established in 2014 under the Ministry of Personnel, Public Grievances and Pensions.
- Evolved from the National Institute of Administrative Research (NIAR), founded in 1995.
- Functions as an autonomous institution focusing on governance, policy reforms, and capacity building.
- Addressing governance challenges across sectors and levels (local, state, national).
- Conducting training and capacity-building programs for civil servants and technocrats (domestic and international).

APTI PLUS

Article 31 C



- Article 31C was enacted in 1971 to prevent laws aimed at achieving particular directive principles (specifically Articles 39(b) and 39(c) from being invalidated for violating fundamental rights (Articles 14, 19, and 31).
- In the Kesavananda Bharati Case (1973), the Supreme Court upheld the principle of basic structure and partially dismissed Article 31C, specifically the provision that protects laws from judicial challenge.
- The 42nd Constitution Amendment Act (1976) expanded Article 31C to include all directive principles (Articles 36-51) and prioritized them over fundamental rights for social and economic change.
- In the Minerva Mills Case (1980), the Supreme Court dismissed several provisions of the 42nd Amendment Act, including provisions of Article 31C, highlighting the limitations on Parliament's amending power.

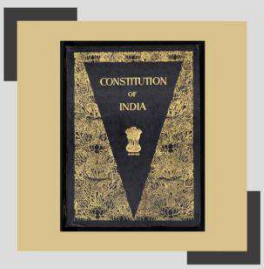
APTI PLUS

Section 33 of RPA

- Section 33 of the Representation of the People Act, 1951 (RPA) outlines key components and criteria for candidates presenting nomination papers for election.
- Candidates can submit nomination papers to the returning officer on or before the specified date, as determined by Section 30 of the RPA. Nomination papers cannot be delivered on a public holiday.
- Candidates contesting in constituencies with reserved seats must specify their caste or tribe and the corresponding Scheduled Caste or Scheduled Tribe area.
- The provisions under Section 33 emphasize the need for proper verification and scrutiny of nomination papers to maintain the integrity of the nomination process.

APTI PLUS

Article 244(A)



- The 22nd Amendment Act of 1969 introduced Article 244(A) to the Indian Constitution, allowing the establishment of an autonomous state in Assam, consisting of certain tribal territories defined in Part A of the Sixth Schedule of the Constitution.
- The primary objective is to establish an autonomous state with its own legislative body and/or Council of Ministers, granting significant powers and autonomy to the region.
- Parliament has the authority to define the powers, functions, and structure of the autonomous state's legislature or Council of Ministers through legislation.
- The 22nd Amendment ensures fiscal autonomy by assigning taxes levied by the State of Assam to the autonomous state, providing financial stability and independence.

Electric Mobility Promotion Scheme (EMPS) 2024

- EMPS 2024 succeeds the Faster Adoption and Manufacturing of Electric Vehicles in India (FAME-II) program, which ended in March 2024.
- It aims to make electric two-wheelers and three-wheelers more affordable, promoting environmentally friendly transportation options.
- It is introduced by the Ministry of Heavy Industries, with the approval of the Department of Expenditure, Ministry of Finance.
- It targets both commercially registered and privately owned electric two-wheelers (e2Ws), catering to a wider range of users.
- It aligned with the Aatmanirbhar Bharat initiative, encouraging local production through the Phased Manufacturing Programme, potentially strengthening the EV supply chain and creating jobs.
- With a timeframe of just four months (April 1, 2024, to July 31, 2024), this scheme might be seen as a way to create a short-term boost for electric vehicle adoption.

Suvidha Portal

- The Suvidha Portal, developed by the Election Commission of India (ECI), acts as a central repository for election-related information.
- The portal operates on the principle of 'First in First Out', ensuring fairness and equal treatment to all parties and candidates.
- Real-time tracking of applications through the Suvidha app and portal enhances transparency, enabling stakeholders to monitor the status of their requests.
- The portal's accessibility through both online and offline modes ensures inclusivity and equal opportunity for all participants in the electoral process.
- By providing detailed permission data and status updates, Suvidha contributes significantly to scrutinizing election expenditures and promoting accountability in the electoral process.

Mid-day Meal Scheme

- Indonesia is interested in implementing a program similar to India's Mid-day Meal Scheme (MDMS), aiming to combat childhood malnutrition and enhance educational outcomes.
- The MDMS model, as the world's largest free school lunch program, offers a blueprint for Indonesia to address similar challenges and promote educational participation among children.

PMAY-U Scheme

- The Pradhan Mantri Awas Yojana - Urban (PMAY-U), launched in 2015, aimed to provide housing for economically weaker
- sections and low-income groups by 2022 with a target of 2 crore houses, but has been extended to December 2024 due to delays in meeting the original completion timeline.

2. INTERNATIONAL RELATIONS

2.1 TURKIYE

Context

- The Turkish President's ruling Justice and Development Party (AK Party) faced its biggest electoral defeat in elections.

Introduction

- Regime change and elections in Turkiye is important for India because two countries share relations in various aspects.

Background of India-Turkiye Relations

Historical Diplomatic Exchanges:

- The first diplomatic missions between Ottoman Sultans and Indian Muslim rulers occurred in 1481-82. **In 1912, Dr. M.A. Ansari led a medical mission to Turkiye during the Balkan Wars and the Khilafat movement.**

Support for Turkey's War of Independence:

- Mahatma Gandhi and other leaders actively supported their independence and advocated against injustices post-World War I.

Establishment of Diplomatic Relations:

- Turkiye promptly recognized India after its independence declaration on 15 August 1947, leading to the establishment of diplomatic relations in 1948.

India Turkey Relations

Political relations:

- The diplomatic relation dating back to 1960, both countries having strong stances against terrorism in UN, SCO, etc show strong political convergence between the two countries.

Economic & Commercial Relations:

- Bilateral agreements were signed in 1973 the visit by the first PM Nehru and India–Türkiye Joint Commission on Economic and Technical Cooperation (JCETC) was established in 1983.
- **Bilateral trade in 2021-22- USD 10.70 billion. India's export to Tukey in 2021-22- $ 8,716.13 million. India's imports for this period were 1,996.75 million.**

The major Indian exports to Turkey:

- petroleum products, auto components/parts, man-made yarn, made ups, aircraft & spacecraft parts, etc.

Imports from Turkey:

- Industrial machinery, broken/unbroken poppy seeds; mechanical appliances, iron and steel articles thereof, inorganic chemicals, granite and marble, etc.

Cultural Relations:

- The Indian Council of Cultural Relations (ICCR) maintains good economic relations with the cultural communities of Turkiye. Ex. Gujarati folk dance group 'Saptak' was hosted in Bursa (Türkiye) in the 34th International Golden Karagoz Folk Competition in 2022.

Indian diaspora:

- A small Indian community of around 2000 people lives in Turkiye. They live mostly in Istanbul. There are currently around 200 Indian students in Türkiye.

Significance of Turkiye for India

Rise of Turkiye in the region:

- Turkiye has increased its profile in Central Asia and has made new relations with other countries in the region. India must maintain good relations with Turkiye for its influence with other countries in the Middle east.

The military:

- Turkiye is increasingly becoming a global military power. In the war between Armenia and Azerbaijan, Turkish military intervention turned the war in favor of the latter.

Potential for Trade:

- Turkish annual trade with the Central Asian region is more than $10 billion with the potential to grow even more. By engaging with Turkiye, India can improve its economic presence in the region.

Connectivity:

- The country is building transportation corridors to Central Asia and beyond, to

China, Georgia, Azerbaijan, etc. The Lapis Lazuli Corridor now connects Turkiye to Afghanistan via Turkmenistan.

G20L

- The G20 is a group of 20 major economies, in which both of these nations participate. There, they have worked closely together to govern the global economy.

2.2 INDIA CHINA TUSSLE ON ARUNACHAL PRADESH

Context

- India rejected China's renaming of places in Arunachal Pradesh, reaffirming the state's integral status within India.

Details of India china tussle in Arunachal Pradesh

Background:

- India's response comes after China announced names for 30 more places in Arunachal Pradesh, which it claims as southern Tibet.

Chinese Actions:

- The Chinese Ministry of Civil Affairs released a fourth list of standardized names in Zangnan, referring to Arunachal Pradesh as part of south Tibet, reinforcing its territorial assertions.

Historical moves:

- Previous actions include releasing standardized names for six places in 2017, 15 places in 2021, and 11 places in Arunachal Pradesh in April last year.

Key Points about the Standardised Maps of China

Territorial Claims:

- The map includes China's territorial claims in **Arunachal Pradesh and the Aksai Chin Region.**
- The map also contains the **"Nine-Dash Line,"** which is a contentious demarcation that covers the entire South China Sea and highlights Beijing's claims over the South China Sea.
- The map also shows the tenth dash line which highlights Beijing's claims over Taiwan island.

Renaming of Places:

- China's release of the new map contains the new names of places in Arunachal Pradesh, including areas close to Itanagar and Tawang.

Disputes between India and China

Border Dispute:

- India and China dispute the undemarcated Line of Actual Control (LAC) in the Himalayas, spanning 3,488 kilometers, leading to tensions and occasional standoffs. **Ex. Mc Mohan line border controversy with independent India led to the Sino-Indian hostilities of October–November 1962.**

Arunachal Pradesh:

- China claims Arunachal Pradesh as "South Tibet," sparking diplomatic tensions with India.

Tibet Issue:

- India's asylum to the Dalai Lama and Tibetan refugees provokes China, to view Tibet as an internal matter.

Strategic Influence:

- Both aim for influence in Asia, competing in infrastructure, trade, and military alliances.

Maritime Disputes:

- India and China have differences in the maritime domain, especially in the Indian Ocean region where both countries seek to expand their naval presence and influence.

Military Standoffs:

- **1962 Sino-Indian War,** Galwan Valley stand-offs in Ladakh in 2020 and in Tawang in Arunachal Pradesh in 2022.

Conclusion

- The India-China border dispute requires sustained diplomatic talks, confidence-building measures, robust conflict prevention mechanisms, enhanced economic

cooperation, and multilateral engagement for lasting resolution.

2.3 NATO

Context

- NATO's chief, amid concerns over Russia's aggression and the potential return of Donald Trump, called on the US to maintain unity with Europe as the alliance marked its 75th anniversary.

Challenges of NATO unity

Differing Threat Perceptions:

- NATO members may have varying perceptions of threats, leading to disagreements on priorities and responses to security challenges.

Budgetary Disparities:

- Differences in defense budgets among NATO countries can strain unity, with some members contributing more while others fall short of agreed-upon spending targets.

Geopolitical Tensions:

- Geopolitical tensions, such as historical rivalries or disputes over territory, can create divisions within NATO, hindering coordinated action in response to external threats. Ex. ongoing territorial dispute between Greece and Turkey over maritime boundaries in the Eastern Mediterranean.

Leadership Changes:

- Changes in leadership, both within NATO and among member states, may result in shifts in policy and priorities, potentially impacting unity and cohesion within the alliance. Ex. **Donald Trump has always spoken against other countries in terms of budgetary allocation of other countries.**

Complex Decision-Making:

- NATO's consensus-based decision-making process can be slow and cumbersome, making it challenging to reach agreements on important issues, particularly in rapidly evolving security environments.

In 2021, the **US had the highest defense budget** among NATO members, **comprising 67% of total NATO defense spending**. However, some allies like Germany, Italy, and Spain fell short of NATO's 2% GDP defense spending target. For instance, Germany's defense expenditure was about 1.5% of its GDP, while Italy's was around 1.4% in 2020.

The Warsaw Pact

- **Formation of the Warsaw Pact:** Signed in May 1955, the Warsaw Pact was a defense treaty between the Soviet Union and seven Eastern Bloc countries in Poland.
- **Purpose and Scope:** The pact aimed to counter NATO during the Cold War, forming a defensive alliance.
- **Member Countries:** Albania, Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, and Romania initially joined the pact.
- **Dual Meaning of "Warsaw Pact":**The term refers to both the treaty itself and the resulting defensive alliance known as the Warsaw Treaty Organization (WTO).

2.4 STRATEGIC IMPORTANCE OF ANDAMAN AND NICOBAR ISLANDS

Context

- The strategic Andaman and Nicobar Islands are in the middle of a major military infrastructure upgrade.

Need for infrastructure upgrade

Deployment Facilitation:

- Upgrade infrastructure to accommodate additional military forces, warships, aircraft, missile batteries, and troops.

Counter to Chinese Influence:

- Respond to Chinese expansion efforts in the region, including the construction of a military facility at Myanmar's Coco Islands, by enhancing infrastructure.

Airstrip Lengthening:

- Increase the length of vital airstrips at naval air stations to accommodate larger aircraft such as P8Is and fighter jets.

Road Improvement:

- Enhance road infrastructure, including the construction of a road from the north of the islands to Port Blair in the south, to facilitate increased traffic flow.

IAF Station Upgrade:

- Upgrade Indian Air Force stations to support fighter squadrons and enable longer durations of operation.

Container Transshipment Terminal:

- Construct a container transshipment terminal and associated infrastructure to support increased traffic and operations in the region.

Important Infrastructures established in Andaman and Nicobar in recent years

Modern Hangar and Dispersal System:

- At INS Utkrosh in Port Blair was inaugurated to enhance naval aviation capabilities.

Precision Approach Radar (PAR):

- At INS Utkrosh to enable safe aircraft landings in low visibility conditions.

Integrated Underwater HarbourDefence and Surveillance System:

- To bolster maritime security at INS Utkrosh.

Naval Communication Network (NCN) Centres:

- At INS Kohassa, INS Baaz, and INS Kardi to enhance the communication and operational capabilities of the ANC.

Coastal Circuit Development:

- The Ministry of Tourism's initiative under the Swadesh Darshan Scheme to develop island tourism, covering Long Island, Ross Smith Island, Neil Island, Havelock Island, Baratang Island, and Port Blair.

Japan's Development Assistance:

- Approval of a USD 265 crore grant aid by Japan in 2021 for development projects in Andaman and Nicobar Islands.

NITI Aayog's Project for Great Nicobar:

- Includes the development of an international container transshipment terminal, an airport, a power plant, and a township for infrastructure development in Great Nicobar.

Strategic Importance of the Andaman and Nicobar Islands

Key Maritime Position:

- Being near the Strait of Malacca, a vital sea lane connecting the South China Sea to the Indian Ocean, provides India with strategic control over maritime trade routes.

Net Security Provider:

- This allows India to assert itself as a 'net security provider' in the region by leveraging its position to protect its interests and maintain regional stability.

Regional Connectivity:

- With 30% of India's Exclusive Economic Zone (EEZ), the islands serve as a crucial link between South Asia and Southeast Asia, enhancing regional connectivity and economic ties.

Indo-Pacific Intersection:

- Positioned at the intersection of the Indian Ocean, South China Sea, and Pacific Ocean, the islands serve as a strategic fulcrum in the Indo-Pacific region.

Maintaining Regional Balance:

- Enables India to establish a maritime exclusion zone and monitor Chinese maritime

activity, countering the presence of the People's Liberation Army Navy (PLAN) in the Indian Ocean and ensuring regional balance.

Conclusion

- The ongoing large-scale construction activities come amid growing Chinese attempts to expand its influence in the region, which includes the construction of a military facility at Myanmar's Coco Islands lying 55 km north of A&N Islands. India should make the Andaman and Nicobar Islands an important element of its "Act East Policy" and "Neighborhood First" initiative.

2.5 INDIA AFRICA DEFENCE RELATIONS

Context

- In a sign of expanding focus on military diplomacy, India sent Defence Attachés (DA) to a number of its missions in Africa for the first time.

Details of New Defense Attaches (DA)

Deployment in Africa:

- Four new DAs expected, with one likely assigned to Francophone Western Africa, and three others to Eastern and Southeastern African countries.

Targeted Countries:

- Discussions ongoing for deployment in countries like Ivory Coast, Mozambique, Ethiopia, and Djibouti, enhancing India's defense presence and engagement in these regions.

Expansion Beyond Africa:

- Apart from Africa, a new DA scheduled for deployment in the Indian embassy in Poland. Currently, the DA in the Indian embassy in the Czech Republic serves concurrently for the Indian mission in Warsaw.

India-Africa Defence Relations

India-Africa Defence Dialogue (IADD):

- Held during DefExpo 2022 in Gujarat, focusing on enhancing defence and security cooperation. Gandhinagar Declaration adopted, emphasizing increased training, empowerment of African defence forces, and joint humanitarian assistance.

AF-INDEX:

- Africa-India Field Training Exercise (AF-INDEX) promotes collaboration in capacity building of African armies. The second edition, was held in March 2023.

IADMC:

- India-Africa Defence Ministers and Chief's Conclave has been institutionalized for biennial meetings with aims at exploring joint ventures in defence equipment, cyber security, and maritime security.

Maritime Security:

- Indian Navy emerges as a key security provider in the Indian Ocean Region (IOR). SAGAR initiative promotes trust, transparency, and peaceful resolution of maritime security issues.

IMT Trilateral Exercise:

- Joint maritime exercise between India, Mozambique, and Tanzania enhances interoperability and cooperation.

2.6 INDIA'S STAKES IN THE IRAN-ISRAEL CONFLICT AND ITS STAND

Context

- India raised "serious concern" over escalating tensions and urged immediate de-escalation after Iran's retaliatory attack on Israel.

Concerns for India

- India is concerned about the potential escalation of conflict, particularly due to its strategic ties with both Iran and Israel.

India's stake in Israel

Strategic Partnership:

- India and Israel share a strong strategic partnership, cooperating in defense, counter-terrorism, intelligence sharing, and cybersecurity to address common security threats.

Defense Cooperation:

- Israel is a key defense supplier to India, providing advanced technologies like missiles, UAVs, radar systems, and electronic warfare systems, strengthening India's defense capabilities. **Ex. SPYDER surface-to-air missile system, Heron UAVs (Unmanned Aerial Vehicles), EL/M-2080 Green Pine radars, and EL/W-2090 Phalcon airborne early warning and control systems, etc.**

Counter-terrorism Collaboration:

- Both countries closely collaborate in counter-terrorism efforts, sharing intelligence and expertise in areas such as border security and counter-insurgency operations.

Technological Partnership:

- India seeks to benefit from Israel's expertise in fields like agriculture, water management, healthcare, and renewable energy, promoting mutual growth through technology transfer and innovation.

Economic Relations:

- Bilateral trade and investment between India and Israel have grown significantly, with collaborations in sectors such as agriculture, IT, pharmaceuticals, and startups, contributing to prosperity in both nations.

Diplomatic Engagement:

- Diplomatic relations between India and Israel, established in 1992, have strengthened through high-level visits and dialogues, enhancing cooperation across various domains.

People-to-People Contacts:

- Cultural exchanges, academic collaborations, and tourism play a vital role in fostering understanding and friendship between India and Israel, strengthening bilateral relations at the grassroots level.

India's stake in Iran

Energy Security:

- Iran serves as a vital energy source for India, notably in oil imports, reducing reliance on other oil-producing nations.

Strategic Location:

- Iran's strategic position in the Persian Gulf and its proximity to crucial shipping lanes are geopolitically significant for India, contributing to maritime security and strategic interests in the region.

Infrastructure Development:

- India invests in Iranian infrastructure projects, including the Chabahar Port and associated road and rail networks, to enhance connectivity, regional trade, and counter China's influence in the area. **The Chabahar Port facilitates access to Afghanistan and Central Asia, diversifying trade routes and enhancing India's energy security.**

Trade and Economic Cooperation:

- Despite international sanctions, India maintains economic ties with Iran, exploring collaboration in agriculture, pharmaceuticals, infrastructure, and manufacturing to expand bilateral trade and investment.

Cultural and Historical Ties:

- Deep-rooted cultural and historical connections between India and Iran foster mutual understanding through cultural exchanges, academic collaborations, and people-to-people contacts. **Ex. There are more than 1 Lakh Zoroastrians in India who migrated to India from Persia.**

Diplomatic Engagement:

- India engages in diplomatic relations with Iran through high-level dialogues and exchanges to reinforce mutual trust, promote dialogue, and address shared challenges and opportunities.

Other Significant impacts of the war on India

Risk to Indian Communities:

- Approximately 18,000 Indians reside in Israel, while 5,000-10,000 are in Iran. However, around 90 lakh Indians live and work in the Gulf and West Asia region, posing a risk to

the Indian community in case of conflict escalation.

Energy Security Concerns:

- India heavily depends on the West Asia region for 80 percent of its oil supplies. Any conflict would disrupt these supplies, and impact India's energy security

Strategic Diplomatic Relations:

- India's extended neighborhood policy and New Delhi's efforts to establish the India-Middle-East-Europe Economic corridor could be affected by conflict.

Conclusion

- India has strategic ties with both Iran and Israel and has traditionally maintained a balanced position between the two. India's position that **there should be "immediate de-escalation" and "step back from violence" and "return to the path of diplomacy"** is, therefore, crucial to its national interest.

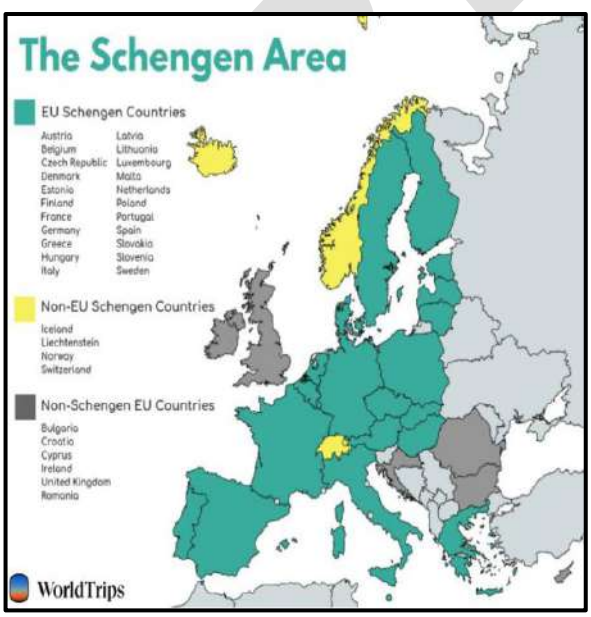
2.7 SCHENGEN VISAS

Context

- The new visa 'cascade' regime of EU will provide Indian nationals easier access to visas with multi-year validity for travellers "with an established travel history, if the passport validity allows.

Details of the amendments

- Visa rules now allow Indian nationals to get multiple-entry Schengen visas with an extended validity period.
- **It is known as the "cascade" system.**
- The new regime aims to simplify the visa application process for frequent travellers with proven travel history, provided their passport validity allows it.



Benefits of the "cascade" system

- ***Indian nationals can now be issued long-term, multi-entry Schengen visas valid for two years after having obtained and lawfully used two visas within the previous three years. The two-year visa will normally be followed by a five-year visa, if the passport has sufficient validity remaining.***
- During the validity period of these visas, holders enjoy travel rights equivalent to visa-free nationals.

Schengen visa

- It is an official document mandatory for some non-Europeans to travel to all the 27 countries which are part of the Schengen area.

Schengen Area Countries

- The Schengen area consists of *29 European countries of which 25 are EU states* (**Belgium, Bulgaria, Croatia,Czech Republic, Denmark, Germany, Estonia, Greece, Spain, France, Italy, Latvia, Lithuania, Luxembourg, Hungary, Malta, Netherlands, Austria, Poland, Portugal, Romania, Slovenia, Slovakia, Finland and Sweden, along with Iceland, Liechtenstein, Norway and Switzerland).**

Schengen Agreement

- The Schengen Agreement of 1985, which was signed on June 14, 1985, laid the groundwork for the eventual creation of the Schengen Area.
- **Entry into Force:** While the Schengen Agreement was signed in 1985, *it did not come into effect until much later.* The full implementation of the Schengen Agreement occurred on March 26, 1995, when internal border controls were abolished among the initial group of member states.
- **Free Movement of People:** It facilitates the free movement of people within the Schengen Area. This means that citizens of member states, as well as certain non-citizens with valid Schengen visas, can travel between participating countries without encountering border controls or the need to show passports or other forms of identification at internal borders.
- **Abolition of Internal Borders:** One of the fundamental aspects of the Schengen Agreement is the abolition of internal borders between member states. *This allows for seamless travel within the Schengen Area, enhancing economic integration and cultural exchange among participating countries.*
- **Common Visa Policy:** It establishes a common visa policy among member states for travelers from non-Schengen countries. This means that *a single Schengen visa, issued by any member state, allows the holder to travel freely within the entire Schengen Area for a specified period, typically up to 90 days within a 180-day period.*
- **Enhanced Security Cooperation:** While internal borders are open within the Schengen Area, member states maintain stringent security measures at their external borders. This includes *cooperation on border control, immigration, and law enforcement to ensure the safety and security of the Schengen Area as a whole. Additionally, the Schengen Information System (SIS) enables member states to share information about individuals and objects of interest, such as stolen passports or wanted criminals, to enhance security and prevent cross-border crime.*

2.8 CHERNOBYL DISASTER

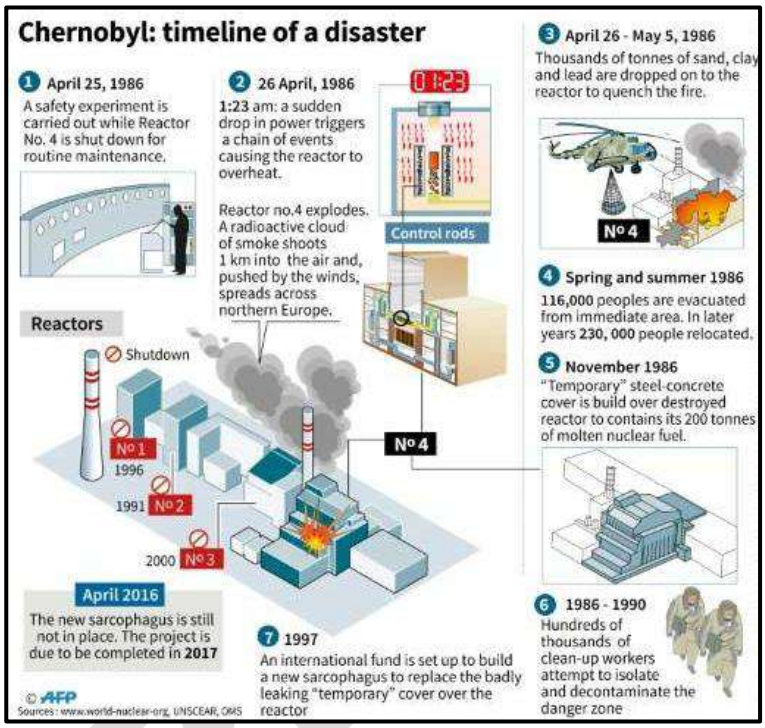
Context

- On April 26, 1986, Chernobyl Nuclear Power Plant exploded, causing one of the worst nuclear disasters.

The Chernobyl disaster

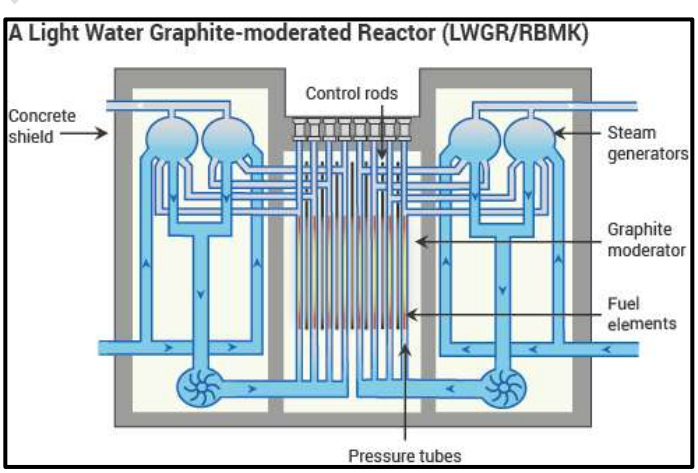
- It began on 26 April 1986 with the explosion of the No. 4 reactor of the Chernobyl Nuclear Power Plant, near the city of Pripyat in the north of the Ukrainian SSR, close to the border with the Byelorussian SSR, in the Soviet Union.

What caused the Chornobyl accident?



- On April 26, 1986, the *Number Four RBMK reactor at the nuclear power plant at Chernobyl, Ukraine, went out of control during a test at low power, leading to an explosion and fire that demolished the reactor building and released large amounts of radiation into the atmosphere.*
- Safety measures were ignored, and the uranium fuel in the reactor overheated and melted through the protective barriers.
- RBMK reactors do not have what is known as a containment structure, a concrete and steel dome over the reactor itself designed to keep radiation inside the plant in the event of such an accident.
- Radioactive elements including plutonium, iodine, strontium, and cesium were scattered over a wide area.
- The graphite blocks used as a moderating material in the RBMK caught fire at high temperatures as air entered the reactor core, which contributed to the emission of radioactive materials into the environment.

RBMK



- The RBMK (Russian: reaktorbolshoymoshchnostikanalnyy, "high-power channel-type reactor") is a class of **graphite-moderated nuclear power reactors** designed and built by the Soviet Union. It is one of two reactor types to be developed in the Soviet Union in the 1970s.
- The name refers to its **(unusual)design** where, instead of a **large steel pressure vessel surrounding the entire core**, the core is surrounded by a cylindrical annular steel tank inside a concrete vault, and each fuel assembly is enclosed in an individual 8 cm (inner) **diameter pipe (called a "technological channel").** The channels also contain the coolant and are surrounded by graphite.
- The RBMK is an early **Generation II reactor** and the oldest commercial reactor design still in wide operation, although reactor units of the first generation type have all been decommissioned.

Fatalities from disaster

- According to the International Atomic Energy Agency, the initial explosion killed two workers, *with 28 firemen and emergency clean-up workers dying within three months from Acute Radiation Sickness.*

- In 2005, the UN predicted that *around 4,000 people may eventually die due to radiation exposure.*
- A 2006 World Health Organization study predicted 9,*000 cancer-related fatalities in Ukraine, Belarus, and Russia as a result of the Chernobyl disaster.*
- An area of roughly *2,600 sq km remains (permanently) out of bounds for human habitation*, due to the radio-active contamination.
- The Chornobyl disaster is said to have released *400 times more radiation than the atomic bomb dropped on Hiroshima, Japan by the United States.*

2.9 2024 GLOBAL REPORT ON FOOD CRISIS (GRFC)

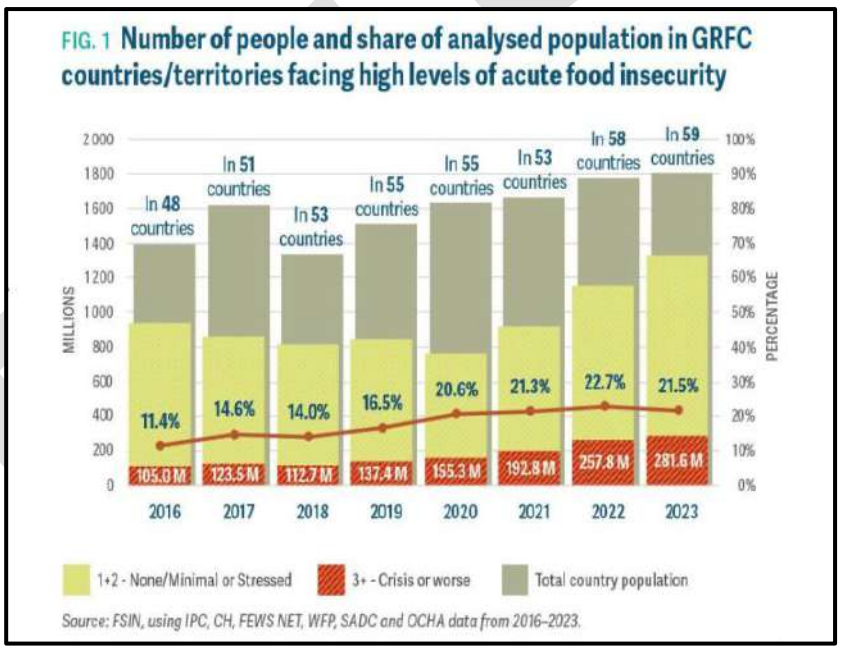
Context

- As per the 2024 Global Report on Food Crisis (GRFC) *Nearly 282 million people faced high levels of acute food insecurity in 59 countries in 2023, with extreme weather being the second most significant factor driving the food crisis.*

Main findings of the report

The magnitude of Food Insecurity:

- Nearly 282 million people in 59 countries faced high levels of acute food insecurity in 2023, with about 22% of the analyzed population affected.



Displacement and Insecurity:

- The number of forcibly displaced people reached 90 million, with Sudan becoming the world's biggest internal displacement crisis. **The Gaza Strip saw almost 80% of its population internally displaced.**

Famine Situations:

- North Gaza faced an imminent risk of famine between March and May 2024, with half of its population experiencing catastrophic acute food insecurity.

Economic Impact:

- Economic shocks, especially in low-income and import-dependent countries, led to acute food insecurity for over 75 million people.

Improvements and Challenges:

- While food security improved in 17 countries, 12 countries saw deterioration, particularly in Sudan, with 13.5 million more people in need of urgent assistance.

Drivers of Food Crisis

- **Conflict and insecurity:** the primary drivers in 20 countries, affecting 135 million people,
- **Extreme weather events:** affected 72 million people in 18 countries.
- **Economic shocks:** significant in 21 countries, impacting over 75 million people.

Regional Hotspots

- The conflict intensified in places like *Palestine (Gaza Strip) and Sudan, with Sudan facing one of the worst food crises globally*.
- Southeastern Sudan, a key agricultural region, has been particularly affected.
- In Sudan, the UN report noted that 20.3 million people – or 42 per cent of the population – struggled to find enough to eat last year, after conflict erupted in April.
- The report also warned that people in *South Sudan, Burkina Faso, Somalia and Mali likely endured the worst levels of food insecurity in 2023.*

2024 Global Report on Food Crisis (GRFC)

- This eighth edition of the report, produced annually by the Food Security Information Network
- The report is produced annually.
- It is published by the **Food Security Information Network and launched by the Global Network Against Food Crises**, involving various stakeholders like UN agencies, the EU, USAID, and NGOs.

Food Security

- Food security is defined by the World Food Summit of 1996:**"When all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active, and healthy life".**

It includes the following dimensions:

1. **Availability:** This refers to the presence of food within a country, including food produced domestically, imports, and stock stored in government granaries.
2. **Accessibility:** Accessibility ensures that food is within reach of every individual without discrimination, ensuring that everyone has the opportunity to obtain the food they need.
3. **Affordability:** Affordability means having enough financial resources to purchase sufficient, safe, and nutritious food to meet one's dietary requirements. It ensures that individuals can afford to buy the food they need to maintain their health and well-being.

Conclusion

- This underscores the urgent need for coordinated efforts to address the root causes of food insecurity, mitigate the impacts of climate change, and ensure access to nutritious food for vulnerable populations worldwide.

2.10 U.S.' 'PRIORITY WATCH LIST'

Context

- U.S. Trade Representative's 2024 Special 301 report was released recently.

Highlights of the report

- The U.S. has once again**included India in the 'priority watch list' of countries, along with China, Russia, Venezuela, and three others, for alleged problems related to IP protection and enforcement.**
- As per the report, Progress has been noted in the U.S.-India Trade Policy Forum regarding issues such as trademark infringement investigations and pre-grant opposition proceedings.
- However, significant concerns persist, including high rates of online piracy, a substantial backlog in trademark opposition cases, and inadequate legal mechanisms for safeguarding trade secrets.
- The report also **emphasizes the need for India to fully implement the WIPO Internet Treaties and ensure that copyright statutory licenses do not extend to interactive transmissions.**

- India has consistently been placed on the 'priority watch' list due to ongoing issues related to IP protection, enforcement, or market access for American IP-dependent industries.
- **Besides India, Indonesia, Chile, and Argentina also feature in the 'priority watch list' of seven countries.**
- USTR **removed the Dominican Republic and Uzbekistan from the Watch List** this year for significant progress in addressing concerns with IP enforcement and transparency.
- **The report identifies 20 trading partners on the 'watch list,'** comprising countries that the U.S. believes **require bilateral attention to address underlying IP issues,** although they fare better than those on the'priority watch list.' These countries are Algeria, Barbados, Belarus, Bolivia, Brazil, Bulgaria, Canada, Colombia, Ecuador, Egypt, Guatemala, Mexico, Pakistan, Paraguay, Peru, Thailand, Trinidad and Tobago, Türkiye, Turkmenistan, and Vietnam.
- The Special 301 review of **Ukraine continues to be suspended due to Russia's full-scale invasion of Ukraine in February 2022.**

Special 301 Report

- The United States Trade Representative(USTR) releases the Special 301 Report **annually**.
- The Report identifies trading partners that **lack effective protection and enforcement of Intellectual Property (IP)** rights or prevent market access for U.S. innovators and creators reliant on IP protection.
- It assesses the state of intellectual property (IP) protection and enforcement regimes in various trading partner countries.
- While the U.S. does not immediately take action against countries on the **'priority watch list,'** it may resort to **'retaliatory'** measures if a country's IP situation deteriorates further, leading to its categorization as a **'priority country.'**

India's stand:

- India maintains that its intellectual property laws comply with the WTO's Trade-Related Aspects of Intellectual Property Rights (TRIPS) Agreement and asserts that it is not obligated to adhere to global rules necessitating changes in its laws.

Concussion

- Despite some progress noted in areas such as trademark infringement investigations and pre-grant opposition proceedings through the U.S.-India Trade Policy Forum, India remains under scrutiny for its IP-related policies and practices. This designation underscores the importance of ongoing dialogue and collaboration between the U.S. and India to address IP concerns and promote fair and effective trade relations.

2.11 SHORT ARTICLES

US and the UK sign agreement on AI safety testing

Context

- Following through commitments made at the**Bletchley Park AI Safety Summit**, the United States and the United Kingdom signed an agreement to work together to develop tests for the most advanced artificial intelligence (AI) models.

Details of the agreement

- **Alignment of Scientific Approaches:** Both countries pledge to synchronize their scientific approaches, focusing on accelerating and making robust evaluations for AI models
- **Information Sharing:** Sharing vital information concerning the capabilities and risks associated with AI models and systems.
- **Technical Research Collaboration:** Collaboration extends to sharing fundamental technical research on AI safety and security,

with a concerted effort to align deployment practices for AI systems.

- **Joint Initiatives with US and UK AI Safety Institutes:**Both Institutes are working together to establish a common approach to AI safety testing, emphasizing the sharing of capabilities to effectively mitigate risks.
- **Global Partnerships:**Both countries commit to forging partnerships with other nations to advance AI safety measures on a global scale.

Quds Forces and Iranian-Israeli hostility

Context

- Israeli war jets attacked an Iranian consulate building in Damascus, Syria, killing at least 13 people – including General Mohammad Reza Zahedi, who was a senior leader of the Iranian Quds Force.

Who are the Quds Force?

- The Quds Force serves as the paramilitary and intelligence arm of the Iranian Revolutionary Guard Corps (IRGC), founded by Ayatollah Khomeini after the 1979 Islamic Revolution.
- **Establishment:** Ayatollah Khomeini established the IRGC to protect Iran following the overthrow of the Shah, forming a theocratic state to counter both domestic and external threats.
- **Structure:**The IRGC encompasses army, naval, and air force wings, totaling approximately 125,000 members, aiming to safeguard Iran's interests.
- **Basij Paramilitary Force:**The Basij, affiliated with the IRGC, claims to mobilize around 600,000 volunteers, serving as an additional paramilitary force for potential mobilization in Iran.

Quds Role in Middle east and Israel's problem with the Quds Force

- **Regional Deployment:** Tehran has deployed Quds Force units across the Middle East to protect Iranian interests beyond its borders.
- **Presence in Syria:** The Quds Force maintains a significant presence in Syria, operating numerous military bases across the country.
- **Active Involvement in Syrian Conflict:** Quds Force actively intervenes in the Syrian war, supporting the Assad regime against ISIS and collaborating with Russia to bolster President Bashar al-Assad's position despite opposition from the US.
- **Strategic Alliance:** Damascus and Tehran share a close strategic alliance, posing security concerns for Israel due to the Quds Force's activities in Syria.

Democracy Report 2024

Context

- V-Dem Institute's recent democracy index termed India "one of the worst autocracies"

The Democracy Report

- The Democracy Report 2024 is **a collaborative project involving 4,200 scholars from 180 countries** and is based on 31 million datasets.
- 'Democracy Report 2024' was released by the Gothenburg-based V-Dem Institute.

Five types of democracies as per V-Dem:

- Electoral, Liberal, Participatory, Deliberative, and Egalitarian, and collect data to measure these principles.

Components of the Liberal Democratic Index (LDI) as per the V-Dem's 'Democracy Report 2024'

- **Liberal Component Index (LCI):**It measures aspects such as the protection of individual liberties and legislative constraints on the executive branch of government.
- **Electoral Democracy Index (EDI):**This index considers indicators that ensure free and fair elections, such as freedom of expression and association.
- **Egalitarian Component Index:**It assesses the extent to which different social groups within a country are equal in terms of rights and opportunities.
- **Participatory Component Index:** This index evaluates the health and functionality of citizen groups and civil society organizations, reflecting the level of citizen participation in governance.

- **Deliberative Component Index:**Examines whether political decisions are made through public reasoning focused on the common good or through emotional appeals, solidarity attachments, or coercion.

Findings of the Democracy Report 2024

- **Autocratisation Trends:** The Democracy Report 2024 reveals that 42 countries, housing 35% of the global population, are experiencing autocratisation.
- **Shifts in Political Systems:** Previously, 8 out of the top 10 autocracies were liberal or electoral democracies, but in 2023, none retained liberal democracy status, with only 2 classified as electoral democracies.
- **Decline in Democratic Standards:** Democracy levels for the average individual globally have reduced to 1985 levels, with Eastern Europe and South/Central Asia witnessing the steepest declines.
- **Electoral Autonomy:** In 22 of the autocratising countries, there's a substantial weakening of electoral management bodies' autonomy.
- **Indian Democracy Trends:** India's level of "liberal democracy" has plummeted to 1975 Emergency-era levels for the average citizen.
- **Regional Dynamics:** Bhutan stands as the sole liberal democracy in South and Central Asia, as highlighted by the report.

Rwandan Genocide

Context:

- April 7 marked the beginning of Rwandan genocide in 1994.

Rwanda genocide

- The Rwandan genocide, also known as the genocide against the Tutsi, was a genocidal mass slaughter of Tutsi in Rwanda by members of the Hutu majority government. An estimated more than 800,000 Rwandans were killed during the 100 days from April 7 to mid-July 1994.

Main Causes

- **Assassination of Habyarimana:** The killing of moderate Hutu leader President Habyarimana in a plane crash on April 6, 1994, triggered the genocide.
- **Historical Ethnic Tensions:** Rwanda's history of Tutsi monarchy and Belgian favoritism towards Tutsis deepened communal rifts between Tutsis and Hutus.
- **1959 Hutu Revolution:**Violent riots led by Hutus resulted in the killing of thousands of Tutsis and forced many to flee the country.
- **Hutu Dominance:**After independence, Hutu parties gained power, leading to ongoing ethnically motivated violence against Tutsis.
- **Armed Insurgencies:** Tutsis who fled formed armed insurgencies, further fueling tensions and violence.

Outcome and Aftermath

- **Devastating Human Toll:**The Rwandan genocide resulted in the deaths of over 800,000 Tutsis and moderate Hutus, along with widespread rape and atrocities committed against civilians.
- **International Response:**The international community faced widespread criticism for its failure to intervene effectively to stop the genocide, with the United Nations peacekeeping mission unable to prevent the violence.
- **Rwandan Patriotic Front (RPF) Victory:** The Rwandan Patriotic Front (RPF), a Tutsi rebel group, emerged victorious, overthrowing the genocidal regime and ending the mass killings.
- **Reconciliation Efforts:** Rwanda embarked on a path of national reconciliation and healing, establishing the Gacaca courts to prosecute perpetrators and promote community-based justice and reconciliation.

Amended India-Mauritius protocol on the double taxation avoidance agreement (DTAA)

Context

- The Income Tax Department stated that the revised India-Mauritius DTAA awaits ratification and notification.

Amendment:

- On March 7, 2024, India and Mauritius amended their **Double Taxation Avoidance**

Agreement (DTAA) and introduced a Principal Purpose Test (PPT) to prevent tax avoidance by ensuring treaty benefits are granted only for genuine transactions.

- **Need for amendment:**Concerns arose regarding potential heightened scrutiny of investments through Mauritius and whether past investments would be affected.
- **Principal Purpose Test (PPT):**PPT test is a scrutiny process which may involve assessing the intent and commercial rationale behind structures and investments to determine eligibility for treaty benefits
- **Impact of PPT Test:**The introduction of the PPT test is expected to lead Indian tax authorities to scrutinize transactions more closely.
- **Double Tax Avoidance Treaty (DTAA): A**lso known as a tax treaty, It is an agreement between two countries aimed at preventing double taxation of income earned in one country by a resident of the other country. These treaties typically allocate taxing rights between the two countries and provide mechanisms for relieving double taxation.

SCO Defence Ministers' meeting

Context

- SCO Defence Ministers' Meeting in Kazakhstan endorses 'One Earth, One Family, One Future'

Highlights of the meet:

- A protocol was signed by the Defence Ministers of all SCO Member States.
- *A Joint Communique* was issued in which the SCO Defence Ministers agreed, amongst other initiatives, *to develop the idea of 'One Earth, One Family, One Future', which is rooted in the ancient Indian philosophy of 'VasudhaivaKutumbakam'.*
- At the meeting, the Defence Secretary reiterated India's steadfast commitment to maintaining peace, stability, and security in the SCO region.
- He emphasized the need to adopt a **zero-tolerance approach** towards terrorism in all its forms for the prosperity and development of the SCO Member States.
- The defence secretary also mentioned India's long-standing proposal of a **Comprehensive Convention on International Terrorism at the United Nations.**
- He also highlighted the concept of **'Security and Growth for All in the Region (SAGAR)'**, proposed by India for the Indo-Pacific.

ASEAN Future Forum

Context

- External Affairs Minister Dr. S. Jaishankar Speaks At First 'ASEAN Future Forum' Virtually.

About First ASEAN Future Forum:

- It was proposed by Vietnam at the 43rd ASEAN Summit in 2023.
- It took place in Hanoi, Vietnam.
- **Theme 2024:** ASEAN Matters: Epicentrum of Growth.
- The theme of the first forum was "**Toward fast and sustainable growth of a people-centred ASEAN Community."**

ASEAN Future Forum:

- This platform allows ASEAN and its partners to share new ideas and policies.
- This forum aims to be an annual multi-stakeholder, track 1.5 dialogue platform for open and constructive discussions about the future of ASEAN.
- The goal is to help ASEAN stay strong and forward-thinking, adjusting to changes while staying true to its values and supporting its members.

- The forum is important because it tackles big questions about ASEAN's future and finds practical ways to keep promoting peace, security, and development in the area.

Indo-Pacific Oceans Initiative:

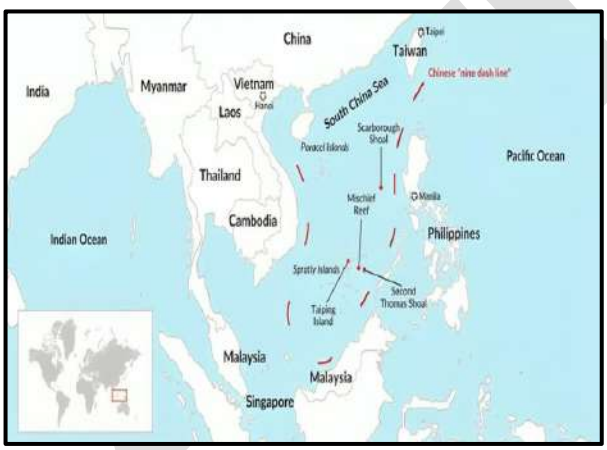
- On 4 November 2019 Prime Minister Narendra Modi launched the *Indo-Pacific Oceans Initiative (IPOI) at the East Asia Summit.*
- *IPOI seeks to ensure security and stability of the regional maritime*
- IPOI is an open, **non-treaty based initiative for countries** to work together for cooperative and collaborative solutions to common challenges in the region.
- Australia is the lead partner on the maritime ecology pillar and is looking to drive scientific collaboration and share best practice across the Indo-Pacific on reducing marine pollution, with a focus on plastic waste.
- **IPOI draws on existing regional architecture and mechanisms to focus on seven pillars:**

Maritime Security	Maritime Ecology	Maritime Resources	Capacity Building and Resource Sharing
Disaster Risk Reduction and Management	Science, Technology and Academic Cooperation	Trade Connectivity and Maritime Transport	

Sierra Madre

Context

- The clash between Philippines and China increased over the issue of Sierra Madre, raising concerns about an escalation.



Sierra Madre

- Sierra Madre is a World War II-era ship.
- The 100 ft-long Sierra Madre was *constructed in the US for World War II (1939-45) and commissioned in 1944 as a landing ship.*
- Subsequently, it was sent to Vietnam during the US participation in the Vietnam War (1954-75).
- In 1976, it was transferred to the Philippines, an ally of the US.

Sierra Madre's association with Spratly Islands

- In 1999, it was left on the Second Thomas Shoal, which is a part of the mostly uninhabited Spratly Islands.
- A few years ago, China had laid claims on the nearby *Mischief Reef.* The move was an attempt at halting further Chinese assertions.
- *China has since demanded the ship's removal* – which the Philippines has rejected. Today, the ship is largely dilapidated and rusting. However, for the Philippines, its removal would risk weakening its claims over the islands and the Chinese presence being established.
- *The disputes "gradually escalated under former Philippine President Benigno Aquino III and culminated in 2012 when China took effective control of the disputed Scarborough Shoal after a tense standoff."*

Full Membership for Palestine in United Nations

Context

- U.S. vetoes resolution backing full U.N. membership for Palestine.

