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Contents

PRELIMS

POLITY & GOVERNANCE

SC DIRECTS CENTRE TO FORMULATE POLICY TO MANAGE SACRED GROVES

Context: The Supreme Court asked the Centre to create a comprehensive policy for the governance and management of sacred groves across the country while underlining their ecological importance.

Background: -

- The Supreme Court judgment came on applications dealing with the protection of sacred groves of Rajasthan.

Key takeaways

- **Sacred groves** are patches of forest that are preserved by local communities due to their religious, cultural, or spiritual significance.
- **Distribution in India**: Found across India, particularly in states with tribal or indigenous populations.
    - **Rajasthan**: Orans, associated with folk deities.
    - **Maharashtra** and Karnataka: Devarakadu (God's forests).
    - **Northeast India**: Sacred forests of Meghalaya (e.g., Mawphlang).
    - **Kerala**: Sarpa Kavu (Snake groves).
- SC directed that as part of the policy on sacred groves, the Union Ministry of Environment, Forest and Climate Change must develop a plan for a nationwide survey of sacred groves, by whatever name they are identified in each State.
- The survey should identify their area, location, and extent, and clearly mark their boundaries. These boundaries should remain flexible to accommodate the natural growth and expansion of these forests while ensuring strict protection against any reduction in size.
- Highlighting the ecological and cultural importance of the sacred groves, the top court recommended their protection under the Wildlife Protection Act, 1972, particularly through Section 36-C, which allows for declaration of "community reserves".

Piplantri model lauded in the judgement

- SC lauded the Piplantri village in Rajasthan's Rajsamand district, which under the leadership of its Sarpanch Shyam Sundar Paliwal, started the initiative to plant 111 trees for every girl child born.
- The tragic passing of a girl child of the sarpanch Shyam Sundar Paliwalprompted the movement in the village which had until then witnessed environmental damages due to excessive marble mining. The mining activity led to acute water shortages, deforestation and economic decline.
- Environmentally, over 40 lakh trees have been planted, which has helped raise the water table by 800-900 feet and cooled the climate by 3-4°C. These efforts have improved local biodiversity and protected the land from soil erosion and desertification.
- Economically, the planting of indigenous species of trees like gooseberry, aloe vera, and bamboo

has created sustainable jobs. Aloe vera processing, furniture making, and other businesses have increased local incomes, providing work, especially for women, through self-help groups.

- The Supreme Court bench also pointed out that the model has helped eliminate harmful practices like female foeticide.
- Piplantri model demonstrates how community-driven initiatives can effectively address social, economic, and environmental challenges in a cohesive manner.

Source: Indian Express

GOVERNORS: APPOINTMENT AND TRANSFER

Context: Government announced new gubernatorial appointments, including former Union Home Secretary Ajay Kumar Bhalla as Governor of Manipur and former Army Chief V K Singh as Governor of Mizoram.Among the other appointments by President are: Kerala Governor Arif Mohammed Khan as Governor of Bihar; Mizoram Governor Dr Hari Babu Kambhampati as Governor of Odisha; and Bihar Governor Rajendra Vishwanath Arlekar as Governor of Kerala.

Background: -

- The choice of Bhalla as Manipur Governor is significant as the Centre has been struggling to control the ethnic violence in the state for over one-and-a-half years. Bhalla was Union Home Secretary when the violence began on May 3, 2023.

Key takeaways

- **Article 153 of the Constitution says**
    - "There shall be a Governor for each State." A few years after the commencement of the Constitution, an amendment in 1956 laid down that "nothing in this article shall prevent the appointment of the same person as Governor for two or more States".
    - "Governor of a State shall be appointed by the President by warrant under his hand and seal".
- Under **Article 156**, "the Governor shall hold office during the pleasure of the President", but his normal term of office will be five years. If the President withdraws her pleasure before the completion of five years, the Governor has to step down. Since the President acts on the aid and advice of the Prime Minister and the Union Council of Ministers, in effect, the Governor is appointed and removed by the central government.
- **Articles 157 and 158** lay down the qualifications of the Governor and the conditions of his office.
- The Governor must be a citizen of India and should have completed the age of 35 years. The Governor should not be a member of Parliament or a state legislature, and must not hold any other office of profit.

Powers and Functions

- **Executive Powers** :
    - **Article 154** - The executive power of the State shall be vested in the Governor and shall be exercised by him either directly or through officers subordinate to him in accordance with this Constitution.

- The Governor appoints the Chief Minister and other ministers based on their majority in the Legislative Assembly (**Article 164**).
- **Key Appointments:** Appoints the Advocate General (Article 165), State Election Commissioner (Article 243K), and members of the State Public Service Commission.