Details:

- **Request by Palestine:** Amid the Gaza war, Palestine submitted a request to reconsider its 2011 application for UN membership to the Secretary-General on April 2.
- **Previous Attempts:** In 2011, the Security Council couldn't agree on recommending Palestine's membership to the General Assembly, which needs to hold a vote involving its 193 member states.
- **Draft Resolution:** The draft resolution was moved to UNGA, simply recommending Palestine's admission to the UN as a member state.
- **Voting Requirements:** For a draft resolution to pass, the Security Council needs at least nine members in favour and no veto from its permanent members **(China, France, Russia, UK, US).**
- **The Voting:** The vote in the 15-member Security Council was 12 in favour, the United States opposed, and two abstentions.
- **Palestine's Status:** Palestine has been a Permanent Observer at the UN since 2012, and prior to that, it was an observer in the UN General Assembly.

Why the US does not support Palestine's inclusion in the UN as a full member state:

- **Strategic Alliance with Israel:** The US has a longstanding and close strategic alliance with Israel. Supporting Palestine's inclusion in the UN as a full member state could be seen as undermining this alliance and Israel's interests.
- **Security Concerns:** The US may have security concerns regarding Palestine's inclusion in the UN, especially if it believes that Palestine has not taken sufficient steps to address security threats or has not shown a commitment to peace and stability in the region.
- **Bilateral Negotiations:** The US has historically advocated for a negotiated settlement to the Israeli-Palestinian conflict through direct bilateral negotiations between the parties involved. Supporting Palestine's unilateral inclusion in the UN could be viewed as bypassing this process and undermining the US-led peace efforts.
- **Domestic Politics:**Support for Israel is a significant aspect of US domestic politics, with strong bipartisan backing for Israel in Congress. The US administration's handling of the conflict can impact domestic political dynamics, particularly in terms of public opinion and electoral considerations.

Nagorno-Karabakh

Context

- Russian peacekeepers have begun withdrawing from Nagorno-Karabakh following Azerbaijan's recapture of the disputed territory from Armenian separatists last year.

What is the Nagorno-Karabakh conflict?

- The Nagorno-Karabakh conflict is a long-standing *territorial dispute primarily between Armenia and Azerbaijan over the Nagorno-Karabakh region, which is internationally recognized as part of Azerbaijan but populated predominantly by ethnic Armenians.*

Causes of the conflict:

- **Historical Context:**The **Nagorno-Karabakh region has a long history of ethnic and territorial disputes between Armenians and Azerbaijanis** dating back to the early 20th century. During the Soviet era, Nagorno-Karabakh was an autonomous region within the Azerbaijan Soviet Socialist Republic, despite its Armenian majority population.
- **Ethnic Conflict:**The region is ethnically Armenian but located within the borders of Azerbaijan. As a result, **both Armenians and Azerbaijanis have laid claim to the territory,** leading to tensions and periodic outbreaks of violence.
- **Nationalism and Self-Determination:** Armenian nationalists argue that Nagorno-

Karabakh's Armenian population has the right to self-determination and independence or union with Armenia, citing historical and cultural ties. Azerbaijani nationalists, on the other hand, assert Azerbaijan's territorial integrity and sovereignty over Nagorno-Karabakh.

- **Collapse of the Soviet Union:** The dissolution of the Soviet Union in 1991 led to the escalation of the conflict. ***As Soviet control weakened, both Armenia and Azerbaijan sought to assert their claims over Nagorno-Karabakh, leading to armed conflict and eventually a full-scale war from 1992 to 1994.***
- **External Involvement:** External actors, including Russia, Turkey, and Iran, have historically played roles in the conflict due to their strategic interests in the region. Russia has close ties with Armenia, while Turkey has supported Azerbaijan.
- **Failure of Diplomatic Efforts:** Despite numerous attempts at mediation and peace negotiations by international organizations such as the OSCE Minsk Group, which was established in 1992 to facilitate a peaceful resolution to the conflict, a lasting solution has remained elusive.

Netzah Yehuda

Context

- The US government may soon sanction a battalion of the Israeli Defence Forces (IDF) Netzah Yehuda over alleged human rights violations, marking the first such move in the history of the two countries' relations.

Basis of US Sanctions:

- The US is reportedly acting on concerns related to *alleged human rights violations committed by the battalion, particularly incidents in the West Bank before Hamas attacked Israel in October the previous year.*
- An incident involving the death of a 78-year-old US-Palestinian citizen, Omar Assad, while in IDF custody has been highlighted. The IDF claimed he died of a heart attack, but allegations of mistreatment have been made.
- The US State Department has expressed deep concern about Assad's death and called for a thorough investigation and accountability.
- The potential sanction is believed to be based on the Leahy Laws in the US.

> The **Leahy Laws** or **Leahy Amendments** are U.S. human rights laws that prohibit the U.S. Department of State and Department of Defense from providing military assistance to foreign security force units that violate human rights with impunity. It is named after its principal sponsor, Senator Patrick Leahy (D-Vermont).

Netzah Yehuda Battalion:

- The Netzah Yehuda battalion was ***established in 1999 to accommodate the religious beliefs of ultra-Orthodox Jews and other religious nationalist recruits in the IDF.***It's an all-male unit known for giving time for prayers and study and limiting interactions with female soldiers.
- Criticisms and allegations of human rights violations, including torture and sexual assault of Palestinians, have been associated with the battalion over the years.

International Narcotics Control Board

Context

- India's JagjitPavadia was re-elected for a third term to the International Narcotics Control Board.

International Narcotics Control Board (INCB)

- Established in 1968, INCB is an independent and quasi-judicial body monitoring the implementation of UN international drug control conventions.
- Membership Composition: Consists of 13 members elected by the Economic and Social Council (ECOSOC), not as government representatives and Three members with medical, pharmacological, or pharmaceutical expertise nominated by WHO, and 10 members nominated by governments.
- Functions:

- Ensures adequate drug supplies for medical and scientific purposes, while preventing diversion to illegal areas.
- Monitors government control over chemicals used in illicit drug manufacturing and helps prevent their diversion.

Underpriced exports to UAE

Context

- The Centre has permitted 24,400 MT shipments to the UAE amid a ban on exports 'till further orders'; exporters allege selling price is being set too low, triggering windfall profits for selected UAE importers

GAIA

Context

- The Global Alliance for Incinerator Alternatives (GAIA) Asia Pacific, has called on the Association of Southeast Asian Nations (ASEAN) to take decisive action in response to plastic pollution.

Akhal-Teke

Context

- Turkmenistan will hold a beauty contest for ' Heavenly Horses' called Akhal-Teke..

Mexico suspends ties with Ecuador

Context

- Mexico has ended its diplomatic ties with the South American nation of Ecuador, following an unprecedented incident in the Ecuadorian capital city of Quito.

Safety of Rwanda Bill

Context

- The United Kingdom's upper house of parliament passed a Bill as part of the government's plan for deporting undocumented immigrants to the East African nation of Rwanda.

Swiss summit for peace

Context

- Switzerland to host peace summit on June 15-16 as initial effort for Ukraine's peace post-Russian invasion.

Artemis Accords

Context

- Sweden becomes 38th country to sign NASA's Artemis Accords for moon exploration.
- The Artemis Accords were announced in May 2020 *by the United States National Aeronautics and Space Administration (NASA)*.
- As of April 19, 2024, *thirty-nine countries have signed the accords,* including nineteen in Europe, eight in Asia, five in South America, three in North America, three in Africa, and two in Oceania.
- Drafted by NASA and the U.S. Department of State, the Accords established *a framework for cooperation in the civil exploration and peaceful use of the Moon, Mars, and other astronomical objects.* They are grounded in the *United Nations Outer Space Treaty of 1967*, which signatories are obliged to uphold, and cite most major U.N.-brokered conventions constituting space law.

3. ECONOMY

3.1 GREEN STEEL

Context

- In March 2023, Union Steel Minister granted for the formation of 13 task forces, each tasked with identifying actionable strategies for green steel production and the adoption of sustainable manufacturing processes.

Environmental Impact of traditional steel production

- Traditional steel production, which involves the **use of coal as a reagent to reduce iron ore to pig iron**, is one of the largest emitters of CO_2, **contributing 6%–7% of global greenhouse gas emissions**.
- The process of **making steel and shaping** it into useful geometries requires high temperatures and intensive energy consumption, which usually comes in the form of fossil fuels.
- On top of that, the steelmaking process requires breaking the chemical bond in iron ore to get access to pure iron, a reaction that requires a reagent to bind with oxygen. In the last 2,000 years of **steelmaking**, that reagent has been coal, which **generates CO_2 as a by-product.**
- Steelmaking is on track to **consume 50% of the total remaining 1.5°C carbon budget by 2050**. In addition to CO_2 emissions, traditional steel production also contributes to other forms of pollution, such as air and water pollution.

Understanding Green Steel:

- Green steel represents a revolutionary approach to steel manufacturing, **emphasizing the elimination of fossil fuels throughout the production process.**
- It relies on alternative energy sources and innovative technologies to minimize or completely eliminate carbon emissions.
- Key solutions in green steel production include the **utilization of "green hydrogen" and the adoption of electric arc furnaces.**

Benefits of Green Steel

- Green steel significantly **cuts carbon emissions** by utilizing renewable energy sources like wind and solar power and recycling scrap steel, **reducing global greenhouse gas emissions by up to 7%.**
- It **reduces energy consumption** compared to traditional methods, relying heavily on fossil fuels, **through efficient productionmethods and renewable energy sources**.
- By utilizing scrap steel, green steel production **reduces reliance on virgin raw materials like iron ore and coal, conserving natural resources for future generations.**
- Green steel production focuses on renewable energy and resource conservation**, improving air and water quality and reducing environmental impacts caused by traditional steel production.**
- It **creates new jobs in renewable energy and recycling sectors**, reduces dependence on imported fossil fuels, and supports local economies, fostering sustainable development.

Technologies for Green Steel Production

- Some of the methods and technologies used in green steel production include **Hydrogen Direct Reduction (HDR) and Molten Oxide Electrolysis (MOE), which are low-carbon primary steelmaking technologies.**
- **Carbon capture and storage (CCS)** can also be applied to blast furnaces to reduce emissions.

Additionally, increasing the use of electric arc furnaces (EAF) for steel production, which rely on recycled scrap steel, can reduce emissions.

Challenges in Achieving Green Steel

- The **transition from conventional blast furnaces to electric arc furnaces**, a critical step in achieving green steel production, has been slow.
- **Limited availability of low-carbon hydrogen**, a crucial component in green steel production, poses a significant barrier to scaling up this technology.
- Renewable energy sources like wind and solar power hold potential for powering steel production, yet their widespread adoption is **hindered by the need for substantial investment and further technological development.**

Promotion of Green Steel in India

- The Ministry of Steel in India aims for net-zero emissions by 2070, promoting decarbonization in the steel industry through measures like energy efficiency, renewable energy, and green hydrogen adoption. They incentivize energy reduction and technology upgrades to encourage sustainable practices and tap into the emerging green steel market.

Steps for Promoting Decarbonization in Steel Industry	Description
Steel Scrap Recycling Policy, 2019	Enhances availability of domestically generated scrap to reduce coal consumption in steelmaking.
MNRE National Green Hydrogen Mission	Ministry of New and Renewable Energy (MNRE) initiative promoting green hydrogen production and usage; steel sector included as a stakeholder.
Motor Vehicles Scrapping Facility Rules, Sept 2021	Increases availability of scrap in the steel sector through regulations governing vehicle scrapping.
National Solar Mission	Launched by MNRE in January 2010, promotes solar energy usage and helps reduce emissions in the steel industry.
Perform, Achieve and Trade (PAT) scheme	Incentivizes the steel industry to reduce energy consumption under the National Mission for Enhanced Energy Efficiency.
Adoption of Best Available Technologies (BAT)	Steel sector globally adopts BAT in modernization and expansion projects to improve efficiency and reduce emissions.
NEDO Model Projects	Implemented in steel plants by Japan's New Energy and Industrial Technology Development Organization (NEDO) for energy efficiency improvement.

3.2 BASEL ACCORDS

Context

- The U.S. Federal Reserve's recent announcement of significant changes to the "Basel III endgame"

Background of the Basel Accords

- Initiated in the **1980s,** the Basel Accords aimed to standardize banking regulations globally to mitigate financial risks.
- The **Basel Committee on Banking Supervision (BCBS), founded in 1974**, convened by the Bank for International Settlements (BIS) in Basel, Switzerlandprovided a platform for member countries to

collaborate on banking supervision matters.

Basel I Accord:

- Introduced in 1988, Basel I primarily focused on capital adequacy, categorizing assets into risk buckets ranging from 0% to 100%.
- Banks were mandated to **maintain capital equivalent to at least 8% of their risk-weighted assets**, ensuring a buffer against unexpected losses.

Basel II Accord:

- Basel II, launched as an update to Basel I, emphasized three pillars: **minimum capital requirements, supervisory review, and market discipline.**
- It introduced a more nuanced approach to risk assessment and tightened capital requirements for banks based on their risk profiles.

Basel III Accord:

- Formulated post-2008 financial crisis, Basel III **aimed to fortify banking regulations further in response to vulnerabilities exposed during the crisis.**
- Key provisions included **minimum common equity and liquidity ratio requirements and the phasing out of tier 3 capital considerations.**

Key Features of Basel III

- **Tiered Regulatory Capital:** Tier 1 (Common Equity Tier 1 and Additional Tier 1) and Tier 2 capital, with stringent criteria for each tier. Basel III norms have introduced strong capital ratios **by increasing the minimum Tier 1 capital from 4% to 6%, and minimum Common Equity Tier 1 capital from 4% to 4.5%.**
- **Bucketing Method:** Classification of banks based on size and systemic importance, influencing regulatory requirements.
- **Liquidity Safeguards:** Stringent measures to ensure banks maintain adequate liquidity during crises, reducing the risk of insolvency.
- **Resilience Enhancement:** Enhanced capital and liquidity requirements aimed at making banks more resilient to economic shocks and systemic risks.

Bank's regulatory capital is divided into Tier 1 and Tier 2. Tier 1 capital is subdivided into Common Equity Tier 1 and additional Tier 1 capital. There is the highest level of subordination in security instruments of Tier 1 capital.

- Common equity Tier 1 capital includes equity instruments that carry discretionary dividends and no maturity.
- Additional Tier 1 capital consists of securities that are subordinated to most subordinate debt, with no maturity date, and dividends that can be cancelled at any time.
- Tier 2 capital consists of unsecured subordinated debt with a maturity of at least five years.
- The bucketing method is used to group banks according to their size and importance in the economy.

Proposed Changes and Implications

- **Credit Risk:** The proposal aims to curtail banks' reliance on internal risk models for determining capital reserves, advocating for more standardized approaches to prevent the underestimation of risk.
- **Market Risk**: Addressing concerns regarding the underestimation of market risks, the proposal seeks to establish more stringent requirements for assessing and provisioning for potential losses.
- **Operational Risk:** Introducing standardized methodologies to assess operational risks, encompassing various sources of potential losses such as management errors, litigation costs, and external events.

Basel Norms Implementation in India

1. **Basel-I Guidelines (1999):** India adopted Basel-I guidelines in 1999.
2. **Basel-II Implementation (31 March 2009):** The Reserve Bank of India (RBI) implemented Basel II standardized norms on 31 March 2009.
3. **Basel-III Norms Implementation:** Basel III Norms were implemented in India in a phased manner, with full implementation scheduled to be completed by 2019.

Key Features of Basel III Norms in India

- **Minimum Capital Requirements:** RBI increased the minimum capital adequacy ratio (CAR) to 11.5% for Indian banks, higher than Basel III's 10.5%. The minimum Tier 1 capital requirement was also raised to 9.5%, with a 2.5% capital conservation buffer.
- **Countercyclical Buffer (CCB):** Introduced by RBI, the CCB ranges from 0% to 2.5% of risk-weighted assets based on macroeconomic conditions. It builds up in good times and supports lending during downturns.
- **Liquidity Coverage Ratio (LCR):** Requires banks to hold a minimum amount of high-quality liquid assets (HQLA) to meet short-term liquidity needs. Phased implementation started at 60% in 2015, reaching 100% by January 2019.
- **Leverage Ratio:** RBI introduced a leverage ratio requiring banks to maintain Tier 1 capital at 4.5% of total exposures, with a 2.5% buffer.
- **Disclosure Requirements**: Banks must regularly report on capital adequacy, liquidity, and risk management practices to promote transparency and market discipline.

3.3 2019 ORDER ON SOLAR PHOTOVOLTAIC MODULES

Context

- To bolster India's solar module manufacturing industry, the Ministry of New and Renewable Energy (MNRE) has implemented an executive order, The Approved Models and Manufacturers of Solar Photovoltaic Modules (Requirements for Compulsory Registration) Order, 2019, effective from April 1.

Purpose of the recent Executive Order

- First issued in 2019, the order **mandates makers of solar modules to undergo an inspection of their manufacturing facilities by the National Institute of Solar Energy, certifying them as 'approved' manufacturers.**
- This move aims to distinguish legitimate manufacturers from mere importers or assemblers in India's solar industry, which heavily relies on imports from China despite its ambitious plans for indigenous solar production.

Challenges in Local Production

- Despite India's commitment to scaling up solar installations four-fold by 2030, **local production of solar cells and modules falls short of demand.**
- Limited capacity to manufacture raw materials such as ingots and wafers further exacerbates the dependency on imports.

Import Dependency and Targeted Growth

- The order also seeks to address India's reliance on solar imports, particularly from China, which controls a significant portion of the global supply.
- With plans to **source 500 GW of electricity from non-fossil fuel sources by 2030**, India aims to substantially increase its solar capacity.
- However, meeting these targets requires a considerable expansion in solar panel and component cell

production, challenging the capacity of India's domestic industry.

Incentives for Solar Manufacturers in India

- While the Approved Models and Manufacturers (AMM) list for solar modules **remains voluntary**, there are compelling reasons for manufacturers to seek certification.

Access to Government Tenders

- Being on the AMM list grants eligibility to compete for tenders issued by the government for flagship solar energy programs, including the PM Surya GharMuft Bijli Yojana.
- This scheme **aims to subsidize rooftop solar installations for approximately one crore households,** offering significant market opportunities for certified domestic manufacturers.

What are Solar PV Modules?

- Solar PV modules **are made by connecting photovoltaic (PV) cells, typically from semiconductor materials like crystalline silicon.**
- They convert sunlight into electric energy, which is used for lighting residential and commercial establishments.

How do Solar PV Modules Work?

- PV cells in solar modules **absorb sunlight, transferring the energy from photons to the semiconductor material.**
- This process generates electric current, and when cells are connected in modules, it boosts the power output.
- Each module is **rated between 50 W to 350 W and may or may not be linked to the electrical grid.**

Applications of Solar PV Modules

- When a number of modules are connected to the grid PV system via an inverter, they**transform DC current into AC for household use or selling excess electricity back to the grid.**
- Individual modules **power devices like torches, flashlights, and wristwatches in remote areas**.

Scheme Benefits and Incentives

- Additionally, **participation in schemes like PM KUSUM and the Production Linked Incentive Scheme requires certification as a genuine local manufacturer.**
- These schemes provide incentives and subsidies for solar pump sets, rural electrification, and domestic manufacture of solar panels and components, encouraging indigenous production.

Challenges

- Despite recent growth in India's solar exports, **the country still relies on imports for nearly half of its solar modules, mainly from China.**
- The **demand-supply gap persists**, highlighting **the need to boost domestic manufacturing capacity.**
- While the government aims for increased self-reliance, **challenges remain in achieving a comfortable degree of indigenous production.**

Future Outlook

- The government's **efforts to restrict imports from China emphasize the importance of enhancing domestic manufacturing capabilities to achieve long-term self-sufficiency in the solar energy sector.**

3.4 WTO FARM SUBSIDIES AND PEACE CLAUSE

Context

- India has invoked the peace clause at the World Trade Organization (WTO) for the fifth consecutive time for the marketing year 2022-23 (October-September) due to breaching the prescribed subsidy limit for rice offered to its farmers.

Background

General Agreement on Tariffs and Trade (GATT)

- **Established in 1948** to promote international trade by reducing barriers like tariffs and quotas.
- Loopholes in agriculture trade persisted, with non-tariff measures like import quotas and subsidies prevalent.

Formation of WTO

- In 1995, the World Trade Organization (WTO) **succeeded GATT through the Marrakesh Agreement**.
- Aims to ensure fairer markets for farmers globally, leading to the creation of the Agriculture Agreement.

WTO's Agriculture Agreement

- Introduced to address issues in the agriculture sector and promote equitable trade practices.
- India, as a WTO member, is obligated to comply with the terms of the Agriculture Agreement.

WTO Agreement on Agriculture

Background

- Negotiated during the **Uruguay Round of multilateral trade negotiations.**
- Concluded on December 15, 1993, and ratified in April 1994 **at Marrakesh, Morocco.**
- Comprises commitments to reduce support and protection in domestic support, export subsidies, and market access.
- Considers non-trade concerns like food security and environmental protection, with special treatment for developing countries.

Provisions

- Focus on three main areas: Market access, Domestic support, Export subsidies.

Reduction commitments:

  - **Developed countries**: Within 6 years (by 2000).
  - **Developing countries**: Within 10 years (by 2004).
  - **Least developed countries** exempted from commitments.

Market Access Commitment

- Addressed under Article 4.
- Aims to abolish non-tariff barriers and convert them into tariffs (tariffication).
- Reduction targets:
  - **Developed countries**: 36% reduction in total tariffs.

- **Developing countries**: 24% reduction in tariffs.
- **Special treatment** for certain countries experiencing balance of payment problems.

- **Coverage**: Article 6 of the Agriculture Agreement.

Targets:

- **Developed countries**: 20% reduction within six years.
- **Developing countries**: 13% reduction within ten years.
- **Least developed countries** exempt.
- **Scope**: Reduction in total support, not individual commodities.

Exemptions:

- Green Box policies excluded, including those benefiting rural communities and domestic food aid.
- Investment subsidies for low-income farmers in developing countries also exempt.

Box	Status	Payment Type
Amber	Trade-distorting	• Marketing loan benefits • Product-specific supports • Crop and revenue insurance subsidies • Irrigation subsidies • Renewable energy programs
Blue	Market-distorting and production-limiting	• Deficiency payments
Green	Non-trade-distorting	• Environmental payments • Natural disaster relief • Decoupled income support • Farm credit programs

Export Subsidies Commitment

- **Coverage**: Article 8 of the Agriculture Agreement.

Targets:

- **Developing countries**: 36% reduction in export subsidies, 21% in quantity within six years.
- **Developed countries**: 24% reduction in subsidies, 14% in quantity within ten years.
- **Least developed countries exempt.**
- **Restrictions**: Products not categorized as subsidized export goods cannot be included in the future.

India's Commitment to the Agreement on Agriculture

Market Access

- India is exempt from tariffication due to maintained quantitative restrictions stemming from balance of payment issues.

Export Subsidies

- Export subsidies permissible until 2023, then **phased out as per the Nairobi Package of 2015**.

Domestic Support

- **Introduction of de minimis by WTO**: Developing countries limited to 10%, developed to 5%.
- Exceeding set percentages necessitates reduction commitments.

Minimum Support Prices (MSPs)

- MSPs fall under domestic support, not green box (non-trade-distorting).
- India argues MSPs compliant due to low Aggregate Measure of Support (AMS), below 10% threshold for developing nations.
- Thus, MSPs upheld as non-violative of the agreement.

Challenging Allegations

- In 2018, the US raised concerns at the WTO, alleging India's domestic support for rice and wheat exceeded permissible levels by 60-70%.
- India's Response: India argues that the US failed to consider key provisions, such as the de minimis rule and inflation adjustments, outlined in the WTO agreement on agriculture.

Peace Clause

- The Agreement in Agriculture contains a Temporary "due restraint" or "peace clause".
- The **Temporary 'peace clause'** said that **no country would be legally barred from Food Security**

Programmes even if the subsidy breached the limits specified in the WTO agreement on agriculture.

- Thus, the breach of the de minimis limits (10 percent) is covered by the peace clause set out in the WTO Bali conference in 2013. Bali ministerial Peace Clause decision on public stockholding was taken for food security purposes.
- The WTO members at the Bali Summit had agreed to put the 'Peace Clause' mechanism in place **as an interim measure.** Members **further committed to negotiating an agreement for a permanent solution.**
- Members clarified that the "peace clause" would remain in force until a permanent solution was agreed, even if that meant going beyond the 2017 deadline.

India's Concerns and the Need for a Permanent Solution

Concerns:

- The expiration of the Peace Clause **could endanger vital food security programs like Minimum Support Prices (MSPs), leaving farmers vulnerable.**
- The limited timeframe offered by Western powers for the Peace Clause is deemed insufficient by India, raising doubts about their commitment.
- Full disclosure requirements under the clause **may expose India to international scrutiny**, **impacting its sovereignty over domestic matters.**

Need for a Permanent Solution:

- **Food security is a basic human right**, especially critical in a nation like India with a large impoverished population.
- Western criticism of India's food subsidies seems hypocritical given its socio-economic realities.
- India's subsidized produce faces **challenges in global markets, impacting its agricultural sector**.
- Accepting only a temporary Peace Clause **risks conceding to trade norm violations,** highlighting the **urgency for a lasting solution to ensure food security and address trade imbalances.**

Proposed Permanent Solutions for Food Security at WTO

Options by India:

- **Adjusting for Inflation**: Proposes adjusting the 'external reference price' to reflect inflation since the 1986-88 baseline, ensuring a more realistic calculation of the minimum support price ceiling.
- **Three-Year Average Price**: Suggests using a three-year average price of crops, excluding extreme highs and lows, allowing for updated pricing based on current global market conditions.
- **Subsidy Calculation Reform**: Advocates for subsidy calculations based on actual procurement rather than all eligible production, benefiting developing countries reliant on price support for farmers.
- **Public Stockholding**: Seeks allowance of public stockholding programs for food security, subject to conditions ensuring they don't distort trade or harm other members' food security.

Pressure on India

- Despite pressure to reduce farmer subsidies, India's subsidies are significantly lower than those provided by the US and EU.
- India's subsidy per farmer stands at $300, far below the $40,000 per farmer subsidy in the US.

3.5 MULTILATERAL DEVELOPMENT BANKS REFORM

Context

- Antonio Guterres has identified Multilateral Development Bank reform as a key theme for this year's Future Summit at the UN General Assembly in September.

Evolution of Multilateral Development Banks (MDBs)

- ***Origins*:** MDBs were **established post-World War II to aid in rebuilding war-torn countries**.
- ***Shift in Focus***: Over time, their role expanded to include supporting global development and poverty reduction efforts.

Calls for MDB Reform

- ***Reasons*:** Recent discussions, including at COP27 and by G20 leaders, underscore the need for MDB reform.
- ***Focus*:** While increasing funding is important, it may not address all challenges faced by MDBs.

Rationale for MDB Reforms

- ***Climate Crisis Concerns*:** Experts emphasize that the climate crisis demands reforms within MDBs to effectively tackle global challenges, especially in emerging markets and developing economies (EMDEs).
- ***Alignment with SDGs*:** MDBs are urged to align their strategies with the Sustainable Development Goals (SDGs) set by national governments, focusing on transformative, long-term plans.
- ***Enhanced Private Sector Engagement*:** Reforms should prioritize greater engagement with the private sector, departing from the traditional separation of private and sovereign financing arms.
- ***Improved Coordination***: The success of MDBs hinges on better coordination among diverse stakeholders. Reform efforts should aim to address coordination failures between domestic and international stakeholders, as well as between the public and private sectors.
- ***Increased National Involvement*:** National governments should play a more active role in shaping a cohesive vision encompassing goals, policies, investments, and financing within MDBs.

Ideal Characteristics of a Reformed MDB

- ***Building on Experience*:** A reformed MDB should retain successful strategies and **align goals with global targets like climate change mitigation.**
- ***Smart Money Use*:** Funds should be wisely invested in **infrastructure and institutions to maximize impact.**

Three Key Shifts for a 21st Century MDB

- ***Goals and Targets***: Emphasis on sustainable development, considering environmental and climate change impacts.
- ***Working Together*:** Improved coordination among MDBs and countries to develop customized plans.
- ***Partnerships with Business*:** Collaborating with businesses to finance mutually beneficial projects.

Emphasis on Principles of Equality and Inclusivity

- ***Highlight*:** The UN emphasizes principles of equality, shared prosperity, and inclusivity in MDB operations.
- ***Importance***: These principles ensure that development benefits all segments of society, promoting equitable and sustainable global development.

Bridging Global North-South Divide

- ***Challenge***: Differing views on MDB reform between the global North and South have created a significant divide.
- ***UN's Role:*** The UN sees itself as morally responsible for representing the interests of the global South in these discussions. This role is particularly crucial in addressing the needs of low- and middle-income countries that often lack the resources to support their development aspirations.
- ***Focus on Sustainable Infrastructure***: Recognizing the role of sustainable infrastructure in driving economic growth in low- and middle-income countries.

Focus Areas for the High-Level Summit

- ***Priorities:*** Climate change, poverty alleviation, and MDB reform will be key topics at the upcoming summit.
- ***UN's Commitment***: This highlights the UN's commitment to driving significant reforms in global development financing.

3.6 BIMA TRINITY: BIMA SUGAM, BIMA VISTAAR, AND BIMA VAHAK

Context

- The Insurance Regulatory and Development Authority of India (IRDAI) has proposed pricing its comprehensive rural insurance product, BimaVistaar, at Rs 1,500 per policy, aiming to extend insurance coverage to underserved rural areas, enhancing social safety nets.

Background

- **IRDAI, in collaboration with the General Insurance Council (GIC)** and **Life Insurance Council (LIC),** is spearheading the 'Bima Trinity,' akin to the UPI revolution, to democratize insurance access, especially in rural regions.
- The 'Bima Trinity' initiative introduces three crucial elements: **Bima Sugam, BimaVistaar, and BimaVahak**, designed to simplify insurance operations and expand distribution networks.

BimaVistaar

- BimaVistaar: Comprehensive insurance **for rural communities.**
- Combines **life, health, personal accident, and property insurances.**
- Simplifies access and enhances affordability for rural households.

Price Breakdown:

- Life cover: Rs 820
- Health cover: Rs 500
- Personal accident cover: Rs 100
- Property cover: Rs 80
- Total premium: Rs 1,500 per policy.

Family Coverage:

- Option for family coverage **on a floater basis.**
- Entire family coverage: Rs 2,420.
- Additional Rs 900 for **covering all family members under one policy.**

Additional Details and Insights:

Sum Assured and Coverage:

- Life, personal accident, and property covers offer a sum assured of Rs 2 lakh each.
- Health cover provides Rs 500 for 10 days (max Rs 5,000) without producing bills.

- Ensures timely financial assistance during medical emergencies.

Commission Incentives:

- **Agents earn a 10% commission**, encouraging wider distribution and adoption.

What is Bima Sugam?

- IRDAI's online portal for insurance queries, **policy purchase, claim settlement, and advice.**
- Envisioned as a **trusted platform by IRDAI.**

Key Features:

E-commerce Platform for Insurance:

- Aggregates offerings from life and non-life insurers.
- Unified digital marketplace for hassle-free policy exploration and purchase.

End-to-End Digital Journey:

- Digitizes the entire insurance journey for policyholders.
- Seamless experience from purchase to **renewals, claim settlements, and grievance redressal.**

Unified Integration:

- Seamlessly **integrates with government databases, insurers, and intermediaries.**
- Facilitates swift and transparent transactions through data sharing.

Benefits for Customers:

Streamlined Insurance Processes:

- Eliminates paperwork with digitized policies.
- Offers a seamless and paperless experience.

Centralized Policy Management:

- Access to all policies from a single application.
- Convenient viewing of details and renewal dates.

Enhanced Affordability and Transparency:

- Cuts down intermediary commissions for affordability.
- Direct selling may result in lower premiums.
- Promotes transparency in transactions.

BimaVahak

- IRDAI's initiative for last-mile insurance services.
- **Each Gram Panchayat has a BimaVahak** for selling and servicing bundled insurance.

Women-Centric Distribution Channel:

- Establishes a **women-centric insurance distribution channel.**
- Aims to enhance trust and awareness in rural communities.

Comparison to Banking Correspondents:

- Similar to rural **banking's banking correspondents.**
- Expected to boost insurance reach in underserved areas.

Collaborative Efforts with State Governments:

- Insurers collaborate with **state governments for effective implementation.**
- Aims to tailor insurance plans to regional needs, akin to banking initiatives.

Expansion of Insurance Coverage:

- Collaborative model targets underinsured and uninsured segments.
- State-wise approach and local partnerships for wider coverage and financial security.

3.7 SMALL FINANCE BANKS (SFBS)

Context

- The RBI declined applications from DvaraKshetriyaGramin Financial Services Pvt Ltd and Tally Solutions Pvt Ltd to establish Small Finance Banks (SFBs) in the private sector.
- These entities had submitted their applications for SFB licenses in 2021 under the on-tap licensing guidelines.

Criteria for Small Finance Banks (SFBs) to Become Universal Banks

Minimum Net Worth Requirement:

- SFBs aspiring for universal bank status must maintain **a minimum net worth of Rs 1,000 crore, as stipulated by the Reserve Bank of India (RBI) on-tap licensing norms.**

Scheduled Status and Track Record:

- SFBs seeking qualification must possess scheduled status and a satisfactory **performance track record for at least five years.**
- The bank's shares should have been listed on a recognized stock exchange, according to the RBI circular.

Financial Performance Criteria:

- SFBs eyeing universal bank status must exhibit a net profit in the last two financial years.
- Additionally, they **must maintain gross non-performing assets (GNPA) and net non-performing assets (NNPA) of ≤3% and ≤1%, respectively,** over the same period, as per RBI requirements.

Promoter Requirements for Transition to Universal Bank:

- The RBI clarifies that eligible **SFBs do not require a mandatory identified promoter.**
- Existing promoters, if present, **must continue as promoters during the transition to a universal bank.**
- **No addition of new promoters** or changes in existing ones will be permitted during this transition phase.
- Furthermore, there will be **no new mandatory lock-in requirement for minimum shareholding of existing promoters in the transitioned universal bank.**

Aspect	Universal Banks (UBs)	Small Finance Banks (SFBs)
Definition	UBs encompass a wide range of financial entities such as commercial banks, financial institutions, NBFCs.They engage in diverse financial transactions- lending, deposits, investments, and other financial services.	SFBs are focused financial institutions registered as public limited companies. They primarily **serve unserved and unbanked regions of the country**, catering to marginalized segments like **marginal farmers, MSMEs, and other underserved populations.** SFBs also **engage in non-risk sharing financial activities with prior approval from the RBI**.
Origins and Mandates	UBs were conceptualized as development financial institutions (DFIs) by **the Narsimham committee.**	The concept of SFBs was introduced in the recommendations of the **Raghuram Rajan Committee.**
Eligibility Criteria	Individual/Entity Requirements for UBs: - Minimum 10 years of senior-level experience in banking and finance or a successful track record of **10 years** for private entities. - **Assets of Rs. 5,000 crore or above**. - Required net worth of Rs. 500 crore, to be maintained at all times. Restrictions on Large Industrial Houses: - Large industrial houses limited to investing up to 10% only in UBs.	Individual/Entity Requirements for SFBs: - Minimum 10 years of experience in the BFSI sector at senior levels for individuals. - Corporate entities must have a **successful track record of at least 5 years.** - Eligible entities include NBFCs, microfinance institutions, local banks, and cooperative banks. Minimum Paid-up Voting Equity Capital or Net Worth: - Rs. 200 crore for SFB applicants.

LICENSING

- **On-Tap Bank Licensing:** - Allows entities to apply for bank licenses throughout the year directly to the RBI. - **Introduced in 2016** to promote financial inclusion and the creation of more financing institutions.
- **Previous Licensing Procedure:** - Banking licenses were granted through invitation of applications by the RBI before on-tap licensing. - The last round of UB licenses was granted in 2015 to Bandhan Bank and IDFC Bank.

Trivia

Urban Cooperative Banks (UCBs) Transitioning to SFBs

- Voluntary Transition: - **Initial net worth requirement of Rs. 100 crore**, to be **increased to Rs. 200 crores within five years.**
- Key Aspects for Fulfilment: - Financial Inclusiveness. - Soundness of Business & Technological Model. - Strong Management Track Record. - Sustainable Governance. - Adequate Capital Structure.

Performance of Small Finance Banks in India

- SFBs compete fiercely for CASA base despite offering higher rates.
- Deposits surged 32% from FY20 to FY23, surpassing banking sector's 11% CAGR.
- Strategies like higher rates and branch expansion fuel growth.
- Covid-19 posed asset quality challenges, spiking NPAs and credit costs.
- FY23 saw recovery with improved margins and asset quality.

- FY24 maintains momentum with sustained NIMs and asset quality enhancement.

Role of Small Finance Banks in Financial Inclusion

- SFBs aid financial inclusion by **serving low-income groups and unbanked areas.**
- **Mandated to open 25% branches in rural areas** and allocate 75% credits to priority sectors.
- **Fill gaps left by larger banks**, addressing challenges in traditional banking.
- Boost economic activities by increasing **lending to businesses and farmers.**
- **Contribute significantly to MSME sector** development and microfinance activities.
- Support government initiatives **like JAM Trinity for financial inclusion.**
- Essential for **scaling up small lending and attracting low-cost deposits in underserved regions.**
- Designed to **promote rural and semi-urban savings and economic growth in unserved areas.**

3.8 SHORT ARTICLES

Currency derivatives

Context

- RBIhas decided to postpone the enforcement of regulations concerning exchange-traded currency derivatives.

Currency Derivatives

- Currency derivatives **encompass futures and options contracts where a specified amount of a particular currency pair is traded on a predetermined future date.**
- The underlying assets are **currency pairs like USDINR or EURINR, unlike stock and futures options.**

Participants in Currency Trading

- The foreign exchange market serves as the arena for trading currency options and currency futures.
- Key players include **banks, corporations, exporters, and importers, with central banks and importers-exporters** predominantly involved in India's currency derivatives market.

Role of Currency Derivatives in India

- Currency derivatives in India serve to shield businesses from fluctuations in foreign currencies such as the euro, dollar, and yen.
- They are **frequently utilized by corporate entities engaged in regular imports and exports to manage currency-related risks.**

Market Dynamics

- In India, **currency derivatives primarily involve central banks and importers-exporters,** contributing to a daily trading volume of approximately 44,859 Cr. However, the participation of speculators and arbitrageurs is growing, driven by profit potential.

Trading Methods in India

- Trading in currency derivatives can be conducted **through recognized platforms like the Bombay Stock Exchange (BSE) and the National Stock Exchange (NSE),** as well as through stockbrokers, providing accessibility to the forex market.

Benefits of Currency Derivatives

- Currency derivatives serve as effective tools for hedging against foreign currency exposure, **facilitating trading based on short-term market movements,** and offering opportunities for arbitrage, allowing traders to exploit price differences in currency exchange rates for profit.

CDP-SURAKSHA

Context

- The government has launched a new platform called CDP-SURAKSHA **to disburse subsidies to horticulture farmers under the Cluster Development Programme (CDP).**This initiative aims to promote horticulture crops

across the country.

CDP-SURAKSHA:

- CDP-SURAKSHA stands for ***"System for Unified Resource Allocation, Knowledge, and Secure Horticulture Assistance."***
- It's a **digital platform facilitating instant subsidy disbursal to farmers in their bank accounts using e-RUPI vouchers from National Payments Corporation of India (NPCI).**
- Features include **database integration, cloud-based server space, UIDAI validation, eRUPI integration, and more.**

Operational Process:

- Farmers, vendors, implementing agencies (IA), and cluster development agencies (CDAs) access the platform.
- Farmers place orders for planting material, contribute their share, and receive automatic subsidy confirmation.
- Upon payment, an e-RUPI voucher is generated, received by the vendor, and planting material delivered to the farmer.
- After verification, the IA releases funds to the vendor, who uploads an invoice for subsidy release by the CDA.

e-RUPI:

- e-RUPI is a **one-time payment mechanism used on the CDP-SURAKSHA platform for subsidy disbursal.**
- It **can be shared with beneficiaries via SMS or QR code** for specific purposes without requiring digital payment apps or internet banking.

Comparison with the Old System:

- Unlike the old system where farmers bought materials and approached officials for subsidy release, CDP-SURAKSHA provides upfront subsidies.
- Vendors receive payment only after farmers verify material delivery, ensuring transparency.

Cluster Development Program (CDP):

- CDP is a **central sector scheme of National Housing Bank aiming at leveraging horticulture cluster specialization for integrated development.**55 horticulture clusters identified, with 12 selected for the pilot, and additional clusters in the pipeline.
- Each cluster has an implementing agency and a cluster development agency.
- The initiative aims to cover 9 lakh hectares, benefiting 10 lakh farmers, attracting private investment of Rs 8,250 crore.

National Investment and Infrastructure Fund Limited (NIIFL)

Context

- The National Investment and Infrastructure Fund Ltd. (NIIF) has invested $200 million in iBUS Network and Infrastructure Pvt Ltd., a connectivity technology firm.

Establishment and Objectives

- NIIFL is a **government-owned company aimed at maintaining infrastructure investment funds for both international and Indian investors, anchored by the Government of India.**
- Its objective is to catalyze capital into the country and support growth needs across various sectors.

Creation and Initial Funding

- Announced in the Union Budget of 2015-16 by Finance Minister Arun Jaitley.
- Initially proposed to be established with an inflow of ₹20,000 crore from the Government of India, **with their commitment being 49% of the total corpus.**
- Registered with SEBI as **a Category II Alternative Investment Fund** after its first governing council meeting in December 2015.

Leadership

- **Governing Council: Chaired by the Finance Minister of India**, currently Nirmala Sitharaman, and comprises members from corporate bodies, investments, and policy sectors.

- **Board of Directors:** Oversees the business strategy and affairs of the organization. Sujoy Bose serves as the Managing Director and CEO.

Funds Managed by NIIFL

- **Master Fund:** Infrastructure fund primarily investing in operating assets in **core sectors such as roads, ports, airports, etc.**
- **Fund of Funds**: Invests in funds **managed by managers with good track records**, spanning various sectors including green energy, social infrastructure, and technology.
- **Strategic Opportunities Fund**: Invests in growth equity and aims to **build domestic leaders in strategic sectors.**

Alternative Investment Funds (AIFs)

- AIFs are distinct investment instruments attracting institutions and HNIs due to substantial investment requirements.
- Governed by SEBI (AIFs) Regulations, 2012, AIFs can be structured as companies, LLPs, trusts, etc.

Category	Type	Description
Category 1	Venture Capital Fund	Targets SMEs and start-ups.
	Angel Funds	Invest in start-ups, requiring a minimum investment of Rs 25 lakh per investor.
	Infrastructure Funds	Focus on infrastructure development.
	Social Venture Funds	Invest in socially responsible businesses.
Category 2	Private Equity Funds	Invest in unlisted private companies.
	Debt Funds	Primarily invest in debt securities of unlisted companies.
	Fund of Funds	Invest in various other AIFs.
Category 3	PIPE Funds	Invest in shares of publicly traded companies at discounted prices.
	Hedge Funds	Pool money from accredited investors, employing aggressive strategi

Eligibility and Regulations

- Open to Resident Indians, NRIs, and foreign nationals with a **minimum investment of Rs. 1 crore.**
- Minimum lock-in period of three years with a **cap of 1000 investors per scheme.**
- Angel funds **can have up to 49 investors.**

Benefits of AIF Investments

- **High Return Potential**: Offers higher return potential compared to traditional options.
- **Low Volatility:** Exhibits less volatility, providing stability.
- **Diversification:** Allows for portfolio diversification, serving as a hedge.

Major Changes Pertaining to Health Insurance Policies

Context

- Insurance Regulatory and Development Authority of India (IRDAI) has lifted the age cap on purchasing health insurance policies, effective from April 1, 2024.

Previous Restriction

- Until April 1, 2024, individuals in India could purchase new health insurance policies only until the age of 65.

Recent Changes

- Effective from April 1, 2024, **individuals of any age can purchase new health insurance policies as IRDAI lifted the age cap.**

IRDAI Notification

- IRDAI directed **insurers to offer health insurance products for all age groups.**
- Insurers **may design products for senior citizens, students, children, maternity, and other specified groups.**

Prohibition on Refusing Policies for Severe Medical Conditions

- Insurers **prohibited from refusing policies to individuals with severe medical conditions like cancer, heart or renal failure, and AIDS.**

Reduction in Waiting Period

- IRDAI **reduced the health insurance waiting period from 48 months to 36 months.**
- **Pre-existing conditions should be covered after 36 months**, regardless of initial disclosure.
- Prohibition on Indemnity-Based Policies.
- Insurance companies **barred from introducing indemnity-based health policies, which compensate for hospital expenses.**
- Only permitted to provide benefit-based policies, offering fixed costs upon the occurrence of a covered disease.

FDIin the Space Sector

Context

- The following table summarize the amended rules **under the Foreign Exchange Management Act allowing up to 100 per cent FDI in the space sector, categorizing the liberalized entry routes and sectoral guidelines.**

Categories for Liberalized Entry Routes	FDI Allowed	Approval Required Beyond
Manufacturing and Operation of Satellites (satellite data products, ground segment, and user segment.)	100% Up to 74% through automatic route Beyond 74% - government approval	74%
Launch Vehicles and Associated Systems (associated systems or subsystems, and creation of spaceports.)	Up to 49% through automatic route Creation of spaceports	>49% - government approval
Automatic Route for Manufacturing	100% Components, systems, or sub-systems for satellites, ground segment,and user segment	

'Inflation Expectations Survey of Households' and the 'Consumer Confidence Survey'

Context

- The RBI has initiated two significant surveys: **the 'Inflation Expectations Survey of Households' and the 'Consumer Confidence Survey'.**
- These surveys serve as vital tools to gather data and insights that contribute to the formulation of the **RBI's bi-monthly monetary policy.**

Surveys	Inflation Expectations Survey of Households	Consumer Confidence Survey
Objective	To gauge households' perceptions and expectations regarding price movements and inflation.	To gather qualitative insights into households' sentiments regarding various economic indicators.
Coverage	19 cities including Guwahati, Hyderabad, Jaipur, Kolkata, Lucknow, and Thiruvananthapuram.	19 cities including Ahmedabad, Bengaluru, Bhopal, Bhubaneswar, Chandigarh, Chennai, and Delhi.
Methodology	**Qualitative responses** on perceptions of price changes over the next three months and one year. **Quantitative responses** on estimates of current and expected inflation rates.	1. Assessment of general economic situation. 2. Perceptions about current employment scenario. 3. Views on prevailing price level. 4. Analysis of households' income and expenditure patterns.

Inheritance Tax for Wealth Redistribution

Context:

- A video of Nikhil Kamath, co-founder of Zerodha, expressing support for inheritance tax as a means of wealth distribution went viral.

What is Inheritance Tax?

- A levy **imposed on the transfer of assets from deceased persons to their beneficiaries.**
- Implemented in various countries to redistribute wealth and promote economic equality.

Background:

- Initiation of Debate: Sam Pitroda, Chairman of the Indian Overseas Congress, recommended inheritance tax to bridge income and wealth inequality in India.

Importance of Inheritance Tax:

- **Wealth Redistribution:** Redistributes wealth from affluent individuals to the less privileged.
- **Economic Equality:** Helps create a more equitable distribution of wealth within society.

Inheritance Tax in India: Past, Present, and Future Considerations

History of Inheritance Tax in India (1953-1985):

- **Introduction:Estate Duty Act of 1953** aimed to reduce economic disparity.
- **Tax Structure:** Duty imposed on **total property value, with rates ranging from 7.5% to 85%.**
- **Controversies and Abolition:** Abolished in 1985 due to **complexity, high rates, and administrative challenges.**

Global Comparison:

- International Prevalence: Prevalent in countries **like the UK, Japan, France, and Finland.**
- US Scenario: Only six states have inheritance tax, indicating a varied approach within the country.

Debate pertaining to it

- **Equity vs. Growth:** Supporters aim for fairness, while critics fear economic repercussions.
- **Administrative Hurdles**: Critics cite complexity and costs, while proponents suggest solutions.
- **Business Impact:** Concerns over small businesses clash with proposals for exemptions.
- **Welfare Funding**: Proponents see revenue potential; skeptics seek alternative funding.
- **Wealth Transfer Tax**: Fairness vs. individual rights are debated.

Impact of Inheritance Tax if implemented in India

- Inheritance Tax **could boost government revenue by taxing wealth transfers.**

- It **targets the affluent** to reduce wealth inequality.
- Challenges include avoidance through estate planning and administrative complexities.
- Optimal rates and thresholds require careful consideration for balancing revenue and economic growth.
- May **promote intergenerational equity by taxing inherited wealth.**
- It could encourage individuals to distribute wealth during their lifetime to minimize tax liabilities.
- The tax **could fund social welfare programs and public services, benefiting society as a whole.**

Conclusion:

- The debate on inheritance tax highlights broader discussions on wealth distribution and economic equality.
- Proponents argue **it's necessary for a just society, despite potential opposition.**

Asset Reconsctruction Companies

Context

- The Reserve Bank of India (RBI) issued a master direction for asset reconstruction companies (ARCs), effective from April 24, 2024, aiming to strengthen regulatory oversight.

Details

- ARCs are **now required to maintain a minimum capital of Rs 300 crore**, increased from Rs 100 crore previously, with existing ARCs given until March 31, 2026, to comply.
- **Non-compliance will lead to supervisory action**, including a **prohibition on incremental business** until the minimum Net Owned Fund (NOF) requirement is met.

About ARCs

- Originating from global asset management models, ARCs **were proposed by the Narsimham Committee** - II in 1998 to address bad loans, inspired by successful models in countries like Malaysia and Korea.
- ARCs are **registered under the RBI and regulated by the Securitisation and Reconstruction of Financial Assets and Enforcement of Securities Interest Act, 2002 (SARFAESI Act, 2002).**
- Their business activities include acquiring a portion of bank Non-Performing Assets (NPAs) for reconstruction or securitisation.
- **ARCs with a minimum Net owned Fund of Rs 1000 crore** can act as resolution applicants.
- They are **permitted to invest in government securities**, deposits with scheduled commercial banks, Small Industries Development Bank of India (SIDBI), National Bank for Agriculture and Rural Development (NABARD), or other entities specified by the RBI.
- Additionally, **ARCs can invest in short-term instruments such as money market mutual funds, certificates of deposit, and corporate bonds/commercial papers with a short-term rating equivalent to AA- or above by a credit rating agency.**
- Investments in short-term instruments are **subject to a cap of 10% of the NOF.**
- This directive aims to bolster the stability and efficiency of the ARC sector while encouraging responsible investment practices.

3.9 TOPICS IN NEWS

Paradox of Thrift

- The Paradox of Thrift, as highlighted by Keynesian economists, reveals that **while individual savings may seem prudent, collectively, they can diminish overall savings, leading to decreased economic output**. This economic concept emphasizes the delicate balance between personal thriftiness and the need for spending to drive economic growth, urging timely government intervention and a nuanced approach to economic policy.

White Onions

- India, the **second-largest global producer of white onions after China**, sees significant

cultivation in Maharashtra, Karnataka, Andhra Pradesh, and Madhya Pradesh. Maharashtra leads with 40% of the country's production, followed by Karnataka and Andhra Pradesh contributing 20% and 15% respectively, while Gujarat, particularly Bhavnagar and Amreli districts, stands out as a key hub for production and export.India, renowned for its mild-flavored white onions, boasts a profile low in sulfur and rich in sugar, resulting in a less pungent taste.

New Flight Duty Time Limitation (FDTL) Rules

- The Directorate General of Civil Aviation (DGCA) has issued new Flight Duty Time Limitation (FDTL) rules to mitigate stress and fatigue among pilots in Indian airlines. Recent incidents of pilot fatalities purportedly linked to exhaustion emphasize the critical need for compliance with these regulations. **Key changes include increasing the mandatory weekly rest period from 36 to 48 hours and adjusting night flying limits, which entail a broader definition of 'night' and limitations on night landings per crew.**

Decentralized Industrialization Model

- Tamil Nadu stands out in India for its decentralized industrialization model, which underscores a shift towards diverse economic activities beyond agriculture. The state's Gross Value Added (GVA) distribution highlights reduced dependence on agriculture, with increased contributions from industry, services, and construction sectors, reflecting a decentralized approach to industrial development. This evolution signifies Tamil Nadu's emphasis on manufacturing, services, and infrastructure, facilitated by decentralized industrialization strategies. These strategies involve **supporting small and medium enterprises (SMEs), promoting local entrepreneurship, enhancing rural infrastructure, incentivizing industrial investment outside major cities,** and adding value to local resources. Notably, Tamil Nadu's success in decentralized industrialization is evident through cluster-based industrialization initiatives **like those in Tirupur, Coimbatore, and Sivakasi,** along with the emergence of specialized clusters in small towns. Grassroots entrepreneurship, exemplified by individuals from farming backgrounds and local communities, further fuels industrial growth, as seen in Coimbatore's industrial units led by the KammavarNaidu community.

World Intellectual Property Day

- India celebrated World Intellectual Property (IP) Day on April 26, showcasing its remarkable progress in patent filings. With an impressive annual growth rate of 24.6% in patent filings during FY2023, totaling 83,000 filings, India witnessed its highest growth rate in two decades. Moreover, the "**Patenting Trends in India" report** revealed a significant doubling of granted patents, surpassing 100,000 between FY2019 and FY2023. World Intellectual Property Day, observed annually on April 26th, was established by the World Intellectual Property Organization (WIPO) in 2000 to raise awareness about the impact of patents, copyright, trademarks, and designs on daily life. It celebrates the contributions of creators and innovators to global economies and societies. WIPO, a UN specialized agency established in 1970 and **headquartered in Geneva, Switzerland**, plays a pivotal role in promoting and protecting global intellectual property (IP) rights. With 193 member states, WIPO collaborates with nations, shapes IP policies, provides global IP registration and protection services, mediates cross-border IP disputes, and fosters connectivity among IP systems, wielding significant influence in IP rights worldwide.

Authorised Economic Operator (AEO) status

- The Gem &Jewellery Export Promotion Council (GJEPC) recently announced the

extension of the AuthorisedEconomic Operator (AEO) status to the gem and jewellery sector. Falling **under the World Customs Organisation (WCO) SAFE Framework of Standards**, the AEO program, initiated by the Customs department in 2011, aims to secure and facilitate global trade while promoting ease of doing business. By enhancing international supply chain security and facilitating the movement of legitimate goods, the program aligns with India's commitments **under Article 7.7 of the WTO Trade Facilitation Agreement (TFA).** Participation in the AEO program is voluntary and allows Indian Customs to collaborate closely with stakeholders in the international supply chain, including importers, exporters, logistics providers, custodians, custom brokers, and warehouse operators, as per the Central Board of Indirect Taxes (CBIC). The SAFE Framework of Standards, **adopted in 2005 by the World Customs Organization, emphasizes collaboration between Customs and businesses to enhance global trade security and efficiency, while the WTO Trade Facilitation Agreement (TFA), finalized in Bali in 2013,** aims to simplify international trade procedures and benefit both developed and Least Developed Countries (LDCs), particularly aiding small and medium-sized enterprises in integrating into global value chains.

New RBI Guidelines on Penal Charges

- **Effective from April 1,** the RBI has introduced new guidelines concerning penal charges and penal interest on loan accounts. Key features of these guidelines include the **prohibition of banks from charging penal interest for late EMI payments and restrictions on adding extra charges to the interest rate, although penalties can still be levied separately.** These measures aim to foster responsible credit behavior, addressing concerns over banks' misuse of penal charges. Distinct from penal interest, which is **an additional rate added to the customer's existing interest rate, penal charges are fixed fees imposed separately from the interest rate.** Banks will determine these charges based on the defaulted amount, following their board-approved policy. While the guidelines cover various loan portfolios, certain **categories like export credit and foreign currency loans are exempted.** Additionally, instructions are provided for non-performing loan accounts, ensuring comprehensive applicability and clarity in implementation.

Shrinkflation and Skimpflation

- As the Fast-Moving Consumer Goods (FMCG) sector grapples with transitioning input prices from stable to inflationary, the phenomena of shrinkflation and skimpflation emerge as noteworthy strategies employed by manufacturers and retailers. Shrinkflation, **characterized by the downsizing of product packaging or quantity while maintaining prices,** enables businesses to bolster operating margins and profitability amidst rising costs, without directly **impacting Consumer Price Index (CPI) or Retail Price Index (RPI).** Coined by **economist Pippa Malmgren,** shrinkflation reflects **competitive dynamics and consumer behavior, where firms opt for downsizing over price hikes to maintain competitiveness and consumer loyalty**. However, consumers may face challenges in assessing product value and making informed choices, as subtle size reductions may go unnoticed. Conversely, skimpflation entails **lowering the quality of goods or services in response to higher costs, effectively requiring consumers to pay more for the same level of service without a direct price increase.** Both phenomena underscore the complexities faced by consumers and businesses in navigating economic shifts and maintaining value propositions in the face of inflationary pressures.

Imported Inflation

- The Asian Development Bank's warning of imported inflation in India, driven by potential Rupee depreciation amidst rising interest rates in the West, raises concerns about the country's economic stability. Imported inflation, **characterized by price increases due to higher import costs**, can significantly impact overall inflation in the economy. Factors contributing to imported inflation include currency depreciation, which **makes imports more expensive, thereby raising import costs and potentially leading to higher prices for consumers.** Moreover, even without currency depreciation, a rise in international commodity prices can escalate import costs and inflation, akin to cost-push inflation where higher input costs result in elevated prices. In essence, imported inflation underscores the importance for central banks to consider such dynamics in policymaking to effectively manage inflationary expectations and maintain economic stability.

Special Rupee Vostro Accounts (SRVA) Arrangement

- Traders importing pulses from Myanmar are now utilizing a Rupee/Kyat direct payment system facilitated by Punjab National Bank's Special Rupee Vostro Account (SRVA), marking a significant development in trade arrangements. The **Vostro Account, wherein domestic banks hold foreign banks' funds in Indian rupees, enables seamless payments between Indian importers and foreign traders in rupees, as well as settlements for Indian exporters**. The SRVA arrangement, an additional system to existing ones using freely convertible currencies, mandates that all exports and imports be denominated and invoiced in INR, with final settlement occurring in Indian National Rupee (INR). **Operationalized through invoicing, exchange rate management, and settlement procedures, domestic importers make payments in INR into the correspondent bank's SRVA account,** while domestic exporters receive export proceeds in INR from the correspondent bank's designated account. **Eligibility criteria for banks involve partnering with authorized domestic dealer banks, ensuring the correspondent bank is not from a country listed in the updated FATF Public Statement.** This arrangement aims to reduce the net demand for foreign exchange, particularly the U.S. dollar, for trade settlement, decrease reliance on foreign exchange reserves and foreign currencies, and promote the INR as an international currency by facilitating advance payments for Indian exporters in INR. Additionally, the **concept of Nostro accounts, which are held by one bank in another bank in its home currency, simplifies foreign exchange and trading transactions, allowing entities without a physical presence in a country to conduct transactions conveniently.**

Financial Services Institutions Bureau (FSIB)

- The Financial Services Institutions Bureau (FSIB), established by the Central Government from July 01, **2022**, **operates under the Department of Financial Services** and plays a pivotal role in recommending appointments for key positions in state-run financial institutions, such as whole-time directors and non-executive chairpersons. Its Secretariat, **comprising a Secretary and five officers, oversees its operations and advisory functions**, ensuring merit-based appointments and formulating ethical codes for personnel management. FSIB's functions extend to **issuing guidelines for selecting general managers and directors of public sector general insurance companies, acting as a headhunter for state-owned financial entities, formulating business strategies, and assisting in fundraising plans for state-run banks.** Its critical role is underscored by the ongoing mergers and efficiency concerns within PSU entities, where FSIB plays a crucial part in cleaning up HR practices and enhancing operational efficiencies. Notably,

FSIB replaced the Banks Board Bureau (BBB) due to concerns over improper appointments, highlighting the importance of ensuring transparency and meritocracy in senior appointments across government-owned financial institutions. The Financial Services Institutions Bureau (FSIB), chaired by a central government nominee, comprises a diverse board including Secretaries of the DFS, the chairman of IRDAI, and a deputy governor of the RBI. Additionally, it encompasses three banking experts and three insurance sector specialists as part-time members.

SCORES 2.0

- SEBI (Securities and Exchange Board of India) has introduced SCORES 2.0, the **latest version of the SEBI Complaint Redress System**, to enhance the efficiency of addressing investor complaints in the securities market. SCORES is **an online platform allowing complainants to lodge grievances against listed companies and SEBI registered intermediaries**, with all complaints managed through this system. SCORES 2.0 **brings automated routing and escalation, directing complaints to the relevant entities promptly, and reduces complaint resolution timelines to 21 calendar days from the previous 30 days**. Moreover, it **implements a two-tier review process involving designated bodies and SEBI, ensuring comprehensive resolution of persistent grievances.** This upgrade aims to bolster investor confidence, promote transparency and accountability among regulated entities, and facilitate swift resolution of complaints, thereby enhancing overall market efficiency.

TOPICS COVERED ON IASGYAN WEBSITE:

- 90 YEARS OF RBI
- Direct Tax Collection
- FMCG SECTOR IN INDIA
- Trend of Rupee in the last 10 years
- Household Debt and Household Debt Sustainability in India
- Household Debt and Savings Report 2023
- IMF's Stand-By Arrangement (SBA)
- WTO's Global Trade Outlook and Statistics Report released
- India's Shrimp Industry
- Rice Fallow Initiative
- Household Debt and Savings Report 2023

3.9 TOPICS IN NEWS

APTI PLUS

DIGITA to Combat Cyber Fraud in Digital Lending

- The Reserve Bank of India (RBI) is considering establishing the Digital India Trust Agency (DIGITA) to address the growing cyber fraud in the digital lending sector.
- DIGITA aims to verify digital lending apps and maintain a public register of verified apps to prevent the spread of illegal lending apps.
- Apps lacking DIGITA's 'verified' signature would be deemed unauthorized for law enforcement purposes, acting as a crucial deterrent against financial crimes.
- DIGITA will vet digital lending apps to ensure compliance with regulatory standards, once established.
- A rigorous verification process by DIGITA is expected to enhance transparency and accountability in the digital lending sector, which has seen a surge in fraudulent activities.

APTI PLUS

Strengthening Energy Security through Strategic Petroleum Reserves

- India, a significant oil consumer and importer, is enhancing its energy security by constructing its first commercial crude oil strategic storage.
- ISPRL's Initiative: Indian Strategic Petroleum Reserves Ltd (ISPRL) is building underground storage in Padur, Karnataka.
- Operational Framework: Storage space will be leased to oil companies, ensuring India's priority access during emergencies.
- Importance and Utilization: Strategic reserves will be used during supply disruptions or wartime scenarios.

APTI PLUS

GDP per capita

- India should target per capita, not aggregate, GDP- Analyst.
- Gross domestic product per capita is a country's economic output per person and is calculated by dividing the GDP of a country by its population.
- GDP per capita is the sum of gross value added by all resident producers in the economy plus any product taxes (less subsidies) not included in the valuation of output, divided by mid-year population.
- In 2022, the estimated gross domestic product per capita in India amounted to about 2,410.89 U.S. dollars.
- Countries with the highest GDP per capita are Luxembourg ($142,214), Singapore ($127,565), and Ireland ($126,905). [2022]

APTI PLUS

Criollo Cattle

- Irish scientists find that Criollo cattle, historically bred in the New World, show promising resilience to climate change.
- Criollo is a group of cattle breeds descended from Iberian stock imported to the Americas.
- Research from University College Dublin reveals their unique genetic traits, including heat tolerance and disease resistance, making them well-suited to warmer climates.
- Despite their adaptive advantages, Criollo cattle face threats from modern production systems, risking the preservation of valuable indigenous genetic resources in Latin America.

APTI PLUS

Funding Winter

- In 2023, foreign venture capital (VC) investments in India plummeted over 85% due to a funding winter, impacting major firms like Tiger Global, Peak XV Partners, Accel, and SoftBank.
- "Funding Winter" refers to a period when start-up companies experience decreased funding.
- Venture capitalists and investors become more cautious during this time, reducing funding opportunities.
- Factors contributing to a funding winter include economic uncertainty, market volatility, and shifts in investor sentiment.
- Startups may struggle to secure financing during a funding winter, resulting in slower growth and potential industry consolidation.

Rice Vampireweed

- Rice vampireweed (Rhamphicarpa fistulosa) poses a formidable challenge to rice cultivation in Africa.
- The weed's detrimental impact on agricultural productivity has garnered attention across the continent.
- The weed is prevalent in over 35 African countries, particularly in rainfed lowland rice areas.
- While primarily affecting rice, the weed also poses a threat to other cereal crops like sorghum and maize.
- Certain rice cultivars, such as NERICA-L-40 and -31, exhibit resistance to the weed while maintaining high yields.

Global Financial Stability Report

- The latest Global Financial Stability Report, was released highlighting several key risks to the global financial system.
- The Global Financial Stability Report assesses the global financial system, focusing on emerging market financing and systemic risks, with special features on international financial stability and economic imbalances.
- It is a semiannual report by the International Monetary Fund (IMF).

"There Is No Alternative" (TINA) Factor

- Escalating tensions in the Middle East and Ukraine, coupled with potential US interest rate cuts, has reinforced gold's appeal as a safe-haven asset. Result: Substantial increase in gold demand in China driven by the "There Is No Alternative" (TINA) sentiment.
- TINA describes a scenario where one asset or investment is perceived as more attractive due to economic conditions.
- Arises when traditionally safe investments offer lower returns, prompting investors to seek higher returns elsewhere.
- Emerged after the 2007-08 financial crisis when central banks slashed interest rates, leading to decreased bond yields and investors turning away from bonds.
- Portfolio Allocation: Shift away from safe investments like bonds towards riskier assets like stocks, commodities, or crypto currencies, leading to increased market volatility.
- Risk Management: Tempts investors to focus on high-return assets while overlooking risk management, exposing portfolios to higher risk levels, especially in volatile market conditions.

Spices Board

- MDH and Everest spices facing bans in Singapore and Hong Kong.
- Spices Board taking proactive measures for safety and quality of Indian spice exports.
- Regulatory and export promotion agency for Indian spices under the Ministry of Commerce and Industry.
- Headquartered in Kochi, known as the Spice Capital of the world.
- Established in 1987 under the Spices Board Act, 1986.
- Focus on cardamom production, export promotion of 52 spices listed in the Act.

Key Functions:

- Research, Development, and Regulation.
- Post-Harvest Improvement.
- Export Promotion.
- Development in North East.
- Quality Regulation for exports.

4. DEFENSE & SECURITY

4.1 WORLD CYBERCRIME INDEX

Context

- ***India ranked number 10*** in cybercrime, with frauds involving people making advance fee payments being the most common type, according to the ***World Cybercrime Index*** that surveyed cybercrime experts around the world.

World Cybercrime Index Highlights

- It was developed as a joint partnership between the ***University of Oxford and the University of New South Wales, Sydney.***
- It was founded by ***CRIMGOV, a European Union-supported*** project.
- The Index data comes from ***a survey of 92 top cybercrime experts worldwide*** who specialize in gathering intelligence and conducting investigations on cybercrime.
- It ranks roughly 100 countries and identifies key hotspots according to various categories of cybercrime.
- The survey was conducted to identify ***major cybercrime hotspots globally.***

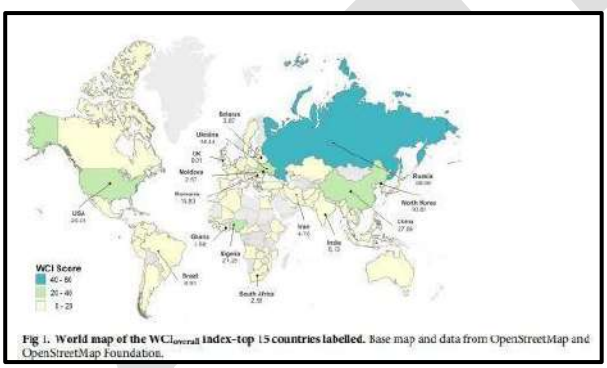


Fig 1. World map of the $WCI_{overall}$ index-top 15 countries labelled. Base map and data from OpenStreetMap and OpenStreetMap Foundation.

Key findings of the report

- The index was ***topped by Russia*** and was followed by Ukraine, China, the US, Nigeria, and Romania.
- North Korea was in the 7th position, while the UK and Brazil were at the 8th and 9th positions, respectively.
- India was ranked number 10 in cybercrime, with frauds involving people making advance fee payments being the most common type.
- The researchers discovered distinct patterns linking certain cybercrimes to specific countries.
- ***Data and identity theft*** were notably linked to activities originating from ***the United States***, whereas cybercrimes related to ***technical products or services*** were often traced back to ***China.***
- Interestingly, among the top-ranking countries, some exhibited a specialty for cybercrimes with moderate technical complexity, such as data and identity theft, while others demonstrated expertise in both high-tech and low-tech offenses.
- Notably, ***India*** emerged as a hub for ***"scams"***

As per the report five categories of the most significant cybercrime threats on a global scale

1. Technical products/services (e.g. malware coding, botnet access, access to compromised systems, tool production).
2. Attacks and extortion (e.g. DDoS attacks, ransomware).
3. Data/identity theft (e.g. hacking, phishing, account compromises, credit card comprises).
4. Scams (e.g. advance fee fraud, business email compromise, online auction fraud).
5. Cashing out/money laundering (e.g. credit card fraud, money mules, illicit virtual currency platforms).

Conclusion

- Public awareness campaigns like Cyber Surakshit Bharat help educate people about cybersecurity. Collaborating internationally and investing in cyber forensics also bolster our defenses. By staying vigilant and adapting to new threats, India aims to protect its digital landscape effectively.

4.2 SIGNIFICANCE OF CARRIER AVIATION

Context

- Both aircraft carriers of the Indian Navy, INS Vikramaditya, and INS Vikrant, showcased "twin carrier operations" with MiG-29K fighter jets taking off simultaneously from both and landing cross deck.

INS Vikrant

- Indian Navy's first aircraft carrier designed and built in India, commissioned in September 2022.
- It is constructed at Cochin Shipyard limited.
- Based on a refurbished Russian Kiev-class platform.
- Named after the original INS Vikrant which played a significant role in the 1971 Indo-Pak war.
- **Built at an overall cost of around 220,000 crore and 76% indigenous content, the ship has specialised cabins to accommodate women officers and sailors.**
- It houses two galleys that cater to all onboard, preparing upto 4,500-5,000 meals every day.

Significance of INS Vikrant

- **Capabilities:** It is a symbol of India's growing naval power and strategic capabilities, capable of carrying a range of fixed-wing aircraft and helicopters.
  - It can operate an air wing of 30 aircraft comprising MiG-29K fighter jets, Kamov-31, MH-GOR multi-role helicopters, in addition to indigenous Advanced Light (Navy).
  - **It uses the STOBAR (Short Take-Off but Arrested Recovery) method to launch and recover aircraft for which it is equipped with a ski-jump to launch aircraft, and three 'arrestor wires' for their recovery.**
- **Self Reliance:** INS Vikrant represents a milestone in India's defense preparedness and self-reliance.
- **Advanced weapons system:**It is equipped with advanced weapons systems and sensors to detect and counter emerging threats.
- **Naval operations:** It serves as a vital asset for various naval operations, including humanitarian assistance, disaster relief, and safeguarding maritime interests.
- **Strategic Importance:**As India seeks to assert its influence in the IOR, INS Vikrant plays a crucial role in safeguarding India's maritime interests and maintaining regional stability.

Significance of Aircraft Carriers

Coordination:

- An aircraft carrier is fundamental to command, control and coordination of operations from the sea and to project combat power ashore, over the seas or in the air.

Maritime security:

- They are particularly significant given that the fragile maritime security situation across the Indian Ocean Region (IOR) and India's stature as the largest resident naval power necessitates a strong and robust Navy. Aircraft carriers play a pivotal role in this.

Credible presence in the region:

- The availability of two Carrier Battle Groups facilitates credible presence and preparedness on both the Western and Eastern seaboard.

Global best practices:

- There is a renewed global interest with several countries now going for carriers of varying sizes. **The U.S. is fielding new supercarriers, and the U.K. has inducted new carriers while Japan has begun converting its helicopter carriers to operate F.35 fighter jets. Last month, China announced that it is building its nuclear-powered supercarrier. China's pace of building IACs is unprecedented.**

4.3 SHALLOW FAKES

Context

- More than deep fakes, shallow fakes should be a worrying factor in upcoming elections.

Deepfakes and shallow fakes

Category	Deepfakes	Shallow fakes
Definition	Deepfakes describe photorealistic and audio-realistic images, video, and audio created or manipulated with artificial intelligence to deceive.	They are created using existing technologies like basic photo edits, video slowdowns to alter speech patterns, or mis-captioning and mis-contextualizing existing media, presenting it as recent or from a different location.
Creation method	Deepfakes use artificial intelligence to generate fabricated images	Whereas shallow fakes rely less on complex editing techniques and more on connecting partial truths to small lies.
Quality	The deep fakes can appear highly realistic and create often indistinguishable counterfeit content.	The manual nature of shallow Fakes often results in less convincing alterations.
Accessibility	It is less accessible than shallow fakes.	Being less technologically intensive,they are more accessible to the average person, allowing for widespread use compared to deepfakes which use AI and Machine learning.
Threat perception	Less sophisticated and easier to detect due to basic alterations like simple edits or manipulations to images or videos.	Greater threat due to their advanced AI technology, capable of creating highly convincing fake videos or audio that are difficult to distinguish from genuine content, posing significant risks for misinformation and manipulation.

Measure to address Shallow fakes

Education and Awareness

- Increasing public awareness about shallowfakes and their potential risks to encourage critical thinking and skepticism.

Technology Solutions

- Developing and deploying advanced algorithms and tools to detect and authenticate digital media, enabling swift identification of shallowfakes.

Legal Frameworks

- Enacting and enforcing laws and regulations to deter the creation and dissemination of malicious shallowfakes, with penalties for offenders.

Collaboration

- Promoting collaboration between tech companies, government agencies, and civil society to share resources and expertise in combating shallowfakes.

Media Literacy

- Integrating media literacy education into school curricula and public awareness campaigns to equip individuals with skills to discern between authentic and manipulated content.

4.4 ANTI-TANK GUIDED MISSILES (ATGMS)

Context

- Trishakti Corps of the Indian Army conducted a training exercise, involving the firing of anti-tank guided missiles (ATGMs) at a super high-altitude area of 17000 feet in Sikkim.

Anti-tank guided missiles (ATGMs)

- They are precision weapons designed to destroy heavily armored targets, particularly tanks and armored vehicles. They typically consist of a ***missile, guidance system, and warhead.***

Nag Missile

- Nag missile is a ***fire-and-forget, third-generation missile.***
- The NAG missile has been developed to strike and neutralize highly-fortified enemy tanks. It also has ***night strike capabilities.***
- It weighs 42–44 kg, has a length of 1.83 m, and a diameter of 0.15 m. It has a tandem ***high-explosive anti-tank (HEAT) warhead*** that weighs 8 kg.
- The Nag has a range of 500–4 km and is launched from the ***NAMICA carrier(Nag Missile Carrier).***
- Bharat Dynamics Limited (BDL) manufactures the missile.

HELINA (Helicopter Launched Nag)

- DRDO is currently in the final stages of the development of the ***helicopter-launched*** version of Nag ATGM, called the Helina, which underwent successful tests in 2018.
- It is a***third-generation***, Lock on Before Launch (LOBL) fire and forget system that can operate in all weather conditions, day and night.
- It can defeat battle tanks with conventional armor and explosive reactive armor (ERA).
- They are Launched from twin-tube stub wing-mounted launchers on board H***AL Rudra helicopters and HAL Light Combat Helicopters (LCH)*** manufactured by Hindustan Aeronautics Limited (HAL).

Spike ATGM (Imported and License Produced)

- Spike is an Israeli fire-and-forget and anti-personnel missile.
- It is a ***5th generation*** multipurpose, multi-platform missile.
- It is developed and designed by the Israeli company Rafael Advanced Defense Systems.
- Missile weight- 14kg
- ***Imaging infrared seeker:*** Provides high-precision guidance for day and night engagements.
- ***Tandem warhead:*** Utilizes two warheads, with the second one triggered after penetrating armor, increasing armor penetration capability.
- Range: Varies depending on the variant (Spike-MR: 2.5 km, Spike-LR: 4 km).
- India has imported and licensed the Spike, including the medium-range Spike MR in 2019 and the long-range Spike LR in 2020..

Amogha-1 ATGM

- The Amogha-1 is a ***second-generation***, guided missile developed by Bharat Dynamics Limited (BDL) in Hyderabad, India.
- It has a range of 2.5–2.8 km and can hit targets with pinpoint accuracy.
- The Amogha-1 is one of several variants of the Amogha missile, including the Amogha-II and Amogha-III.
- The ***Amogha-II*** uses***Semi Automatic Command to Line of Sight (SACLOS)*** with a radio frequency seeker.
- Semi-automatic command to line of sight (SACLOS) is a method of missile guidance where the operator ***must continuously point a sighting device at the target while the missile is in flight.***
- The***Amogha-III*** is a ***third-generation***, fire-and-forget missile that doesn't require external intervention after launch.

MPATGM (Man-Portable Anti-Tank Guided Missile)

- It is an Indigenous ***third-generation*** fire-and-forget anti-tank guided missile derived from India's Nag missile.

- It is under development by DRDO.
- Portable by infantry soldiers, providing them with a potent anti-tank capability.
- The system consists of the MPATGM, a launcher, a target acquisition system (TAS), and a fire control unit (FCU).
- ***Expected range:*** Up to 2.5 km.
- Intended to replace older man-portable ATGMs in service with the Indian Armed Forces, providing enhanced performance and lethality.
- It is launched from a man-portable launcher.

4.5 ZIRCON MISSILES

Context

- Ukraine claimed that Russia had fired five Zircon missiles at Kyiv in 2024.

Zircon missile

- Zircon is a hypersonic cruise missile that uses ***scramjet propulsion***. They use cooled ***supersonic combustion ramjet engines***, which power combustion by compressing air flowing at supersonic speeds due to the missile's forward motion.
- This missile is Powered by cooled supersonic combustion ramjet engines, which compress air moving at supersonic speeds due to the missile's forward motion.
- Its maximum speed is Mach 9.
- It has an estimated operational range of over 1000 kilometers (620 miles), allowing it to strike targets at long distances with high precision.

Hypersonic missiles

- A hypersonic weapon is a weapon capable of travelling at hypersonic speed, defined a***s between 5 and 25 times the speed of sound or about 1 to 5 miles per second***. It's a two-stage missile that uses solid fuel in the first stage and a scramjet motor in the second stage.

Countries with hypersonic missiles

Country	Hypersonic Missile Name(s)	Country	Hypersonic Missile Name(s)
Russia	Avangard, Kinzhal	India	Hypersonic Technology Demonstrator Vehicle (HSTDV)
United States	ARRW, HAWC	France	ASN4G
China	DF-ZF, CM-401	Australia	Hypersonic International Flight Research Experimentation (HIFiRE) program
Germany	HyFly	Japan	HGV

Types of Hypersonic missiles

Boost-glide Vehicles (BGVs):

- These missiles are launched into space on a rocket and then glide back to Earth at hypersonic speeds, maneuvering through the atmosphere to reach their target.

Scramjet-Powered Missiles:

- These missiles use a scramjet (supersonic combustion ramjet) engine to sustain hypersonic speeds. They rely on the air intake from the atmosphere to achieve combustion and propulsion.

Waverider Missiles:

- Waverider missiles utilize a specialized aerodynamic design that generates lift from the shockwaves produced as they travel at hypersonic speeds. This lift enables sustained flight within the upper atmosphere.

Boost-Glide Boosters (BGBs):

- BGBs are designed to boost payloads, including hypersonic glide vehicles, into space. They typically consist of a conventional rocket booster stage followed by a glide phase at hypersonic speeds.

Air-Launched Hypersonic Missiles:

- These missiles are launched from aircraft, such as bombers or fighter jets, and can achieve hypersonic speeds to strike targets over long distances.

Status of Hypersonic missiles development in India

- India has been testing scramjet technology since 2016, and in 2019 and 2020, tested an indigenously developed ***hypersonic technology demonstrator vehicle (HSTDV).***
- The 2019 test was unsuccessful, but the 2020 test was successful, with the HSTDV flying for about 22-23 seconds at Mach 6 speed. Further tests are underway.
- In addition to the HSTDV, the nation is currently partnering with Russia for the development of the ***Brahmos Mark II(K) missiles*** through its private sector joint venture corporation BrahMos Aerospace.
- India is the fourth nation after Russia, US and China to demonstrate hypersonic capability.

4.6 BRAHMOS

Context

- India's BrahMos supersonic cruise missiles were delivered to the Philippines as part of a $375 million deal signed by the two countries in 2022.

BrahMos missile

- **The BrahMos is a medium-range ramjet supersonic cruise missile that can be launched from submarines, ships, and fighter aircraft.**
- **It is a joint venture between the Indian Defence Research and Development Organisation and the Russian Federation's NPO Mashinostroyeniya, who together have formed BrahMos Aerospace.**
- **The name BrahMos is derived from the names of two rivers, the Brahmaputra of India and the Moskva of Russia.**

Important Features:

- **Two-Stage Design:** BrahMos is a two-stage missile with a solid propellant booster engine, enabling it to achieve supersonic speeds and deliver payloads with high precision over long distances.
- **Stealth features:** The missile has a low radar signature, making it difficult to detect, and can operate at various altitudes and trajectories.

- **Improved efficiency:** It can strike targets with extreme accuracy, enhancing its effectiveness in diverse combat scenarios.
- **Standoff Range Capability:** BrahMos is a "standoff range weapon," which means that it can be launched from a distance far enough to evade enemy defenses, increasing its survivability and lethality.

Variants of Brahmos

- BrahMos is deployed across land, sea, and air platforms, forming a triad of capabilities in India's defense posture.

BrahMos missile exports and discussions with various countries

- **Philippines:** BrahMos missiles were delivered to the Philippines as part of a deal signed in 2022.
- **Vietnam:** Discussions regarding BrahMos missile sales to Vietnam have been ongoing in recent years.
- **UAE (United Arab Emirates):** Talks about the possible export of BrahMos missiles to the UAE have been reported in recent years, without a specific year of export mentioned.
- **Indonesia:** Interest from Indonesia in acquiring BrahMos missiles has also been reported from last year..
- **Oman:** Talks between India and Oman regarding the sale of BrahMos missiles have been reported in 2023.
- **Chile:**Discussions about the potential sale of BrahMos missiles to Chile have been reported recently.

4.7 SHORT ARTICLES

Rampage missile

Context

- Israel used the locally developed missile 'Rampage' in the Iran attack.

Rampage Missile

- The Rampage Missile is an **advanced, long-range, air-to-ground precision strike weapon** designed for high-value target destruction.
- It is an advanced, versatile weapon system designed to deliver precise strikes against high-value targets with exceptional speed, range, and accuracy.
- **Development:**Developed jointly by Israel Aerospace Industries and Israeli Military Industries Systems.
- **Purpose and Targets:**Primarily intended for missions targeting well-protected, high-value assets such as communication centers, air force bases, and infrastructure facilities.

Features:

- **Length:**4.7 meters (15.4 feet), Weight: 570 kilograms.
- Capable of supersonic speeds, rendering it difficult to detect and intercept by air defense systems.
- Range exceeds 190 miles.
- Payload capacity of 150 kilograms of explosives.
- Equipped with a blast fragmentation or general-purpose warhead.
- Utilizes GPS/INS guidance navigation and anti-jamming technology.
- Can adjust its trajectory mid-flight for precise target engagement.
- Operational in all weather conditions and capable of day and night operations.
- Can be launched from an aircraft or as a stand-alone system.

DUSTLIK Exercise

Context

- The fifth edition of the India-Uzbekistan joint military exercise DUSTLIK, was held at Termez in Uzbekistan.

Details of the exercise:

- The exercise is conducted annually, alternating between India and Uzbekistan.
- The previous edition took place in Pithoragarh, Uttarakhand, in February 2023.
- The**first edition**of the exercise was**held in Uzbekistan** in November **2019.**

Dustlik-2024:

- It is the fifth edition of the joint exercise.
- The exercise was conducted at Termez in Uzbekistan.
- The Indian Armed Forces contingent and personnel from the Indian Army, primarily from a battalion of the JAT Regiment, participated in the exercise.

72nd Division of Army

Context

- The Army is considering raising the 72 Division, a new Army division for possible deployment in eastern Ladakh.

About 72 Division:

- This division was originally intended to **function under the 17 Mountain Strike Corps (MSC).**
- The division would be based in Panagarh, West Bengal, which is the headquarters of the 17 MSC.
- Its primary purpose would be **to enhance India's military presence and capabilities in Eastern Ladakh.**
- The division would be tasked with possible deployment in Eastern Ladakh under the Northern Command.
- It would consist of infantry brigades and support elements.

About Division:

- Divisions are usually made up of 3 to 4 Brigades.
- An Indian Army division is commanded by a General Officer Commanding (GOC) of the rank of Major General.
- A division has approximately 14,000 to 15,000 troops.

Strike Corps:

- A strike corps is responsible for offensive trans-border action.
- Currently, the Army has four strike corps — the Mathura-based 1 Corps, Ambala-based 2 Corps, Bhopal-based 21 Corps, and 17 MSC in Panagarh.
- However, till 2021, only the 17 MSC — which was partially raised then — was focused on China. The other three were focused on Pakistan.
- The newly created 72-division would completely focus on China.

National Security Guard (NSG)

Context

- Senior IPS officer Nalin Prabhat has been appointed as the Director-General of the National Security Guard (NSG).

National Security Guard:

- It is an elite counter-terrorism unit under the Indian Ministry of Home Affairs (MHA).
- It was **founded on 22 September 1986 under the National Security Guard Act, 1986 following Operation Blue Star.**
- National Security Guard personnel are sometimes referred to as The Black Cats.
- **It is one of the Seven CAPFs that falls under the Ministry of Home Affairs.**

Mandate and Role:

- NSG's primary mandate is to combat terrorist activities to protect the country from internal and external threats.
- It is responsible for handling situations like **hijacking, hostage rescue, and counter-terrorism operations.**
- NSG also protects VIPs, and vital installations, and conducts bomb disposal operations.

Organization and Structure:

- **NSG is organized into two operational units:** Special Action Group (SAG) and Special Rangers Group (SRG).
- SAG consists of specially trained commandos for counter-terrorism operations.
- SRG comprises personnel from various Central Armed Police Forces (CAPFs) and State Police Forces for support functions.

Training and Selection:

- NSG recruits are selected from various branches of the Indian Armed Forces and Central Armed Police Forces (CAPFs).
- Selection involves rigorous physical and mental tests, followed by specialized training in counter-terrorism tactics, hostage rescue, bomb disposal, and VIP protection.
- The training curriculum is designed to enhance operational readiness and response capabilities.

Operational Deployments in the Past:

- NSG has been deployed in **various high-profile operations, including the Mumbai terror attacks in 2008, the Akshardham temple attack in 2002, and the Pathankot airbase attack in 2016.**
- They also conduct regular exercises and joint training sessions with other national and international counter-terrorism units to enhance coordination and interoperability.

INSV Tarini

Context

- The Indian Naval Sailing Vessel (INSV) Tarini returned to her base port at Goa on 21 Apr 24 after a historic transoceanic expedition of nearly two months duration.

Chronology and journey:

- It was flagged off from Goa on February 28, 2024.
- After navigating through the Indian Ocean for 22 days, the INSV Tarini arrived at Port Louis, Mauritius, on March 21, 2024.
- Departed Port Louis on March 30, 2024, facing challenges of heavy winds, adverse sea states, and rough seas.
- Demonstrated indomitable spirit and steadfast resolve, guiding INSV Tarini safely back to Goa on April 21, 2024

Significance and Achievements:

- The voyage highlights the Indian Navy's commitment to promoting gender equality and empowering women in the maritime domain.
- Officers displayed exceptional seamanship and resilience, embodying a spirit of adventure and exploration.
- It is important as it prepares for the next voyage, **a circumnavigation of the globe (Sagar Parikrama - IV expedition) on INSV Tarini starting in September this year.**
- Achievement to inspire future generations, especially women, in the Indian Navy to volunteer for challenging maritime adventure activities.
    - It represents collective achievement and camaraderie within the Indian Navy.

About INSTarini

- It is the second sailboat of the Indian Navy after INSV Mhedi.
- It was constructed at Aquarius Shipyard located in Goa.
- After undergoing extensive sea trials, she was commissioned to Indian Navy service on 18 February 2017.
- It is known for circumnavigating the globe with an all-women officer crew in the historic expedition titled 'Navika Sagar Parikrama' in 2017.

Mercenary spyware

Context

- Months after several Opposition leaders claimed that they received messages warning of "state-sponsored" hackers trying to access their iPhones, the tech giant has sent out a "mercenary spyware" alert to its users in 92 countries, including India.

Mercenary Spyware Definition

Case of Pegasus Spyware

"Pegasus" is a highly advanced mercenary spyware developed by NSO Group, an Israeli company. It is alleged that it was allegedly used by various governments to target journalists, activists, and political figures worldwide. In 2019, it was revealed that Pegasus had ***exploited WhatsApp's vulnerabilities to infect devices with malware,*** allowing extensive surveillance without user consent. Targets reported their phones being remotely monitored, with access to private messages, calls, and even camera and microphone activation. The case sparked international outcry, leading to investigations into ***NSO Group's***practices and calls for tighter regulation of the surveillance industry to protect privacy and human rights.

- Mercenary spyware refers to surveillance software developed and sold by private companies to various entities, including governments and corporations. These companies typically market their products as tools for law enforcement, intelligence agencies, or cybersecurity firms to monitor individuals or organizations.

Features

- Target Audience: **These companies typically market their products to governments, law enforcement agencies, intelligence organizations, and corporations.**
- Capabilities: **Mercenary spyware is highly sophisticated and can infiltrate various devices, including smartphones, computers, and digital systems.**
- Stealthy Installation: **It's often designed to be installed on target devices without the knowledge or consent of the individuals being monitored.**
- Data Collection: **Once installed, the spyware can collect a wide range of data, including text messages, emails, call logs, browsing history, and location information, and can even activate microphones and cameras for audio and video surveillance.**

Example

- One prominent example is Pegasus, developed by the Israeli company NSO Group, which was allegedly used by governments to target journalists, activists, politicians, and others.

Black swan events

Context

- Army Chief Gen Manoj Pande on Monday called upon the force to be always prepared for 'black swan' events.

'Black swan' event

- It **is a rare, unpredictable event that comes as a surprise and has a significant impact on society or the world.**

Distinguishing Characteristics

- Unpredictability: **They are extremely rare and outside the realm of regular expectations;**
- Severity: **They have a severe impact after they hit; and**
- Cognitive biases: **They seem probable in hindsight when plausible explanations appear**

When did the term originate?

- **The black swan theory was put forward by author and investor Nassim Nicholas Taleb in 2001 and later popularised in his 2007 book – *"The Black Swan: The Impact of the Highly Improbable".***
- **In his book, Taleb stresses building "robustness" in systems and strategies to deal with black swan occurrences and withstand their impact.**

When have such events occurred in the past?

- 2008 global financial crisis –Triggered by a sudden crash in the booming housing market in the US.
- The fall of the Soviet Union in 1991-Triggered by the fall of the Berlin Wall
- The terrorist attack in the US on September 11, 2001
- 2008, Zimbabwe hyperinflation.

Was covid 19 pandemic a black swan event?

- COVID-19 has often been described as a black swan event due to its unexpected and unprecedented nature, causing widespread disruption globally.

Grey Swan Event

- A grey swan is an event that is known and possible to happen, but which is assumed to be unlikely to occur. The term derives from the black swan theory, which describes an event that is unlikely but unknown.
- A grey swan event is an outlier, but it is more probable than a black swan.
- As a result, people can better prepare for and hedge against a grey swan than for a black swan.

New Generation Ballistic Missile Agni-Prime

Context

- Strategic Forces Command (SFC), along with the Defence Research and Development Organisation (DRDO), conducted the successful flight test of New Generation Ballistic Missile Agni-Prime from Dr APJ Abdul Kalam Island off the coast of Odisha.

Agni-Prime

- The 'Agni Prime' or 'Agni-P' is a nuclear-capable new-generation advanced variant of the Agni class of missiles.
- It is a surface-to-surface, canister-launched, road-mobile, and solid-fueled medium-range ballistic missile.
- It is a two-stage canistered missile with a maximum range of 1,000 to 2,000 km.
- The 'Agni Prime' missile is lighter than all the earlier Agni series of missiles.
- It is the sixth missile in the Agni series.
- The first test of the 'Agni Prime' was conducted in 2021, while the second test was conducted six months later in December. Last year in June, the DRDO carried out the first night launch of the 'Agni Prime' missile.

Doxxing

Context

- A woman reported to Mumbai Police via Twitter about a man who shared a video of her dancing and compared it to sex work. Despite her requests, he refused to take it down, leading to harassment from others.

Doxxing

Definition: Doxxing involves publicizing private details like addresses, phone numbers, or medical conditions, often obtained illegally. Even sharing semi-public content without consent can constitute doxxing and harassment.

- **Intent Behind Doxxing:** Intent matters in determining if sharing information is malicious or abusive. Social media Platforms like X(formerly twitter) take action against abusive sharing but doxxing often leads to global attacks on victims.
- **Impact of Doxxing:** Victims may face physical, digital, and emotional threats, requiring them to secure various aspects of their lives, such as finances, employment, and physical safety.

Ways to tackle Doxxing:

- **Actions by Victims:**Keep evidence, report to platforms and authorities, change passwords, enable two-factor authentication, and consider legal options like filing FIRs.
- **Platform Responses:** Companies like Meta and Google have tools and policies against doxxing; Discord updated its guidelines to address it separately from harassment.
- **Indian Legal Framework:** Indian IT Rules hold social media platforms accountable; victims can file cybercrime complaints for quick action.
- **Recovery and Support:** Victims should ensure removal of Personally Identifiable Information (PII) and account security, and seek support for recovery and resilience against future attacks.

Indian Laws on Doxxing:

India lacks specific laws on "doxxing," but provisions in existing legislation apply.

- **Legal Framework:**The Information Technology Act, 2000, addresses cybercrimes, including unauthorized disclosure, under sections like 43, 66, and 72.
- **Indian Penal Code (IPC):** Sections such as 354D (Stalking), 503 (Criminal Intimidation), and 509 (Insult to Modesty) may apply to cases involving doxxing for harassment or threats.
- **POCSO Act, 2012:** This Act protects children from online harassment, including doxxing, under the umbrella of sexual offenses and exploitation.
- **Right to Privacy:** India recognizes the right to privacy under Article 21 of the Constitution, protecting against unauthorized disclosure of personal information, although

comprehensive standalone privacy laws are lacking.

Operation Meghdoot

Context

- **Recently a Mange outbreak was reported among Asiatic wild dogs in Mudumalai.**

Key points about Operation Meghdoot:

- Launch of Operation Meghdoot: **Operation Meghdoot was initiated on April 13, 1984, by the Indian Army and Indian Air Force (IAF) to secure the Siachen glacier, strategically located in Northern Ladakh.**
- Background: **Pakistan's cartographic aggression and permission for foreign mountaineering expeditions in Siachen raised concerns. Intelligence reports indicated a potential Pakistani military action, prompting India to act.**

Initiatives and IAF's Role

- Fighter Operations: Fighter aircraft operations commenced in September 1984, with Hunters from No 27 Squadron operating from Leh. Fighter sweeps and simulated strikes over the glacier boosted troop morale and deterred adversaries.
- Infrastructure Development: Ground infrastructure improved for fighter flying, enabling operations of MiG-23s, MiG-29s, and other aircraft from Leh and Thoise. The IAF also inducted Cheetal helicopters for glacier operations in 2009.
- Technological Advancements:The IAF demonstrated its capabilities by landing a Lockheed Martin C-130J Super Hercules aircraft at Daulat Beg Oldie in Ladakh, the world's highest airstrip, in 2013.
- **Current Operations: Various aircraft of the IAF, including Rafale, Su-30MKI, Chinook, Apache, and others, support Operation Meghdoot, providing essential logistics, evacuating the sick and wounded, and maintaining communication with troops.**

Exo-atmospheric interception

Context

- Israel claims success in defending against an extensive attack by Iran using their air-defense system, including exo-atmospheric interceptors.

Exo-Atmospheric Interceptors:

- Exo-atmospheric interceptors, also known as **anti-ballistic missiles (ABMs)**, are surface-to-air missiles designed to counter incoming ballistic missiles during the mid-course or terminal phase of their trajectory.
- They operate beyond the Earth's atmosphere and are equipped with advanced technology such as infrared sensors and radar systems to detect and track incoming missiles.
- The interception by Israel involved Israel's **"Arrow 3" Hypersonic Surface-to-Air Missile System**.

Features:

- These missiles travel at **hypersonic speeds** and use sophisticated guidance systems to accurately intercept targets moving at high velocities.
- They employ a **three-stage solid rocket booster** to eject themselves out of Earth's atmosphere and have inbuilt rocket motors for precise navigation towards the target.
- They use inertial navigation systems updated during flight to ensure accurate targeting. Additionally, they utilize contour maps stored in computerized memory to aid navigation.

ATACMS

Context

- The United States has confirmed providing long-range Army Tactical Missile Systems (ATACMS) to Ukraine to aid its war effort against Russia.

What is the ATACMS system?

- It is a conventional surface-to-surface artillery weapon system capable of striking targets well beyond the range of existing Army cannons, rockets, and other missiles.
- Its maximum range is 300km.
- These missiles are **fired from the High Mobility Artillery Rocket System (HIMARS) and Multiple Launch Rocket System (MLRS)**

M270 platforms, which were provided by the US and the United Kingdom earlier.

Why does the ATACMS matter, and why has it been sent now?

US and Ukraine gave the following reasons:

- Ukraine's long-range capabilities, artillery, and air defense are critical tools for restoring just peace sooner.
- Ukraine needed them now, following reports that North Korea recently provided ballistic missiles to Russia. These follow a projectile path and have a long range.
- North Korean weapons were also referenced the last time the US provided the short-range cluster munitions to Ukraine.

Hangor Class Submarine

Context

- The first Hangor class submarine, built by China for Pakistan, was launched on April 26 at a Wuhan shipyard.

What is a Hangor class submarine?

- The Hangor-class is an export variant of the Chinese Type 039A Yuan class.
- The recently launched submarine was the first of eight submarines of this class that the Pakistan Navy is set to induct into its fleet by 2028.
- It is a diesel-electric attack submarine, named after the now-decommissioned PNS Hangor, which famously sank the Indian frigate INS Khukri during the 1971 war.
- It has four diesel engines.
- It is also equipped with a**n air-independent propulsion (AIP) system,** which significantly increases the submarines' endurance underwater.
- **It has six 21-inch torpedo tubes and capabilities to launch anti-ship missiles**, as well as the Babur-3 subsonic cruise missile, which has a range of 450 km.

Note:

- Attack submarines are specifically designed for sinking other submarines or surface vessels using torpedoes, or in modern times, cruise missiles.