- **Legislative Powers**
  - **Summoning and Dissolution**: Summons, prorogues, and dissolves the state legislature (Article 174).
  - Addresses the legislative assembly at the beginning of its first session (Article 176).
  - **Assent to Bills**: Can give or withhold assent to bills, or reserve them for the President's consideration (Article 200).
  - **Ordinances**: Can promulgate ordinances during recess of the legislature (Article 213).
- **Judicial Powers**
  - Can grant pardons, reprieves, respites, or remissions of punishment, or suspend, remit, or commute sentences in cases involving state laws (Article 161).
- **Discretionary Powers**
  - **Article 163**: The Governor acts on the advice of the Council of Ministers except in matters where they are required to exercise their discretion.
  - **Examples of discretionary powers**:
    - Reserving a bill for the President's consideration.
    - Recommending President's Rule (Article 356) in case of a breakdown of constitutional machinery.
    - Appointing a Chief Minister when no party has a clear majority.

Source: Indian Express

CONDUCT OF ELECTION RULES

Context: The Centre recently amended the Conduct of Election Rules to restrict access for the public to a section of poll documents. This was done by the Union Law Ministry following a recommendation from the Election Commission (EC).

Background:

- While the EC said the amendment aims to restrict access to electronic data, the Opposition and transparency activists have been up in arms, branding it as an attack on the right to information and electoral freedom.

Key takeaways

- **The Conduct of Election Rules,1961**, is a set of rules which provide for provisions on how to conduct the elections as per the Representation of People Act.
- **Rule 93(2)(a) of the 1961 Conduct of Election Rules** had earlier stated that “all other papers relating to the election shall be open to public inspection” but after the amendment, it reads, “all

other papers as specified in these rules relating to the election shall be open to public inspection."

Why has the amendment been brought in now?

- The move comes after a recent direction to the EC by the Punjab and Haryana High Court to share all documents related to the Haryana Assembly election, including treating CCTV footage also as permissible under Rule 93(2) of the Conduct of Election Rules, to a petitioner.
- An official of the Election Commission explained that the rule previously mentioned election papers but did not explicitly refer to electronic records, leading to ambiguity.
- To address this and considering concerns over the violation of voting secrecy and the potential misuse of CCTV footage from polling stations, particularly through artificial intelligence, the rule was amended. The official noted that sharing such footage could have serious consequences, especially in sensitive regions like Jammu and Kashmir, where voters' lives might be at risk.

Why are the transparency activists protesting?

- **RTI activists have termed** the move as a setback to transparency.Rule 93 is akin to the Right to Information Act as far as elections are concerned and, any change hurts the citizen's right to know about the process.
- The amendment appears to aim at restricting citizens access to a wide range of documents generated during elections. Many of these documents are not explicitly mentioned in the Conduct of Election Rules but are referenced in handbooks and manuals published periodically by the Election Commission.
- These records include reports submitted by Election Observers, scrutiny reports from Returning Officers after polling day, and Index Cards sent to the Election Commission following the declaration of results, which contain detailed election statistics.
- Given the controversy surrounding voter turnout in recent Lok Sabha and Assembly elections, access to the Presiding Officers' diaries, which include detailed data about voter turnout at various times during polling day and the number of tokens distributed to voters in the queue at the scheduled closing hour, is not specifically mentioned in the Conduct of Election Rules. Yet access to such documents is crucial to assess the fairness of elections.

Source: The Hindu

OPPOSITION SET TO SUBMIT NOTICE FOR RESOLUTION TO IMPEACH DHANKHAR

Context: In an unprecedented move, about 60 Opposition MPs belonging to the INDIA bloc submitted a notice in New Delhi on Tuesday at the Rajya Sabha Secretary General P.C. Mody's office, seeking the removal of the Chairperson of the Upper House, Vice President Jagdeep Dhankhar.

Background: -

- Alleging that Mr. Dhankhar, since assuming the office of Chairperson of the Rajya Sabha, had conducted the proceedings in an "extremely biased" manner, the Opposition members also presented a six-point "charge-sheet" against him in the notice.

Key takeaways

- The Vice President of India can be removed from office through a resolution passed by

Parliament under Article 67(b) of the Constitution. While often referred to as "impeachment," the process for the Vice President's removal is distinct from the impeachment process for the President.

Constitutional Provisions

- **Article 63**: Establishes the office of the Vice President.
- **Article 64**: States that the Vice President is also the ex-officio Chairman of the Rajya Sabha.
- **Article 67(b):** Outlines the removal procedure of the Vice President.

Procedure for Removal

- **Initiation:**
    - The removal resolution must be moved in the Rajya Sabha.
    - The motion must be signed by at least one-fourth of the total members of the Rajya Sabha.
- **Notice Period**: A 14-day prior notice is required before the motion is taken up for consideration.

Special Majority:

- The resolution must be passed by a majority of all members of the Rajya Sabha whose seats are not vacantand agreed to by the Lok Sabha through a simple majority (majority of members present and voting).