Samudra Paheredar

Context

- Indian Coast Guard Vessel Samudra Paheredar makes a port call at Muara, Brunei

ICGS Samudra Paheredar

- Commissioned in 2012, It is a Pollution Control Vessel (PCV) of the Indian Coast Guard.
- It is the second Pollution Control Vessel of India (the first wasICGS Samudra Prahari).
- It was indigenously built by ABG Shipyard, Surat.
- It is stationed on the East Coast of India in Visakhapatnam, Andhra Pradesh.

- **"Diesel-electric"** refers to the mode of propulsion where diesel engines power the submarine when surfaced (as they need air to operate), while a battery, charged by the diesel engine, allows the vessel to operate while submerged.
- Conventional diesel-electric submarines **need to surface to recharge their batteries after a few days (2-5, depending on the battery used), making them detectable to enemy radar and exhaust fumes sensors.**
- **An AIP system** can increase submarines' underwater endurance manifold (upwards of 15-20 days). The Indian Navy is currently in the process of installing an indigenously developed AIP system to its Kalavari class submarines.

Features

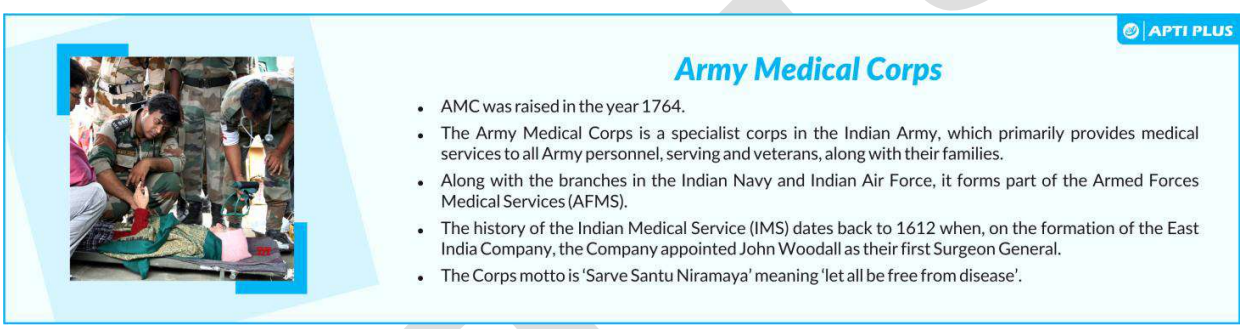
- At economical speed, the ship has an endurance of 6,500 nautical miles and can stay at sea for 20 days.
- The ship's primary role is *pollution response at sea and is equipped with the most advanced and sophisticated pollution response and control equipment* for mitigating oil spills, which includes containment equipment like hi-sprint booms and river booms, recovery devices like skimmers, and side sweeping arms.

- The ship is capable of ***unhindered oil-recovery operations***, with a storage capacity of 502 kilolitres.
- It has an integrated platform management system, a power management system, and a high-powered external fire fighting system.
- It is capable of operating one twin-engine ALH/ Chetak helicopter.

"Puneet Sagar Abhiyan"

- National Cadet Corps (NCC) and the United Nations Environment Programme (UNEP) signed a Memorandum of Understanding (MoU) in the presence of Raksha Mantri in New Delhi on September 22, 2022, to tackle the issue of plastic pollution and achieve the universal goal of clean water bodies through *'Puneet Sagar Abhiyan' and 'Tide Turners Plastic Challenge program'*.
- The campaign aims to clean sea shores from plastic and other waste material and create awareness about the importance of cleanliness
- Since the launch of Puneet Sagar Abhiyan, over 100 tonnes of plastic waste have been collected from nearly 1,900 locations by more than 12 lakh NCC cadets, alumni, and volunteers.

4.9 SNIPPETS



APTI PLUS

Exercise Poorvi Lehar (XPOL 2024)

- The Indian Navy conducted Exercise Poorvi Lehar on the East Coast.
- It is a coordinated exercise between the Indian Navy, Indian Army, Indian Aird Force, and Indian Coast Guard.
- Aim: Assessment of the Indian Navy's preparedness for Maritime Security challenges in the region and to demonstrate an interoperability among the services.
- Participating Forces: Assets from Eastern Naval Command, Indian Air Force (IAF), Andaman & Nicobar Command, and Coast Guard participated.
- Phases of Exercise:
- Tactical Phase: Combat training in realistic scenarios.
- Weapon Phase: Successful firings during the Weapon Phase showcased the Navy's capability to hit targets accurately.

APTI PLUS

ROCKS Missile

- India successfully tests new 250 km strike range ROCKS missile from Su-30 MKI jet in Andaman.
- The missile is also referred to as Crystal Maze 2.
- It is a next-generation extended stand-off air-to-surface missile developed by Israel.
- Designed for precision strikes on high-value targets.
- It is a ballistic missile that is capable of hitting targets at a distance exceeding 250 km.
- Can target long-range radar and air defense systems.
- Capable of engaging heavily fortified positions from long distances.
- Renowned for its accuracy and reliability in combat scenarios and preferred choice for missions requiring surgical precision.
- It operates effectively in GPS-denied areas and can breach regions secured by air defense systems.
- Allows for the choice between penetration or blast fragmentation warheads, making it suitable for targeting both surface and heavily fortified underground facilities.
- Currently, India is developing it under the Make in India campaign.

5. ENVIRONMENT & ECOLOGY

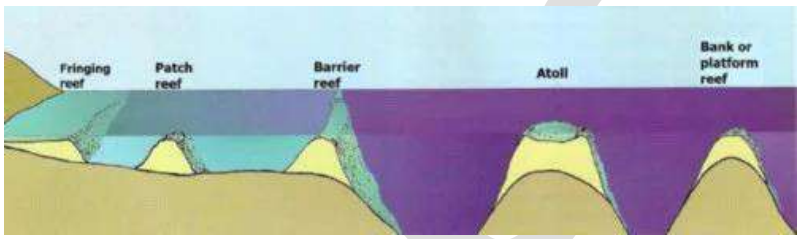
5.1 BARRIER REEFS

Context

- Recent evidence from the Australian Marine Conservation Society indicates that coral bleaching in the southern part of the Great Barrier Reef is more severe than anticipated.

Coral reef

- Massive structures made of limestone deposited by coral polyps.
- Often referred to as the "rainforests of the sea."
- Support approximately 25 percent of all known marine species.



Polyps

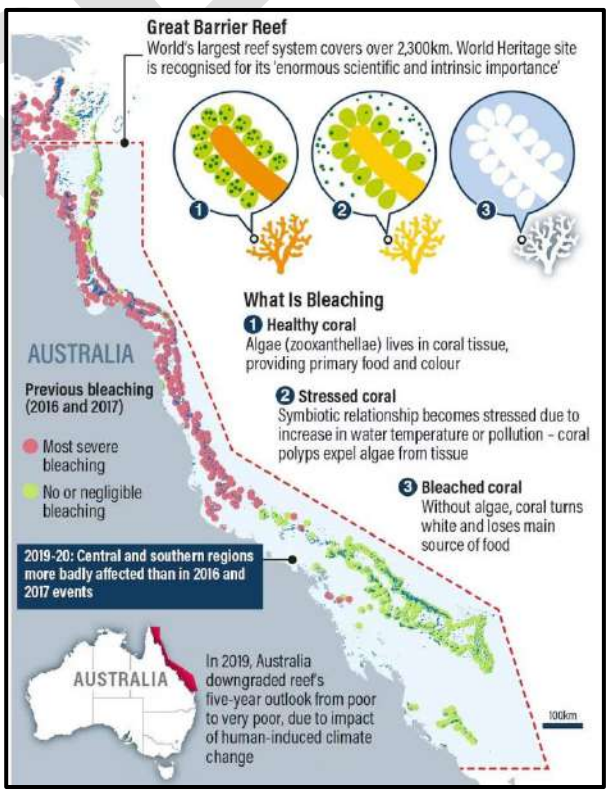
- Shallow water organisms have a soft body covered by a calcareous skeleton.

Formation of coral reef

- Death of coral polyps- growth of new polyps- repetition of the cycle for over millions of years - accumulation of layers of corals- Formation of the reef- formation of coral islands (Lakshadweep) over the years.

[Coral Reef Relief Features]

- Fringing reef, barrier reef and atoll (coral islands are formed on atolls).



Fringing reefs

- Grow directly from a shore.
- Located very close to land, and often form a shallow lagoon between the beach and the main body of the reef.
- Most common of the three major types of coral reefs.
- **The largest fringing coral reef in the world is the Ningaloo Reef, stretching along the coastline of Western Australia.**
- Commonly found in the Philippines, Indonesia, Timor-Leste, the western coast of Australia, the Caribbean, East Africa, and the Red Sea.

Barrier reefs

- They are extensive linear reef complexes that parallel a shore and are separated from it by lagoon.
- Far less common than fringing reefs or atolls.

- Common in the tropical Atlantic as well as the Pacific.
- The 1200-mile long Great Barrier Reef off the NE coast of Australia is the world's largest example of this reef type.

Atoll

- Roughly circular (annular) oceanic reef system surrounding a large (and often deep) central lagoon.
- **Three forms-**
  - true atoll—a circular reef enclosing a lagoon with no island;
  - an atoll surrounding a lagoon with an island;
  - A coral island or an atoll island which is, in fact, an atoll reef, built by the process of erosion and deposition of waves with island crowns formed on them.
- More common in the Pacific than any other ocean.
- In the Indian Ocean, they are found in the Lakshadweep, the Maldives and Chagos island groups, the Seychelles, and in the Cocos Island group.

5.2 SCIENCE BASED TARGETS INITIATIVE (SBTI)

Context

- SBTi is a **corporate climate action organization** aimed at **combating the climate crisis by enabling companies and financial institutions worldwide to set science-based targets.**
- A joint initiative of the Carbon Disclosure Project (CDP), the UN Global Compact (UNGC), the World Resources Institute (WRI) and WWF.
- It defines and promotes best practices in emissions reductions and net-zero targets in alignment with climate science.
- The initiative **develops standards, tools, and guidance to assist companies and financial institutions in setting science-based targets based on the latest climate science.**
- SBTi also offers validation services to assess and validate the targets set by companies and financial institutions, ensuring they are in line with scientific recommendations.

Carbon Disclosure Project

- It is an international **non-profit organisation based in the United Kingdom, Japan, India, China, Germany, Brazil, and the United States that helps companies, cities, states, regions, and public authorities disclose their environmental impact.**
- **Aim:** to make environmental reporting and risk management a business norm, driving disclosure, insight, and action towards a sustainable economy.
- **Formation:** 2000

United Nations Global Compact

- It is a non-binding United Nations pact to get businesses and firms worldwide to adopt sustainable and socially responsible policies and to report on their implementation.
- It is the world's largest corporate sustainability and corporate social responsibility initiative, with more than 20,000 corporate participants and other stakeholders in over 167 countries.
- **Formation:** 2000

WWF

About WWF:

- It is an international non-governmental organization
- Founded in 1961

- **Headquarters** — Gland (Switzerland).
- **Aim:** wild species preservation & the reduction of human impact on the environment
- It is the world's largest conservation organization.

Objectives:

- Conserving the world's biological diversity
- To ensure that the use of renewable natural resources is sustainable
- Promoting the reduction of pollution and wasteful consumption

Reports & programs:

- **Living Planet Report**— published every two years by WWF since 1998; it is based on a Living Planet Index.

Earth hour

- Debt-for-nature swaps–financial transactions in which a portion of a developing nation's foreign debt is forgiven in exchange for local investments in environmental conservation measures.
- **Marine Stewardship Council(MSC)** — independent non-profit organization that sets a standard for sustainable fishing
- **Healthy Grown Potato** — Eco-brand providing high-quality, sustainably grown, packaged, and shipped potatoes to consumers by leveraging integrated pest management(IPM) farming practices on large scale farms.

5.3 ELEPHANT CORRIDORS

Context

- The article "Efforts to reconnect elephant corridors must be carefully planned" highlights issues of elephant corridor management in India.

What is a corridor?

- Landscape ecology in the 1960s defined a corridor as an elongated stretch of land joining two reserves. The landscape was conceived as a patchwork of habitat "patches", usually reserves, within a "landscape matrix" used by humans.
- A corridor would help animals cross the matrix in a relatively safe manner to go from one protected area to the next.

Elephant corridors

- They are a strip of land that enables elephant movement between two or more friendly habitats. The corridors are reported by respective state governments.

State Wise Distribution of corridors

- West Bengal leads with 26 corridors, constituting 17% of the total.
- East central India contributes 35% (52 corridors), while the North East region has 32% (48 corridors).
- Southern India has 21% (32 corridors), and northern India has the lowest with 12% (18 corridors).

Status of Corridor Use

- *The Elephant corridor report* released by the central government showed a *40% increase in elephant corridors across 15 elephant range states in India.*
- *19% of corridors (29) show a decrease in use, and 10 require restoration due to impairment.*

Legal recognition of elephant corridors in India

Wildlife protection act, 1972:

- It empowers the state governments to declare areas that link protected regions as "conservation reserves" under Section 36A.

Project elephant:

- Launched in 1992 aims to protect elephants, their habitat and corridors, to address issues of man-animal conflict and address welfare of captive elephants.

Right of Passage project:

- Wildlife Trust of India (WTI) in partnership with India's Project Elephant, the forest departments of elephant range states, and various non-governmental organisationsworks to protect and secure elephant corridors

5.4 SC JUDGEMENT ON CLIMATE ACTION

Context

- The Supreme Court ruled that individuals have the right to be protected from climate change under fundamental rights.

M K Ranjitsinh &Ors versus Union of India &Ors Ruling

- The judgment recognized the **fundamental right to be free from the adverse effects of climate change.**
- The case was specifically **focused on the conservation of the Great Indian Bustard and involved directives regarding the undergrounding of power lines to protect the bird species.**

Constitutional provisions related to the right to a clean environment

- **Article 48A** of the Constitution provides that the State shall endeavor to protect and improve the environment and safeguard the forests and wildlife of the country.
- **Clause (g) of Article 51A:** it shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers, and wildlife, and to have compassion for living creatures.

International Frameworks on right to clean environment

Stockholm Declaration (1972):

- Recognizes the fundamental right to freedom, equality, and adequate conditions of life, in an environment of a quality that permits a life of dignity and well-being.

Rio Declaration (1992):

- **Principle 1:** Human beings are entitled to a healthy and productive life in harmony with nature.
- **Principle 10:** Environmental issues are best handled with participation of all concerned citizens, at the relevant level.

Paris Agreement (2015):

- Commitment to limit global temperature rise to well below 2 degrees Celsius above pre-industrial levels, and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius.

About the Great Indian Bustard

- **Scientific name:**Ardeotisnigriceps, It is the State bird of Rajasthan.
- **Habitat:**dry grasslands and scrublands on the Indian subcontinent.

Distribution:

- It is endemic to the Indian subcontinent.
- It is found in Rajasthan (Desert National Park), Gujarat, Madhya Pradesh, Karnataka, and Andhra Pradesh in India and parts of Pakistan.

Conservation Status

- IUCN Red List: It is a Critically Endangered species with less than 150 birds left in the wild.

- CITES: Appendix I
- Convention on Migratory Species (CMS): Appendix I
- Wildlife (Protection) Act,1972: Schedule I
- **Threats:** Collision/electrocution with power transmission lines, hunting (still prevalent in Pakistan), habitat loss and alteration as a result of widespread agricultural expansion, etc.

Steps Taken to Conserve the GIB

Species Recovery Programme:

- Under the Integrated Development of Wildlife Habitats of the Ministry of Environment, Forests and Climate Change (MoEFCC).

Artificial Hatching:

- Eggs from the wild and they are artificially hatched. The first chick hatched in June 2019 was named 'Uno'.

National Bustard Recovery Plans:

- Being implemented by government's conservation agencies.

Conservation Breeding Facility:

- The Ministry of Environment, Forest and Climate Change, the Rajasthan government, and the Wildlife Institute of India (WII) have established a conservation breeding facility in Desert National Park in Rajasthan.

Project Great Indian Bustard:

- The Rajasthan Government initiated "Project Great Indian Bustard" to protect the critically endangered Great Indian Bustard, locally known as Godawan. The project involves building breeding enclosures and infrastructure to ease human pressure on their habitats.

5.5 INVASIVE ALIEN SPECIES

Context

- The Andaman and Nicobar Islands administration requested assistance from the Wildlife Institute of India to manage the abundant chital population on Ross Island.

Definition

- They are plants, animals, pathogens and other organisms that are non-native to an ecosystem, and which may cause economic or environmental harm or adversely affect human health.
- *Since the 17th century, invasive alien species have contributed to nearly 40% of all animal extinctions for which the cause is known (CBD, 2006).*

Definition of Invasive Alien Species in India

- In India, the legal definition of **Invasive Alien Species** under the Wildlife Protection Act, 1972 (amended in 2022), is narrower.
- They are defined as "species of animal or plant which is not native to India, and whose introduction or spread may threaten or adversely impact wildlife or its habitat."
- This leaves out species within India that might be invasive to a particular region — like the chital in Andamans, which are protected in mainland India, but have become a menace in the island chain.

National initiatives to prevent IAS

National Action Plan on Invasive Alien Species (NAPINVAS):

- The Ministry of Environment, Forest and Climate Change (MoEFCC) launched the NAPINVAS plan, which focuses on the prevention, early detection, control, and management of invasive species.

- **The National Invasive Species Information Center (NISIC)** in India provides information and resources on invasive species in India.
- **The Himalayan Environmental Foundation** has been working to control invasive species like Lantana camara in the Himalayas.

International Instruments and Programmes on Invasive Species

Kunming-Montreal Global Biodiversity Framework (2022):

- Governments have committed to reducing the rate of introduction and establishment of invasive alien species by at least 50% by 2030.

Convention on Biological Diversity (CBD - 1992):

- Adopted at the 1992 Earth Summit in Rio de Janeiro, it recognizes invasive alien species as a major threat to the environment, second only to habitat destruction.

Convention on the Conservation of Migratory Species (CMS - 1979):

- This intergovernmental treaty aims to conserve migratory species and includes measures to control or eliminate invasive alien species already present.

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES - 1975):

- Focuses on ensuring international trade does not threaten the survival of wild animals and plants; it also considers the impact of invasive species involved in trade.

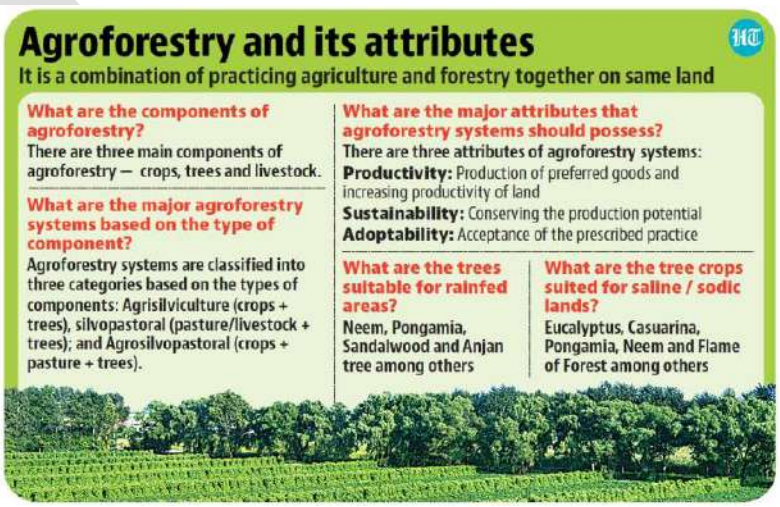
5.6 AGROFORESTRY

Context

- Agroforestry has gained popularity after decades of mono-cropping inspired by the Green Revolution as it enhances farmer livelihoods and benefits the environment.

Definition

- **It** is a process where trees and/or shrubs are deliberately combined with crops and/or livestock.



Types of Agroforestry in India

Agrisilvicultural System (crops and trees including shrubs/vines and trees):

- Involves the use of land for the concurrent production of agricultural crops including tree crops and forest crops.

Silvopastoral System (trees + pasture and/or animals):

- Characterized by integrating trees with forage and livestock production. Involves grazing livestock in wooded rangeland and incorporating trees in pastures for shade and timber.

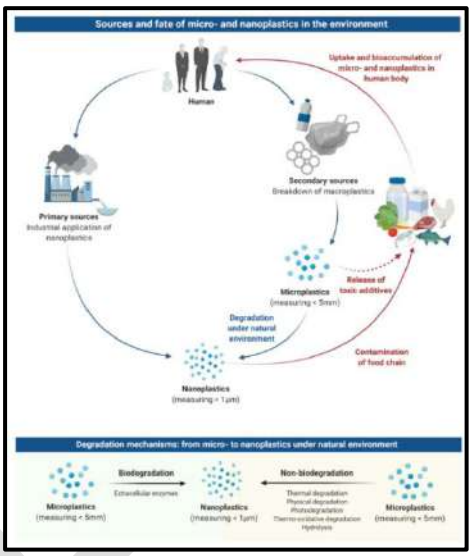
Agrosilvopastoral System (trees + crops+pasture/animals)

- **Home Gardens:**Many species of trees, bushes, vegetables and other herbaceous plants are grown in dense and apparently random arrangements.
- **Woody Hedgerows:** In this system various woody hedges, especially fast-growing and coppicing fodder shrubs and trees, are planted for the purpose of browse, mulch, green manure, soil conservation etc. The main aim of this system is production of food/fodder/fuelwood and soil conservation.

5.7 EXPOSURE PATHWAYS

Context

- Research has identified three exposure pathways and multiple impacts of microplastics and nanoplastics on humans.



Microplastics and nanoplastics

- Microplastics refers to pieces of plastic that are smaller than 0.5mm in diameter, which is roughly equivalent to a grain of rice.
- Nanoplastics are far smaller, at just 100 nanometres or less.

Sources of microplastics

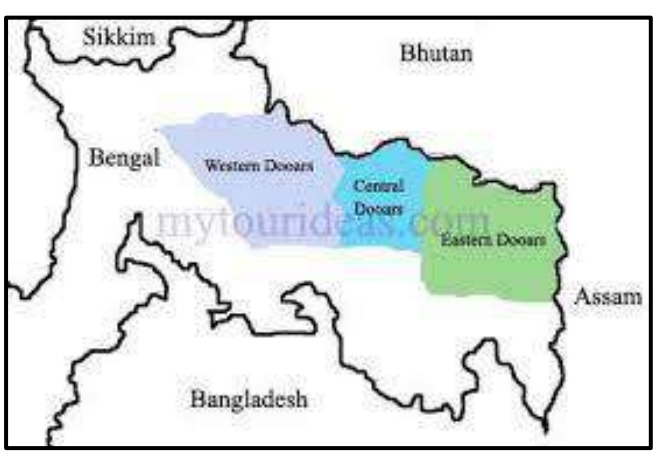
- *Over 80% of microplastics are produced on land, with less than 20% originating from the sea*. As microplastics are uniquely light, indestructible, and able to float, they can travel far across the globe.
- **Primary sources:** They are those that deliberately created micro- and nanoplastics for consumer and industrial uses, such as exfoliants in cleansers, cosmetics, drug delivery particles in medicines, and industrial air blasting.
- **Secondary sources:**Macroplastic products that disintegrate into micron-sized and smaller particles are the secondary source of micro- and nanoplastics; they occur both terrestrially and in the aquatic environment.

5.8 DOOARS

Context

- In 2024, Dooars commemorates 150 years of tea cultivation,which traces back to establishment of the first tea plantations in 1874, a few decades after Darjeeling.

Location



- They are a vast area in northeastern India, below the *Himalayan foothills and Brahmaputra plain.*
- It's around *30 km wide and extends about 350 km from the Teesta River in West Bengal to the Dhansiri River in Assam.*
- It serves as a *passage to Bhutan, Sikkim, and Eastern Nepal, with 18 gateways between the hills and plains.*
- Split by the Sankosh River, it's divided into Eastern and Western Dooars, totaling 880 km2. Known for its fertile soil, especially for tea plantations, it's a hub for the tea industry, employing thousands of people.
- The Dooars region ***politically constitute***s the plains of Kalimpong district, the whole of Jalpaiguri district and Alipurduar district and the upper region of Cooch Behar district in West Bengal and the districts ofKokrajhar and Bongaigaon in the state of Assam.

Biodiversity

- Known for its rich biodiversity, Dooars is home to several national parks and wildlife sanctuaries, including Jaldapara National Park, Gorumara National Park, and Buxa Tiger Reserve.

Tea Gardens

- The deep, well drained and fertile soil rich in the humus of the Dooars is used for the development for the tea plantations.
- Tea from here contributes significantly to India's tea production and these estates are renowned for producing high-quality tea.

Rivers

- The region is crisscrossed by several rivers, including the Teesta, Torsha, and Jaldhaka, which add to the natural beauty and fertility of the area.

Ethnic Diversity

- Inhabited by a diverse population comprising various ethnic groups such as the Gorkhas, Bhutias, Lepchas, and Adivasis, etc.

Nearest Towns

- Jalpaiguri and Siliguri

5.9 PLASTIC REGULATION IN INDIA

Context

- India supports regulating single-use plastic rather than outright eliminating it, according to an analysis by the Centre for Science and Environment (CSE).

Features of the Plastic Waste Management (Amendment) Rules, 2022

Classification of Plastics

- **Category 1:** Rigid plastic packaging will be included under this category.
- **Category 2:** Flexible plastic packaging of single layer or multilayer (more than one layer with different types of plastic), plastic sheets and covers made of plastic sheet, carry bags, plastic sachet or pouches will be included under this category.
- **Category 3:** Multi-layered plastic packaging (at least one layer of plastic and at least one layer of material other than plastic) will be included under this category.
- **Category 4:** Plastic sheet or like used for packaging as well as carry bags made of compostable plastics fall under this category.

Extended Producer Responsibility Certificates

- Guidelines now permit the **sale and purchase of excess Extended Producer Responsibility (EPR) certificates**, creating a market for managing plastic waste.
- This market system will help handle plastic waste better.

Centralised Online Portal

- The government launched a single online portal, managed by the Central Pollution Control Board (CPCB), where producers, importers, brand-owners, and plastic waste processors can register and submit annual reports by 31st March 2024
- This portal will keep track of all orders and guidelines for implementing EPR for plastic packaging under the Plastic Waste Management Rule, 2016.

Environmental Compensation

- Based on the *"polluter pays" principle*, producers, importers, and brand owners failing to meet EPR targets will face environmental compensation charges.
- This principle holds those responsible for pollution accountable for fixing it, regardless of intent.

Committee to Recommend Measures

- A committee, chaired by the CPCB chairman, will suggest ways to improve EPR implementation, including possible changes to EPR guidelines.

Annual Report on EPR Portal

- State Pollution Control Boards (SPCBs) or Pollution Control Committees (PCCs) must submit an annual report on the EPR portal regarding EPR compliance by producers, importers, brand-owners, and plastic waste processors in their state or Union Territory to the CPCB.

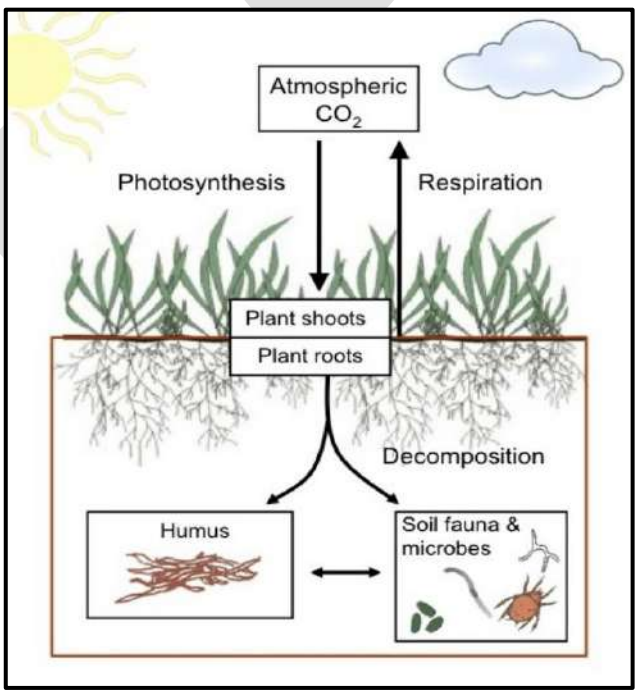
5.10 SOIL ACIDIFICATION

Context

- According to the study published in the journal *Science*, Acidification may strip Indian soils of 3.3 billion tonnes of essential carbon, affecting crop growth, sequestration.

Findings

- The global stock of soil organic carbon is estimated to be approx.2400 petagram (Pg = 10^15 g) at a depth of 2 metres.
- *Globally, future global warming and soil pH changes will deplete SIC in the top 0.3 m of soil by 1.35, 3.45 and 5.83 gigatonnes of carbon (GtC) under different scenarios, where temperatures could likely reach around 1.8°C, 2.7°C and 4.4°C warming by 2100, respectively.*
- Every year, approximately 1.13 billion tonnes of inorganic carbon are lost from soils to inland waters.
- *Acidification may lead to the loss of approximately 3.3 billion tonnes of essential carbon from Indian soils.*



Soil carbon

- Soil carbon is the *solid carbon stored in global soils. This includes both soil organic matter and inorganic carbon as carbonate minerals.*
- *Carbon in soil can be stored in the form of SIC or soil organic carbon (SOC). The former includes mineral forms of carbon like calcium carbonate produced by weathering parent material in soil or from the reaction of soil minerals with atmospheric carbon dioxide.*
- Soil organic carbon (SOC) is the carbon that remains in the soil after partial decomposition of any material produced by living organisms. It constitutes a key element of the global carbon cycle through the atmosphere, vegetation, soil, rivers, and the ocean.
- Together, soils store more than thrice the quantity of carbon in vegetation or double the quantity of carbon in the atmosphere.

5.11 SUSTAINABLE FINANCE FOR TIGER LANDSCAPES CONFERENCE

Context

- Bhutan will host the Sustainable Finance for Tiger Landscapes Conference on Earth Day 2024, aiming to secure $1 billion in new funding over the next decade to safeguard tiger habitats across Asia.

Conference Details

- **The two-day event is being conducted under the patronage of Bhutan's Queen, Jetsun Pema Wangchuck.**
- **It is co-organized by the Royal Government of Bhutan and the Tiger Conservation Coalition.**
- Expert panels at the conference will discuss sustainable finance, UN's Global Biodiversity Framework,and the role of public-private partnerships in tiger landscape preservation.

Status of Tigers in India as per 5th cycle of India's Tiger Census 2022

- The National Tiger Conservation Authority (NTCA), along with state forest departments, conservation NGOs, and the Wildlife Institute of India (WII), **conducts the national tiger census every four years.**

Population Growth:

- India's tiger population increased to 3,682 in 2022, up from 2,967 in 2018,.The growth rate is About 6.7% (from 2018 to 2022)— significantly slower than the 33% growth rate during 2014-2018.

Regional Changes:

- Significant population increases were observed in the Shivalik Hills and Gangetic Plains regions. However, tiger occupancy declined in Jharkhand, Odisha, Chhattisgarh, and Telangana.

Regional Hotspots:

- The North East Hills and Brahmaputra Plains recorded 194 tigers through camera traps, with the Nilgiri cluster noted as the world's largest tiger population, playing a crucial role in tiger colonization of adjacent areas.

Decline in Specific Areas:

- The Western Ghats region witnessed a decline in tiger occupancy, particularly in the Wayanad landscape and the Biligiriranga Hills.

Global Tiger Population

- Recent data from The International Union for Conservation of Nature suggests a potential 40% increase in tiger numbers, reaching around 4,500 in 2022.
- Despite severe threats, this represents a remarkable stabilization and potential growth in tiger populations.

5.12 BRIDGE FUEL

Context

- Whether natural gas actually is cleaner than coal is controversial.

Bridge Fuel

- Natural gas has been called a 'bridge fuel' for countries looking to transition away from coal and oil dependency, and as they pursue a pathway towards renewables and electrification.
- **Aim:**The aim of a bridge fuel is to substitute most current fossil fuel-dependent energy sources.
- **Why is natural gas considered bridge fuel?** Since natural gas has a lesser climate impact than coal because it emits 50 per cent less CO2 into the atmosphere, it is widely considered as bridge fuel.

Is natural gas actually cleaner than coal?

- **Methane Composition of Natural Gas:** Natural gas primarily consists of methane, comprising 70-90% of its composition.
- **Methane's Greenhouse Gas Impact:** Despite dissipating faster than CO2, methane has a stronger warming effect and high global warming potential (GWP). *Methane's GWP is 28 times higher than CO2 over 100 years and significantly greater over a 20-year period.*

- **Underreported Methane Emissions:** Methane emissions from the oil and gas sector are often underreported. Studies reveal significant discrepancies between reported and actual methane emissions, indicating potential environmental impact.
- **Comparison with Coal:** Given methane's significant warming potential and underreported emissions, natural gas may not be cleaner than coal as previously believed.

About Natural Gas

- Natural gas is a fossil fuel. Like all fossil fuels, it is a nonrenewable resource.
- It is a mixture of gases which are rich in hydrocarbons.
- It is a colorless and odorless gas composed of 70-90% methane (CH4). Its other ingredients include ethane (C2 H6) and propane (C3 H8).

5.13 GREEN CREDITS PROGRAM

Context

- The Ministry of Environment, Forest and Climate Change (MoEFCC) has recently issued the Green Credit Rules 2023, which formally established the Green Credit Programme (GCP) for India.

About

- It is an innovative market-based mechanism aimed at incentivizing voluntary environmental actions across diverse sectors.
- It involves **various stakeholders such as individuals, communities, private sector industries, and companies.**
- **It was launched by the Indian PM on the sidelines of COP 28.**
- **Union budget 2024 had also highlighted the Green Credit Initiative.**

Covered Activities

- The GCP encompasses e**ight key types of activities** focused on enhancing environmental sustainability.
- These include **tree plantation, water management, sustainable agriculture, waste management, air pollution reduction, and mangrove conservation and restoration.**

Governance and Administration

- The operational framework of the GCP involves a process where both individuals and corporations contribute financially to the restoration efforts of forests deemed 'degraded'.
- This process is facilitated through applications to the **Indian Council of Forestry Research and Education (ICFRE), an independent entity under the Environment Ministry.**

Earning and Calculation of Green Credit

- To earn Green Credits, participants need to register their environmental activities through a dedicated website.
- These activities undergo verification by a designated agency, and based on their report, the administrator grants the applicant a certificate of Green Credit.

Green Credit Registry and Trading Platform

- It helps track and manage earned credits.
- Additionally, the administrator creates and maintains a trading platform, enabling the trading of Green Credits on a domestic market.

5.14 SHORT ARTICLES

Kalesar WLS

Context

- SC stays construction of 4 dams inside Kalesar Wildlife Sanctuary.

About Kalesar National Park

- It is situated in the Yamunanagar District of Haryana.
- It occupies a location in the foothills of the Shiwalik ranges of the Himalayas.
- The park attained its status as a National Park on 8th December 2003.

Borders

- To its east, the park is bordered by the River Yamuna.
- Northeast of the park lies the Rajaji National Park, situated in Uttrakhand.
- To the north, the park shares a border with Himachal Pradesh, where the Simbalbara National Park is nestled in the Shivalik Hills.
- The western boundary of the park is marked by the Morni Hills.

History

- The park derives its name from the Kalesar Mahadev temple located within its premises.
- Historically, the park served as hunting grounds for rulers during the Mughal and British Raj periods.
- The park features colonial-era Dak bungalows, which serve as administrative architectural structures.

Natural vegetation

- The park's vegetation predominantly consists of tall and dense sal trees, with other species like Semul, Bahera, Amaltas, Shisham, Khair, Sain, Chhal, and Jhingan also present.

Fauna

- The fauna of the park includes several threatened species such as leopards, Ghoral, Barking deer, Sambar, Chital, Python, King Cobra, and Monitor lizard.

Global forest watch

Context

- According to Global Forest Watch, India has lost approximately 2.33 million hectares of tree cover since 2000.
- It is an online platform that provides near-real-time data and tools for monitoring the world's forests.
- **Launched in 2014 by the World Resources Institute (WRI)** with the aim of providing accessible and timely information about forests worldwide to support better forest management, conservation, and sustainable development efforts.

Global Forest Status

- At the global level, **between 2002 and 2023, approximately 76.3 million hectares of humid primary forest were lost, constituting 16% of total tree cover loss**.
- Additionally, globally, there was a loss of 488 million hectares of tree cover from 2001 to 2023, equivalent to a 12% decrease since 2000. Deforestation remains a significant driver of this loss, accounting for 23% globally.
- **Initial Tree Cover:** In 2010, the world's tree cover extended over about **3.92 billion hectares, representing roughly 30% of the Earth's land area.** However, between 2010 and 2023, the world experienced a notable loss of 28.3 million hectares of tree cover due to various factors.

Just Transition Approach

Context

- The just transition approach is gaining popularity in recent times.

The concept of 'just transition

- It encompasses a socio-economic framework that**aims to navigate the shift away from plastic-dependent industries towards more sustainable alternatives while ensuring equity and inclusivity.**

- This approach **prioritizes addressing social and economic impacts associated with transitioning, such as job losses and economic disruptions,** by providing support to affected workers and communities.
- It particularly focuses on **marginalized or vulnerable groups,** including informal waste workers, **ensuring they are not disproportionately affected by industry shifts** and promoting social justice through inclusive decision-making processes and resource access.

United Nations Permanent Forum on Indigenous Issues(UNPFII)

Context

- The 23rd session of the UN Permanent Forum on Indigenous Issues commenced in New York, highlighting concerns over the slow pace of recognition of indigenous territories (IT) despite growing awareness.

About

- It is a body within the United Nations (UN) system focused on indigenous peoples' rights and issues.
- **Establishment: The UNPFII was established in 2000 by the UN Economic and Social Council (ECOSOC) resolution 2000/22.**
- **Mandate:** Discussing indigenous issues related to economic and social development, culture, the environment, education, health, and human rights. Provides recommendations to UN agencies and member states on indigenous issues.
- **Membership:The UNPFII consists of 16 independent experts, including eight nominated by governments and eight nominated by indigenous organizations.** Experts are selected based on their knowledge and experience in indigenous issues.
- **Sessions:** Holds annual sessions at the UN Headquarters in New York, typically in April or May.

Kallakkadal

Context

- Hundreds of houses have been flooded in several coastal areas of Kerala due to swell waves locally known as Kallakkadal.

Kallakkadal

- It refers to coastal flooding during the pre-monsoon season (April-May) on the southwest coast of India.
- It is caused by swell waves, as described in a 2016 paper titled "*Teleconnection between the North Indian Ocean high swell events and meteorological conditions over the Southern Indian Ocean.*"
- In 2012, the term "Kallakkadal" was formally approved and recognized by the United Nations Educational, Scientific and Cultural Organization (UNESCO).

Mange outbreak

Context

- Recently a Mange outbreak was reported among Asiatic wild dogs in Mudumalai.

Types of Mange

- Sarcoptic mange (caused by Sarcoptesscabiei mites) and Demodectic mange (caused by Demodex mites).
- Sarcoptic mange is highly contagious and can affect both animals and humans, while Demodectic mange is less contagious and is usually species-specific.

Symptoms

- Intense itching, hair loss, redness, and inflammation of the skin.

Transmission

- Direct contact with an infected animal or through contaminated bedding, grooming tools, or living areas.

Diagnosis

- Veterinarians typically diagnose mange through skin scrapings, where they collect samples of skin cells and examine them under a microscope to identify the presence of mites or their eggs.

Prevention

- Preventing mange involves keeping pets clean and healthy, avoiding contact with infected animals, and regularly cleaning living areas.

Asiatic Wild Dogs

Asiatic wild dogs

- It is a wild canid found in the forests of central, south and southeast Asia. They are also known as Indian wild dogs, whistling dogs, red wolf, red dog and mountain wolf.
- **Distribution:**
  - They are found throughout Eastern and Southeastern Asia.
  - They can be seen as far north as Siberia, as far south as some Malaysian islands, and as far west as the Indian peninsula.
  - They are found in three clusters across India, namely the Western and Eastern Ghats, the central Indian landscape and North East India.
- **Conservation status:**
  - IUCN Red List: Endangered
  - The Wildlife Protection Act 1972: Schedule II
  - CITES: Appendix II

Indian Laurel Tree

Context

- Forest department authorities in Andhra Pradesh's Alluri Sitharama Raju district cut the bark of an Indian laurel tree, with water gushing out.

Indian Laurel Tree

- Tropical or subtropical species found in parts of Asia, the Western Pacific Islands, and Australia.
- **Importance:** provides an important source of food for many species of birds and animals.
- **Scientific Name:** Ficus microcarpa.
- **Applications:**
  - **Woods:** Furniture, cabinetry, joinery, paneling, boat-building, and making musical instruments like guitar fretboards.
  - **Leaves:**consumed by Antheraea paphia, silkworms that produce tussar silk, a commercially valuable form of wild silk.
  - **Bark and fruit:**yield pyrogallol and catechol, which are used for dyeing and tanning leather and they also have medicinal properties.
- **IUCN status:** Least Concern

Neptisphilyra

Context

- Neptisphilyra, a rare butterfly species known as the long-streak sailor, was recently found in India at the Tale Valley Wildlife Sanctuary in Arunachal Pradesh.

Neptisphilyra

- It is a rare species of butterfly, commonly known as the long-streak sailor.
- **Distribution:** found across various regions of East Asia, including eastern Siberia, Korea, Japan, and central and southwest China.
- **Distinct markings:**white cell streak forming a "hockey stick" pattern on the forewing.
- **Family:**Nymphalidae
- **Preferred habitats:** evergreen forests, riverine vegetation, and rocky streams.

Talley Valley Wildlife Sanctuary:

- **Location:** Arunachal Pradesh, India.
- The area has some of the most important endangered species including the clouded leopard.
- Rivers like Pange, Sipu, Karing, and Subansiri flow through this sanctuary.

Plastic Regulation in India

Context

- India supports regulating single-use plastic rather than outright eliminating it, according to an analysis by the Centre for Science and Environment (CSE).

The Plastic Waste Management Rules 2016

- **Segregated Storage at Source:**Ensures that waste is segregated at its source, facilitating proper management and disposal.
- **Responsibilities of Local Bodies:**The rules outline the responsibilities of local bodies in managing plastic waste within their jurisdictions.
- **Involvement of Gram Panchayats:** Requires gram panchayats to play a role in the

effective management of plastic waste in rural areas.

- **Role of Waste Generators:**Rules also Specifies the responsibilities of waste generators in managing plastic waste, promoting accountability.
- **Duties of Retailers and Street Vendors:** Mandates retailers and street vendors to participate in plastic waste management efforts, ensuring compliance and cooperation.

Plastic Waste Management (Amendment) Rules, 2022

- Plastic Waste Management (Amendment) Rules, 2022 amended The Plastic Waste Management Rules 2016.

Swell Waves

Definition

- It is the formation of long wavelength waves on the surface of the seas. These are composed of a series of surface gravity waves.

Formation

- Swells form without precursors or local wind activity, distinguishing them from wind-generated waves.

Characteristics

- Swells have narrower frequency and direction ranges compared to locally generated wind waves.
- They disperse from their origin, lose randomness, and take on a more defined shape and direction.

Propagation of Swell Waves

- Swell waves can travel in directions different from the wind's direction, unlike wind-generated waves.
- Their wavelengths typically range up to 150 meters, but longer swells exceeding 700 meters can occur during severe storms.

Variation in Swell Wavelength

- Swell wavelength varies from one event to another. Occasionally, swells longer than 700 meters occur due to extreme storm conditions.

Indian National Centre for Ocean Information Services (INCOIS)

- INCOIS is an autonomous organisation under the Ministry of Earth Sciences (MoES)
- **HQ:** Hyderabad, **Establishment Year:** 1999.
- It is a unit of the Earth System Science Organization (ESSO), New Delhi.
- It is mandated to provide the best possible ocean information and advisory services to society, industry, government agencies and the scientific community through sustained ocean observations and constant improvement through systematic and focused research.
- **It has launched three ocean-based specialised products/service**s — the Small Vessel Advisory and Forecast Services System (SVAS), the Swell Surge Forecast System (SSFS) and the Algal Bloom Information Service (ABIS).

Golden Trevally

Context

- Researchers at the ICAR-Central Marine Fisheries Research Institute (CMFRI) achieved captive breeding of golden trevally, a high-value marine fish, after five years of research at CMFRI's Visakhapatnam Regional Centre.

Golden trevally

- It is also known as golden kingfish.
- ***Scientific name:****Gnathanodonspeciosus.*
- It is considered an ideal candidate for mariculture due to its faster growth rates, good meat quality, and high market demand for consumption and ornamental purposes.
- Golden trevally is a *reef-associated fish with yellowish coloration on the belly, scattered black patches, and yellow fins with a black tail.*
- Juveniles are particularly attractive with golden coloration and black bands, making them preferred for aquarium keeping.
- *The farm-gate value of golden trevally is estimated to be between ₹400-500 per kg, while the ornamental variety can fetch prices ranging from ₹150-250 per piece.*

Pelagia noctiluca

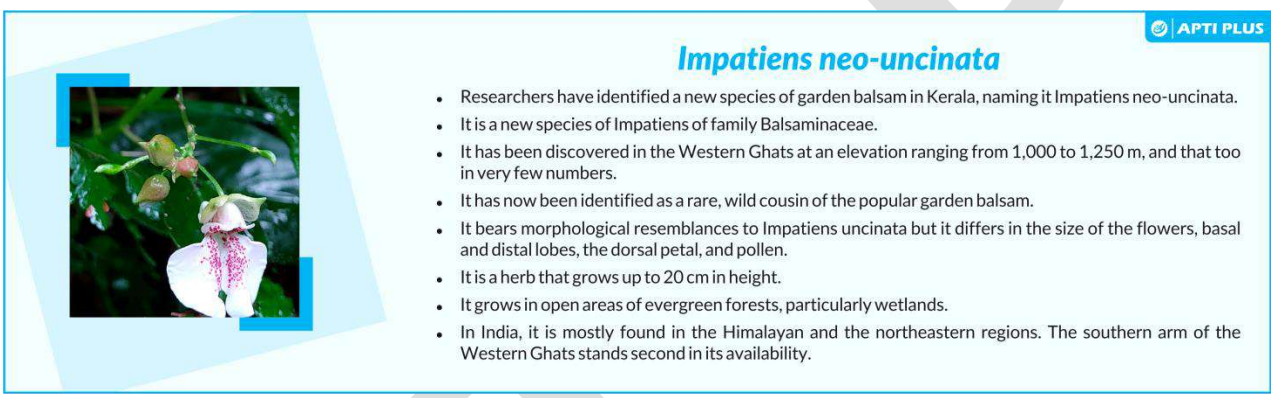
Context

- Venomous jellyfish blooms are spotted along the Visakhapatnam coast in Andhra Pradesh.

Pelagia noctiluca

- Pelagia noctiluca is also known as the ***mauve stinger or purple-striped jellyfish.***
- **Appearance:**A blue-purple (mauve) colour with a globe-shaped umbrella covered in orangey brown warts.
- **Habitat:**It is primarily pelagic or they live in the open ocean. However, this species can survive in benthic and temperate coastal habitats.
- **Distribution:**It is mainly found in the Indo-Pacific, Atlantic Ocean, and the Mediterranean Sea.
- **Special feature**
  - These are***bioluminescent,***having the ability to produce light in the dark.
  - It is venomous and causes varying degrees of illness such as diarrhea, extreme pain, vomiting, and anaphylactic shock.

5.15 SNIPPETS



APTI PLUS

Vasuki indicus

- Paleontologists in India discovered fossilized remains of a giant predator snake in Gujarat's Panandhro Lignite Mine in Kutch.
- They were terrestrial snakes that existed from the Upper Cretaceous to the Late Pleistocene.
- It belonged to the extinct Madtsoiidae snake family, which lived between the Upper Cretaceous and the Late Pleistocene.
- The snake is estimated to be 10-15 meters long and dates back approximately 47 million years.
- Vasuki indicus had a broad, cylindrical body.
- It reached lengths between 10.9 and 15.2 meters, surpassing modern snakes like the reticulated python.
- It rivalled the size of the infamous Titanoboa, one of the largest known predators in history.
- They are significant for understanding snake origins and evolution.
- The discovery has implications for understanding Gondwanan inter-continental dispersal and the evolution of large body sizes during the Middle Eocene period.

APTI PLUS

Climate clock

- India's biggest Climate Clock activated at CSIR Hq to celebrate Earth Day.
- The Climate Clock is a graphic to demonstrate how quickly the planet is approaching 1.5 °C of global warming, given current emissions trends.
- It also shows the amount of CO2 already emitted, and the global warming to date.
- The installation of the Climate Clock aims to raise awareness about climate change and its adverse impacts.
- Climate clocks provided by the foundation have been installed in various CSIR labs to raise awareness about climate change.

APTI PLUS

Cape Buffalo

- One of the 'Big Five' species in Africa. Others- the lion, the leopard, the elephant, and the rhino.
- It is one of the four subspecies of African Buffalo found south of the Sahara. Others- the forest buffalo, the West African Savanna Buffalo, and the Central African Savanna Buffalo.
- They have a strictly herbivorous (graminivorous, florivorous) diet.
- They feed on a wide variety of grasses, sedges, leaves, and other plants.
- African buffalo are polygynandries (promiscuous) meaning that both males and females mate with multiple partners.
- International Union for Conservation of Nature's Red List: 'Near-Threatened'

APTI PLUS

Clouded Tiger Cat

- Scientists in Brazil have identified a new species of tiger cat, called the clouded tiger cat (Leopardus pardinoides), which is small.
- Tiger cats, also known as oncillas, are small spotted cats found in Central and South America.
- They are adapted for tree-climbing and hunting small prey, weighing between 1.5 to 3 kilograms, much smaller than domestic house cats.
- Scientific Name:Leopardus pardinoide.
- IUCN Status: Vulnerable
- Previous Classification: Until recently, tiger cats were classified into two species:
- The northern tiger cat (Leopardus tigrinus) and
- The Atlantic Forest tiger cat (Leopardus guttulus).
- Researchers studying tiger cats in Brazil concluded that there is a third species, the clouded tiger cat, found in the cloud forests of southern Central America and the Andean mountain chains.
- Threat of Extinction: Despite the discovery of a new species, all tiger cats, including the clouded tiger cat, are under threat from deforestation and habitat destruction. This puts them at risk of extinction.

6. SOCIAL ISSUES

6.1 INDIA'S DECREASING TOTAL FERTILITY RATE (TFR)

Context

- A report from The Lancet projects India's total fertility rate (TFR) to decrease to 1.29 by 2051.

Total Fertility Rate (TFR)

- The Total Fertility Rate(TFR) of a population is the average number of children that are born to a woman over her lifetime if:
  - they were to experience the exact current age-specific fertility rates (ASFRs) through their lifetime
  - and they were to live from birth until the end of their reproductive life.
- It is obtained by **summing the single-year age-specific rates at a given time**.

Reports on India's TFR

- UN Population Division estimates India's population to reach **nearly 1.7 billion by 2065.**
- Discussions on India's population **often neglect other demographic aspects and contributions to economic growth.**
- The Lancet's report forecasts India's Total Fertility Rate (TFR) to **decline to 1.29 by 2051, derived from comprehensive global demographic modeling.**
- The **estimate range of 0.97 to 1.61 reflects methodological precision and provides insights into India's population dynamics.**

Factors Driving Demographic Transition

- **Rapid Economic Development:** Economic growth, particularly since the early 21st century, has been a key driver of India's demographic transition.
- **Reduction in Mortality Rates:** Lower infant and child mortality rates have reduced the need for larger families to provide old-age support.
- **Women's Empowerment:** Increased women's education and participation in the workforce have contributed to declining fertility rates.
- **Improvements in Living Conditions:** Better housing conditions and old-age security systems have further facilitated demographic transition.

Immediate and Long-Term Impacts

- **Initial Effects of TFR Decline:** A rapid decline in TFR **leads to a decrease in the dependency ratio and a higher proportion of working-age adults,** stimulating economic growth and intergenerational transfers.
- **Future Challenges:** However, this decline also results in a larger elderly dependent population, similar to patterns observed in other countries like China and Japan.
- **Projected Dependency Ratio:** India's dependency ratio, accounting for both young and old dependents relative to the working-age population, is expected to **increase from 13.8 in 2011 to 23 in 2036.**

Regional Disparities and Transition Dynamics

- **Uneven Transition Across States:** Transition to replacement-level fertility varies across states, **with larger like Uttar Pradesh, Bihar and Jharkhand,expected to take a decade to achieve stabilization.**
- **Inter-District Variations:** Significant differences exist within states, with some districts experiencing faster transitions than others, highlighting the complexity of demographic change.**Example:**Odisha, the state experiencing the fastest transition among the poor states, will achieve TFR as low as 1.51 by 2036

and **yet districts like Kandhamal, Nabarangpur and Rayagada will have it much above the replacement level, modelled on the data from NFHS 5.**

Economic Implications and Labor Dynamics

- **Positive Economic Impact:** Demographic transition is expected to enhance labor productivity in several states through:
    - Increase in capital resources and infrastructure per capita.
    - Reallocation of resources towards education and skill development.
    - Changes in age distribution, leading to a larger fraction of the labor force.
- **Implications for Education:** Lower TFR leads to fewer children enrolling in schools, as observed in states like Kerala, potentially improving educational outcomes without additional state resources.
- **Women's Workforce Participation:** With reduced childcare responsibilities due to declining fertility rates, more women are expected to join the labor force in the coming decades. Higher participation of women in MNREGA employment in southern states indicates the potential for increased workforce participation.

Sectoral Redistribution

- **Shift from Agriculture:** The workforce is transitioning from agriculture to industries and services, leading to a more balanced sectoral distribution.
- **Inclusivity in Skill Development:** Skill development initiatives among SCs/STs and religious minorities ensure a sufficient labor supply in growing sectors.
- **Spatial Redistribution of Labor:** Movement of labor from northern to southern states creates spatial balance in the labor market. Modern sectors in southern states, Gujarat, and Maharashtra attract cheaper labor from northern states, potentially improving working conditions.

Asia 2050 Report

- The report underscores the **importance of sectoral and spatial redistribution of the workforce**, skill development, and increasing women's workforce participation to compensate for the declining working-age population.

Way Ahead

- **Importance of Addressing Emerging Population Issues:** Policymakers need to focus on skill development, especially for women and marginalized groups, to harness the potential of demographic transition.
- **Impact on Education:** Declining TFR may lead to lower enrollment in schools, necessitating a shift in focus towards higher education and technical skills development.
- **Gender-Sensitive Policies:** Policies promoting women's workforce participation are crucial for leveraging demographic changes for economic growth and social development.

6.2 INDIA EMPLOYMENT REPORT, 2024 ON WOMEN'S EMPLOYMENT

Context

- The India Employment Report, 2024, by the Institute for **Human Development and the International Labour Organization** highlights improvements in key labor market indicators.
- Labor Force Participation Rate (LFPR), Workforce Participation Rate (WPR), and Unemployment Rate (UR) showed long-term deterioration until 2019.
- However, these indicators have improved since 2019, coinciding with periods of economic distress, except for two peak pandemic quarters.

Women's Participation

Current Scenario:

- Female Labor Force Participation Rate (LFPR) **significantly lower than male counterparts**: Male LFPR: 78.5; Female LFPR: 37 (2023).
- **World women LFPR rate**: 49 (World Bank figures).
- **Female LFPR declined steadily since 2000,** reaching 24.5 in 2019 before a slight increase, particularly in rural areas.
- Despite improvements, employment conditions for women remain poor.

Employment Patterns:

- India Employment Report indicates women primarily contribute to the rise in self-employment and unpaid family work.
- Two-thirds of incremental employment post-2019 constituted self-employed workers, predominantly unpaid (women) family workers.Regular work's share, which increased post-2000, started declining after 2018.

Youth Employment

- South Asia, including India, has **consistently high rates of youth not in employment, education, or training (NEET), averaging 29.2% between 2010 and 2019 (ILO 2022a).**
- India also has a significant share of NEET youth, with higher rates among young women compared to men.

Recent Employment Trends

- Post-2019, nearly two-thirds of employment comprised self-employed workers, with predominantly unpaid (women) family workers.

Reasons for Low Women's Participation in the Labor Force

- **Lack of job opportunities and women's disproportionate responsibility** for caregiving, cooking, and cleaning at home.
- **Low wages, patriarchal mindsets, and safety** concerns contribute to the challenge.
- Decline in women's labor participation between 2004 and 2018, **suggesting a global trend of women being squeezed out of employment due to scarcity of paid work.**
- **Job-intensity of India's growth pattern**, combined with social norms limiting women's mobility and caregiving responsibilities, restrict women's employment opportunities.
- **Concerns over public safety and lack of transport** further confine women's job options, echoing.
- Factors influencing the supply and demand for female labor include opportunities for **balancing work and family, education decisions, technological advancements, laws, norms, and economic structural transformations.**
- **Persistent limitation of women's choices by marriage and family responsibilities**, applicable globally, including in India.

Policy Interventions Needed

- Intervention required on both demand and supply sides of the labor market.
- **Promotion of labor-intensive sectors, public investment in safety, transport, and affordable childcare** and elderly care crucial for enabling women to access better-paying opportunities.

6.3 YOUTH SUICIDE IN INDIA

Context

- The National Crime Records Bureau (NCRB) reports that 1.71 lakh people died by suicide in 2022.

Suicide in India: Key Statistics [National Crime Records Bureau (NCRB) report]

- In 2022, India **witnessed a record-high of 1.71 lakh suicides**, with a staggering rate of **12.4 per 1,00,000—ranking the country highest globally.**
- Despite these alarming numbers, the true extent of the issue may be even greater due to factors like **inadequate registration systems and stigma.**
- **41% of all suicides occur among individuals under 30,** making suicide the leading cause of death for young women in India.
- **Every eight minutes, a young Indian takes their own life,** highlighting the immense loss to families, society, and the nation's future.

Contributing factors to youth suicide

- **Mental health issues:** Depression, anxiety, and psychiatric disorders are common underlying factors in youth suicides.
- **Family problems:** Dysfunctional dynamics, domestic violence, parental pressures and conflicts contribute to vulnerability.
- **Academic stress:** High academic expectations, coupled with rigid systems, often lead to extreme stress among students.
- **Sociocultural challenges for young girls and women:** Gender-specific issues like early marriage, domestic violence, economic dependence, and societal discrimination increase the risk for young females.
- **Substance use and addiction:** Alcohol and substance abuse worsen mental health issues and impair decision-making.
- **Impact of Internet and social media**: Cyberbullying, social media addiction, and exposure to harmful content increase suicidal thoughts.
- **Influence of media portrayal:** Sensationalized coverage, especially involving celebrities, can trigger copycat behavior and worsen vulnerabilities.

National Suicide Prevention Strategy:

- The Ministry of Health's initiative aims to develop a comprehensive National Suicide Prevention Strategy.
- The strategy emphasizes collaboration between ministries like Health, Education, Information, and Social Welfare.
- It focuses on leveraging educational institutions and youth organizations to raise mental health awareness and reduce substance abuse.
- Successful implementation requires dissemination to all states, adequate budgets, and concerted efforts at various levels

Solutions to Youth Suicide

- **Equip with coping skills:** Provide youth with problem-solving and emotional regulation techniques to navigate challenges effectively.
- **Early mental health support**: Implement proactive measures for early identification and intervention of mental distress.
- **Foster supportive environments**: Create inclusive spaces in families, schools, and communities where youth feel comfortable seeking help.
- **Promote healthy lifestyles**: Encourage balanced nutrition, regular exercise, and responsible internet usage for better mental well-being.
- **Enhance family environments**: Address issues like domestic violence and economic instability to create safer homes.

- **Reform education:** Reduce academic pressure, focus on holistic development, and introduce alternative assessment methods.
- **Challenge societal norms:** Combat stigma around mental health and promote inclusivity for a supportive society.

6.4 RIGHT TO PERSONS WITH DISABILITY ACT, 2016

Context

- The Supreme Court expressed deep concern over the lack of progress in implementing the provisions of the RPWD Act in a recent case (Seema Girija Lal and anr vs Union of India and ors).

Background

- The RPWD Act, 2016 was **enacted to safeguard the rights and interests of persons with disabilities in India.**
- Despite being over five years since its enactment, **the implementation of the Act remains dismal across the country.**

Right to Persons with Disability Act, 2016

Right to Persons with Disability Act, 2016

- Came into force on **19th April 2017.**
- Aim: Give effect to the **United Nations Conventions on Rights with Persons with Disability.**
- Addresses issues faced by disabled individuals like poor education, lack of family support, representation, low social security, and health benefits.

Definition of disability

- RPWD Act 2016 categorizes disabilities into three groups:

1. Person with benchmark disability
2. Person with disability
3. People with disabilities having high support needs.

- The act expanded the types of disabilities from 7 to 21, with the Central Government empowered to add more.

Types of Disability (RPWD Act 2016)

- Blindness, low-vision, leprosy cured persons, hearing impairment (deaf and hard of hearing), locomotor disability, dwarfism, intellectual disability, mental illness, autism spectrum disorder, cerebral palsy, muscular dystrophy chronic, neurological conditions, specific learning disabilities, multiple sclerosis, speech and language disability, thalassemia, haemophilia, sickle cell disease, multiple disabilities including deafblindness, acid attack victim, and Parkinson's disease.

Key Provisions

- The RPWD Act guarantees equality, dignity, and respect for persons with disabilities, prohibiting discrimination and ensuring reasonable accommodations.
- It also safeguards women and children with disabilities, emphasizing education access and protection from abuse.
- The Act also emphasizes reproductive rights, access to education without discrimination, and free education for children **with benchmark disabilities aged 6-18.**

Rules for Private Sector

- It requires the private sector to adopt an **Equal Opportunity Policy, appoint a Liaison Office**, prohibit discrimination, and provide additional benefits and facilities for disabled employees etc.

Authority

- The **Chief Commissioner for Persons with Disabilities and State Commissioners** will monitor the Act's implementation, acting as regulatory bodies and grievance redressal agencies.

Funds

- Funds created at state and national levels to support PWDs financially.

Courts

- Special courts for handling cases concerning violation of PWDs' rights and ensuring speedy trials.

Penalty

- Breach of the Act is penalized with **fines up to Rs. 10,000 for the first offense, Rs. 50,000 for subsequent offenses, extendable up to Rs. 5,00,000.**
- Cruelty against PWDs is punishable **with imprisonment of 6 months to 5 years, along with a fine.**
- Fraudulent use of benefits meant for PWDs is also punishable under the Act.

Supreme Court's Observations and Directives

- **Dismal Implementation:** Many States have not framed rules under the Act, which was required within six months of its enactment, indicating a lack of commitment.
- **Non-Framing of Rules:** Rules are essential for providing detailed guidelines on how the Act's provisions are to be implemented.
- **Court's Directives:** Directed the Department of RPWD to take up the matter with relevant authorities and report on compliance status before the Court, emphasizing urgent action.

Previous Court Orders

- Despite issuing several orders in the past for proper implementation, the lack of progress is concerning.

Status of Implementation

- Several States and Union Territories are yet to fulfill their obligations under the RPWD Act, including **non-appointment of Commissioners, creation of funds, and lack of special courts and public prosecutors.**

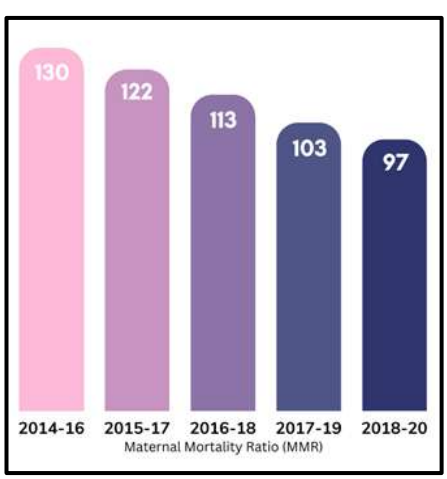
Court's Action

- Called for **immediate steps to address deficiencies, with the matter scheduled for further hearing in July, indicating seriousness in implementation.**

6.5 MATERNAL MORTALITY RATE IN INDIA

Context

- The Indian Council of Medical Research (ICMR) is funding a study to analyze maternal deaths caused by heart diseases.



Maternal Mortality in India

- Maternal mortality has been a concern in India, reflecting the reproductive health status of women.
- Maternal Mortality Ratio (MMR) **is the number of maternal deaths per 100,000 live births.**
- **Historical Perspective:** In 1990, **India had an MMR of 556**, with approximately 1.38 lakh women dying annually due to pregnancy-related complications, **much higher than the global MMR of 385.**

- **Government Target:** The National Health Policy (NHP) 2017 aimed to reduce India's MMR to below 100/lakh live births by 2020.
- **Achievement:** India successfully reduced its MMR to 97/lakh live births in 2018-20, meeting the NHP target.
- **Progress**: The country witnessed a consistent decline in **MMR over the past eight years,dropping from 130/lakh live births in 2014-16 to 103 in 2017-19, significantly below the global MMR of 211 in 2017.**
- **Interventions:** Targeted government interventions **focusing on all aspects of maternal care contributed to this decline.**

Sustainable Development GoalTarget 3.1: Maternal Mortality

- **Global Goal:**SDGsaim to reduce global Maternal Mortality Ratio (MMR) **to less than 70/lakh live births by 2030.**
- **India's Progress:** India is on track to achieve this goal ahead of time, with several states already achieving the SDG target- Kerala (19), Maharashtra (33), Telangana (43), Andhra Pradesh (45), Tamil Nadu (54), Jharkhand (56), Gujarat (57), & Karnataka (69).
- **Schemes:** Schemes like **Pradhan Mantri SurakshitMatritva Abhiyan** provide free comprehensive antenatal care, diagnostics, and counselling services to improve maternal and newborn care.

Government Initiatives for Maternal Health

- **POSHAN Abhiyaan:** Aims to improve nutritional outcomes, with a focus on pregnant women.
- **RashtriyaPoshanMaah:** Focuses on maternal and child health, promoting Poshan Panchayats and Gram Panchayats.
- **Pradhan Mantri Matru Vandana Yojana (PMMVY):** Provides cash benefits to pregnant women to meet nutritional needs and compensate for wage loss.
- **SurakshitMatritvaAnushasan (SUMAN):** Ensures dignified and respectful delivery of healthcare services at no cost.
- **Labour Room & Quality Improvement Initiative (LaQshya):** Aims to reduce maternal and newborn mortality, enhance quality of care, and improve birthing experience.
- **Impact:** Institutional deliveries in India increased from **79% in 2015-16 to 89% in 2019-20,** with various initiatives promoting institutional deliveries and improving healthcare infrastructure.

Future Goals

- **SurakshitMatritvaAashwasan:** Aims for zero preventable maternal and newborn deaths, with a focus on in-facility maternity care and reproductive health awareness.
- **MMR Reduction:** India aims to reduce **MMR below 70/lakh live births** and maintain a steady decline, envisioning a future where maternal mortality is no longer a concern.

Findings of Recent ICMR Study on Maternal Mortality

Emerging Risk Factor:

- **Heart disease is emerging as a significant risk factor for maternal mortality**, along with traditional factors like infections and excessive bleeding.

Trends in Maternal Mortality [2018-2020 Data]

- India has seen a **remarkable decline in MMR over the last two decades**, with the current rate at 97 deaths per lakh live births.

Understanding the Causes of Heart Disease Among Mothers:

- Pregnancy induces **metabolic changes increasing the risk of cardiovascular events.**
- Valvular and congenital heart diseases are common causes of maternal deaths in India.

Late Diagnosis and Stigma:

- Many women **discover their heart condition during pregnancy, particularly those from lower economic backgrounds.**
- Undiagnosed or late-diagnosed heart diseases can lead to heightened risks and complications during pregnancy.

Implementing a Treatment Protocol:

- Collaboration between cardiologists and obstetricians is crucial for managing heart disease complications during pregnancy.
- Dedicated cardio-obstetrics teams ensure comprehensive management of heart diseases during pregnancy.

6.6 ABORTION IN INDIA

Context

- The Supreme Court, led by Chief Justice of India D Y Chandrachud, **has granted permission for a 14-year-old victim of sexual assault to terminate her almost 30-week pregnancy.**

The MTP Act 1971 and The MTP Act Amendments 2021

	MTP Act 1971	The MTP Amendment Act 2021
Indications (Contraceptive failure)	Only applies to married women	Unmarried women are also covered
Gestational Age Limit	20 weeks for all indications	24 weeks for rape survivors Beyond 24 weeks for substantial fetal abnormalities
Medical practitioner opinions required before termination	One RMP till 12 weeks Two RMPs till 20 weeks	One RMP till 20 weeks Two RMPs 20-24 weeks Medical Board approval after 24 weeks
Breach of the woman's confidentiality	Fine up to Rs 1000	Fine and/or Imprisonment of 1 year

In a nutshell,

Medical Termination of Pregnancy (Amendment) Act 2021

Gestational Age	Conditions for Abortion	Requirements
Up to 20 weeks	Based on the advice of one doctor	One doctor's advice
20 to 24 weeks	Under certain categories, after evaluation by two registered medical practitioners	Evaluation by two registered medical practitioners
After 24 weeks	Allowed only if there is substantial foetal abnormality, requiring evaluation by a medical board	Evaluation by a medical board
Forced Pregnancies	Conditions listed in Section 3B of the Rules under the MTP Act, including statutory rape, disabilities in women, or changes in marital status during pregnancy	Evaluation by medical practitioners as per Section 3B

Court's Decisions on Late-Term Abortions

- Supreme Court **allows terminations beyond 24 weeks in exceptional cases like threat to woman's life or rape.**
- Court can overrule medical boards denying termination.

Foetal Viability and Rights of the Unborn Child

- Foetal viability is key in abortion law; **not explicitly mentioned in India's MTP Act.**

- **US law (Roe v Wade, 1973)** allows abortion up to foetal viability, now considered around 23-24 weeks.
- Indian courts consider foetal viability, leaning towards woman's autonomy.

Issues in a nutshell

- **Differing Opinions:** One view sees termination as a woman's right, while another emphasizes the state's duty to protect life, creating a complex ethical and legal debate.
- **Global Variations:** Countries have different laws on abortion, considering factors like foetal health and risk to the woman, leading to varying conditions and time limits.
- **24-Week Limit:** The law prohibits abortion after 24 weeks, except for cases of substantial foetal abnormalities, posing challenges for cases requiring late-term abortion due to rape.
- **Need for Medical Professionals:** The Act mandates abortions to be performed by specialist doctors, creating accessibility issues in rural areas with a shortage of such professionals.

Criticism and Debate

- MTP Act's reliance on doctors for late-term abortion approval is **criticized for shifting decision from woman.**
- **Emphasis on medical evaluation over woman's choice** leads to last-minute court interventions.

Way Ahead

- **Legal Clarity:** Amend MTP Act to provide **clearer guidelines on late-term abortions**, balancing woman's autonomy and foetal rights.
- **Medical Training:** Enhance medical training on abortion procedures and ethics to empower doctors and reduce reliance on courts.
- **Counseling and Support:** Provide comprehensive counseling and support services to women facing unplanned pregnancies.
- **Upholding Constitutional Rights:** The landmark **Puttaswamy case** recognized women's right to make reproductive choices under **Article 21 of the Indian Constitution**. This sets a strong legal precedent, emphasizing the need for a shift in power towards women seeking abortion.
- **Standardized Protocols:** Ensuring that all healthcare institutions follow standardized protocols for abortions is crucial. This will guarantee safe and accessible abortion services across the country.
- **Human Rights and Scientific Principles:** Decision-making on abortion should be guided by human rights principles and solid scientific evidence. It should also be aligned with technological advancements in the field.
- **Advancement in Women's Rights:** The amendment signifies progress in addressing women's issues. It marks a step forward in advancing women's rights and signifies the country's commitment to addressing these issues effectively.
- **Research and Dialogue**: Encourage research and public dialogue on reproductive rights to inform future policy decisions.

6.7 NATIONAL FRAMEWORK OF EARLY CHILDHOOD STIMULATION, 2024

Context

- The National Framework of Early Childhood Stimulation, 2024, **underscores a critical aspect of child development: learning begins at birth.**

Background

- Ministry of Women and Child Development recently launched **a National Framework for Early Childhood Stimulation for children from birth to three years** and **a National Curriculum for Early Childhood Care and Education for children from three to six years.**

National Framework of Early Childhood Stimulation, 2024

Objective:

- Empower caregivers and **Anganwadi Workers for holistic early stimulation.**
- Promote optimal development of children, focusing on body and brain development.

Conceptual Framework:

- Based on the **Nurturing Care Framework.**
- Fills conceptual and practical gaps in understanding care and stimulation.

Core Principles:

Serve and Return:

- Emphasizes **responsive interactions between caregiver and child.**

Caregiver's Three Acts:

- Love, talk, play.

Positive Guidance:

- Encourages positive reinforcement and guidance.

Activities:

- **36 month-wise age-based activities** provided.
- Can be conducted at household, Anganwadi Centre, or Creche.
- Delivered through all contact points including home visits, monthly meetings, and community-based events.

Special Focus:

Screening:

- Early identification of developmental delays or issues.

Inclusion:

- Ensure all children, including Divyang children, are included.

Referrals:

- Provide referrals for further assessment and support.

Importance of Early Years:

- Recognizing that **85% of brain development occurs before the age of six.**
- Emphasizes the importance of a child's early years.
- Aligned with the National Education Policy, 2020, which emphasizes a continuum of learning from the early years.

Developmental Milestones and Activities:

- Emphasizes engaging children in activities that **stimulate their senses and promote cognitive, language, and motor skills** development.
- Activities include **talking to the child, playing, moving, listening to music, and engaging in sensory stimulation**, focusing on sight and touch.
- Provides a month-by-month guide for specific developmental needs of children at different stages.

Training and Implementation:

- Involves training staff in the 14 lakh anganwadis across the country.
- Aims to equip caregivers, **including parents, anganwadi workers, and ASHA workers,** with the knowledge and skills to conduct the prescribed activities effectively.

Early Identification of Developmental Delays:

- Focuses on **early identification of developmental delays.**
- Provides guidance on adapting activities to suit the child's needs.

National Curriculum for ECCE 2024: Enhancing Early Childhood Development

Comprehensive Coverage of Development Domains

- Covers physical/motor, cognitive, language and literacy, socioemotional, cultural/aesthetic, and positive habits.
- Aligned with the National Curriculum Framework for Foundational Stage 2022 (NCF-FS).

Improving Quality of ECCE

- Prioritizes **competency-based lesson plans and activities.**
- Presented in a **simple and user-friendly manner for effective implementation.**

Focus on Early Learning

- Emphasizes playful joy-based learning.
- Prepares children for primary school by developing foundational skills.

Structured Curriculum Design

- Provides a weekly calendar **comprising 36 weeks of active learning, 8 weeks of reinforcement, and 4 weeks of initiation.**
- **Includes 5+1 days of play-based learning in one week**, with three blocks of activities in one day.

Diverse Range of Activities

- Offers a combination of in-center and at-home, indoor and outdoor, child-led, and educator-led activities.
- Ensures a holistic approach to learning and development.

Assessment Tools for Progress Tracking

- Provides **robust assessment tools to track progress and tailor learning.**
- Facilitates continuous monitoring of development milestones.

Focus on Inclusion

- Special focus on screening, inclusion, and referrals of **Divyang children.**
- Ensures all children can benefit from the curriculum.

Community Engagement

- Facilitates community engagement through **monthly ECCE days and home learning activities.**
- Encourages active involvement of parents and caregivers.

6.8 SC VERDICT ON CHILDCARE

Context

- The recent Supreme Court judgment, addresses a critical issue: the underrepresentation and challenges faced by women in the Indian workforce.

Key Points from the Judgment

- **Interpretation of Article 15:** The judgment centers on **Article 15 of the Constitution,** prohibiting gender discrimination and empowering the state to enact special provisions for women.
- **Constitutional Entitlement:** Chief Justice Chandrachud emphasizes **women's workforce participation** as a constitutional entitlement, not a privilege.
- **Case Overview:** The case involves a Government College assistant professor denied childcare leave (CCL) to attend to her child's genetic condition.
- **Constitutional Mandate:** The employer's argument, **based on state discretion in policy adoption**, is challenged, stressing the constitutional obligation to address women's workforce concerns.

Low Women's Workforce Participation

- The judgment arrives amid growing concerns over the low participation of women in the Indian workforce, despite advancements in various sectors.
- Women's representation **in formal employment remains disproportionately low, underscoring the need for comprehensive support systems, particularly in childcare services.**

Challenges Faced by Women in the Indian Workforce

- **Triple Burden:** Women in India juggle housework, care work, and paid employment, facing a formidable triple burden.
- **Time Use Disparity:** The Time Use Survey of India 2019 reveals **a stark disparity in unpaid domestic and care work**, highlighting gender-based unequal responsibilities.
- **Marginalized Women:** Socially and economically marginalized women confront amplified challenges, **navigating "marriage penalties" and "motherhood penalties," often forced to temporarily withdraw from the workforce.**

Implications and Recommendations

- The judgment calls for systemic reforms to foster gender equality in the workforce, emphasizing robust childcare provisions and challenging traditional gender roles surrounding care responsibilities.
- **Systemic Reforms:** The imperative lies in fostering gender equality through **robust childcare provisions and support mechanisms to enable women's participation and thrive in the workforce.**
- **Challenging Gender Roles:** There's a pressing **need to challenge traditional gender roles, recognizing care as a collective societal obligation rather than solely the burden of women.**

Constitutional Provisions and Evolution of Childcare Policies

- **The Constitutional Mandate:** The Indian Constitution empowers the state to **enact special provisions for women and children**, laying the foundation for inclusive policies promoting gender equality.
- **Sectoral Labour Laws:** Historical sectoral labour laws **mandated childcare services and paid maternity leaves** for workers in various industries, emphasizing the establishment of crèches on worksites.

Transformation under the Labour Code on Social Protection, 2020

- **Milestone in Evolution:** The **Labour Code on Social Protection, 2020** marked a milestone, transforming childcare policies by

emphasizing care as a shared parental responsibility.

- **Gender-Neutral Entitlement:** Crèches were transformed into a gender-neutral entitlement, reflecting a progressive approach towards addressing gender stereotypes.

Limitations and Challenges

- **Exclusionary Criterion:** The entitlement to childcare facilities is **limited to establishments with 50 or more employees**, excluding many women from informal sectors, highlighting the need for a more inclusive approach.
- **Crèches under Welfare Programmes:** Despite recognition, initiatives like the **National Crèches Scheme remain underfunded and limited**, facing implementation challenges due to resource constraints.
- **Challenges in Implementation:** Despite progressive laws, effective implementation remained a challenge, highlighting the gap between policy intent and implementation.

Initiatives

- **Mission Shakti and the Palna Scheme:** The **Palna Scheme, under Mission Shakti, offers options for establishing crèches**, aiming to expand access to childcare facilities and support working parents.
- **State Initiatives:** States like Haryana, Karnataka, Odisha, and Assam have taken proactive steps, introducing Anganwadi centre-cum-crèches to enhance childcare infrastructure.

Way Forward

- **Need for Institutionalization and Funding:** There's a need to institutionalize initiatives and ensure sustained funding, with a committed budget allocation critical for scaling up childcare services effectively.
- **Collective Responsibility and Gender Equality:** Viewing care as a collective responsibility shared by the state, employers, and communities is crucial, facilitating women's full participation in employment by providing adequate support systems.
- **Economic Implications and Potential:** Research indicates a strong correlation between women's labor force participation and equitable sharing of unpaid care work, with potential significant economic gains, as evidenced by the IMF's predictions.

6.9 SHORT ARTICLES

Challenges and Solutions in India's Labor Market

Context

- India's economic growth positions it as a potential counterweight to China, seen as a key driver of the global economy.

Challenges Ahead

- **Demographic Dividend:** India's young demographic (**median age of 28 years**) presents both opportunities and challenges, with a low dependency ratio.
- **Skill Gap:** India's large labor pool and **annual addition of 10 million new workers** are seen as advantageous, but matching them to productive jobs is a challenge.
- **Complexities of India's Labor Market:** The demographic dividend offers **a short window of opportunity** but also poses significant challenges in job matching.

Current State of the Labour Market

- Signs of failure in labor market functioning, with **high overall unemployment rates (8 percent)** and **particularly high rates among graduates (29 percent)** and those with secondary or higher education (18 percent).

Factors Contributing to Market Constraints

- **Size of Firms:**Indian firms are smaller, limiting their demand for labor.
- **Skill Deficit:** Challenges in finding skilled workers, with the education system criticized for not adequately addressing skill development. Reports like **ASER highlight issues with student learning, affecting the labor market's pool of skilled workers.**

Impact on Hiring Patterns

- **Skill Mismatch:**Difficulty in finding skilled workers leads to reluctance in hiring, especially among graduates and high-school degree holders in the white-collar segment.
- **Clash of Aspirations:** The labor market reflects a clash between entrepreneurial aspirations and available opportunities, with many small firms opting to stay small despite growth potential.
- **Entrepreneurial Landscape:** Limited growth aspirations among entrepreneurs hamper competitiveness, while young workers aspire for meaningful employment opportunities.

Addressing Challenges in India's Labour Market to Unlock Full Potential

- **Harnessing Demographic Dividend**: Improving Education and Skill Development Aligning educational curricula with industry requirements ensures students acquire pertinent skills for employment.
- **Expanding vocational training and apprenticeship programs** offers practical experience and job-specific skills to youth.
- **Encouraging lifelong skill enhancement** aids workers in adapting to evolving job market dynamics.
- **Boosting Firm Growth and Productivity** Providing easier access to credit and financial resources enables SMEs to expand operations and hire more personnel.
- **Encouraging technology adoption and innovation** among firms enhances productivity and competitiveness, fostering job creation and economic advancement.
- **Streamlining business regulations and reducing bureaucratic obstacles** facilitates firm growth and promotes entrepreneurship.
- **Revamping Labour Laws and Job Security** Introducing more flexible labour policies enables firms to tailor their workforce to market needs, fostering job generation and economic resilience.
- **Ensuring equitable and adequate job protections** for workers enhances job satisfaction and stability.

Conclusion

- Prioritizing solutions to address unemployment and underemployment is essential to **leverage India's demographic dividend effectively.**
- Proactive measures are **needed to align labor market opportunities with the aspirations of India's burgeoning workforce**, preventing the demographic dividend from turning into a demographic curse.

Specific Learning Disabilities (SLD)

Context:

- The Union government's forthcoming initiative to introduce a new test for diagnosing specific learning disabilities (SLDs) in adults in India marks a significant step in addressing the challenges faced by individuals with SLDs in obtaining disability certificates.

Specific Learning Disabilities (SLD):

- **Definition:** SLDs encompass **neurodevelopmental disorders hindering comprehension, communication, and calculation abilities, persisting despite intervention efforts.**
- **Symptoms:** Challenges in reading, writing, spelling, and mathematical reasoning, impacting academic performance.
- **Severity:** Ranges from mild to severe, with interventions like Individualized Education Programs and Psychotherapy helping manage symptoms.

Key Stats

- The overall pooled **prevalence of SLD in India is 8%- National Center for Biotechnology Information.**
- Nearly 8% of children up to 19 years have SLD.

Legal Challenges and Certification Requirements:

- **Writ Petition:** Supreme Court highlighted the **absence of diagnostic methods for SLDs in adults,** stressing the necessity for tests to obtain disability certificates.

- **Importance:** Disability certificates essential for accessing benefits under the Rights of Persons with Disabilities Act, 2016.

The Role of NIEPID in Test Development:

- The National Institute for the Empowerment of Persons with Intellectual Disabilities (NIEPID) **tasked with designing the new test, showcasing collaboration between governmental bodies and specialized institutions.**

Implementation Challenges and Stop-Gap Measures:

- **Urgency:** Ministry of Social Justice's notification on revising disability assessment guidelines **underscores the need to address certification processes for SLDs.**
- **Existing Gap:** Current certification requirements focus on children, **leaving adults diagnosed later in life facing challenges in obtaining certification.**

Individual Experiences and Advocacy:

- **Personal Testimonies:** Highlight struggles individuals like N. Sai Balaji face in navigating educational and societal barriers without proper certification.
- **Advocacy:** Stress on certification processes not hindering access to rights and opportunities for persons with disabilities.

National Institute for the Empowerment of Persons with Intellectual Disabilities (NIEPID)

The National Institute for the Empowerment of Persons with Intellectual Disabilities (NIEPID), **established in 1984** under the **Ministry of Social Justice and Empowerment**, serves as a pivotal institution in promoting inclusivity and empowerment. **Headquartered in Secunderabad, Hyderabad, NIEPID** operates with a core mission to empower individuals with mental handicaps.

6.10 SNIPPETS

7. SCIENCE & TECHNOLOGY AND HEALTH

7.1 USSD

Context

- The Department of Telecom (DoT) has issued an official directive to telecom operators regarding the deactivation of USSD-based call forwarding services, effective from April 15.

Details

Background

- USSD (Unstructured Supplementary Service Data) is **widely used by mobile subscribers for various functions, including checking IMEI numbers and mobile balances.**
- Instances of misuse, particularly in the form of unwarranted activities, have been observed with USSD-based call forwarding services, notably the *401# service.

Reasoning and Impact

- The directive is aimed at preventing fraud and online crimes perpetrated through mobile phone services.
- By suspending USSD-based call forwarding, telecom operators can mitigate the risks associated with fraudulent activities, thereby enhancing security for subscribers.

About USSD

- USSD (Unstructured Supplementary Service Data) is a **protocol used by GSM cellular telephones to communicate with the service provider's computers**.
- It is a technology that allows users to interact with various services, such as mobile banking, checking account balance, prepaid mobile recharge, and accessing information, using short codes.
- These short codes initiate a session between the user's phone and the service provider's system.

How USSD Works

- When a user dials a USSD code, a session is established between the user's device and the service provider's system.
- The service provider's system processes the request in real-time and sends back the corresponding response.
- USSD operates on a session-based model, which means it's interactive and stateful, unlike SMS.
- The working of USSD involves a series of steps that facilitate communication between a mobile device and the service provider's system.

Applications of USSD:

- **Mobile Banking**: Users can check balances, transfer funds, pay bills, etc.
- **Telecom Services**: Checking prepaid balance, activating/deactivating services, etc.
- **Information Services**: Accessing weather updates, news, sports scores, etc.
- **Government Services**: Payment of utility bills, accessing government services, etc.

Advantages of USSD:

- **Real-time Interaction**: Responses are immediate as USSD sessions are live.
- **Widespread Accessibility**: USSD works on any GSM-enabled mobile device.
- **No Internet Required**: Unlike mobile apps, USSD works even on basic mobile phones without internet connectivity.
- **Security**: USSD transactions are encrypted, providing a secure channel for sensitive transactions.

Challenges of USSD:

- **Limited Interaction**: USSD menus are typically text-based and have limited interactivity compared to mobile apps or web interfaces.
- **Dependency on Network**: USSD relies on the network's availability, and poor network conditions can affect its usability.
- **User Experience**: Text-based menus might not provide the best user experience, especially for complex transactions.

7.2 HIGGS BOSON

Context

- Noble prize-winning physicist Peter Higgs, responsible for the one the greatest scientific discoveries in the last century, died at the age of 94 .

Details

- The Higgs boson, often referred to as the "God Particle," is a fundamental particle in particle physics that plays a crucial role in our understanding of the origin of mass in the universe.

About the Higgs Boson

- **Theoretical Prediction**: In 1964, British physicist Peter Higgs proposed the existence of the Higgs boson as part of the Higgs mechanism, a theoretical framework to explain how particles acquire mass.
- **Fundamental Force Carrier**: The Higgs boson is a fundamental force-carrying particle that interacts with other particles, giving them mass through the Higgs field.

Discovery:

- **Large Hadron Collider (LHC)**: The search for the Higgs boson was a primary objective of the LHC, the world's largest and most powerful particle accelerator, located at CERN (European Organization for Nuclear Research) in Switzerland.
- **ATLAS and CMS Experiments**: Two main experiments at the LHC, ATLAS and CMS, independently announced the discovery of a new particle consistent with the Higgs boson on July 4, 2012.
- **Confirmation**: Further data analysis confirmed the particle's properties, including its mass and decay modes, matching theoretical predictions for the Higgs boson.
- **Mass Measurement**: The discovered Higgs boson has a mass of approximately 125 billion electron volts (GeV), making it 130 times more massive than a proton.
- **Spin and Charge**: The Higgs boson has a spin of zero and no electric charge, characteristics consistent with theoretical expectations.

Significance:

- **Completing the Standard Model**: The discovery of the Higgs boson completed the Standard Model of particle physics, providing a crucial piece of evidence for its validity.
- **Understanding Mass**: By confirming the Higgs mechanism, scientists gained deeper insights into the origin of mass and the fundamental forces governing the universe.
- **New Physics**: The discovery also opened avenues for exploring beyond the Standard Model physics, such as supersymmetry and dark matter.

Why is it Called the "God Particle"?

- **Origin of the Name**: The term "God Particle" was coined by Nobel laureate physicist Leon Lederman in his book, originally titled the "Goddamn Particle," reflecting the frustration over the particle's elusive nature.
- **Publisher's Decision**: Lederman's publishers changed the title to "The God Particle," which stuck despite its controversial nature.
- **Significance**: The nickname emphasizes the importance of the Higgs boson in providing mass to particles and shaping the structure of the universe.

Controversy:

- **Religious Ire**: The nickname "God Particle" has drawn criticism from religious communities due to its association with divine creation.
- **Scientific Discomfort**: Some scientists, including Peter Higgs himself, have expressed discomfort with the nickname, considering it sensationalist and misleading.

7.3 ZERO ORBITAL DEBRIS

Context

- The Indian Space Research Organisation (ISRO) recently conducted the PSLV-C58/XPoSat mission, which has been highlighted for its innovative approach to minimizing space debris.

Details

- **PSLV-C58/XPoSat Mission**: Conducted by ISRO, this mission aimed to deploy multiple satellites into their designated orbits using the Polar Satellite Launch Vehicle (PSLV).

Minimization of Space Debris

- **PSLV Orbital Experimental Module-3 (POEM-3)**: ISRO transformed the fourth stage of the PSLV into a special orbital station known as POEM-3.
- **Purpose**: POEM-3 served as a platform to test technologies and strategies for reducing space debris.
- **De-orbiting Strategy**: After completing its primary mission of deploying all satellites, the fourth stage was de-orbited from 650 kilometers to 350 kilometers above Earth's surface.
- **Increased Susceptibility**: By lowering its altitude, the stage became more prone to atmospheric drag, hastening its re-entry into Earth's atmosphere.

Passivation of the Stage:

- **Fuel Dumping**: ISRO "passivated the stage" by expelling any remaining fuel, eliminating the risk of explosion.
- **Purpose**: This measure was crucial in preventing the stage from breaking apart and generating additional debris.

Benefits of the Approach:

- **Minimal Debris**: By transforming the fourth stage into POEM-3 and passivating it before de-orbiting, ISRO ensured that virtually no debris remained in Earth's orbit.
- **Reduced Risk to Space Assets**: The removal of debris minimizes the risk of collisions with operational satellites and spacecraft, safeguarding space assets.

Environmental Impact:

- **Atmospheric Re-entry**: The de-orbited stage, now devoid of fuel and other hazardous materials, safely re-enters Earth's atmosphere.
- **Burn-Up**: Upon re-entry, the stage undergoes intense heat and friction, causing it to burn up completely and disintegrate into harmless particles.

About POEM

Purpose and Development:

- **Inexpensive Space Platform**: POEM serves as a cost-effective orbital platform, utilizing the spent fourth stage of a Polar Satellite Launch Vehicle (PSLV) rocket for scientific experiments and technology demonstrations.
- **VSSC Development**: Developed by the Vikram Sarabhai Space Centre, POEM aims to maximize the utility of launch vehicles by repurposing spent stages for in-orbit operations.

Operational History:

- **PSLV-C53 Mission**: POEM was first utilized in the PSLV-C53 mission launched in June 2022, where it served as a stabilized platform for scientific experiments.
- **PSLV C-44 Mission**: ISRO previously demonstrated the reuse of the spent fourth stage in the PSLV C-44 mission in 2019, showcasing the feasibility of repurposing rocket stages for extended operations.

Innovative Approach to Space Debris Mitigation:

- **Minimization of Debris**: POEM-3's controlled re-entry into Earth's atmosphere effectively mitigated the risk of space debris by ensuring the safe disposal of the fourth stage of the PSLV rocket.
- **Technological Innovation**: The utilization of POEM-3 as an experimental platform demonstrates ISRO's commitment to developing innovative solutions for managing space debris/ ensuring sustainable space exploration.

7.4 OZONE ON JUPITER'S MOON

Context

- An international team of scientists, including researchers from India, conducted the study that led to the discovery of ozone on Callisto.

Details

About Ozone

- Ozone is a molecule composed of three oxygen atoms (O3) and is found in two main regions of the Earth's atmosphere: the stratosphere and the troposphere.
- It plays crucial roles in both regions, with significant implications for life on Earth.

Properties of Ozone:

- **Chemical Formula:** O3
- **Molecular Weight:** Approximately 48 g/mol
- **Physical State:** Ozone is a pale blue gas at room temperature with a distinct odor.
- **Solubility:** It is sparingly soluble in water.

About Jupiter

- Jupiter, the largest planet in our solar system, is a gas giant composed mostly of hydrogen and helium.
- It's a fascinating celestial body with unique features, including its massive size, powerful magnetic field, iconic bands of clouds, and swirling storms.

Characteristics of Jupiter:

- **Size and Mass:** Jupiter is the largest planet in the solar system, with a diameter of about 139,822 kilometers (86,881 miles) and a mass approximately 318 times that of Earth. Its volume is over 1,300 times greater than Earth's.
- **Orbit:** Jupiter orbits the Sun at an average distance of about 778 million kilometers (484 million miles), taking approximately 11.86 Earth years to complete one orbit.
- **Rotation:** Jupiter has a rapid rotation period of about 9.9 hours, making it one of the fastest-spinning planets in the solar system.
- **Magnetic Field:** Jupiter possesses an extremely powerful magnetic field, about 14 times stronger than Earth's. This magnetic field generates intense radiation belts, posing a significant hazard to spacecraft.
- **Atmosphere:** Jupiter's atmosphere is predominantly composed of hydrogen (about 75%) and helium (about 24%), with traces of other elements and compounds. It exhibits colorful cloud bands, zones, and belts caused by differential wind speeds and chemical composition.

Composition and Structure:

- **Core:** Jupiter likely has a solid core made of heavy elements, possibly surrounded by a layer of metallic hydrogen under immense pressure.
- **Atmospheric Layers:** The atmosphere consists of several layers, including the troposphere, where most weather phenomena occur, and the stratosphere, mesosphere, and thermosphere, extending outward.
- **Clouds:** Jupiter's clouds are primarily composed of ammonia crystals, sulfur, and other compounds. Prominent features include the Great Red Spot, a massive storm system larger than Earth, and other smaller storms.

Moons:

- **Galilean Moons:** Jupiter has four large moons discovered by Galileo Galilei in 1610: Io, Europa, Ganymede, and Callisto. These moons are some of the most intriguing objects in the solar system, with diverse features such as volcanoes, subsurface oceans, and potential for habitability.
- **Other Moons:** Jupiter has many smaller moons, totaling over 70 known satellites. Some are irregularly shaped captured asteroids or fragments, while others are relatively large and have unique characteristics.

About Moons of Jupiter

- Jupiter, the largest planet in our solar system, boasts a remarkable collection of moons, with over 79 known natural satellites as of current observations.

- Among these, the four largest moons, known as the Galilean moons, were discovered by Galileo Galilei in 1610.
- These moons—Io, Europa, Ganymede, and Callisto—have fascinated astronomers and scientists for centuries due to their diverse geological features, potential for subsurface oceans, and possible habitability.

7.5 SUPERCONDUCTIVITY

Context

- On April 8, 1911, superconductivity was discovered by Dutch physicist Heike Kamerlingh Onnes.

Details

- Superconductivity is a **state in which a material exhibits zero electrical resistance and the expulsion of magnetic flux when cooled below a critical temperature.**
- Heike Kamerlingh Onnes**discovered superconductivity in 1911 in mercury.**

Types of Superconductors

- **Type I Superconductors:**
  - Examples: Mercury, lead, tin.
  - Properties: They have a single critical temperature and are typically pure metals with strong electron-phonon coupling.
  - Behavior: They undergo a sudden transition from normal to superconducting state and exhibit perfect diamagnetism.
- **Type II Superconductors:**
  - Examples: Niobium, yttrium barium copper oxide (YBCO).
  - Properties: They have a complex phase diagram with multiple critical temperatures and exhibit both type I and type II behavior.
  - Behavior: They can support magnetic flux penetration in the form of vortices and exhibit mixed state behavior.

BCS Theory of Superconductivity

- **Bardeen-Cooper-Schrieffer (BCS) Theory:** Proposed in 1957 by John Bardeen, Leon Cooper, and Robert Schrieffer.
- BCS theory explains superconductivity in terms of the formation of Cooper pairs, which are bound pairs of electrons due to electron-phonon interactions.
- At low temperatures, electrons near the Fermi surface form pairs with opposite momentum and spin, leading to a macroscopic quantum state with zero resistance.

Applications of Superconductivity

- **Magnetic Resonance Imaging (MRI):** Superconducting magnets are used to generate strong magnetic fields for medical imaging.
- **Power Transmission:** Superconducting cables can carry electricity with minimal loss, leading to more efficient power transmission over long distances.
- **Quantum Computing:** Some quantum computing architectures utilize superconducting qubits due to their long coherence times and ease of manipulation.
- **Magnetic Levitation (Maglev):** Superconductors are used in magnetic levitation trains for frictionless transportation.
- **Particle Accelerators:** Superconducting materials are used in particle accelerators like the Large Hadron Collider (LHC) to generate powerful magnetic fields for accelerating and steering charged particles.
- **Superconducting Quantum Interference Devices (SQUIDs)**: Sensitive magnetic field detectors used in various scientific and medical applications, including biomagnetic imaging and materials testing.

High-Temperature Superconductors (HTS)

- High-temperature superconductors were discovered in the late 1980s, initially in copper-based compounds like YBCO.
- These materials exhibit superconductivity at significantly higher temperatures compared to traditional superconductors.
- HTS materials have potential applications in power transmission, magnetic levitation, and

medical imaging due to their higher critical temperatures.

Challenges

- **High Temperature Superconductors:** Efforts are ongoing to discover or engineer materials that exhibit superconductivity at higher temperatures, which would make practical applications more feasible.
- **Fabrication Techniques:** Developing cost-effective fabrication techniques for superconducting materials and devices is crucial for widespread adoption.
- **Understanding Unconventional Superconductivity:** Many superconducting materials exhibit unconventional behavior not fully explained by BCS theory, and further research is needed to understand and harness these properties.

7.6 LEAP SECONDS

Context

- Glaciers are melting so fast that we may need to delay adding that 'negative leap second' to keep clocks aligned with Earth's rotation.

Details

- The recent study published in the science journal Nature sheds light on a fascinating aspect of how climate change, particularly the rapid melting of ice sheets in Greenland and Antarctica, is affecting the Earth's rotation and, consequently, our timekeeping systems.

Key takeaways

Impact of Melting Ice Sheets:

- The study highlights how the **accelerated melting of glaciers and ice sheets due to rising global temperatures is leading to the redistribution of weight across the planet.**
- This **redistribution is causing a slight slowdown in the Earth's rotation on its axis, altering the rotation rate that our clocks and calendars are based on.**
- While the study suggests a potential delay in needing the negative leap second, some experts caution that the Earth's rotation is unpredictable.
- Demetrios Matsakis, a former chief scientist for time services at the US Naval Observatory, expresses skepticism about definitively predicting when or if the negative leap second will be necessary.

About Leap Seconds

- Leap seconds are **adjustments made to Coordinated Universal Time (UTC) in order to keep it in sync with the Earth's rotation.**
- These adjustments are **necessary because the Earth's rotation is gradually slowing down due to tidal forces caused by the gravitational interactions with the Moon and other celestial bodies**.

Background

- **Origin**: The concept of leap seconds was introduced in 1972 by the International Telecommunication Union (ITU) and the International Astronomical Union (IAU) to account for discrepancies between atomic time and Earth's rotation.
- **Atomic Time vs. Earth's Rotation**:
  - **Atomic Time**: Based on the International Atomic Time (TAI), which relies on the vibrations of atoms, particularly cesium atoms.
  - **Earth's Rotation**: Determined by astronomical observations, such as the time it takes for the Earth to complete one rotation relative to distant stars (sidereal day).

7.7 CARBON FIBRES

Context

- The Indian government is planning to replace metal with carbon fibre in some key manufactured components, namely in the aerospace, civil engineering and defence sectors. For this, it is considering to start manufacturing carbon fibre in the country.

Details

- **Reducing Import Dependence:** Currently, India imports carbon fiber from countries like the US, France, Japan, and Germany. By establishing domestic manufacturing units, India aims to reduce its dependence on imports and enhance self-reliance in high-tech industries.

About Carbon Fibers

- Carbon fibers are advanced materials characterized by their exceptional strength, stiffness, and low weight.
- Composed primarily of carbon atoms, these fibers exhibit unique properties due to their crystalline structure and high carbon content.

Properties of Carbon Fibers:

- **High Strength-to-Weight Ratio:** Carbon fibers exhibit tensile strengths exceeding those of steel while being significantly lighter.
- **High Modulus of Elasticity:** These fibers possess stiffness comparable to or greater than that of metals like aluminum and steel.
- **Low Thermal Expansion:** Carbon fibers demonstrate minimal expansion or contraction under temperature variations, making them suitable for high-temperature applications.
- **Chemical Inertness:** They are resistant to corrosion and chemical degradation, enhancing their durability in harsh environments.
- **Electrical Conductivity:** While inherently electrically conductive, carbon fibers can be modified to exhibit semiconducting or insulating properties.

Types of Carbon Fibers:

- **Standard Modulus Carbon Fibers:** Offer a balance of strength and stiffness, commonly used in aerospace, automotive, and sporting goods industries.
- **High Modulus Carbon Fibers:** Possess superior stiffness and are utilized in aerospace, military, and structural engineering applications.
- **Intermediate Modulus Carbon Fibers:** Provide a compromise between standard and high modulus fibers, finding applications in sporting equipment and industrial components.
- **Ultra-High Modulus Carbon Fibers:** Characterized by exceptionally high stiffness, these fibers are employed in specialized aerospace and defense applications.

Applications of Carbon Fibers:

- **Aerospace and Aviation:** Used extensively in aircraft components, including fuselages, wings, and structural reinforcements, due to their lightweight and high strength.
- **Automotive Industry:** Employed in automotive bodies, chassis components, and brake systems to reduce vehicle weight and improve fuel efficiency.
- **Sporting Goods:** Widely utilized in bicycles, tennis rackets, golf clubs, and other sports equipment to enhance performance and durability.
- **Renewable Energy:** Utilized in wind turbine blades and solar panel structures to increase energy efficiency and reliability.
- **Marine Industry:** Applied in boat hulls, masts, and rigging to reduce weight and improve buoyancy and stability.

7.8 TECHNOLOGY BEHIND MANUFACTURING A SEMICONDUCTOR CHIP

Context

- Semiconductor chip manufacturing capabilities are currently limited to very few regions in the world.
- The TATA group has partnered with Taiwan's Powerchip Semiconductor Manufacturing Corporation (PSMC) to set-up a 300mm wafer fabrication plant in Gujarat.
- It will roll out its first 28nm chip in 2026.
- Two assembly and test plants in Gujarat and Assam have also been recently approved by the Government of India.

Details

Semiconductor Material Preparation

- **Silicon Wafer Production:**
  - Silicon ingots are grown using methods like the Czochralski or Float-Zone process, ensuring high purity.
  - The ingots are then sliced into thin, circular discs known as silicon wafers, typically several inches in diameter.
- **Slicing:**
  - Precision sawing or slicing techniques are employed to cut the silicon ingots into wafers of uniform thickness.
  - The surfaces of the wafers are polished to achieve smoothness, critical for subsequent processing steps.

Semiconductor Fabrication (Fabrication Technology)

- **Photolithography:**
  - Photolithography involves using masks containing circuit patterns and exposing them to UV light through a photoresist-coated wafer.
  - The exposed areas of the photoresist become soluble and are removed, leaving behind the desired circuit pattern on the wafer.
- **Doping:**
  - Dopants, such as phosphorus or boron, are introduced into specific regions of the silicon wafer to modify its electrical properties.
  - Techniques like ion implantation or diffusion are used to precisely control the dopant concentration and distribution.
- **Layer Deposition:**
  - Insulating (e.g., silicon dioxide) and conducting (e.g., polysilicon, metal) materials are deposited onto the wafer's surface using methods like chemical vapor deposition (CVD) or physical vapor deposition (PVD).
  - These layers form the building blocks for creating transistors, interconnects, and other electronic components.

Wafer Dicing and Chip Packaging

- **Dicing:**
  - After the fabrication process, the wafer is diced into individual chips using diamond saws or laser cutting techniques.
  - Each chip contains multiple copies of the integrated circuit pattern created during fabrication.
- **Packaging:**
  - Individual chips are mounted onto lead frames or substrates and encapsulated in protective materials such as epoxy resin or ceramic.
  - Bond wires or flip-chip connections are used to establish electrical connections between the chip and the package leads.
- **Testing:**
  - Packaged chips undergo rigorous testing to ensure functionality and reliability.
  - Functional testing verifies that the chip performs its intended operations, while stress testing assesses its performance under extreme conditions such as temperature and voltage variations.

Role of the Transistor in Semiconductor Revolution

- **Replacement of Vacuum Tubes:** Transistors replaced bulky and power-hungry vacuum tubes in electronic devices, leading to smaller, more efficient circuits.
- **Fundamental Building Blocks:** Transistors serve as the basic building blocks of

integrated circuits, enabling the creation of complex digital and analog functions.

- **Versatility:** Transistors can function as switches, amplifiers, or voltage regulators, making them essential components in virtually all electronic devices.

7.9 EXPANSION OF THE UNIVERSE

Context

- The expansion rate of the universe, often referred to as the Hubble constant (H_0), has been a subject of intense study and debate in cosmology.
- Two primary methods have been used to measure this constant, leading to different estimates and creating what's known as the Hubble tension.

Details

Background

- **Hubble Tension**:
  - The Hubble tension arises from two equally valid methods of measuring the expansion rate of the universe, both yielding significantly different results.
  - Despite repeated measurements and refinements in calculations, the tension persists, indicating a real discrepancy rather than a flaw in the data.
- **Lambda Cold Dark Matter Model**:
  - The model is currently the standard cosmological model used to explain various features of the universe, including its expansion.
  - However, the Hubble tension suggests that the model may be incomplete or incorrect in some aspects, prompting cosmologists to search for alternative models.

Types of Universes

- The universe can have different geometric shapes based on its curvature: open, closed, or flat.
- An open universe continues expanding indefinitely, a closed universe eventually collapses due to gravitational forces, and a flat universe maintains a constant expansion rate over time.

Observational Techniques

- Cosmologists use two main methods to measure the expansion rate:
  - **Cosmic Microwave Background (CMB):** Studies of the CMB, the afterglow of the Big Bang, provide one estimate of the expansion rate.
  - **Cosmic Distance Ladder:** This method involves measuring the distances to celestial objects, such as Cepheid variable stars, to estimate the expansion rate.
- **Measurements and Estimates**:
  - Studies based on the CMB suggest an expansion rate of around 68 kilometers per second per megaparsec ((km/s)/Mpc).
  - Measurements using the cosmic distance ladder, particularly Cepheid variable stars, yield a higher estimate of around 73 (km/s)/Mpc.

Recent Findings

- Researchers have utilized advanced telescopes like the James Webb Space Telescope (JWST) to study Cepheid variable stars and validate previous measurements.
- Studies comparing data from the Hubble Space Telescope and JWST found no significant difference in estimates of the stars' distances, reinforcing the reality of the Hubble tension.

About Cosmic Expansion

- **The concept of the universe expanding** was first proposed by Belgian astronomer Georges Lemaître in the 1920s and later supported by Edwin Hubble's observations.
- **The expansion of the universe** refers to the increasing distance between galaxies over time, leading to the stretching of space itself.

Evidence for Cosmic Expansion:

- **Hubble's Law:** The observation that galaxies are receding from us, with their redshift

proportional to their distance, indicates universal expansion.

- **Cosmic Microwave Background (CMB):** An echo of the Big Bang, the CMB radiation is uniformly distributed and provides evidence of the universe's early hot and dense state.
- **Large-Scale Structure:** Observations of the distribution of galaxies and galaxy clusters show a web-like structure, consistent with an expanding universe.

The Fate of the Universe:

- **Critical Density:** The balance between the expansion rate and gravitational pull determines whether the universe will expand forever or eventually collapse.
- **Open, Closed, and Flat Universes:** Depending on the density of matter and energy, the universe could be open (expanding forever), closed (eventually collapsing), or flat (balancing expansion and gravity).
- **Current Understanding:** Current observations suggest a flat universe dominated by dark energy, leading to an accelerated expansion.

7.10 HYDROCARBONS EXTRACTION

Context

- Over millennia, geological processes have heated and compressed organic matter within the Earth's crust, forming hydrocarbons.
- These hydrocarbons accumulate in subterranean rock formations, primarily as natural gas, coal, crude oil, and petroleum.

Details

Location of Hydrocarbons

- Hydrocarbons are typically found in underground reservoirs, formed when impermeable cap rocks overlay porous rock formations, preventing the hydrocarbons from migrating to the surface.

Sources:

- **Natural Gas, Coal, Crude Oil, and Petroleum:** Common forms of hydrocarbons found in underground reservoirs.
- **Kerogen:** Primary source of hydrocarbons, originating from organic matter. Three main sources:
  - Lacustrine (lake)
  - Marine
  - Terrestrial
- Different types of kerogen yield varying hydrocarbon compositions:
  - Lacustrine: Waxy oils
  - Marine: Oil and gas
  - Terrestrial: Light oils, gas, and coal

Petroleum Geology and Exploration

- **Tools and Techniques:** Petroleum geologists use various methods to assess underground rock formations, including analyzing porosity and permeability.
- **Source Rock:** The rock containing kerogen is called the source rock. Petroleum geologists study its characteristics to evaluate its hydrocarbon-producing potential.
- **Exploration Activities:** Petroleum geologists conduct modeling based on observational data and undertake exploration drilling to estimate the quantity and quality of hydrocarbons present.

Accessing Hydrocarbons

- **Creating Production Wells:**
  - Drilling and reservoir engineers create production wells strategically located to maximize drainage from the reservoir.
  - Drilling machines are used to create the well, consisting of drill pipe, drill collars, and a drill bit.
- **Casing and Cementing:**
  - Steel casings narrower than the hole are lowered into the well and surrounded by cement slurry to protect against cave-ins and prevent fluid intrusion.
  - Drilling fluid, circulated around the drill bit, aids in cooling and removing rock cuttings.
- **Blowout Prevention:** Mechanical valves called blowout preventers are used to control the

pressure of the drilling fluid and prevent hydrocarbons from erupting to the surface uncontrollably.

- **Mud-Logging:** The process of recording rock cuttings by depth and studying their properties helps in assessing the geological formations encountered during drilling.
- **Drilling Operations:** Drilling rigs, equipped with generators and batteries, facilitate the drilling process, including extending the length of the drill pipe as needed.

Extracting Hydrocarbons

- **Completion Stage:** Once the production well is drilled, the completion stage involves removing the drill string and perforating the casing to allow hydrocarbons to flow into the well.
- **Production Stage:**
  - Valves at the wellhead control the outflow of hydrocarbons. Pump jacks may be used to lift hydrocarbons from wells with low pressure differentials.
  - Workovers may be performed to optimize production from existing wells.
- **Production Phases:**
  - **Primary Phase:** Relies on natural processes such as pressure differentials.
  - **Secondary Phase:** Involves artificial interventions to maintain pressure differentials, such as water injection.
  - **Tertiary Phase:** Uses enhanced recovery methods like steam injection to extract remaining hydrocarbons.

Depletion and Decommissioning

- **Well Depletion:** Extraction rates determine when a well may be considered depleted, based on economic viability.
- **Well Plugging:** Abandoned wells are plugged to prevent hydrocarbon and gas leaks into the surroundings, either temporarily or permanently.
- **Decommissioning:**
  - Decommissioning involves permanently sealing a well, often due to economic or environmental considerations.
  - Improperly abandoned wells can contribute to methane emissions and environmental pollution.

Environmental Impact

- Improperly abandoned wells and methane emissions during extraction and production contribute to environmental pollution and climate change.
- Mitigating these impacts requires proper well management, decommissioning practices, and transitioning to cleaner energy sources.

7.11 PRIMARY PLASTIC POLYMERS

Context

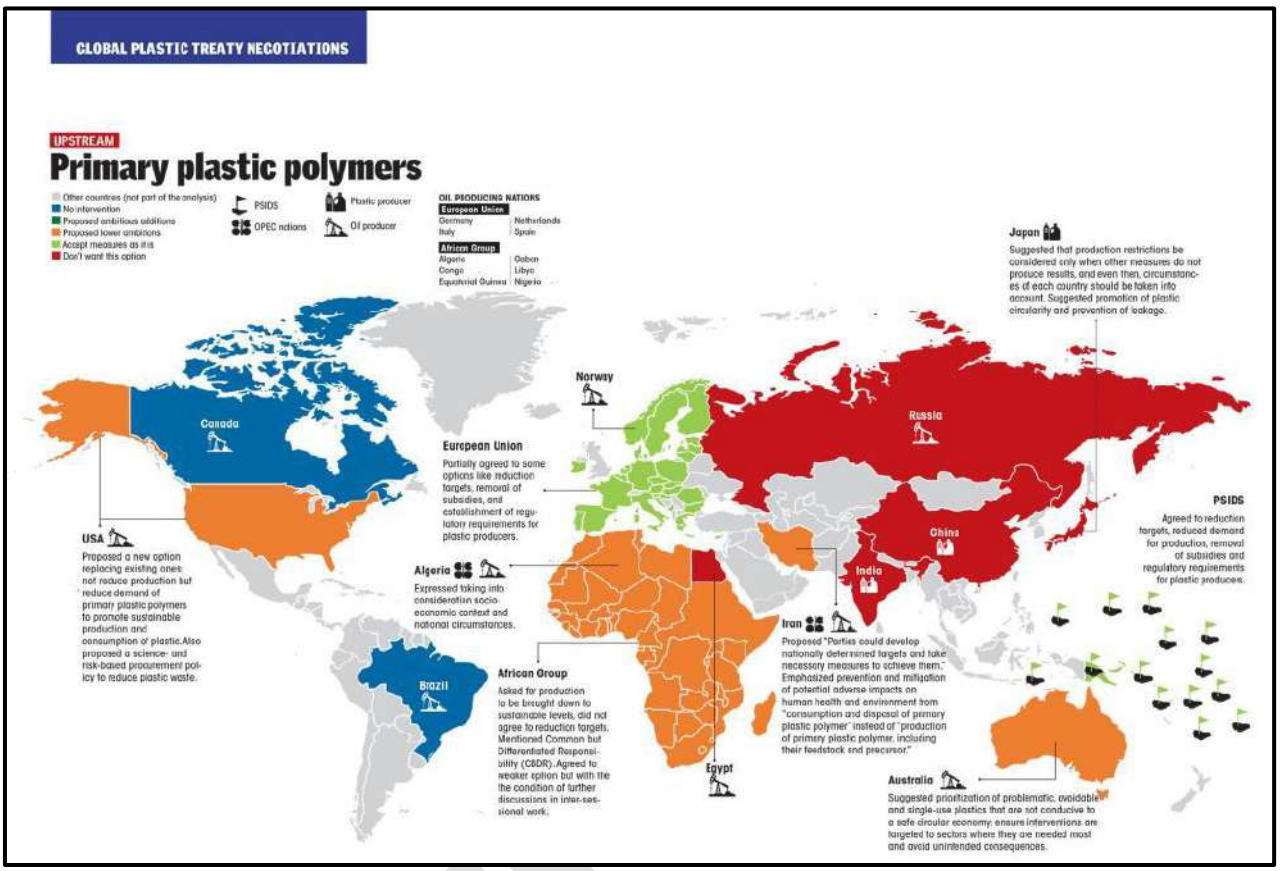
- In the context of the ongoing negotiations within the United Nations Environment Assembly (UNEA) to end plastic pollution, the term **"primary plastic polymers" refers to the types of plastic resins or polymers that are commonly used in the production of plastic products.**
- These primary polymers represent the foundational building blocks of most plastic items found in everyday use.

Importance of Negotiations within UNEA:

- **Targeted Measures**: Negotiations focus on identifying primary polymers that contribute significantly to plastic pollution, enabling targeted regulatory measures.
- **International Cooperation**: By engaging in negotiations, countries collaborate to develop global strategies and agreements to tackle plastic pollution effectively.
- **Policy Alignment**: Negotiations help align national policies and regulations with international goals and commitments, fostering consistency and coherence in addressing plastic pollution.
- **Capacity Building**: Participation in negotiations provides opportunities for capacity building and sharing of best practices among countries, particularly those with limited resources or expertise.

Details

Global Plastic Profiles: Regulation of Primary Polymers



About Primary Plastic Polymers

- Polymers are large molecules made up of repeating structural units, known as monomers.
- These molecules are formed through a process called polymerization, where monomers bond together to form long chains or networks.
- Primary plastic polymers are a subset of polymers that are widely used in various industries due to their versatile properties.

Classification of Primary Plastic Polymers:

Primary plastic polymers can be classified based on their chemical structure and properties. The main types include:

- **Thermoplastics**:
  - These polymers can be melted and reshaped multiple times without undergoing any significant chemical change.
  - Examples include polyethylene (PE), polypropylene (PP), polyvinyl chloride (PVC), and polystyrene (PS).
- **Thermosets**:
  - These polymers undergo irreversible chemical reactions during curing, forming a rigid three-dimensional network.
  - Once cured, thermosets cannot be melted or reshaped.
  - Examples include epoxy resins, phenolic resins, and polyester resins.
- **Elastomers**:
  - These polymers exhibit elastic properties, returning to their original shape after being stretched.

- Examples include natural rubber, synthetic rubber (e.g., styrene-butadiene rubber, neoprene), and silicone rubber.

7.12 METHANOL

Context

- Health officials in the United States have recalled several lots of hand sanitisers and aloe gels over the risk of methanol exposure.

Details

- The Food and Drug Administration recently announced that 40 lots of Aruba Aloe Hand Sanitizer Gel Alcohol 80% and Aruba Aloe Alcoholada Gel were recalled as they contain "alcohol denatured with methanol."
- The FDA said in a notice that methanol can be highly toxic.

What is Methanol?

- Methanol, also known as methyl alcohol or wood alcohol, is a simple chemical compound with the formula CH_3OH.
- It is the simplest alcohol, consisting of a methyl group ($-CH_3$) linked to a hydroxyl group (-OH).
- Methanol is a colorless, volatile, flammable liquid with a characteristic odor.
- It is miscible with water and many organic solvents.
- Methanol can be produced naturally in small quantities through the anaerobic metabolism of certain bacteria, as well as in the decomposition of organic matter.
- The primary method for commercial methanol production is through the catalytic conversion of carbon monoxide and hydrogen, known as the synthesis gas or syngas process.

Properties of Methanol:

- **Physical Properties**: Methanol is a polar liquid at room temperature, with a boiling point of 64.7°C and a melting point of -97.6°C.
- **Chemical Properties**: It is a primary alcohol, undergoing typical alcohol reactions such as oxidation to form formaldehyde and further oxidation to form formic acid.

Uses of Methanol:

- **Fuel**: Methanol is used as a fuel or fuel additive, particularly in racing cars, where it is known as "methanol fuel" or "racing fuel." It is also being explored as a potential alternative fuel for internal combustion engines and fuel cells.
- **Chemical Synthesis**: Methanol serves as a key building block in the synthesis of numerous chemicals, including formaldehyde, acetic acid, methyl tert-butyl ether (MTBE), and dimethyl ether (DME).
- **Solvent**: Due to its polar nature, methanol is used as a solvent in various industrial processes, such as in the production of resins, paints, and pharmaceuticals.
- **Antifreeze**: Methanol is sometimes used as an antifreeze in windshield washer fluid and automotive cooling systems, although its use is declining due to safety concerns.
- **Biodiesel Production**: Methanol is employed in the transesterification process to produce biodiesel from vegetable oils or animal fats.
- such as biomass or carbon dioxide captured from industrial processes or the atmosphere, to reduce its environmental impact.

7.13 BIOMARKERS

Context

- A new AI-powered test could one day be used to accurately and quickly detect three major types of cancer using only a single spot of dried blood.

Details

- The new tool uses machine learning, a type of artificial intelligence (AI), to analyze by-products of metabolism, or metabolites, in blood samples.
- **These metabolites — which are found in the liquid portion of blood known as serum — act as "biomarkers" that can potentially flag cancer's presence in the body**

Key Findings

- **Test Accuracy:** The preliminary experiments indicate that the test can distinguish between patients with pancreatic, gastric, or colorectal cancer and those without cancer with high accuracy, around 82% to 100% of the time.
- **Speed and Efficiency:** The analysis using this new tool takes only minutes, providing rapid results compared to traditional diagnostic methods.
- **Minimal Blood Requirement:** The test requires less than 0.05 milliliters of dried blood, making it minimally invasive and potentially easier to administer than traditional blood tests.

Potential Impact

- **Early Detection:** Screening for blood biomarkers offers the potential for earlier cancer diagnosis, improving survival rates, especially for cancers like pancreatic, colorectal, and gastric, which currently lack standalone blood tests.
- **Global Access:** The use of dried blood samples could democratize cancer screening by improving access to testing, particularly in remote or resource-limited areas.
- **Reducing Undiagnosed Cases:** The test could significantly reduce the proportion of undiagnosed cases of these cancers if implemented in large-scale screening programs.

About Biomarkers

- Biomarkers are **measurable indicators of biological processes, conditions, or responses to interventions.**
- They can be molecular, biochemical, physiological, or imaging-based characteristics that can be objectively measured and evaluated.

Types of Biomarkers:

- **Genetic Biomarkers:** These biomarkers involve variations in an individual's DNA sequence and can indicate susceptibility to certain diseases or predict treatment response.
- **Protein Biomarkers:** Proteins such as enzymes, hormones, or antibodies can serve as biomarkers, reflecting various physiological states or disease conditions.
- **Metabolic Biomarkers:** These biomarkers represent the products of metabolic processes and can indicate the presence or progression of diseases like diabetes or metabolic syndrome.
- **Imaging Biomarkers:** Imaging techniques like MRI, CT scans, or PET scans can reveal structural or functional changes in tissues or organs, serving as biomarkers for disease diagnosis or monitoring.
- **Epigenetic Biomarkers:** Changes in gene expression patterns due to modifications in DNA or histone proteins can serve as epigenetic biomarkers, offering insights into disease mechanisms or environmental exposures.

7.14 GPS SPOOFING

Context

- India's past military operations may have been hindered by the United States (US) using a technique similar to the one reportedly used by Israel to confuse Iran's missile targeting teams by jamming Global Positioning System (GPS) navigation signals in the days leading up to Tehran's overnight attack.

Details

GPS Spoofing in Military Conflicts

Israel's Actions Against Iran:

- Israel reportedly jammed GPS navigation signals within its territory to confuse Iran's missile targeting teams ahead of a direct attack on Israel.
- This tactic aimed to disrupt the accuracy of Iranian missiles and drones by providing false location information.

US Actions in the Kargil War:

- During the Kargil War between India and Pakistan in 1999, the US denied GPS data to India, hindering its military operations.
- **The US used a technology called "selective availability" to intentionally degrade GPS accuracy for civilian receivers, while retaining better accuracy for military use.**
- This action negatively impacted India's military operations during the conflict.

Implications

Development of Independent Navigation Systems:

- Adverse experiences with GPS denial or manipulation prompted countries like India to develop their own navigation systems.
- India's NavIC (Navigation with Indian Constellation) provides precise positioning, navigation, and timing services within India and its surrounding regions, reducing dependence on foreign systems.

Military Preparedness and Resilience:

- Nations are increasingly aware of the vulnerability of GPS-dependent systems to spoofing and jamming.
- They are investing in technologies and strategies to detect and mitigate such attacks, including the development of alternative navigation systems and anti-spoofing technologies.

Geopolitical Dynamics:

- The use of GPS spoofing and denial tactics underscores the complex geopolitical dynamics and strategic interests involved in military conflicts.
- Control over navigation systems can significantly impact the outcome of battles and shape regional power dynamics.

About GPS Spoofing

- GPS spoofing refers to the **manipulation of GPS signals to deceive GPS receivers, making them believe they are at a different location than they actually are.**

How GPS Works:

- GPS relies on signals from satellites orbiting the Earth. These satellites continuously broadcast signals containing their location and the precise time.
- GPS receivers on the ground calculate their position by triangulating signals from multiple satellites.
- GPS receivers typically achieve accuracy within a few meters under normal conditions.

Types of GPS Spoofing:

- **Signal Jamming**: Interference with GPS signals to disrupt reception, causing receivers to lose accuracy or fail altogether.
- **Signal Manipulation**: Altering GPS signals to provide false location information to receivers.
- **Replay Attacks**: Recording genuine GPS signals and replaying them later to deceive receivers.
- **Meaconing**: Broadcasting counterfeit GPS signals to mimic legitimate ones, leading receivers to calculate incorrect positions.

7.15 PINK HYDROGEN

Context

- India is in talks with large domestic companies to invest in the regulated nuclear sector, including promoting clean power.

Details

Current Regulatory Landscape

- The Atomic Energy Act, 1962, **restricts private ownership of nuclear plants, with the central government holding significant control over the production, development, use, and disposal of atomic energy.**
- The Nuclear Power Corporation of India (NPCIL) is allowed to form joint ventures with

other public sector units for project funding, but private and foreign companies face limitations in participating directly in nuclear projects.

Potential for Private Sector Participation

- While private companies cannot own nuclear plants, they **can contribute to related activities such as supplying components and reactors, providing financing, and participating in project development**.
- Private companies may also earn returns on investment through the sale of electricity generated by nuclear plants, while NPCIL may retain operational and maintenance fees.

About Pink Hydrogen

- Pink hydrogen, **also known as purple hydrogen or red hydrogen, is produced through the electrolysis of water using electricity generated from nuclear energy sources.**
- **Nuclear-Powered Electrolysis:** This variant of hydrogen production utilizes nuclear power plants to provide the electricity needed for electrolysis, resulting in hydrogen production with zero greenhouse gas emissions.

Advantages of Nuclear-Powered Pink Hydrogen:

- Pink hydrogen, generated through electrolysis powered by nuclear energy, benefits from **the steady baseload profile of nuclear power, enabling high capacity factors compared to intermittent renewable sources**.
- While pink hydrogen production may be expensive, the **potential for large-scale production and the utilization of high temperatures from nuclear reactors** in other industrial processes make it a promising option.
- **High Temperatures for Efficient Electrolysis:** The high temperatures generated by nuclear reactors can be utilized to produce steam, which can enhance the efficiency of electrolysis processes or be used in steam methane reforming, thereby increasing the overall efficiency of hydrogen production.

Applications of Pink Hydrogen:

- **Industrial Sectors:** Pink hydrogen is a promising replacement for fossil fuels in various industrial sectors, including cement and steel production, where it can serve as both a feedstock and energy source without emitting greenhouse gases.
- **Transportation:** Pink hydrogen can also be used as a clean fuel in aviation and heavy transportation, offering a sustainable alternative to conventional fossil fuels and reducing emissions.

Challenges:

- **Safety:** While nuclear-powered pink hydrogen production offers numerous benefits, safety considerations regarding nuclear energy and hydrogen storage and transportation must be addressed.
- **Public Perception:** Public perception and acceptance of nuclear power and hydrogen technologies may influence the widespread adoption of pink hydrogen.

7.16 NETWORK AS A SERVICE (NaaS)

Context

- The proliferation of India's internet economy has given rise to a myriad of digital services, transforming the way businesses operate and individuals engage with technology.
- As the digital landscape continues to evolve, the adoption of innovative solutions becomes imperative to meet the growing demands of users and businesses alike.
- Network as a Service (NaaS) emerges as a transformative approach, promising to revolutionize the way networks are provisioned, managed, and utilized in the era of hyper-connectivity.

About NaaS

- Network as a Service (NaaS) is a **cloud-based service model that provides networking capabilities to users on a subscription basis**.
- NaaS**enables organizations to access and utilize network resources and infrastructure without the need to own, manage, or maintain physical networking hardware and equipment**.

- Instead, networking services are delivered over the internet or through a dedicated network infrastructure, allowing for greater flexibility, scalability, and cost-effectiveness.

Components of NaaS:

- **Virtualized Network Infrastructure:**NaaS leverages virtualization technologies to abstract and pool network resources, including switches, routers, firewalls, and other network devices.
- **Software-Defined Networking (SDN):** SDN plays a key role in NaaS by separating the control plane from the data plane and centralizing network management through software-based controllers. This enables automated provisioning, configuration, and orchestration of network services, improving agility and reducing manual intervention.
- **Network Functions Virtualization (NFV):** NFV virtualizes network functions traditionally performed by dedicated hardware appliances, such as firewalls, load balancers, and intrusion detection systems. By running these functions as software instances on standard servers, NFV enhances flexibility, scalability, and resource utilization.
- **Connectivity Services:**NaaS provides various connectivity services, including wide area network (WAN) connectivity, virtual private networking (VPN), software-defined WAN (SD-WAN), and internet access. These services enable organizations to establish secure and reliable network connections between geographically distributed locations, remote users, and cloud resources.
- **Security Services:**NaaS offers security features and services to protect network traffic, data, and assets from unauthorized access, malware, and cyber threats. These may include firewall-as-a-service (FWaaS), intrusion detection and prevention systems (IDPS), secure web gateways (SWG), and threat intelligence services.
- **Quality of Service (QoS) and Performance Management:**NaaS includes capabilities for monitoring and optimizing network performance, bandwidth allocation, and Quality of Service (QoS) parameters. This ensures that critical applications receive sufficient network resources and prioritization based on their requirements.

Benefits of NaaS:

- **Scalability:**NaaS enables organizations to scale network resources up or down dynamically in response to changing business requirements, without the need for significant upfront investment in hardware.
- **Flexibility and Agility:**NaaS provides greater flexibility and agility in deploying and managing network services, allowing organizations to adapt quickly to evolving technology trends and market demands.
- **Cost Efficiency:** By shifting from a capital expenditure (CapEx) model to an operational expenditure (OpEx) model, NaaS offers cost savings through pay-as-you-go pricing, resource optimization, and reduced maintenance overhead.
- **Simplified Management:** Centralized management and automation capabilities streamline network operations, reducing complexity, human error, and the need for manual configuration and troubleshooting.
- **Improved Security:**NaaS offers built-in security features and services to protect against cyber threats, ensuring compliance with regulatory requirements and safeguarding sensitive data and assets.
- **Enhanced Performance:** With QoS and performance management capabilities, NaaS helps optimize network performance, minimize latency, and ensure reliable connectivity for critical applications and services.

Uses:

- **Enhanced User Experience:** In an era of hyper-connectivity, NaaS promises to deliver seamless and reliable network connectivity, ensuring high-speed data transmission and low-latency communication.
- **Industry Applications:** Industries such as banking, financial services, insurance (BFSI), media, gaming, fintech, and e-commerce stand to benefit from NaaS solutions, which offer secure, high-performance networking

infrastructure to support their digital operations.

- **Frictionless Browsing Experience:** NaaS platforms deliver enhanced network performance, delighting consumers with a frictionless browsing experience while ensuring robust security measures to safeguard sensitive data.

Challenges:

- The **inertia to change** from legacy solutions may hinder the adoption of NaaS among enterprises. However, the promise of improved user experience and operational efficiency can incentivize migration to NaaS.
- While NaaS offers robust security features, enterprises may have **concerns about data privacy and network security.**

The Promise of NaaS:

- The NaaS market in India is projected to expand at a CAGR of 35.6% from $1.18 billion in 2024 to $7.32 billion by 2029, driven by increasing demand for secure, reliable, and high-speed network infrastructure.

7.17 SHORT ARTICLES

Dark Energy

Context

- The recent release of a comprehensive three-dimensional map of the universe by an international team of researchers, including a prominent Indian team led by Shadab Alam at the Tata Institute of Fundamental Research in Mumbai, marks a significant milestone in cosmological research.

Details

- This map, derived from the first year of observations by the Dark Energy Spectroscopic Instrument (DESI), offers insights into the spatial distribution of galaxies and holds promise in unraveling the mysteries of dark energy.

Overview of DESI

- DESI, **mounted over the Mayall 4-Meter Telescope in Arizona**, United States, is a **unique instrument capable of capturing light from 5,000 galaxies simultaneously.**
- Utilizing DESI, researchers have measured light from six million galaxies, spanning distances of up to 11 billion years ago, to construct the most detailed map of the universe to date.
- This comprehensive map provides precise information about the distances between galaxies, enabling scientists to calculate the expansion rate of the universe and explore the elusive nature of dark energy.

Understanding Dark Energy

- Dark energy, **a mysterious force believed to constitute nearly 70% of the universe**, has perplexed scientists for decades.
- The hypothesis of dark energy **arises from the observed phenomenon of the universe expanding at an accelerating pace, contrary to the gravitational forces that tend to pull celestial objects together.**
- Despite extensive research efforts, the **nature and properties of dark energy remain elusive**, prompting scientists to explore new avenues for understanding its fundamental characteristics.

Insights from DESI

- The DESI collaboration's measurement of the expansion rate of the universe, increasing by 68.5 km per second after every 3.26 million light years of distance, represents a significant scientific milestone.
- By accurately determining the distances between galaxies, **DESI provides valuable insights into the behavior of dark energy and its impact on the cosmic expansion.**
- While the data from DESI has generated excitement among scientists, further analysis and observation are needed to unlock the full potential of this groundbreaking research.

Kalam-250

Context

- The successful test firing of Stage-2, named Kalam-250, of the Vikram-1 space launch

vehicle by Skyroot Aerospace represents a significant milestone in India's space industry.

Details

- Kalam-250 is a **high-strength carbon composite rocket motor utilizing solid fuel.**
- It incorporates a high-performance Ethylene-Propylene-Diene terpolymers (EPDM) Thermal Protection System (TPS).
- The stage-2 features a carbon ablative flex nozzle and high-precision electro-mechanical actuators for thrust vector control, ensuring precise trajectory adjustments.
- The solid propellant for Kalam-250 was processed by Solar Industries at their Nagpur facility.

Importance of Stage-2

- Stage-2 plays a **critical role in the ascent of the launch vehicle, propelling it from the atmospheric phase to the deep vacuum of outer space.**
- It is a pivotal component in achieving the desired trajectory for the launch vehicle.

Vikram family

- The Vikram family **comprises small-lift launch vehicles aimed at providing access to space for various payloads.**
- The series includes Vikram I, II, and III, with differing payload capacities and capabilities.
- The inaugural mission, Prarambh, involved a suborbital flight designated "Vikram-S" and was conducted on 18 November 2022.

Vikram I:

- Vikram I, the **first rocket in the series, features three solid-fuel-powered stages and a final stage equipped with Raman engines.**
- The Raman engines, powered by MMH and NTO liquid fuels, are utilized for final orbit adjustments.
- Vikram I is designed to lift payloads of up to 290 kg to a 500 km Sun synchronous polar orbit (SSPO) or 480 kg to a 500 km low Earth orbit (LEO) with a 45° inclination.

Punnett Square

Context

- The Punnett square is a graphical tool used to predict the possible genetic outcomes of offspring when two individuals with known genotypes are crossed.
- Named after British geneticist Reginald Punnett, who developed the concept in the early 20th century.

Details

Purpose

- **Predictive Tool:** Helps predict the variations and probabilities of traits in offspring resulting from genetic crosses.
- **Visual Representation:** Provides a visual representation of possible combinations of alleles from parental genotypes.

Basic Concepts

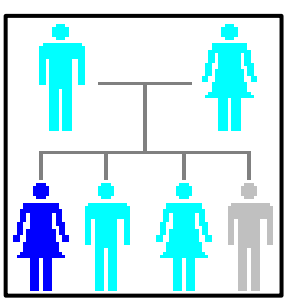
- **Alleles:** Different forms of a gene.
- **Genotype:** The genetic makeup of an individual, represented by letters (alleles).
- **Phenotype:** The physical characteristics resulting from the genotype.
- **Homozygous:** When an individual has two identical alleles for a particular gene.
- **Heterozygous:** When an individual has two different alleles for a particular gene.

Construction of Punnett Square

- **Grid Structure:** Typically, a 2x2 grid is used, representing the possible combinations of alleles from each parent.
- **Allele Representation:** Dominant alleles are usually represented by uppercase letters, and recessive alleles by lowercase letters.
- **Parental Genotypes:** Alleles from one parent are listed along the top row, and alleles from the other parent along the left column.
- **Filling in Squares:** Each square is filled with the combination of alleles from the corresponding row and column.

Example:

	A	a
A	AA	Aa
a	Aa	aa



If both parents are carriers of the recessive allele for a disorder, all of their children will face the following odds of inheriting it: 25% chance of having the

recessive disorder, 50% chance of being a healthy carrier and 25% chance of being healthy and not have the recessive allele at all.

Platelets

Context

- Platelet transfusions are vital in managing severe bleeding, surgical procedures, and chemotherapy. However, challenges such as limited supply, short shelf life, and compatibility issues persist.
- Researchers at North Carolina State University and the University of North Carolina at Chapel Hill have developed synthetic platelets to address these challenges, aiming to enhance hemostasis and tissue healing.

Details

About Synthetic Platelets

- Synthetic platelets are **hydrogel nanoparticles mimicking human platelets in size, shape, and mechanical properties, offering versatility in clinical use.**
- Engineered with antibody fragments targeting fibrin, synthetic platelets facilitate clot formation and contraction, expediting the healing process.

About Platelets

- Platelets, **also known as thrombocytes, are small, disc-shaped blood cells essential for hemostasis**—the process of preventing and stopping bleeding.
- Despite their size, platelets play crucial roles in various physiological processes beyond hemostasis, making them indispensable components of the circulatory system.

NASA's Europa Clipper

Context

- The Europa Clipper mission, **previously known as Europa Multiple Flyby Mission**, is a significant endeavor by NASA aimed at exploring Jupiter's moon Europa.

Details

Mission Overview

- **Objective:** Uncover evidence of life on Jupiter's moon Europa by studying its surface and subsurface environments.
- **Launch Date:** Scheduled for October 2024, the spacecraft will be launched from NASA's Kennedy Space Center in Florida.
- **Duration:** The mission is expected to span over five years, with a targeted arrival at Europa by 2031.
- **Mission Type**: Large Strategic Science Mission within NASA's Planetary Science Division.

Significance of Europa

- Europa is a prime target for exploration due to its potential to harbor liquid water beneath its icy crust, making it a promising candidate for extraterrestrial life.
- Discovering life on Europa would have profound implications for understanding the prevalence of life in the universe.

Mission Components

- **Probe Equipment:** Equipped with advanced instruments including cameras, spectrometers, magnetometers, and radar to analyze Europa's surface and subsurface features.
- **Clean Room Preparation:** The spacecraft is currently housed in a specialized clean room at NASA's Jet Propulsion Laboratory in California, ensuring it remains uncontaminated by Earthly microbes.
- **Launch Vehicle:** The Clipper spacecraft will be launched aboard a Space X Falcon Heavy rocket, utilizing gravitational assists from Mars to reach its destination.

Fractals

Context

- A discovery led by researchers from the Max Planck Institute in Marburg and Philipps University in Marburg has unveiled the first regular molecular fractal found in nature.

Details

What are Fractals?

- Fractals are complex geometric shapes that exhibit self-similarity at different scales.

- This means that when you zoom into a fractal, you'll see smaller copies of the overall shape, each with similar patterns to the whole.
- Fractals often possess infinite detail, meaning you can continue to zoom in and discover new patterns, albeit at diminishing scales.

Properties of Fractals:

- **Self-Similarity**: Fractals exhibit self-similarity, meaning that parts of the fractal resemble the whole at different scales.
- **Fine Structure**: Fractals possess intricate, detailed structures at all scales, with complexity increasing as you zoom in.
- **Non-Integer Dimension**: Unlike regular geometric shapes, fractals can have non-integer dimensions, such as fractional or fractal dimensions.

Types of Fractals:

- **Deterministic Fractals**: These fractals are generated using mathematical formulas or algorithms, such as the Mandelbrot set or the Koch snowflake.
- **Random Fractals**: Also known as stochastic fractals, these are generated using randomness or statistical processes, such as fractal landscapes or Brownian motion.

Applications of Fractals:

- **Computer Graphics**: Fractals are widely used in computer graphics to generate realistic natural phenomena like mountains, clouds, and foliage.
- **Data Compression**: Fractal compression algorithms exploit the self-similarity of images to achieve high compression ratios.
- **Fractal Antennas**: These antennas utilize fractal geometry to achieve compact size and multiband performance in wireless communication systems.
- **Finance**: Fractal patterns are observed in financial markets, with techniques like fractal analysis used for market prediction and risk assessment.
- **Biological Modeling**: Fractals are employed to model and understand complex structures in biology, such as branching patterns of blood vessels and lung airways.
- **Art and Design**: Many artists and designers use fractals as inspiration for creating visually stunning artworks and patterns.

C-Camp joins BFI Biome Virtual Network Program

Context

- The Centre for Cellular and Molecular Platforms (C-CAMP) in Bengaluru has partnered with the Blockchain for Impact (BFI) Biome Virtual Network Program **to accelerate transformative healthcare solutions through biomedical innovation.**

Details

Objective of the Partnership

- The BFI-Biome Virtual Network Program aims to accelerate the impact of transformative scientific advances in healthcare by **fostering collaborations among incubators, research institutes, and stakeholders in the translational pipeline.**
- C-CAMP has a robust pipeline of biomedical innovations in critical areas such as infectious disease diagnostics, antimicrobial resistance, cell therapy, immuno-oncology, regenerative tissues, and digital health technologies.
- At least 10 of these solutions are already in clinical trials or at the pre-IND stage with regulatory bodies such as the FDA or the CDSCO.

Role of BFI in Supporting C-CAMP

- **BFI-Biome Virtual Network Program:** this initiative unites various incubators and research institutes under a single umbrella to foster collaborations and streamline the translational process from research discoveries to real-world applications.
- BFI will **allocate over $200,000 over three years to support essential programs for healthcare-based startups, leveraging C-CAMP's expertise in developing innovative solutions.**

Centre for Cellular and Molecular Platforms (C-CAMP)

- The Centre for Cellular and Molecular Platforms (C-CAMP) is an **initiative of the Department of Biotechnology, Ministry of**

Science, Technology and Earth Sciences, Government of India.

- **Established in 2009,** C-CAMP serves as a dynamic hub for life sciences innovation, fostering collaboration between academia, industry, and the startup ecosystem.
- C-CAMP's efforts in fostering entrepreneurship and innovation have been recognized with the National Entrepreneurship Award 2017 from the Ministry of Skill Development and Entrepreneurship, Government of India.

Ethylene Oxide

Context

- The recall of Everest Fish Curry Masala from India by the Singapore Food Agency due to the alleged presence of a pesticide, ethylene oxide, has raised concerns about food safety and regulatory compliance.

Details

Ethylene Oxide Contamination

- Ethylene oxide is a pesticide not authorized for use in food.
- It is typically used to fumigate agricultural products to prevent microbial contamination.
- While ethylene oxide is allowed for sterilizing spices under Singapore's Food Regulations, its presence in food beyond permissible limits is concerning.

About

- Ethylene oxide (EO) is an important organic compound widely used in various industrial processes.

Uses:

- **Sterilization:** It is widely used for sterilizing medical equipment and supplies due to its ability to penetrate packaging and kill bacteria, viruses, and fungi.
- **Chemical Intermediates:** Ethylene oxide is a precursor to many other chemicals, including ethylene glycol, which is used in antifreeze and polyester production.
- **Surfactants:** It is used in the production of surfactants for detergents, cosmetics, and personal care products.
- **Textiles:** Ethylene oxide is used for treating textiles to impart wrinkle resistance and shrink resistance.
- **Pesticides:** It serves as a raw material for manufacturing certain pesticides.

Bitcoin Halving

Context

- Bitcoin's long-anticipated 'halving' is a vital event that will burnish the cryptocurrency's value as an increasingly scarce commodity, or little more than a technical change talked up by speculators to inflate its price.
- The halving comes after bitcoin hit an all-time high of $73,803.25 in March.

Details

What is Bitcoin's Halving?

- Bitcoin's halving is a **programmed event that occurs roughly every four years, reducing the rate at which new bitcoins are created.**
- **Purpose:** It is designed to maintain scarcity in the supply of bitcoins, with a maximum cap of 21 million tokens, as envisioned by Satoshi Nakamoto, the pseudonymous creator of Bitcoin.

How Does It Happen?

- Every time 210,000 blocks are added to the blockchain (approximately every four years), the reward for miners is halved. This reduces the incentive for mining and slows down the production of new bitcoins.

Relationship with Bitcoin's Price

- **Scarcity and Value:** Some argue that Bitcoin's scarcity, enforced by the halving, contributes to its value proposition. As the supply diminishes, demand may drive up prices.
- **Debate on Impact:** Others dispute this view, suggesting that any impact of halving on price would have been already factored in by the market. The opaque nature of the crypto mining sector adds complexity to predicting price movements.

Previous Halvings and Price Trends

- Previous halvings in 2012 and 2016 have been studied by traders and miners, but

there's **no clear evidence linking halving events to subsequent price rises.**

- **Price surges in the aftermath of halvings are often attributed to various factors, including loose monetary policy, retail investor participation, and regulatory decisions.**

Tachyons

Context

- The universe may be dominated by particles that break causality and move faster than light, new paper suggests.

Details

- Physicists propose that **tachyons, hypothetical particles moving faster than light and breaking causality, may dominate the universe.**
- The researchers suggest that **tachyons could be the true identity of dark matter, which constitutes a significant portion of the mass in the universe.**
- Dark matter outweighs normal matter in galaxies by a ratio of 5 to 1.
- The paper proposes a cosmological model where an expanding universe filled with tachyons initially slows down before reaccelerating, akin to the current accelerating phase driven by dark energy.

About Tachyons

- Unlike ordinary matter, which moves at speeds slower than light, tachyons are theorized to travel faster than the speed of light.

Origin:

- Tachyons were first proposed by physicist Gerald Feinberg in 1967 as a byproduct of his research into faster-than-light phenomena.
- The name "tachyon" originates from the Greek word "tachys," meaning "swift" or "fast."

Properties:

- **Imaginary Mass**: Unlike ordinary particles, which have positive mass, tachyons are theorized to possess imaginary mass. This implies that as their energy decreases, their speed increases, leading to a phenomenon where they gain energy as they lose speed, defying the principles of relativity.
- **Faster-Than-Light Travel**: Tachyons are postulated to travel faster than the speed of light, violating the fundamental tenets of Einstein's theory of special relativity. If real, this would have profound implications for our understanding of causality and the structure of the universe.

Theoretical Implications:

- **Causality Paradoxes**: Tachyons could potentially lead to causality paradoxes, such as the famous "tachyonic antitelephone," where information could be sent back in time, violating causality as we understand it.
- **Quantum Field Theory**: Tachyons are also a subject of interest in quantum field theory, where they arise in certain theoretical frameworks such as string theory and the Casimir effect.
- Some phenomena that were once attributed to tachyons, such as the Cherenkov radiation observed in certain mediums, have been explained through other means, casting further doubt on the existence of tachyons.

Antihistamines

Context

- Currently, there is a lot of research ongoing on H3 and H4 receptors, in particular to alleviate the effects of neurological and immunological disorders, respectively, using specialised drugs.

Details

- Antihistamines are a class of medications used to treat allergic reactions and symptoms by blocking the action of histamine, a chemical released by the immune system during an allergic reaction.
- When histamine binds to specific receptors in the body, it causes symptoms such as sneezing, itching, runny nose, and watery eyes.

Receptors

- Histamine performs various functions in the body, mediated by different histamine

receptors known as H1, H2, H3, and H4 receptors.
- Each receptor type is found in different Mechanism of Action
- **Histamine Receptors:** Histamine acts on specific receptors in the body, mainly H1 receptors (involved in allergic reactions) and H2 receptors (involved in gastric acid secretion).
- **Antagonistic Action:** Antihistamines block the H1 receptors, preventing histamine from binding to them and eliciting an allergic response.

Classification
- **First-Generation Antihistamines:** Older antihistamines that readily cross the blood-brain barrier, causing sedation.
- **Second-Generation Antihistamines:** Newer antihistamines designed to have reduced sedative effects due to their limited penetration of the blood-brain barrier.

Solar Flares

Context
- On April 23, a remarkable celestial event unfolded as the Sun exhibited a rare "super" explosion, marked by the simultaneous eruption of four solar flares.

Details
- The **recent quadruple solar flares erupted from separate regions across the Sun's surface, forming part of a single, interconnected eruption known as a sympathetic solar flare.**
- The simultaneous eruption of four solar flares, **spanning a third of the solar surface**, constitutes an exceptionally rare occurrence in solar activity.
- The flares, **originating from different sunspots and magnetic filaments, were interconnected by massive magnetic field loops,** resulting in rapid succession and amplification of the eruption.

About Solar Flares
- Solar flares are **sudden and intense bursts of energy and radiation emitted from the Sun's surface**.
- These explosive events are caused by the release of magnetic energy stored in the Sun's atmosphere and can have significant effects on space weather, telecommunications, and technological infrastructure on Earth.

Raman Spectroscopy

Context
- The global trade in elephant ivory has long been a concern due to its detrimental impact on elephant populations.
- **Despite restrictions on elephant ivory trade, distinguishing between elephant and mammoth ivory remains challenging for law enforcement agencies.**
- However, **recent advancements in laser spectroscopy present a promising solution to this problem**, potentially disrupting the ivory trade and aiding conservation efforts.

Details
Background
- While **trade in elephant ivory is heavily regulated, mammoth ivory remains largely unregulated**, creating loopholes for illegal trade and exploitation.
- **Differentiating between elephant and mammoth ivory is difficult** and often requires destructive testing methods, posing ethical and practical challenges.
- The **decline in African elephant populations due to poaching** highlights the urgent need for conservation efforts to protect these iconic species.
- The **rise in demand for mammoth ivory has led to the emergence of modern-day "mammoth hunters," posing additional threats to environmental and paleontological conservation.**

Breakthrough in Laser Spectroscopy
- A non-invasive laser technique known as Raman spectroscopy offers a breakthrough in identifying the origin of ivory samples.
- **Raman spectroscopy analyzes the biochemical makeup of ivory, distinguishing**

between collagen and hydroxyapatite present in elephant and mammoth ivory.

- Raman spectroscopy is non-destructive, quick, and offers high accuracy in species identification, making it an ideal tool for customs officials and law enforcement agencies.

About Raman Spectroscopy

- Raman spectroscopy is a **powerful analytical technique used to study molecular vibrations and identify chemical compounds based on their unique fingerprint-like spectra**.
- **Named after the Indian physicist Sir C.V. Raman**, who discovered the Raman effect in 1928, this spectroscopic method provides valuable insights into the structure, composition, and properties of materials across various scientific disciplines, including chemistry, physics, biology, and materials science.

Advanced Composite Solar Sail System

Context

- NASA recently **launched its Advanced Composite Solar Sail System (ACS3) spacecraft from New Zealand**.
- Launched on April 23, 2024, ACS3 **deploys a sail about the size of a small apartment from a toaster oven-sized spacecraft.**

Details

- ACS3 is a **technology demonstration mission aimed at characterizing solar sail structures for future small spacecraft engaged in deep space missions requiring long-duration, low-thrust propulsion.**
- Designed to characterize solar sail structures technologies for future small spacecraft engaged in deep space missions requiring long-duration, low-thrust propulsion.
- **ACS3 is a CubeSat**, featuring four 7 m long deployable composite booms.
- **Propulsion Method:** Similar to a sailboat powered by wind, solar sails utilize the pressure of sunlight for propulsion, eliminating the need for conventional rocket propellant.

Solar Sailing

- **Principle:** Solar sailing utilizes the momentum of photons in sunlight to propel spacecraft.
- **Mechanism:** When sunlight reflects off a shiny solar sail, some of its momentum is transferred, giving the sail a small push.
- **Continuous Thrust:** This push, although slight, is continuous and can impart more thrust to a spacecraft over time compared to traditional chemical rockets.
- **Unique Destinations:** Solar sails enable access to unique destinations in space that are difficult or impossible to reach with other propulsion systems.
- **Interstellar Travel:** Solar sails may be the best option for interstellar travel, offering a promising avenue for exploring distant stars and galaxies.

Biohacking

Context

- Biohacking is gaining popularity in India, with enthusiasts trying various methods like cryotherapy and IV therapy.
- As this trend spreads to the masses, concerns arise about the need for caution regarding safety and regulation.

Details

- Biohacking, **also known as DIY biology or citizen science**, refers to the **practice of experimenting with biology outside traditional laboratory settings, often with the aim of enhancing human capabilities, improving health, or exploring biological systems.**
- It encompasses a wide range of activities, from self-experimentation with supplements to community-based genetic engineering projects.

Types of Biohacking

- **DIY Biology:** This involves individuals or groups conducting biological experiments using readily available tools and materials. DIY biologists may explore topics such as genetics, microbiology, neuroscience, and bioinformatics.

- **Quantified Self:** Biohackers interested in self-optimization often use wearable devices, smartphone apps, and other technologies to track and analyze various physiological and behavioral metrics, such as sleep patterns, exercise performance, and cognitive function.
- **Nutrigenomics:** Nutrigenomics involves using genetic information to personalize nutrition and dietary choices. Biohackers may analyzetheir genetic data to identify potential dietary deficiencies, intolerances, or optimal macronutrient ratios.
- **DIY Genetics:** Some biohackers engage in genetic engineering experiments, such as gene editing using CRISPR technology. While this area raises ethical and safety concerns, it has the potential to drive innovation in fields like medicine, agriculture, and biotechnology.
- **Bioinformatics:** Biohackers interested in data analysis and computational biology may develop software tools, databases, and algorithms to analyze biological data, including genomic sequences, protein structures, and metabolic pathways.

Applications

- **Health Optimization:** Biohacking enthusiasts may experiment with various interventions, such as dietary supplements, nootropics, exercise regimens, and sleep optimization techniques, to improve physical and cognitive performance.
- **Personalized Medicine:** By analyzing their own genetic data, biohackers can gain insights into their genetic predispositions for certain diseases or traits, allowing them to make more informed healthcare decisions and tailor treatments to their individual needs.
- **Environmental Monitoring:** DIY biologists may develop low-cost sensors and monitoring devices to track environmental parameters such as air quality, water pollution, soil health, and biodiversity.

Liquid Nitrogen

Context

- A video of a boy screaming in pain after consuming a 'smoking' biscuit that went viral has led to the Food Safety department issuing an order on the use of liquid nitrogen.

Details

- Liquid nitrogen is a **colorless, odorless, non-toxic, and non-flammable cryogenic liquid with the chemical formula N2.**
- It is derived from the liquefaction of nitrogen gas, which makes up about 78% of the Earth's atmosphere.
- Liquid nitrogen is widely used in various industrial, scientific, culinary, and medical applications due to its unique properties and extremely low temperature.

Properties of Liquid Nitrogen

- **Temperature:** Liquid nitrogen has an extremely low boiling point of -196°C, making it one of the coldest substances on Earth.
- **Density:** It has a density of approximately 0.808 grams per milliliter (g/mL) at its boiling point.
- **Expansion Ratio:** Liquid nitrogen expands about 694 times in volume when it vaporizes to gas at room temperature.
- **Reactivity:** It is relatively inert and non-reactive under normal conditions, but it can react violently with certain materials at high temperatures.
- **Non-toxicity:** Liquid nitrogen is generally safe to handle in well-ventilated areas, although it can displace oxygen in confined spaces, leading to asphyxiation.

Production

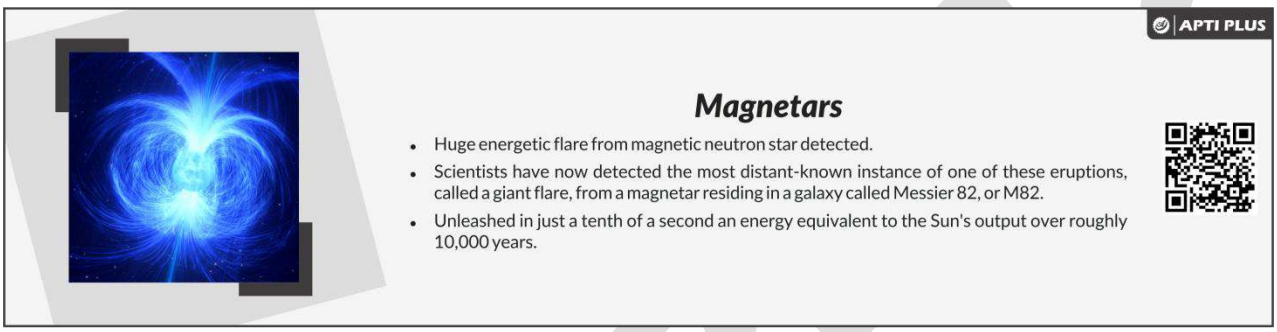
- Liquid nitrogen is typically produced through a process called cryogenic distillation, which involves compressing and cooling nitrogen gas until it liquefies.

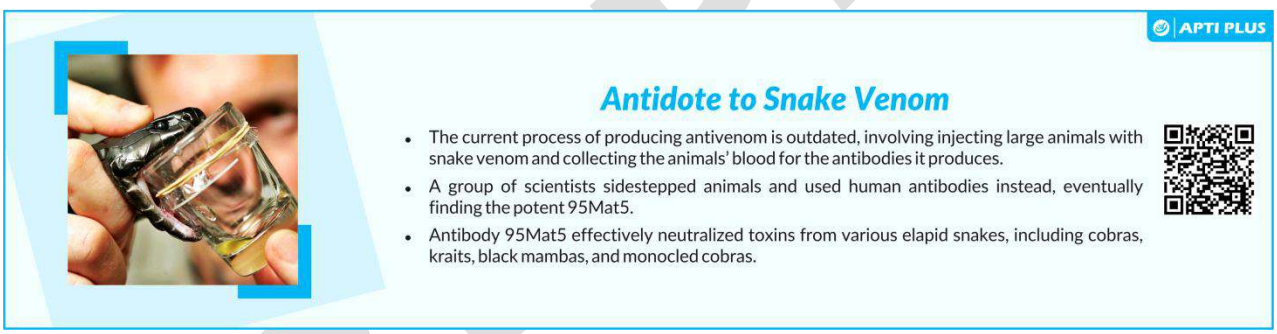
Applications

- **Cryogenics:** Liquid nitrogen is extensively used in cryogenic applications, including cryopreservation of biological samples, cryotherapy for medical treatments, and superconductivity research.
- **Food Industry:** It is used for freezing and preserving food products.
- **Metal Processing:** Liquid nitrogen is employed in metalworking processes, such as cryogenic cooling during machining or in the production of high-strength steel alloys.

- **Healthcare:** In medicine, liquid nitrogen is utilized in dermatology for cryosurgery to remove warts, skin tags, and certain types of skin cancers.
- **Research and Development:** It serves as a coolant for various laboratory equipment, such as nuclear magnetic resonance (NMR) spectrometers, electron microscopes, and particle accelerators.
- **Industrial Applications:** Liquid nitrogen finds applications in industrial processes like inert gas blanketing, purging, and as a coolant for electronic components during manufacturing.

7.18 SNIPPETS



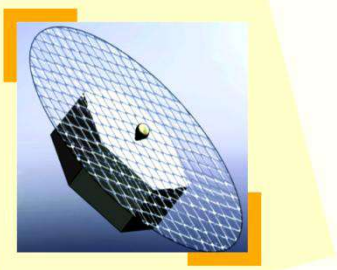


Kodaikanal Solar Observatory

- The iconic Kodaikanal Solar Observatory (KSO) in Tamil Nadu has been a mainstay of Indian astronomy since it was founded on April 1, 1899, by the British East India Company.
- The Kodaikanal Solar Observatory is a solar observatory owned and operated by the Indian Institute of Astrophysics.
- It is on the southern tip of the Palani Hills 4 kilometres from Kodaikanal.
- The first observations commenced in 1901.
- The Evershed effect was first detected at this observatory in January 1909.

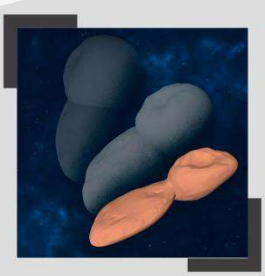
White Rabbit Collaboration

- The launch of the White Rabbit Collaboration by CERN marks a significant milestone in the adoption and advancement of open-source timing technology.
- Developed at CERN, White Rabbit is an open-source timing technology designed to synchronize devices in particle accelerators to sub-nanosecond precision.
- It addresses the challenge of establishing a common notion of time across a network, crucial for coordinating complex systems.
- In 2020, it was incorporated into the Precision Time Protocol (PTP), a worldwide industry standard governed by IEEE.



PRATUSH

- Astronomers are considering placing optical and radio telescopes on and around the moon to overcome limitations faced by terrestrial and Earth-orbiting telescopes.
- The moon's far side offers pristine, airless conditions, shielded from Earth's radio interference and electromagnetic noise.
- PRATUSH (Probing ReionizATion of the Universe using Signal from Hydrogen)is a pioneering space telescope designed to reveal the Cosmic Dawn of the universe by studying the radiation from neutral hydrogen gas.
- PRATUSH is funded for pre-project studies by the Indian Space Research Organization (ISRO).
- The project involves collaboration between the Raman Research Institute (RRI) and ISRO.



Arrokoth

- Recently, scientists proposed a model to explain Arrokoth's ice core.
- Arrokoth is one of thousands of 'icy worlds" in the Kuiper Belt, or the outer zone of the solar system that lies beyond Neptune.
- It is the farthest object in space that has been explored by a human space-craft.
- Arrokoth was discovered on June 26, 2014, by astronomers using the Hubble Space Telescope as part of the New Horizons KBO Search (NHATS) program.
- Originally known as (486958) 2014 MU69, it was informally called Ultima Thule until its official naming.

Genetics And Skin Color

- The latest advances in genomics are improving our understanding of the biology of skin pigmentation.
- In a paper published in the journal Nature Genetics in January 2024, researchers at the University of Pennsylvania used genome editing and chromosomal conformational capture to identify the regulators of a number of genes involved in skin pigmentation.

Mosquito Bats

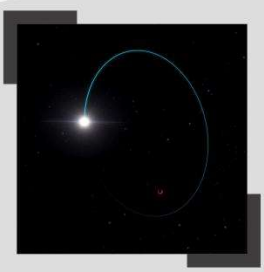
- The mosquito bat, also known as an electric mosquito racket or electric fly swatter, is a handheld device used to electrocute insects, particularly mosquitoes.
- It operates based on principles of electricity and physics to create an effective tool for insect eradication.
- The mosquito bat effectively combines principles of electricity, electromagnetism, and quantum mechanics to create a portable and efficient tool for insect control.

TSAT-1A

- TASL announces successful deployment of sub-metre resolution optical satellite TSAT-1A.
- Launch Vehicle: SpaceX's Falcon 9 rocket
- Mission Name: Bandwagon-1

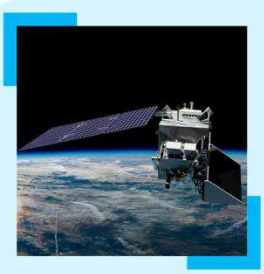
Collaboration:

- TASL collaborated with Satellogic, leveraging the latter's expertise in developing and integrating advanced earth observation satellites.
- The collaboration was initiated in November 2023 to develop and integrate TSAT-1A, showcasing TASL's capability in complex system integration.



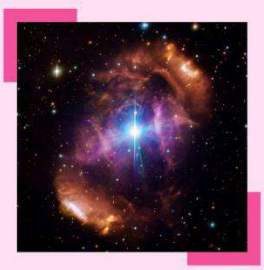
GAIA BH3

- Astronomers have detected the largest stellar black hole with mass 33 times that of the Sun in the Milky Way galaxy.
- It is also the second closest black hole to Earth, sitting just 2,000 light years away from the planet.
- The Milky Way is a barred spiral galaxy, a vast collection of stars, gas, dust, and dark matter, bound together by gravity.
- Stellar Black Holes: Formed from the remnants of massive stars. When such a star exhausts its nuclear fuel, it undergoes a supernova explosion, leaving behind a compact core. If the core's mass exceeds a certain threshold (about three times the mass of the Sun), it collapses into a black hole.



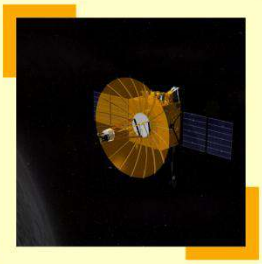
PACE Mission

- NASA's Plankton, Aerosol, Cloud, ocean Ecosystem (PACE) satellite is providing science-quality data on ocean health, air quality, and climate dynamics, offering unprecedented insights into Earth's complex systems.
- The Plankton, Aerosol, Cloud, ocean Ecosystem (PACE) mission, led by NASA, aims to advance global observations of ocean color, biogeochemistry, and ecology, while also studying the carbon cycle, aerosols, and clouds.
- PACE was successfully launched on February 8, 2024, aboard a SpaceX Falcon 9 rocket from Cape Canaveral Space Launch Complex 40.



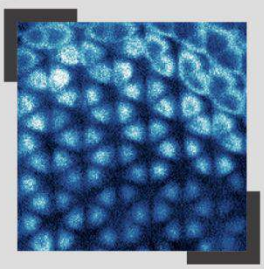
Dragon's Egg Nebula

- The Dragon's Egg Nebula, officially designated as NGC 6164/6165, resides within the Norma constellation, captivating astronomers and space enthusiasts worldwide.
- Emerged from the collision of stellar winds with the surrounding interstellar medium, resulting in intricate structures and shock waves.
- Nebulae are vast clouds of interstellar matter, primarily consisting of hydrogen and helium, along with traces of heavier elements like carbon, oxygen, and nitrogen.



QUEQUIAO-2

- China's National Space Administration (CNSA) has declared the launch of Queqiao-2 a "complete success," underscoring its importance in China's space exploration program.
- Queqiao-2 was launched along with two miniature satellites, Tiandu-1 and Tiandu-2.
- Queqiao-2, the second of two communication relay and radio astronomy satellites, supports China's Lunar Exploration Program by providing communication capabilities to the far side of the Moon.



Wigner Crystal

- Physicists at Princeton University used a scanning tunneling microscope (STM) to directly image the Wigner crystal for the first time.
- The Wigner crystal is a unique form of matter composed entirely of electrons arranged in a crystal-like formation due to their mutual repulsion.
- Quantum crystals are materials where quantum effects dominate the behavior of particles within the crystal lattice.
- These effects can include quantum tunneling, zero-point energy, and quantum entanglement, among others.

Dragonfly Mission

- NASA has confirmed the Dragonfly rotorcraft mission to explore Titan, Saturn's largest moon, with a scheduled launch in July 2028.
- Objective: Dragonfly is designed to fly across the surface of Titan, studying its organic compound-rich environment and assessing its potential habitability.
- Budget: The mission has a budget of $3.35 billion.
- Duration: The planned mission duration is two years.
- Dragonfly was proposed to NASA's New Frontiers program in April 2017.

Voyager 1

- NASA's Voyager 1 probe, the farthest human-made object in the universe, resumes sending usable data to ground control after months of communication issues.
- Since November 14, 2023, Voyager 1 had been transmitting gibberish despite receiving commands from Earth.
- In March, NASA's Jet Propulsion Laboratory identified a malfunctioning chip as the culprit and devised a coding solution compatible with the probe's 46-year-old computer system.
- Launched on September 5, 1977, Voyager 1 made history as the first human-made spacecraft to enter the interstellar medium in 2012.

Mephedrone

- NCB-Gujarat ATS bust mephedrone manufacturing network in two States.
- Mephedrone, also known by its chemical name 4-methylmethcathinone (4-MMC) or colloquially as "meow meow," is a synthetic stimulant drug belonging to the cathinone class.
- It gained popularity as a recreational drug in the early 2000s and is known for its euphoric and stimulant effects.
- Mephedrone is typically sold in the form of white powder, capsules, or tablets and is often used recreationally at parties, clubs, and music festivals.

8. CULTURE & HISTORY

8.1 KUCHIPUDI

Context

- In Kuchipudi village, Krishna district, artists fondly recall childhood performances in the 1980s.

Ancient Origins

- **Natyashastra Influence:** Rooted in ancient traditions, Kuchipudi draws inspiration from the Natyashastra, a seminal Sanskrit text on performing arts.
- **Rural Beginnings:** Emerging from the Bhagavathalu tradition, Kuchipudi initially flourished in villages, recounting tales from Hindu mythology.
-

Medieval Transformation

- **Siddhendra Yogi's Influence:** In the 15th century, Siddhendra Yogi refined Kuchipudi, elevating it from folk art to classical elegance.
- **Cultural Renaissance:** Under Siddhendra Yogi's guidance, Kuchipudi evolved into a refined expression of cultural heritage.

Modern Revival

- **Kuchipudi Art Academy:** Established in 1958, the Kuchipudi Art Academy played a pivotal role in preserving and promoting the dance form.
- **Global Acclaim**: Today, Kuchipudi stands as a beacon of India's classical dance heritage, captivating audiences worldwide with its blend of tradition and innovation.

Principle	Description
Tala and Layam	Kuchipudi relies on rhythmic beats (tala) set by musicians. Dancers must maintain timing and adapt to tempo variations.
Abhinaya	Expression through gestures and facial expressions is crucial for conveying emotions and stories, demanding extensive training.
Natya	Beyond dance, Kuchipudi entails storytelling (Natya) through portrayal of characters from Hindu mythology, synchronized with music and dialogue.
Rasa	Dancers must convey the appropriate emotional essence (rasa) for each scene or character, encompassing love, joy, anger, and more.
Lasya and Tandava	Kuchipudi balances graceful fluidity (Lasya) with energetic dynamism (Tandava), requiring a harmonious fusion for a complete performance.
Costume and Makeup	Integral to Kuchipudi, costumes are vibrant and ornate, enhancing the dance's aesthetic appeal. Makeup highlights facial expressions and emotions, further enriching the performance.

Composition

In Kuchipudi, compositions range from traditional to modern:

- **Varnam:** Complex centerpiece blending dance, storytelling, and expression, often based on Hindu mythology.
- **Tillana**: Energetic piece showcasing agility with fast-paced footwork, accompanied by lively music.
- **Padam**: Expressive composition conveying emotions through gestures and facial expressions to slow, melodious tunes.
- **Javali:** Playful and lively, often themed around love and romance, featuring fast-paced footwork.

- **Sabdam:** Melds dance and storytelling to catchy tunes, often centered around love and devotion.
- **Keertana:** Devotional offering combining dance and music with repetitive chanting, setting a spiritual tone.

Classical Dances of India

Dance	Description	Prominent Dancers
Bharatanatyam	It originated as Sadir or Dasi Attam in temples, evolving into a theatre art. Draws from Bharata's Natyashastra. Rich repertoire in Telugu, Tamil, and Sanskrit.	Rukmini Devi Arundale, Alarmel Valli, Yamini Krishnamurthy
Manipuri	Rooted in Vaishnava faith, known for circular movements and subdued expressions. Divided into Jagoi and cholom styles.	Guru Bipin Singh, Darshana Jhaveri, Priti Patel
Kathak	Associated with Kathakaras or storytellers, flourished under Mughal rule. Emphasizes footwork and pirouettes, featuring the Thumri music genre.	Birju Maharaj, Shovana Narayan, Pt. Birju Maharaj
Odissi	Temple dance revived in the 20th century, featuring soft and graceful movements. Themes often reflect Vaishnava faith.	Kelucharan Mohapatra, Sanjukta Panigrahi, Sonal Mansingh
Kathakali	Originates from Kerala, depicts stories from Ramayana and Mahabharata with symbolic makeup. Facial expressions and hand gestures narrate the tales.	Kalamandalam Gopi, Kottakkal Sivaraman, SadanamKrishnankutty
Mohiniattam	Named after enchantress Mohini, known for its feminine and gentle footwork. Draws rhythms from Kerala's music tradition.	KalamandalamKshemavathy, Sunanda Nair, Bharati Shivaji
Kuchipudi	Originating from Kuchelapuram village, combines speech, mime, and dance. Often performed as a dance drama, featuring storytelling through mime changes.	Dr. Vempati Chinna Satyam, Yamini Reddy, Raja and Radha Reddy
Sattriya	Developed in Vaishnava monasteries, emphasizes hand gestures and movements. Adapted into a modern theatre art, with themes revolving around devotion to Krishna.	Jatin Goswami, Prateesha Suresh, Anwesa Mahanta
Chhau	A blend of martial traditions, temple rituals, and folk performances. Features episodes from epics and folklore, closely tied to festivals and rituals.	Shashadhar Acharya, Lingaraj Pradhan, Gopal Prasad Dubey

8.2 WORLD HERITAGE DAY

Context

- The International Day for Monuments and Sites, also known as World Heritage Day, is observed on April 18.

International Day for Monuments and Sites (World Heritage Day)

- A UNESCO World Heritage Site is **a place recognized by the United Nations Educational, Scientific and Cultural Organization (UNESCO) for its outstanding universal value.**
- It was**established through the Convention regarding the Protection of the World Cultural and Natural Heritage in 1972**.

Aim

- To **promote awareness** about cultural heritage and diversity.
- Inspire people and communities to **value cultural heritage** in their lives.
- Increase public **awareness of the diversity and vulnerability of cultural heritage**.

Criteria for selection

- These sites are selected based on criteria including human creative genius, interchange of values, testimony to cultural tradition, significance in human history, traditional human settlement, heritage associated with events of universal significance, natural phenomena or beauty, major stages of Earth's history, significant ecological and biological processes, and the significant natural habitat for biodiversity.

Theme of World Heritage Day 2024

- "**Disasters & Conflicts Through the Lens of the Venice Charter**".

Athens Charter and Venice Charter

Athens Charter (1931):

- Established restoration advisory organizations.
- Advocated for national legislation to preserve historic sites.
- Emphasized the use of modern techniques and materials in restoration.

Venice Charter (1964):

- Resulted from the Second International Congress of Architects and Specialists of Historic Buildings.
- Emphasized the interpretation of historic monuments and sites as common heritage.
- Stressed the responsibility to safeguard them for future generations with authenticity.

Monuments in India

- India has 3691 monuments and sites, with 40 designated as UNESCO World Heritage Sites.

List of 40 UNESCO World Heritage Sites

- Ajanta Caves (Maharashtra), Ellora Caves (Maharashtra), Agra Fort (Agra), Taj Mahal (Agra), Sun Temple (Orissa), Mahabalipuram Monuments (Tamil Nadu), Kaziranga National Park (Assam), Keoladeo National Park (Rajasthan), Manas Wildlife Sanctuary (Assam), Churches and Convents of Goa (Goa), Monuments of Khajuraho (Madhya Pradesh), Monuments of Hampi (Karnataka), Fatehpur Sikri (Agra), Elephanta Caves (Maharashtra), Great Living Chola Temples (Tamil Nadu), Pattadakal Monuments (Karnataka), Sundarbans National Park (West Bengal), Nanda Devi & Valley of Flowers National Park (Uttarakhand), Monuments of Buddha (Sanchi, Madhya Pradesh), Humayun's Tomb (Delhi), Qutub Minar and its Monuments (Delhi), Mountain Railways of Darjeeling, Kalka Shimla & Nilgiri (Darjeeling), Mahabodhi Temple (Bihar), Bhimbetka Rock Shelters (Madhya Pradesh), Chhatrapati Shivaji Terminus (Maharashtra), Champaner-Pavagadh Archaeological Park (Gujarat), Red Fort (Delhi), Jantar Mantar (Delhi), Western Ghats (Karnataka, Kerala, Tamil Nadu, Maharashtra), Hill Forts (Rajasthan), Rani Ki Vav (The Queen's Stepwell) (Gujarat), Great Himalayan National Park (Himachal Pradesh), Nalanda (Bihar), Khangchendzonga National Park (Sikkim), Architectural Work of Le Corbusier (Capitol Complex) (Chandigarh), The Historic City (Ahmedabad), Victorian Gothic and Art Deco Ensembles (Mumbai), The Pink City (Jaipur), Kakatiya Rudreshwara (Ramappa) Temple (Telangana), Dholavira (Gujarat), Santiniketan (West Bengal), Hoysala temples of Belur, Halebid and Somananthpura (Karnataka).

8.3 SHORT ARTICLES

Sannati Buddhist Site Restoration

Context

- Discovered by the ASI in the 1990s, the neglected Sannati Buddhist site underwent restoration in 2022.

Location	Archaeological Discoveries	Inscriptions and Sculptures	Artifacts and Depictions	Educational Legacy
The Sannati Buddhist site is **located near Kanaganahalli in Karnataka's Kalaburagi district**, nestled **along the banks of the Bhima river.** It also houses the revered Chandrala Parameshwari Temple.	Significant discoveries indicate development across **three phases: Maurya, Early Satavahana, and Later Satavahana** periods, spanning from the **3rd century B.C. to the 3rd century A.D.** The **Ranamandala area** within the site provides insights into prehistoric mysteries and early historical narratives.	An elegant Prakrit inscription inscribed using the **Brahmi script** offers cultural and linguistic insights. A captivating stone sculpture portraying Mauryan Emperor Ashoka, identified by the inscription **"Raya Asoko,"** stands as a testament to the region's historical heritage.	Approximately 60 dome slabs adorned with exquisite sculptural motifs have been unearthed**, depicting Jataka stories, Buddha's life, Shatavahana monarchs' portraits**, and representations of Buddhist missionaries dispatched by Emperor Ashoka.	Adjacent to the Sannati site **lies the ancient NagaviGhatikasthana, known as the Takshashila of the South.** Flourishing during the **Rashtrakuta and Kalyana Chalukya** dynasties between the 10th and 12th centuries, it served as a beacon of knowledge and enlightenment.

Kumittipathi Rock Paintings

Context:

- Miscreants have caused damage to the Kumittipathi Rock Paintings, **located in a cave near Coimbatore, Tamil Nadu.**
- These paintings, which are 3,000 years old, are considered among the most important rock art in the Kongu region.

Kumittipathi Rock Paintings:

- Drawn with **white pigments** on the walls of a **natural cave, depicting animals, human figures, chariots, and scenes from the lives of ancient inhabitants.**
- Offer valuable insights into the ancient culture and daily life of the region's early inhabitants.
- Include depictions of an **elephant, chariots, human figures, and scenes from ancient life.**
- Geographical evidence suggests they could date back to the 5th Century BCE.

Historical Significance and Trade Routes:

- Kumittipathiis **located in the Palakkad Gap of the Western Ghats**, historically significant as a corridor connecting Tamil Nadu and Kerala.
- Ancient **trade routes known as Peruvazhi facilitated trade between regions during the Sangam period.**

Phanigiri Artefacts

Context:

- The Phanigiri artefacts, dating from **200 BCE to 400 CE** and discovered in 1942 in Telangana, India, are currently on display at the New York Metropolitan Museum of Art as part of the Tree and Serpent exhibition.

Discovery and Importance:

- Initially discovered in 1942 and later rediscovered in 2003.
- The Phanigiri Buddhist site, **located in Suryapet district, Telangana, is considered one of the most significant finds in Buddhist iconography in recent times.**
- Phanigiri Gutta, where most discoveries were made, **provides insights into the evolution of Buddhism in the region during that period.**

Historical Significance:

- Artefacts include **thoranas, arch-shaped gateways often seen in Buddhist art.**
- Among the first thoranas discovered south of Sanchi, depicting both Mahayana and Hinayana schools of thought.
- Evidence of the deification of Buddha, marking a transition in Buddhism's history.
- Highlights include a carving of the Buddha wearing a Roman toga with folds.

Fort Emmanuel

Context

- History enthusiasts aim to preserve the laterite-brick remnants of Fort Emmanuel.

About:

- Fort Emmanuel, also known as Fort Manuel, is a significant landmark on Fort Kochi Beach in Kerala, India.
- Constructed by the **Portuguese in 1503**, it represents a strategic alliance between the Maharaja of Kochi and the Kingdom of Portugal.
- Named after **Manuel I of Portugal**, it's the **first Portuguese fort in Asia**.

History:

- **Permission granted** by the King of Kochi to Afonso de Albuquerque in September 1503.
- Constructed with square shape and flanking bastions, using **double rows of coconut tree stems** for walls.
- **Reinforced in 1538**, it endured successive colonial occupations: Portuguese until 1663, Dutch until 1795, and British afterward.
- **Damages** inflicted, especially by the Dutch and British, resulting in significant destruction by **1806**.

Preservation Efforts:

- Remnants, including **partially restored gun battery and fortifications**, attract tourists.
- **Concerns persist** among history enthusiasts regarding conservation.
- **Ongoing efforts** aim to safeguard this historic site, preserving its **colonial heritage** and ensuring its **cultural significance** for future generations.

Mahad Satyagraha

Context

- As we commemorate the **133rd birth anniversary of Babasaheb Ambedkar,** let us reflect on the enduring significance of the Mahad Satyagraha.

Mahad Satyagraha: Sequence of Events

- The **Mahad conference of 1927** stands as a pivotal moment in the history of Dalit empowerment and the fight against caste-based discrimination in India.
- **Led by Dr. B.R. Ambedkar**, the event marked a significant assertion of Dalit rights and unity.
- Despite facing resistance from upper castes and legal obstacles**, thousands of Dalit delegates from Maharashtra and Gujarat gathered to advocate for access to public resources and an end to untouchability.**
- Ambedkar's leadership and the collective mobilization efforts underscored the **determination of the Dalit community to challenge entrenched social hierarchies.**
- **Symbolic acts like drawing water from the Chavadar tank and burning theManusmriti** exemplified the defiance against caste oppression.
- The Mahad conference exemplifies a turning point in the Dalit struggle, emphasizing the importance of solidarity, activism, and perseverance in the quest for social justice and equality.

Significance

- Mahad Satyagraha is hailed as the **cornerstone of the Dalit movement**, showcasing collective resistance against caste-based discrimination.

- It propelled Ambedkar to the forefront of Dalit empowerment and social reform.
- It did **set a precedent for organized anti-caste movements, laying the groundwork for future struggles against caste oppression.**

World Crafts Council

Context

- The World Crafts Council International is **considering Srinagar for nomination as the World Craft City (WCC) from India this year.**
- The WCC recognition would provide global acknowledgment and visibility to Srinagar's centuries-old handicraft practices.

Details

- **Establishment**: The World Crafts Council is a **non-profit, non-governmental organization established in 1964.**
- **Objective:** It aims to **promote fellowship and economic development through craft-related activities.**
- **Activities**: The organization **organizes exchange programs, workshops, conferences, seminars, and exhibitions to support craftspeople worldwide.**
- **Registration**: Registered in **Belgium, it is affiliated with UNESCO.**
- **Regional Organization**: Organized into five regions: Africa, Asia Pacific, Europe, Latin America, and North America.
- **Founders**: Founded by **Kamaladevi Chattopadhay and Aileen Osborn Webb.**
- **Meetings**: Holds meetings and General Assemblies every few years, with notable events in Dublin in 2011, Chennai in 2012.

Bhojshala-Kamal Maula Complex

Context

- The 13th century Bhojshala-Kamal Maula complex in Madhya Pradesh is contested by Hindus and Muslims as the **Vagdevi temple and Kamal Maula Masjid,** respectively.

Details

Location and Name Origin

- Located in Dhar, Madhya Pradesh, **named after King Bhoja of the Paramāra dynasty**, known for his patronage of education and the arts.

Architecture and History

- Mainly **12th-century architecture** with Islamic tombs added in the 14th and 15th centuries, **protected as a Monument of National Importance** by the Archaeological Survey of India.

Current Status and Usage

- Both Hindus and Muslims use it for prayers on specific days, **governed by the Places of Worship (Special Provisions) Act, 1991.**

Terminology

- The term "Bhojśālā" became linked to the building in the early 20th century **based on inscriptions found by K. K. Lele.**

Significance of King Bhoja

- Revered for patronage of arts and education, credited with many Sanskrit works.

Exploration and Inscriptions

- Early scholars studied inscriptions **praising the Tortoise incarnation of Viṣṇu and a drama inscription.**

Social Tensions and Legal Issues

- Occasional disturbances **arise when Hindu and Muslim prayer days coincide.**
- Legal challenges to its status have occurred, including one in 2024.

Paramara Dynasty

The Paramara dynasty ruled central India from the **9th to 14th centuries**, known for their **governance over Malwa from Ujjain, later Dhar and Mandu**. Founded by **King Upendra or Krishnaraja**they were great supporters of art and culture, with King Bhoja being famous for his patronage of learning. The dynasty's legacy includes beautiful **temples like those at Khajuraho**. **The Harsola copper plates hint at a link to the Rashtrakuta dynasty**. Under Bhoja, their empire extended from Chittor to Konkan and from the Sabarmati River to Vidisha.

Discovery of New Archaeological Sites in Telangana

Context

- In recent archaeological explorations in Telangana, three significant sites have been discovered.

Megalithic Monuments in Dense Forest:

- Discovery of over **200 megalithic monuments dating back to around 1,000 BCE**.
- Monuments predominantly of **'Dolmenoid Cists'** type, with unique squarish or rectangular shapes.
- Unique construction style where side slabs follow the cap-stone's shape, resulting in each **'dolmenoid cist'** having a distinct shape.

Unique Iron Age Megalithic Site at Ooragutta:

- Discovery of an **Iron Age megalithic site at Ooragutta near Bandala village in Mulugu district**.
- Site showcases new types of monuments not found elsewhere in India, indicating **a distinct architectural style and cultural practice.**
- Monuments suggest **high craftsmanship and architectural planning.**

Rock Art Sites at Damaratogu:

- Discovery of **two new rock art sites at Damaratogu in Bhadradri Kothagudem district.**
- One site, 'Devarlabanda Mula', exclusively depicts animals, suggesting a cultural significance related to hunting or animal worship.
- **Absence of weapons or domestic animal**s in paintings indicates possible mesolithic age origin, dating between 8000 – 3000 BCE.

Mahavir Jayanti

Context:

- The Vice President greeted the people of the nation on the occasion of Mahavir Jayanti.

Details

Introduction

- Mahavira, also known as **Vardhamana, was the 24th Tirthankara of Jainism.**
- He was the spiritual **successor of the 23rd Tirthankara Parshvanatha.**

Early Life

- Born in the early 6th century BCE into a royal family in Bihar.
- His **mother was Trishala, and his father was Siddhartha,** both devout followers of Parshvanatha.

Renunciation and Spiritual Journey

- Renounced all worldly possessions around the age of 30 and became an ascetic.
- Practiced intense meditation and severe austerities for 12 and a half years, leading to **Kevala Gyan (omniscience).**

Teachings

- Preached for 30 years, emphasizing the vows of **ahimsa (non-violence), satya (truth), asteya (non-stealing), brahmacharya (chastity), and aparigraha (non-attachment) for spiritual liberation.**
- Taught the **principles of Anekantavada (many-sided reality), syadvada, and nayavada.**

Legacy

- His teachings were compiled by his chief disciple **Indrabhuti Gautama as the Jain Agamas**.
- Usually depicted in a meditative posture, **with a lion symbol beneath him.**
- Birth celebrated as **Mahavir Janma Kalyanak and his nirvana (salvation) observed as Diwali.**

Panhala Fort

Context

- The Archaeological Survey of India (ASI) celebrated World Heritage Day at Panhala Fort.

Details

Location and Significance

- Located in Panhala, 20 km northwest of Kolhapur, Maharashtra. Strategically located overlooking a pass in the Sahyadri mountain range, a major trade route from Bijapur to coastal areas.

History

- Built between 1178 and 1209 CE by the Shilahara ruler Bhoja II.
- Under Various Dynasties: Passed into the hands of the Devgiri Yadavas, later becoming an outpost of the Bahamanis of Bidar,

fortified by the Adil Shahi dynasty of Bijapur in 1489. Witnessed skirmishes involving the Marathas, Mughals, and the British East India Company.

- Shivaji's Rule: Taken by Shivaji from Bijapur in 1659, occupied permanently in 1673.
- Under Kolhapur Kings: Center of disputes between Sambhaji and Rajaram I after Shivaji's death, captured and recaptured by various forces in the late 17th and early 18th centuries.
- British Rule and Later: Taken by the British in 1827, dismantled in 1844; seat of the Kolhapur government moved to Kolhapur in 1782.

Major Features

- One of the largest forts in the Deccan, with a perimeter of 14 km and 110 lookout posts.
- Features numerous tunnels and fortifications in the Bijapuri style, with notable structures like Andhar Bavadi, Kalavanticha Mahal, and Amberkhana.
- Temples and mausoleums dedicated to various figures, including Shivaji, Sambhaji II, and Ramchandra Pant Amatya.

Significance of Panhala Fort

- Reflects the transfer of power among various dynasties, strategically located near trade routes connecting the Sahyadri mountains, the Deccan plateau, and the Konkan coast.

Architectural Features

- Partially protected by natural scarp and strengthened with basalt stone fortification.
- Includes three **doublewalled gates, several water bodies like Someshwar Tank, and notable structures like Andhar Vav and Nayikinicha Sajja.**

Indian Historical Records Commission (IHRC)

Context

- Indian Historical Records Commission (IHRC) adopted a New Logo and Motto.

Indian Historical Records Commission (IHRC) Logo and Motto

Establishment and Role:

- **Founded in 1919**, IHRC is India's apex advisory body on archival matters.
- It advises the Government of India on record management and historical research, serving as a forum for creators, custodians, and users of records.

Leadership and Structure:

- **Headed by the Union Minister of Culture**, reflecting its national significance.

Logo and Motto Competition:

- In 2023, an online competition was launched on MyGov to design IHRC's logo and motto.
- Aimed to visually represent IHRC's unique identity and ethos.

Logo Design and Symbolism:

- Features **lotus petal-shaped pages symbolizing resilience in historical record preservation.**

- **Central Sarnath pillar** represents India's rich historical past.
- Brown color theme underscores IHRC's mission of preserving and honoring India's historical records.

Motto and Significance:

- Translates to ***"Where history is preserved for the future."***
- Signifies IHRC's role in identifying, collecting, cataloging, and maintaining historical documents.
- Reflects commitment to conserving valuable historical knowledge for present and future generations.

IHRC's logo and motto encapsulate its mission of safeguarding India's historical records for future generations.

Carnation Revolution

Context

- **Thousands gathered on April 25**, to commemorate the half-century mark of Portugal's historic 'Carnation Revolution'.

The Carnation Revolution (25 April):

- A pivotal event in Portugal's history, **marking the overthrow of the authoritarian Estado Novo regime in Lisbon on April 25, 1974.**
- **Orchestrated by the Armed Forces Movement**, it triggered significant social, economic, and political transformations.

Transition to Democracy:

- **Ended decades of dictatorship**, catalyzing Portugal's transition to democracy.
- Military officers aligned with civilian resistance movements paved the way for democratic reforms and political freedoms.

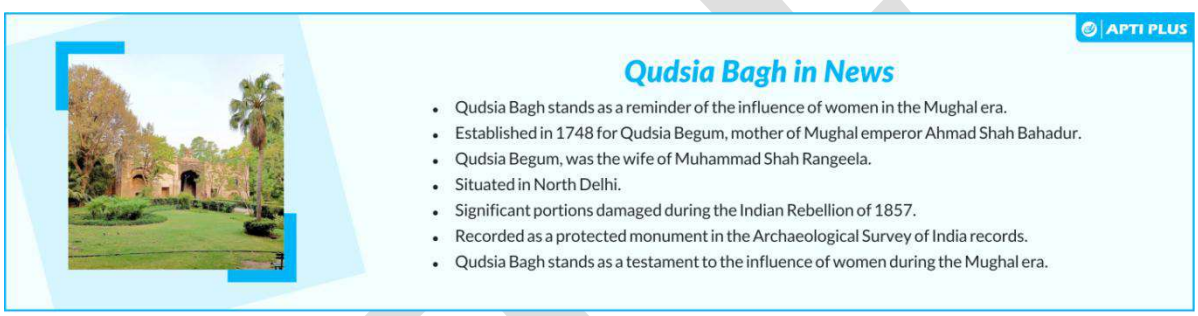
Revolution and Decolonization:

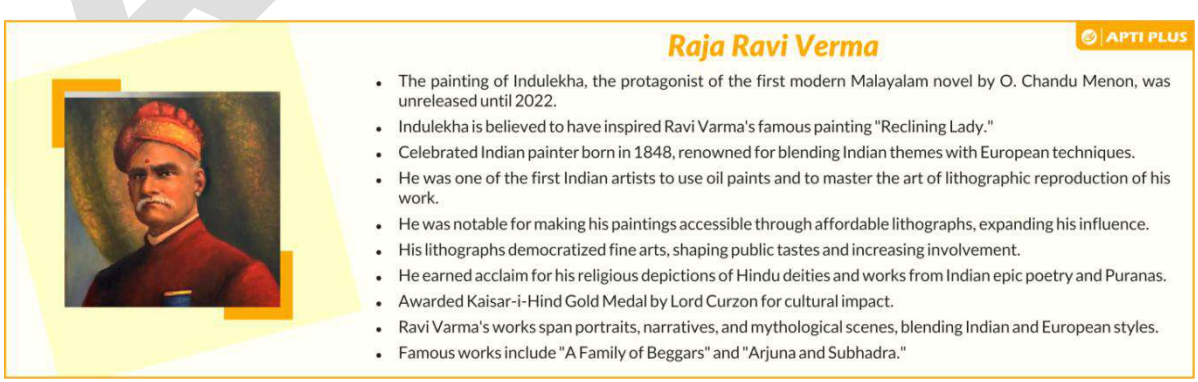
- **Led to the end of Portugal's colonial wars in** Africa, alongside the pursuit of democracy.
- Precipitated rapid decolonization, **resulting in the independence of several African nations, including Guinea-Bissau, Cape Verde, Mozambique, and others.**
- Negotiations with independence movements followed swiftly, **reshaping the geopolitical landscape of Africa and Southeast Asia.**

The Peaceful Nature of the Uprising:

- **Named for the peaceful manner** in which it was carried out, contrasting with other revolutionary movements.
- Notable for the iconic image of carnations offered to soldiers in the streets, symbolizing peace and solidarity.

8.4 SNIPPETS





9. GEOGRAPHY & DISASTER MANAGEMENT

9.1 SHORT ARTICLES

Annual Land Use and Land Cover Atlas Of India

Context

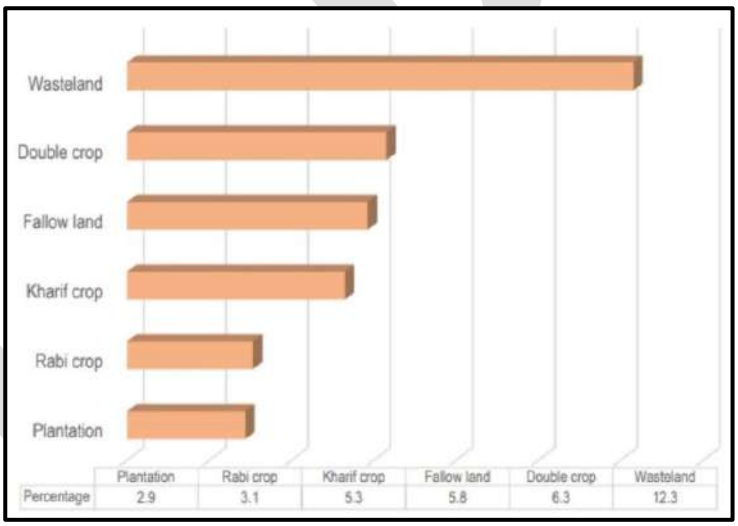
- The National Remote Sensing Centre (NRSC) reports that built-up areas across India expanded by 2.5 million hectares, representing a 31% increase from 2005 to 2022, indicating rapid urban sprawl.

Key Highlights

- A recent report by the National Remote Sensing Centre (NRSC) reveals a significant **increase in built-up areas (cities and towns) across the country.** From 2005 to 2022, these areas expanded by a staggering 2.5 million hectares, reflecting a growth of 31%. This surge signifies a rapid urban sprawl across India, with cities and towns gobbling up land at an alarming rate.

Source of Growth

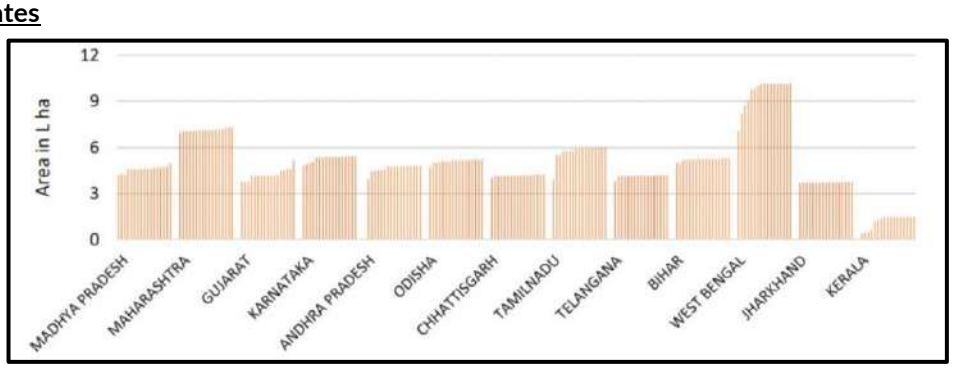
While the rise in built-up areas paints a picture of a growing economy, the source of this land raises concerns. A significant chunk (around 35%) of this expansion comes from the conversion of land previously used for other purposes:



- **Agricultural Land:** A substantial amount of fertile land dedicated to agriculture has been converted for urban development. This includes:
  - **Multi-cropping Land:** A concerning 6.3% of land used for double or triple cropping throughout the year has been sacrificed for urban sprawl. This land is particularly valuable as it produces multiple harvests annually.
  - **Seasonal Crops:** Land dedicated to Kharif crops (summer harvest) and Rabi crops (winter harvest) has also been impacted. 5.3% of Kharif land and 3.1% of Rabi land have been converted, raising concerns about food security in the long run.
  - **Plantations:**Even areas with permanent crops like orchards and plantations haven't been spared. A significant 2.9% of plantation land has been lost to urbanization.
- **Wasteland:** Degraded and unproductive land categorized as wasteland also contributed to the expansion. However, this conversion (12.3%) is less concerning compared to the loss of fertile agricultural land.

Uneven Growth across States

- The report reveals an uneven distribution of urban growth. Some states, like Madhya Pradesh, Gujarat, Karnataka, West Bengal, and Andhra Pradesh, have



witnessed a more substantial rise in built-up areas compared to others. This suggests a concentration of urbanization in specific regions.

The Driving Forces

- A significant increase in government spending on infrastructure projects like roads, highways, and railways is a major driver. This spending has surged, with state and union capital expenditures rising from ₹1.28 lakh crore in 2005-06 to a staggering ₹11.92 lakh crore in 2022-23.
- The report highlights the massive expansion of national highways across several states. For instance, Gujarat witnessed a phenomenal 175% growth in national highway length, followed by Karnataka (109%), Andhra Pradesh (94%), Madhya Pradesh (75%), and West Bengal (58%).

Tornadoes

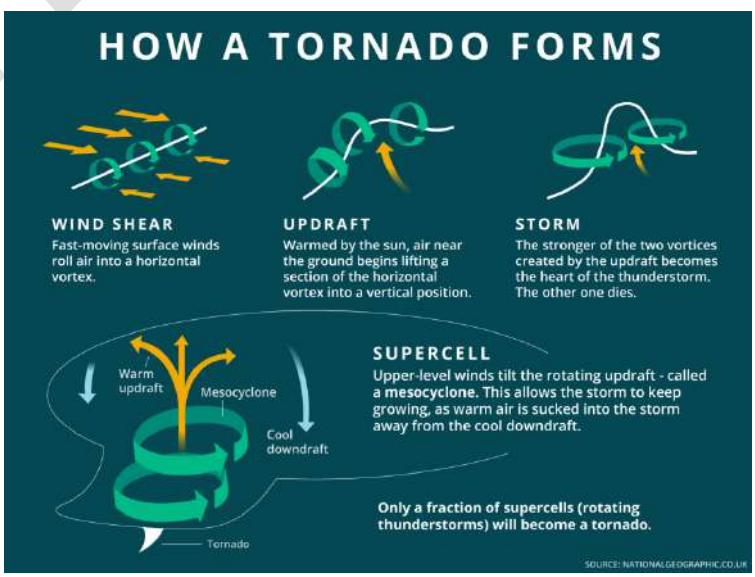
Context

- India recently witnessed a devastating tornado hit the Mainaguri area of Jalpaiguri district in West Bengal. While tornadoes are uncommon in the country, experts are concerned about a possible increase in their frequency and intensity due to climate change.

About Tornado

ENHANCED FUJITA SCALE	DAMAGE
EF-0 (65-85 MPH)	LIGHT
EF-1 (86-110 MPH)	MODERATE
EF-2 (111-135 MPH)	CONSIDERABLE
EF-3 (136-165 MPH)	SEVERE
EF-4 (166-200 MPH)	DEVASTATING
EF-5 (200+ MPH)	INCREDIBLE

- **Tornadoes are rotating columns of air that form from thunderstorms** and reach the ground.
- They are incredibly powerful and can cause fatalities and devastate entire areas in seconds. **Wind speeds can reach up to 300 miles per hour,** with a damage path exceeding a mile wide and 50 miles long.
- They form when warm, moist air collides with cool, dry air in a low-pressure system, creating instability that leads to thunderstorms.
- **Tornadoes can occur anywhere with thunderstorms**, but they are most common in the mid-latitudes (between 20 and 60 degrees north and south).
- The **Enhanced Fujita scale (EF-scale) is used to measure tornado strength based on wind speeds and damage caused.** It ranges from EF0 (weakest) to EF5 (strongest).



How can climate change impact tornado occurrence?

- **Warming Seas:** Rising sea temperatures, such as those in the Bay of Bengal, increase atmospheric moisture. Moisture-laden air is a critical ingredient for thunderstorm development and tornado formation.
- **Land Temperature Increase:** Warmer land temperatures contribute to greater atmospheric instability. As the land heats up, it can create areas of rising warm air, leading to convective instability—another condition favourable for severe weather.

- **Shifts in Wind Patterns:** Climate change can alter global wind patterns, which play a crucial role in tornado development. Changes in wind direction and strength can influence the formation and intensity of thunderstorms capable of producing tornadoes.

Challenges for India

- **Limited Monitoring and Preparedness:** India lacks an official tornado monitoring system, making it challenging to predict and prepare for these events.
- **Vulnerability of Communities:** Tornadoes can cause significant damage to property and pose risks to human life, particularly in densely populated areas.
- **Need for Adaptation Strategies:** Improved disaster management and mitigation strategies are essential to enhance community resilience against tornadoes and other extreme weather events.

Tornado Occurrence in India

- **Tornadoes are relatively rare in India** compared to regions like the United States, but they do occur rarely, particularly in the eastern states during the pre-monsoon season.
- The recent tornado in Jalpaiguri, West Bengal, highlights the increasing frequency of such events, raising concerns about disaster preparedness and management in the region.

National Centre for Polar and Ocean Research (NCPOR)

Context

- NCPOR has performed research in partnership with the British Antarctic Survey to understand the factors behind the drop in sea ice cover in Antarctica.

Key Findings of the Research

- The Antarctic sea ice cover has been unusually low during summer seasons from 2016 to 2023. **The slowest ice expansion ever recorded was in 2023.**
- **Elevated upper-ocean temperatures** played a role in reducing ice expansion by melting or preventing ice formation.
- **Significant changes in wind patterns, particularly associated with the Amundsen Sea Low** and an atmospheric block over the Ross Sea, led to strong northerly winds that pushed the ice edge southward.
- **The eastward shift and deepening of the Amundsen Sea Low influenced climate fluctuations in West Antarctica,** impacting wind patterns and oceanic conditions.
- **Polar cyclones (storms) contributed to slow ice expansion** or retreat episodes, with rapid movements of the ice edge over short periods.

About the National Centre for Polar and Ocean Research (NCPOR)

- NCPOR (formerly National Centre for Antarctic and Ocean Research (NCAOR)), plays a crucial role in advancing scientific research and understanding in polar and oceanic regions.
- NCPOR was established in 1998 as an autonomous institution under the Ministry of Earth Sciences. It is located in Vasco da Gama, Goa.
- **Antarctic Research Stations:** NCPOR manages and maintains India's Antarctic research stations, Bharati and Maitri.
- **Arctic Research Stations:** In addition to Antarctica, NCPOR operates research stations in the Arctic region. This includes the Himadri research station in Svalbard, Norway.
- NCPOR established the Himansh high-altitude research station in Spiti.

9.2 SNIPPETS

APTI PLUS

Time Standard for the Moon

- The National Aeronautics and Space Administration (NASA) establishes a lunar time standard using atomic clocks on the Moon to enhance coordination of lunar activities.
- Einstein's Theory of General Relativity predicts that time passes differently in different gravitational fields. Due to the lower gravitational field on the Moon compared to Earth, time "ticks" faster on the Moon.
- As lunar exploration intensifies with multiple countries and private entities conducting missions, a standardised timekeeping system specific to lunar activities becomes crucial. Coordinating spacecraft operations, landings, and experiments necessitate accurate time synchronisation that accounts for lunar time dilation.
- Plans for establishing permanent lunar bases require a consistent and reliable lunar time standard for day-to-day operations, resource management, and communication with Earth.

APTI PLUS

Ring of Fire

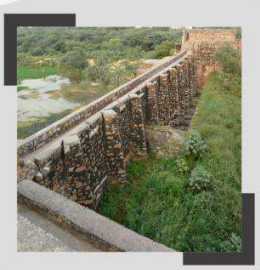
- The Ring of Fire, also referred to as the Pacific Ring of Fire, is a vast tectonic belt encircling the Pacific Ocean, spanning approximately 40,000 kilometres.
- This region is characterised by a high concentration of volcanoes and earthquakes, making it one of the most active geological zones on Earth.
- The Ring of Fire is a result of plate tectonics. The Earth's crust is made up of several large plates that are constantly moving. When these plates collide, subduct (one plate slides under another), or slide past each other, it can cause earthquakes and volcanic eruptions.
- Approximately two-thirds of the world's active or dormant volcanoes are located within the Ring of Fire.
- The region experiences around 90% of the world's earthquakes, including many of the largest and most significant seismic events recorded in history.

APTI PLUS

Mother of dragons

- Comet 12P/Pons-Brooks, also known as the "Mother of Dragons" comet, are small celestial bodies composed primarily of ice, dust, and rocky material, often referred to as cosmic leftovers from the early stages of our solar system's formation.
- Comet 12P/Pons-Brooks is classified as a Halley-type comet, named after its periodic return roughly every 71 years. This predictable orbital period allows astronomers to study it at regular intervals, providing insights into its behaviour over time.
- It belongs to the Jupiter family of comets, indicating that its orbit is significantly influenced by the gravitational forces of Jupiter. These comets typically have shorter orbital periods compared to other comet families.
- As comets approach the Sun, the solar radiation causes the icy nucleus to sublimate, releasing gases and creating a glowing coma (head) around the solid core. The solar wind pushes this released material into a characteristic tail that can extend for millions of kilometres.
- Classification of Comets; Short-Period, Long-Period, and Hyperbolic Comets. Short-period comets originate from the Kuiper Belt, while long-period comets originate from the Oort Cloud. Hyperbolic comets are one-time visitors to the solar system, often originating from interstellar space.

APTI PLUS

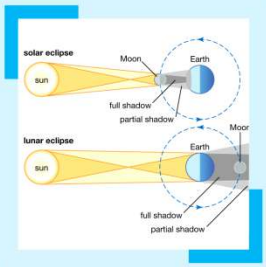


Satpula Dam

- The Satpula, a 14th-century dam constructed by Mohammad Bin Tughlaq in Delhi, holds significant historical and cultural importance, reflecting the architectural and engineering achievements of its era.
- Built-in 1340, the Satpula served a dual role: irrigation and defence. It controlled water flow from a canal originating in the Aravalli hills and acted as a boundary wall for Jahapanah, the fourth city of Delhi.
- The construction of the dam using Delhi quartz, a stone from the Aravalli region, showcases the advanced masonry techniques of the Tughlaq era.
- The canal water near Satpula was believed to have healing properties attributed to Sufi saint Nasiruddin Mahmud, adding a spiritual dimension to the site.
- The area traditionally hosted a Diwali mela where people would take a holy dip in the canal waters, reflecting the site's cultural and religious importance.

APTI PLUS

Total Solar Eclipse



- Solar eclipses occur when the Moon passes between Earth and the Sun, blocking part or all of the Sun's light. They happen during the new moon phase when the Moon's orbit aligns closely with Earth's orbital plane.
- Solar eclipses occur 2 to 5 times a year. Total solar eclipses, where the Sun is completely obscured, are relatively rare and occur approximately every 18 months somewhere on Earth.
- Total solar eclipses require a precise alignment where the Moon is perfectly between Earth and the Sun, casting its shadow on Earth's surface. Moon's orbit is tilted relative to Earth's orbit, causing most new moons to miss casting a shadow on Earth.
- Umbra shadow, where a total eclipse is visible, is relatively small (~100 miles wide) and moves across Earth's surface at varying speeds. Narrow path of the umbra contributes to the limited visibility of total eclipses from specific locations.
- Despite multiple solar eclipses in a year, the occurrence of a total solar eclipse visible from a specific location is infrequent. On average, a particular spot on Earth will witness a total solar eclipse only once every 400 years due to the small coverage of the umbral path and Earth's geographic makeup.

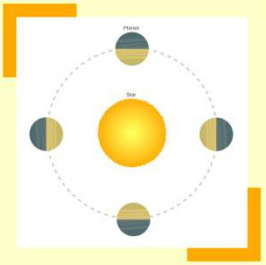
APTI PLUS

Changpa Tribes

- The border march planned by climate activist Sonam Wangchuk and the Leh Apex Body (LAB) in Ladakh highlights the challenges faced by the Changpa nomadic tribes and the broader issues affecting their livelihoods and access to traditional grazing lands.
- The Changpa nomads rely on expansive grazing lands for their herds of yaks and goats. However, they face encroachment and territorial disputes from Chinese incursions in the north and corporate activities in the south, which restrict their access to these vital grazing grounds.
- The Changpa are a semi-nomadic Tibetan ethnic group primarily located in the Changtang region of Ladakh, India, and western/northern Tibet.
- They practise high-altitude pastoralism, herding yaks and goats in the harsh, arid landscapes of the Changtang Plateau.
- The Changpa people speak Changskhat, a Tibetan dialect, and follow Tibetan Buddhism. Their cultural practices are deeply intertwined with Buddhist traditions.
- Pashmina production from Changra goats is a key economic activity for the Changpa, providing livelihoods through the sale of Pashmina fibre, milk, and meat.

APTI PLUS

First Tidally Locked Super-earth Exoplanet



- The confirmation of the first tidally locked super-Earth exoplanet, LHS 3844b, by astronomers using data from the Spitzer Space Telescope, marks a significant milestone in our understanding of celestial bodies beyond our Solar System.
- Tidally locked exoplanets are celestial bodies where one hemisphere permanently faces their host star, while the other hemisphere remains in permanent darkness.
- Tidal locking results in extreme temperature differences and unique atmospheric conditions on tidally locked exoplanets. One side experiences a permanent day, while the other remains in a permanent night.
- An exoplanet is a planet located outside our Solar System. They are detected through various methods, including transit photometry and Doppler spectroscopy.
- The main focus of exoplanet research is the search for potentially habitable worlds. These are planets located within their star's habitable zone, where conditions may support the presence of liquid water on the surface—a key factor for life.

APTI PLUS

Glacial Lake Outburst Floods (GLOFS)

- The Uttarakhand government's evaluation of the Glacial Lake Outburst Flood (GLOF) risk due to climate change-induced glacial melt is a critical initiative aimed at addressing the increasing threat of catastrophic floods in mountainous regions.
- GLOFs occur when water stored in glacial lakes is suddenly released due to the failure of natural barriers, such as moraines or ice dams, holding back the water. Glacial lakes form as glaciers retreat and leave behind depressions that fill with meltwater.
- Accelerated glacier melting, driven by rising global temperatures, has led to the formation and expansion of glacial lakes. As these lakes grow larger, they pose an increased risk of breaching natural barriers and causing devastating floods downstream.
- GLOFs can result in loss of life, injuries, and displacement of populations, especially those living downstream of glacial lakes. Floodwaters carrying debris, rocks, and ice can cause extensive damage to roads, bridges, hydropower facilities, and other infrastructure along river valleys.

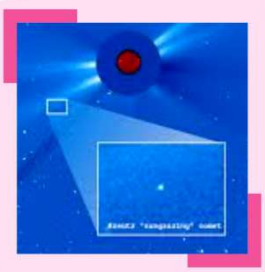
APTI PLUS

Thorium Reserves in India

- India accounts for 25% of the world's Thorium reserves.
- Thorium is a radioactive element found in Kerala, Odisha, Andhra Pradesh, West Bengal, Tamil Nadu. Together, Kerala and Odisha account for over 70% of India's thorium reserves.
- Thorium is weakly radioactive compared to other elements used in nuclear reactors.
- It is estimated to be three to four times more abundant than Uranium in the Earth's crust.
- Monazite is a mineral sand that contains Thorium along with other rare earth elements.
- Thorium, though not directly usable, can be converted into fissile Uranium-233 for nuclear power.
- India's Three-Stage Nuclear Program aims to utilize natural uranium, then plutonium from spent fuel, before finally transitioning to large-scale thorium use.
- Thorium has the potential to provide clean energy and reduce reliance on foreign fuel sources.

APTI PLUS

Sungrazer Comet



- Comets are icy celestial bodies that orbit the Sun.Sungrazing comets are a special class of comets that travel on paths bringing them extremely close to the Sun during their orbit (Perihelion [< 1.6 million km]).
- Due to their proximity, sungrazing comets are subjected to intense solar heat and gravitational forces, causing them to disintegrate or vaporize quickly.
- They do not collide with the Sun's surface. Their orbital paths keep them at a distance despite their close approach.
- Many sungrazers are believed to be fragments of larger comets, like those from the Kreutz group, which originated from a larger comet that broke apart centuries ago.
- Comets are primarily composed of volatile ices (like water ice) along with silicate and organic dust particles. When comets approach the sun, the heat causes these ices to sublimate, creating a coma (atmosphere) around the comet nucleus.

APTI PLUS

Volcanic Vortex Rings

- Mount Etna emits volcanic vortex rings from a new vent, these rings are formed during explosive volcanic eruptions characterised by the rapid release of pressurised gases, ash, and volcanic particles.

APTI PLUS

Veeranam Lake

- Veeranam Lake is situated in the Cuddalore district of Tamil Nadu.
- It is considered one of the longest man-made lakes in the world with a length of 14 km.
- The source of Veeranam is the river of Kollidam; which is the Northern distributary of the Cauvery River, where the Vadavaru river links both the Veeranam and Kollidam.
- Inflow from the Mettur dam through the Lower Anicut also contributes to replenishing the lake, particularly during specific periods.
- Veeranam Lake, historically known as Veeranarayanapuram Lake, has a remarkable history dating back to the 10th century during the Greater Chola period.
- It was constructed by Rajaditya Chola, named after a nearby Vishnu temple, and derived from his father's title, "Veeranarayanan."
- Veeranam Lake features prominently in literature, notably appearing in the opening chapter of the renowned Tamil historical novel "Ponniyin Selvan" by Kalki Krishnamurthy.
- The construction of Veeranam Lake using rudimentary tools highlights the exceptional engineering prowess of the Greater Chola dynasty.
- The Burevi Cyclone which happened recently, got converted into a depression and filled up the lake with its continuous rainfall.

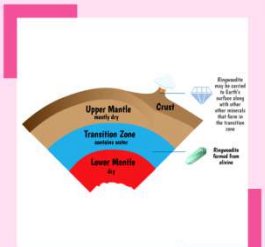
APTI PLUS

Salas Y Gómez

- Scientists identified several potentially new species while studying the Salas y Gómez Ridge, an underwater mountain range in the Southeastern Pacific Ocean.
- The island is part of Chile and is considered one of the most remote places in the world.
- It is situated on the Salas y Gómez Ridge, which runs in a west-east orientation and connects the East Pacific Rise with the Nazca Ridge.
- The island is largely barren with minimal terrestrial vegetation, including only four species of terrestrial plants such as ferns.
- It hosts approximately a dozen species of seabirds including Christmas shearwaters, masked boobies, brown noddies, and great frigatebirds.
- The island was known to the indigenous people of Easter Island (Rapa Nui), who occasionally visited to collect seabirds and eggs.
- The surrounding waters are influenced by the Humboldt Current System, which brings cold, nutrient-rich waters.
- The Atacama Trench, located to the west of the island, contributes to the island's seclusion, limiting exchanges with other oceanic areas.
- Recognizing its unique marine environment, Salas y Gómez is being considered for designation as a Marine Protected Area (MPA).

APTI PLUS

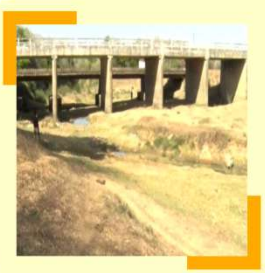
Gigantic Ocean discovered



- The discovery of a massive ocean trapped within a mineral called ringwoodite deep within Earth's mantle, approximately 700 km below the surface.
- Ringwoodite is a high-pressure form of magnesium silicate (Mg_2SiO_4) formed under the extreme temperatures and pressures of the Earth's mantle, specifically between 525 and 660 kilometres depth. It can also contain iron and hydrogen.
- Ringwoodite can contain hydroxide ions (OH^-) within its structure. This essentially allows it to store water, with estimates suggesting the mantle transition zone (where ringwoodite is abundant) holds one to three times the volume of water in Earth's oceans.
- Ringwoodite was first identified in the Tenham meteorite in 1969. Its presence in meteorites and its stability at mantle depths suggest it's a major component of the Earth's mantle, influencing its overall properties.

APTI PLUS

Lakshmana Teertha River



- The drying up of the Lakshmana Tirtha River is a serious issue that highlights the severe effects of drought and insufficient rainfall on residents and ecosystems.
- It originates in the Brahmagiri Hills and flows eastward, forming Irupu Falls.
- The river flows through the Nagarahole National Park.
- It joins the Kaveri River at the Krishna Raja Sagara reservoir.
- The Rameshwara Temple is situated on the banks of the Lakshmana Tirtha River.
- The Kaveri originates at Talakaveri in the Brahmagiri range of the Western Ghats (Karnataka), it flows through Karnataka and Tamil Nadu before emptying into the Bay of Bengal at Poompuhar, Tamil Nadu.
- The Kaveri is the third largest river in southern India, following the Godavari and Krishna rivers. It is the largest river in Tamil Nadu, virtually dividing the state into north and south.
- The Kaveri basin covers three states and a union territory: Tamil Nadu, Karnataka, Kerala, and Puducherry. The basin is fed by several tributaries, including Harangi, Hemavati, Kabini, Bhavani, Lakshmana Tirtha, Noyyal, and Arkavati.

APTI PLUS

Mount Ruang

- The recent eruptions of Mount Ruang in North Sulawesi Province, Indonesia, have caused significant disruptions and safety concerns for the local population.
- Stratovolcanoes are conical-shaped volcanoes, also known as composite volcanoes, that make up about 60% of Earth's volcanoes. Mount Ruang falls into this category. They are built up over time by alternating layers of lava, ash, and volcanic debris from past eruptions.
- Mount Ruang is located in the Sangihe Islands arc alongside other volcanoes like Klabat, Siau, and Ternate.
- Volcanic eruptions are the release of molten rock (magma), hot rock fragments, and hot gasses from a vent or fissure in the Earth's crust.

A volcanic eruption can release:

- Lava Flows: Streams of molten rock that can engulf entire landscapes and scorch everything in their path.
- Pyroclastic Flows: Superheated avalanches of ash, rock fragments, and gas that race down volcano flanks at incredible speeds, incinerating everything in their path.
- Ashfall: Fine particles of pulverized volcanic rock that can blanket vast areas, disrupting transportation, contaminating water supplies, and causing respiratory problems.
- Lahars: Mudflows composed of volcanic debris mixed with water, capable of travelling long distances and causing devastating floods.

APTI PLUS

Glacial Lakes

- The Indian Space Research Organisation (ISRO) report highlighted that over 27% of identified glacial lakes have expanded significantly since 1984, with 130 of these lakes located in India.
- They form when glaciers erode the land and then melt, leaving behind depressions that fill with water. As glaciers retreat, they deposit sediments and create basins where water can accumulate.
- They are commonly found in areas that were once covered by ice sheets or glaciers, such as regions in the Northern Hemisphere that were impacted by the last ice age. They are often located in valleys, cirques (bowl-shaped depressions), or behind moraines (ridges of glacial till).
- They can support unique ecosystems, including cold-water fish species adapted to the cold, nutrient-rich waters.

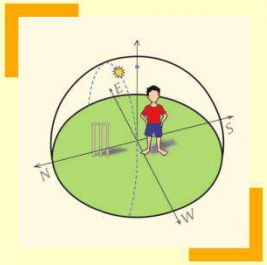
Glacial lakes can be classified into four main types based on their formation process:

- Moraine-dammed lakes: These are the most common type of glacial lake. They form when a glacier retreats and leaves behind a pile of rocks and debris (moraine) that dams a valley. Moraine-dammed lakes can be very large and deep.
- Ice-dammed lakes: These lakes form when a glacier advances and dams a valley. Ice-dammed lakes are typically temporary, as they can be breached by the glacier itself or by meltwater.
- Erosion lakes: These lakes form in depressions carved out by glaciers. Erosion lakes can be large or small, and they may be deep or shallow.
- Subglacial lakes: These lakes form beneath glaciers, where meltwater collects at the base of the ice. Subglacial lakes are difficult to study, but they are thought to be quite common.

APTI PLUS

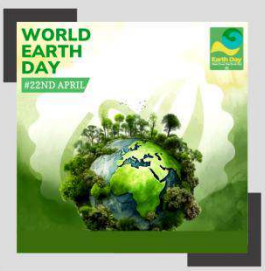
Mount Erebus

- Mount Erebus emits gold dust valued at $6000 each day (about 80 grams), however, due to its remote location, the gold is inaccessible, and scientists monitor the volcano via satellite.
- Mount Erebus is Antarctica's highest active volcano, located on Ross Island, it stands as the most southerly volcano.
- It is known for having a rare "lava lake" within one of its summit craters.
- The volcano has been continuously active since 1972, and its emissions include gold particles.
- The gold originates from volcanic rock and is carried by gases released during eruptions. Some of this gold can also be found in surrounding snow.
- It is a stratovolcano, built layer upon layer from hardened lava flows, volcanic ash, and tephra (fragments of rock and ash ejected during eruptions).
- Mount Erebus shows a remarkable feature - a long-lived lava lake within its summit crater. This pool of molten rock has been continuously active for at least the past 50 years, making it one of the few such permanent lava lakes on Earth.



Zero Shadow Day (ZSD)

- Zero Shadow Day occurs twice a year in regions between the Tropic of Cancer and the Tropic of Capricorn when the Sun is directly overhead at a particular latitude.
- The first occurrence typically falls around April/May when the Sun is moving northwards, and the second occurs around July/August when the Sun is moving southwards.
- On this Day, the Sun is positioned directly overhead at local solar noon. This means that at this specific time, objects cast no shadows or very minimal shadows because the Sun's rays are coming from directly above, perpendicular to the surface.
- The effect can be observed for a short duration, typically lasting for about a minute to a minute-and-a-half. During this brief period, shadows disappear or become extremely faint due to the Sun's direct overhead position.



World Earth Day

- World Earth Day, celebrated annually on April 22nd, is a global event dedicated to raising awareness about environmental conservation and promoting sustainability efforts.
- The theme for World Earth Day 2024, 'Planet v/s Plastics', highlights the urgent need to address the global plastic pollution crisis.
- The concept of Earth Day originated in the late 1960s amid growing concerns over environmental issues. Peace activist John McConnell proposed the idea of Earth Day at a 1969 UNESCO conference, advocating for a day to honour the Earth and promote peace.
- The first Earth Day was celebrated in the United States on April 22, 1970, and gained international recognition when the United Nations officially acknowledged it in 1972.

Tundra

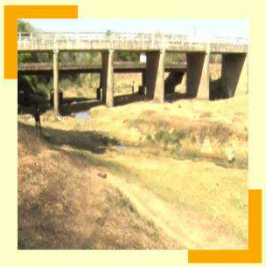
- The study, Environmental drivers of increased ecosystem respiration in a warming tundra, revealed that rising temperatures in arctic and alpine tundra ecosystems increase ecosystem respiration, releasing carbon into the atmosphere and potentially changing these environments from carbon sinks to carbon sources.
- Tundra ecosystems are found in regions with high latitudes, primarily in the Arctic and high mountain areas (alpine tundra).
- They are characterised by cold climates, low temperatures, low annual precipitation, with much of it falling as snow, and short growing seasons.
- The vegetation includes low-lying plants such as mosses, lichens, grasses, and small shrubs. Plants are adapted to cold conditions and have shallow root systems to cope with permafrost (permanently frozen ground).
- Animals have special adaptations to survive harsh conditions, such as thick fur, hibernation, or migration. Common animals include Arctic foxes, polar bears, caribou (reindeer), muskoxen, and migratory birds.
- They store a significant amount of carbon in permafrost and vegetation. Climate warming can release stored carbon into the atmosphere, contributing to global warming.

Northern Permafrost Region

- In the study published in the journal Global Biogeochemical Cycles, researchers highlighted that the northern permafrost region, which covers a fourth of the northern hemisphere, is currently releasing more greenhouse gases (GHGs) into the atmosphere than it is absorbing.
- Historically, permafrost regions absorbed more greenhouse gases than they released. Now, due to rising temperatures, these regions are becoming net emitters of greenhouse gases, contributing to global warming.
- The study highlights emissions of methane, nitrous oxide, and carbon dioxide from thawing permafrost. As permafrost thaws, it releases greenhouse gases, which trap more heat and accelerate thawing, leading to even more emissions.
- The study suggests fire management, wetland conservation, and climate-resilient practices to minimise emissions and maintain the carbon sink capacity of these ecosystems.
- Permafrost refers to soil, sediment, or rock that remains continuously frozen for at least two consecutive years. It forms in regions where the temperature remains below freezing point (0°C) for a significant part of the year, typically in polar and high-altitude environments.

APTI PLUS

Great Nicobar



- A group of experts have expressed concerns about the Great Nicobar Project (a large-scale infrastructure development initiative), due to potential negative impacts on indigenous communities and the environment.
- Great Nicobar Island is the largest and southernmost island in the Nicobar Islands of India.
- Largely covered by rainforests.
- Has several rivers like Alexandra, Amrit Kaur, Dogmar and hills like Mt. Thullier (642m).
- Indira Point is the southernmost point of Great Nicobar and India itself.
- Home to endemic species like Nicobar scrubfowl, giant leatherback turtles, Nicobar macaques, and crocodiles.
- The island shelters two national parks: Galathea Bay National Park and Campbell Bay National Park. These parks protect the island's rich biodiversity, including endangered species such as the saltwater crocodile.
- The island is home to two indigenous communities: Shompen and Nicobarese.

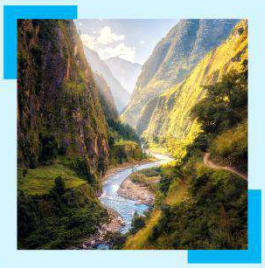
APTI PLUS

International Conference On Disaster Resilient Infrastructure (ICDRI)

- The Prime Minister of India addressed the 6th International Conference on Disaster Resilient Infrastructure (ICDRI).
- The conference is organised annually. The theme for 2024 is "Investing today for a more resilient tomorrow".
- ICDRI was launched by India at the 2019 UN Climate Summit, it is India's second major global initiative after the International Solar Alliance (ISA).
- The primary objective is to promote a global community dedicated to building infrastructure that can withstand disasters and climate change impacts
- The headquarters is established in New Delhi.
- Currently, the CDRI comprises 39 countries and 7 organisations, including national governments, United Nations agencies and programs, multilateral development banks, private sector entities, and academic/research institutions.

APTI PLUS

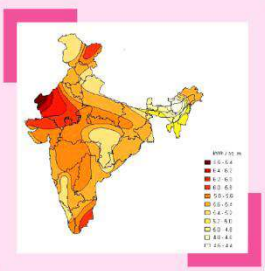
Himalayas: A Biodiversity Hotbed



- The steep slopes create large temperature changes over short vertical distances, resulting in diversified vegetation zones ranging from lush forests at lower elevations to tundra at higher altitudes.
- The environmental diversity encourages the coexistence of species adapted to specific ecological niches, contributing to high biodiversity levels.
- The middle elevations (1,000 to 3,000 metres) have the maximum biodiversity, with favourable temperatures and precipitation levels supporting a diverse range of plant and animal species due to ideal ecological conditions.
- Forests in the Himalayas serve as important carbon sinks by absorbing carbon dioxide (CO_2) from the atmosphere during photosynthesis, storing carbon in tree biomass (trunks, branches, leaves, and roots), and contributing to carbon balance, thus limiting climate change impacts.

APTI PLUS

Solar Radiation in India



- A study by the India Meteorological Department (IMD) based on data from 13 IMD stations from 1985 to 2019 found that solar radiation for electricity generation in India is declining, likely due to rising aerosol load and cloud formation.
- Aerosols, originating from industrial emissions, vehicle exhaust, biomass burning, and dust storms, absorb and scatter sunlight, diminishing solar panel efficiency by reducing the amount of sunlight available for electricity conversion.
- Aerosols acting as cloud condensation nuclei promote cloud formation, which blocks incoming solar radiation, reducing sunlight reaching the Earth's surface and impacting solar energy generation.
- The declining solar radiation trend poses a significant challenge to India's goal of reaching 500 GW of renewable energy capacity by 2030, particularly impacting solar-dependent regions like Gujarat and Rajasthan.

APTI PLUS

Indian National Centre for Ocean Information Services (INCOIS)

- A study conducted by scientists at the Indian National Centre for Ocean Information Services (INCOIS) focused on mapping the Indian Ocean floor.
- INCOIS was established in 1998 under the Union Ministry of Earth Sciences.
- Its objective is to enhance understanding of the Indian Ocean through systematic observations and scientific research.
- It provides a range of services aimed at various stakeholders, including Potential Fishing Zone Advisories, Tsunami Early Warnings, and Ocean State Forecasts.
- INCOIS is the unit of the Earth System Science Organization (ESSO), ESSO-INCOIS has a prominent international presence, being a permanent member of the Indian delegation to the Intergovernmental Oceanographic Commission (IOC) of UNESCO and a founding member of the Indian Ocean Global Ocean Observing System (IOGOOS) and the Partnership for Observing the Oceans (POGO).

APTI PLUS

Ross Ice Shelf

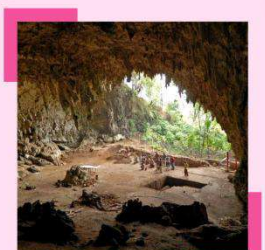
- Research published in "Geophysical Research Letter" highlighted that the Ross Ice Shelf moves several centimetres forward every day. Unlike ordinary glaciers, which have continuous flow, they move in a stop-and-go pattern.
- The Whillans Ice Stream, located beneath the Ross Ice Shelf, has a significant influence on its daily motions.
- Daily movements on the Ross Ice Shelf may contribute to the development of icequakes and cracks within the shelf.
- The Ross Ice Shelf is Antarctica's largest ice shelf, covering around 800 kilometres—an area almost equal to the size of France.
- It is located in the Ross Dependency, which is an area claimed by New Zealand.

APTI PLUS

English Channel

- The English Channel is a water body that separates southern England from northern France.
- It is connected to the North Sea via the Strait of Dover.
- The Channel is approximately 560 km long and varies in width from 240 km at its widest to just 34 km at the Strait of Dover.
- It was formed around 10,000 years ago by rising sea levels after the last glacial period.
- The Channel is a vital shipping lane, connecting major ports in the UK, France, and other European countries.
- Mihir Sen, an Indian swimmer, made history in 1958 by becoming the first Indian and Asian to successfully swim across the English Channel.

APTI PLUS

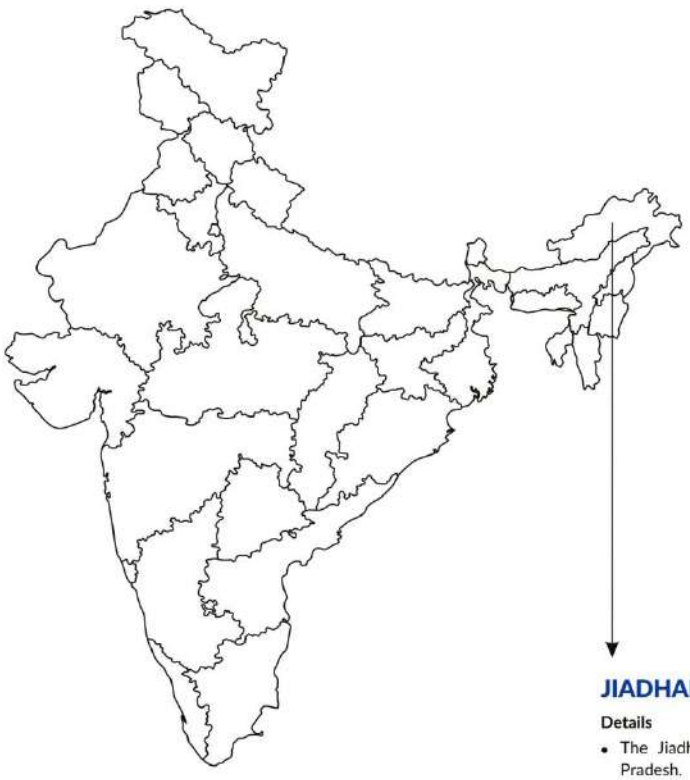


Kitum Caves

- The Kitum Cave in Mount Elgon National Park, Kenya, has gained attention for its relationship with deadly viruses such as Marburg and Ebola, which are transmitted by fruit bats that live in the cave.
- Kitum Cave is a non-solutional cave formed by pyroclastic (volcanic) rocks.
- The cave's walls are high in salt, attracting a variety of species, particularly elephants.
- By digging and expanding the cave, elephants unintentionally contribute to the exposure and transmission of infectious agents within the cave's environment.
- The Marburg virus is highly lethal with a mortality rate of up to 88% among infected individuals. The World Health Organization (WHO) has classified the virus as epidemic-prone due to its potential to cause widespread outbreaks.

10. PLACES IN NEWS

10.1 IN INDIA

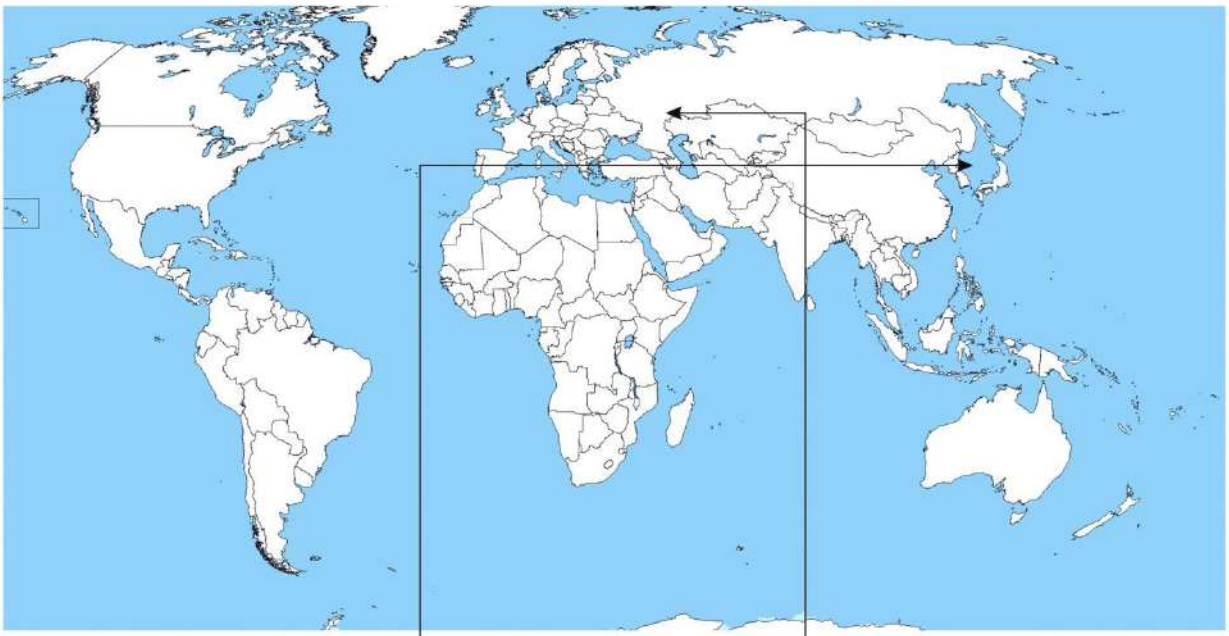


JIADHAL RIVER

Details

- The Jiadhal River originates from the hills of Arunachal Pradesh.
- It flows through the Dhemaji district of Assam, sustaining communities and agriculture along its banks.
- Near its endpoint, the Jiadhal River merges with the Subansiri River, a tributary of the Brahmaputra.
- The Jiadhal River, referred to as the "Sorrow of Dhemaji" due to the significant damage caused by annual floods and erosion, holds crucial importance in the Dhemaji district of Assam.

10.2 IN WORLD



SEA OF JAPAN

Details

- The Sea of Japan is bordered by: Japan to the east, Sakhalin Island (part of Russia) to the north, the Korean Peninsula to the west, and the Russian Far East to the northeast.
- The Sea of Japan is largely isolated from the Pacific Ocean. This isolation contributes to its distinct characteristics, such as minimal tides, high concentration of dissolved oxygen, higher productivity, lower faunal diversity compared to open ocean areas, and lower salinity.
- The sea's water balance is primarily influenced by the inflow and outflow through connecting straits, including the Korea Strait and Tsugaru Strait.
- The inflow of freshwater from rivers and the limited exchange with the ocean create an environment rich in nutrients, which fuels the growth of plankton – the base of the marine food chain. This abundance of plankton makes the Sea of Japan a hotspot for fishing activity.

URAL RIVER

Details

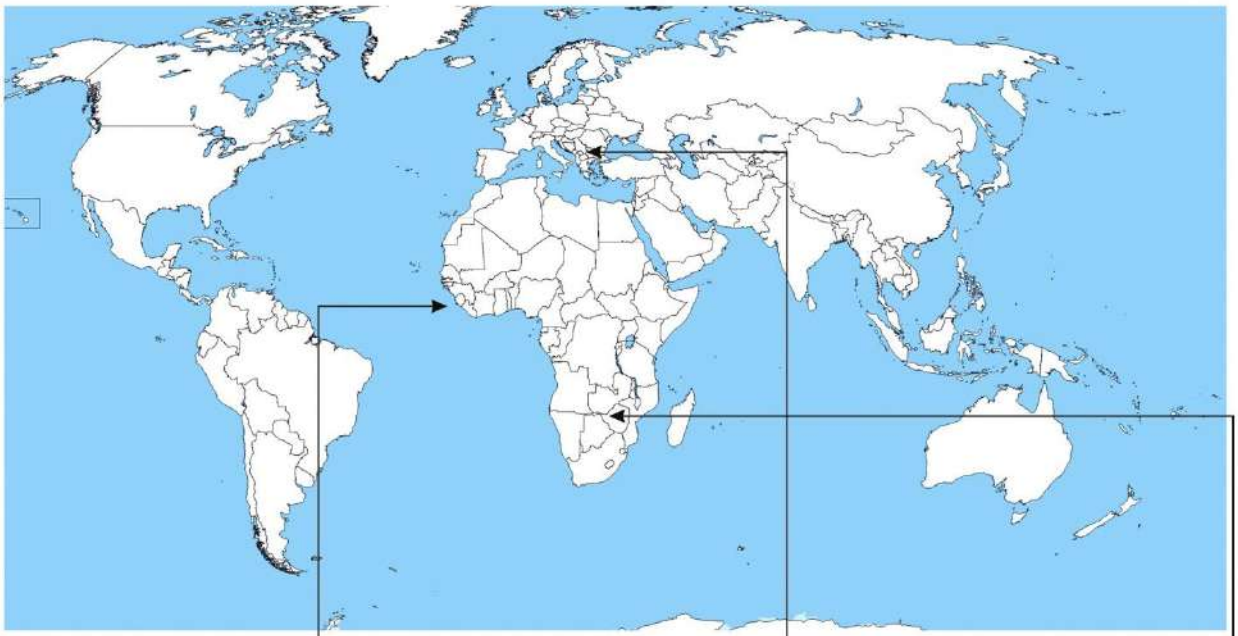
- The declaration of a federal emergency in Russia due to flooding along the Ural River, particularly affecting Orsk.
- The Ural River starts near Mount Kruglaya in the Ural Mountains, which stretch across western Russia from the Arctic Ocean to the Ural River and northwestern Kazakhstan.
- It flows through both Russia and Kazakhstan, serving as a vital waterway for these regions.
- The Ural River acts as a natural border between Europe and Asia, marking a significant geographical boundary.
- The river originates in the southern Ural Mountains and eventually empties into the Caspian Sea, which is the world's largest inland body of water.
- The Ural River is recognized as the third-longest river in Europe, after the Volga and the Danube.

SOUTHERN OCEAN

Details

- The Southern Ocean, encircling Antarctica, is celebrated for having the cleanest air on Earth. This cleanliness is credited to several factors beyond the absence of human industrial activity. While human pollution is limited in this remote region, natural sources like sea spray and wind-blown dust still contribute aerosols to the atmosphere, impacting air quality.
- Researchers have discovered that rain plays a critical role in purifying the atmosphere over the Southern Ocean. Unlike other regions that may experience less frequent and less intense rainfall, the Southern Ocean encounters occasional but intense rain showers. These heavy rain showers are instrumental in cleansing the atmosphere by washing away aerosol particles.

10.2 IN WORLD



SIERRA LEONE

Details

- Sierra Leone declared a national emergency to tackle the worsening issue of drug abuse.
- The affordability and accessibility of drugs, particularly Kush, have contributed significantly to the rise in substance abuse among Sierra Leone's youth.
- Sierra Leone, located on the southwest coast of West Africa, shares borders with Liberia and Guinea.
- Sierra Leone is culturally diverse, with approximately 18 ethnic groups, including the Temne and Mende peoples. The Creole minority, descendants of freed African-Americans and Afro-Caribbean slaves, adds to the country's rich cultural tapestry.
- The country is endowed with natural resources such as diamonds, gold, bauxite, and aluminium, contributing to its economic potential.

KOSOVO

Details

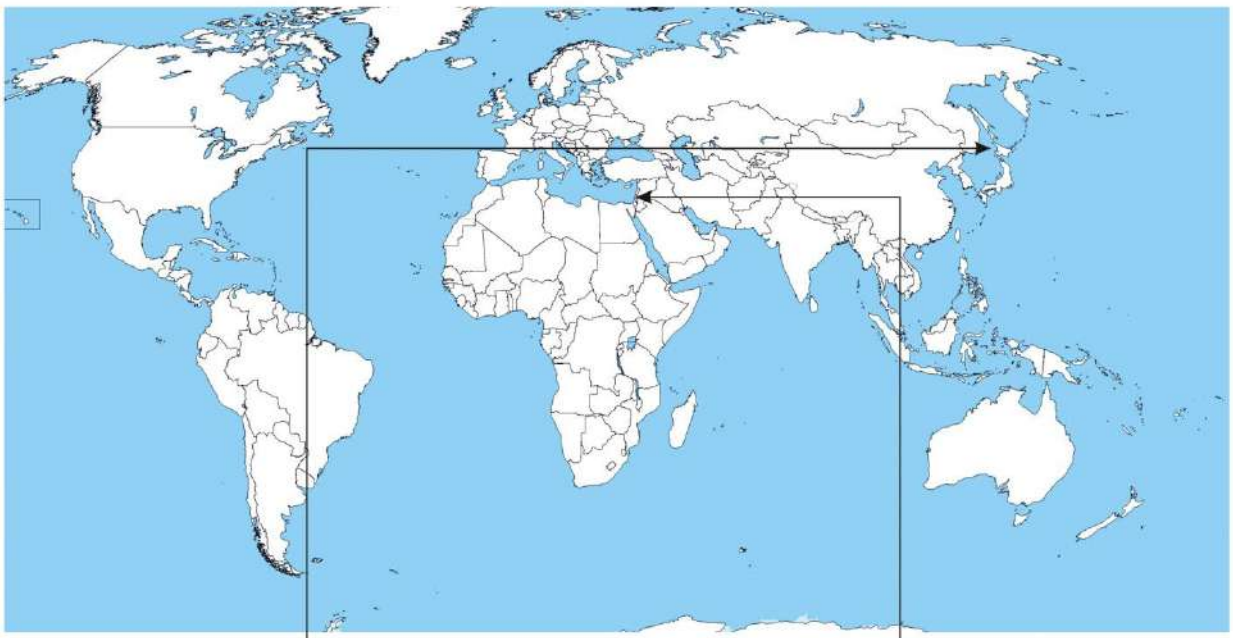
- The launch of Kosovo's first nationwide census since 2011, which includes the survey of the ethnic Serb minority in the north, is a significant development for the country.
- Kosovo is situated in Southeast Europe, within the central Balkans.
- It is a landlocked country bordered by Serbia to the north and east, North Macedonia to the southeast, Albania to the southwest, and Montenegro to the west.
- Kosovo features a diverse landscape, with plains in central areas like the Kosovo field, and mountainous regions such as the Accursed Mountains in the southwest and the Sar Mountains in the southeast.
- Kosovo declared independence from Serbia in 2008 following a period of conflict and international intervention, notably during the Kosovo War of 1998-1999.
- Kosovo has been recognized as an independent state by over 100 countries, including many European and North American nations. However, Kosovo's sovereignty is not recognized by Serbia and some other countries.

LAKE KARIBA

Details

- Lake Kariba, between Zambia and Zimbabwe, is the world's largest artificial lake and reservoir by volume.
- It was established by the construction of the Kariba Dam across the Zambezi River, and it performs important services such as hydroelectric power generation, ecosystem support, and local community development.
- Lake Kariba supports a diversified fish population, including the recent arrival of kapenta (similar to sardines) from Lake Tanganyika, which has resulted in a booming commercial fishery.
- The lake supports a diverse environment that includes Nile crocodiles, hippopotamus, and gamefish such as tigerfish.

10.2 IN WORLD



HOKKAIDO

Details

- Hokkaido in Japan reached a record-breaking 26°C on April 15, 2024, the highest temperature ever recorded.
- Hokkaido is Japan's second-largest island. It is traditionally known for its subarctic climate.
- It's bordered by the Sea of Japan (west), the Sea of Okhotsk (north), and the Pacific Ocean (east)
- Hokkaido sits at the intersection of tectonic plates, leading to a mountainous spine and two volcanic zones. This volcanic activity has blessed Hokkaido with numerous active volcanoes and geothermal hot springs, a popular tourist attraction.
- Central Hokkaido features vast, fertile plains like Ishikari and Tokachi, earning it the nickname "Japan's breadbasket"
- Indigenous communities like the Ainu, who admire Hokkaido as the "Garden of the Gods," face challenges due to a changing environment.
- The five main islands, from north to south, are Hokkaido, Honshu, Shikoku, Kyushu, and Okinawa. Honshu is the largest and is referred to as the Japanese mainland.

GAZA

Details

- Gaza refers to the Gaza Strip, a coastal territory located on the eastern coast of the Mediterranean Sea.
- It is bordered by Israel to the east and north, and Egypt to the south.
- The Gaza Strip is part of the larger Palestinian territories, which also include the West Bank and East Jerusalem.
- It has been under the control of Hamas, an Islamist political and militant organization, since 2007 when Hamas seized control of Gaza from the Palestinian Authority after a brief civil conflict.