Grounds for Removal

- The Constitution does not specify the grounds for the removal of the Vice President. It is left to the discretion of Parliament, making the process political rather than judicial.

Comparison with Presidential Impeachment

- **Impeachment of the President (Article 61) involves:**
    - **Judicial Inquiry**: Charges of violation of the Constitution.
    - **Special Procedure**: A more stringent process requiring two-thirds majority in both Houses.
    - In contrast, the removal of the Vice President is simpler and purely a parliamentary procedure.

Key Point to Note

- The process has never been invoked in Indian history, reflecting the stability of the office and its largely ceremonial nature.

Source: The Hindu

IMPEACHMENT OF HIGH COURT JUDGE

Context: The Opposition has started efforts to move an impeachment motion against Allahabad High Court judge Shekhar Kumar Yadav for his controversial statements at a recent Vishwa Hindu Parishad event.

Background: -

- No High Court judge has been impeached in India so far.

Constitutional Provisions

- **Article 217**:
    - Deals with the appointment and conditions of service of High Court judges.
    - Specifies that judges hold office until the age of 62 unless they resign, are impeached, or are removed.
- **Article 218**:
    - The process of impeachment of a judge of the Supreme Court is laid down in Article 124(4) of the Constitution of India. Article 218 says the same provisions shall apply in relation to a judge of the High Court as well.
- Grounds for Removal: Proved misbehavior or incapacity.
- The procedure to be followed for impeachment of a judge is laid down in the Judges Inquiry Act, 1968.

Procedure for Impeachment

- **Initiation of Motion** - A removal motion must be signed by:
    - At least 100 members in the Lok Sabha, or
    - At least 50 members in the Rajya Sabha.
- **Upon admission of the motion, an inquiry committee is formed. A three-member committee is constituted, comprising:**
    - A Supreme Court judge.
    - A Chief Justice of a High Court.
    - An eminent jurist.
- The committee investigates the charges and submits its report.
- **Parliamentary Approval:**
    - If the committee finds the judge guilty, both Houses of Parliament must pass the motion with a two-thirds majority of members present and voting, and the majority must be no less than 50% of the total membership of the House.
- **President's Order: Upon approval by both Houses, the President orders the removal of the judge.**

Important Points

- **High Threshold**: The impeachment process is deliberately complex to ensure judicial independence.
- **Significant Cases**:
    - Justice Soumitra Sen of the Calcutta High Court faced impeachment proceedings but resigned before the process was concluded.
    - Justice V. Ramaswami of the Supreme Court faced impeachment, but the motion failed in the Lok Sabha.

Source: The Hindu

INTERNATIONAL RELATIONS

THE BRIDGE TO MOSCOW

Context: India-Russia relationship is set to be the most consequential bilateral engagement of the year 2025.

Background: -

- The India-Russia relationship serves not just the two countries in question, but the world.

Key takeaways

- The strength of ties between New Delhi and Moscow matters to both countries. It touches core mutual areas: Trade in energy, technological co-development, and strategic interests.
- Russia remains India's most accommodating partner when it comes to high-tech supplies. While the West — France and the US in particular — are relaxing rules for trade with India in dual-use tech, there is still a long way to go before Delhi's undersea and long-range requirements are satisfied by the West. This is where Moscow steps in.

Apart from being mutually beneficial to India and Russia, the relationship is a vital global public good :

- First, it serves as a bridge between the rest of the world and a Russian polity that has been alienated by, and has set out to further alienate, the West. India's commitment to multilateralism and the global order anchors Russia, to a system that it otherwise seeks to disrupt.
- Second, the India-Russia relationship prevents the Russian bear from totally entering the dragon's den. A Russia locked into servitude to Beijing's interests would be profoundly inimical for the world order, the West in particular. India's outstretched hand grants Russia the ability to manoeuvre and allows it to avoid capitulating completely to China.
- Third, trade between India and Russia in fossil fuels is designed to be compliant with sanctions meant to limit Russian profits. This too provides broader benefits to the world. It brings valuable price stability and predictability to energy markets, which is vital for the West and for Europe in particular.
- Fourth, the relationship allows for new possibilities in the crucial Arctic region. Without India's increasing strategic presence in the Arctic, in partnership not just with Russia but also with European and Nordic friends, a new Russia-China axis would have shaped the region's future. This would have spelt disaster for the ecology and security of global supply chains.
- Finally, India's presence in groupings like BRICS and the Shanghai Cooperation Organisation ensures that these are not weaponised against the West. As External Affairs Minister S Jaishankar has put it, India is non-Western, it is not anti-Western. This moderate and reasonable attitude shapes the actions and positions of such groupings. The entry of New Delhi's candidates — and Western friends — such as the UAE, Egypt and Vietnam into BRICS as either members or partners has further moderated that grouping.
- The ability to partner with nations that are deeply divided by geopolitics has been a feature of Indian diplomacy since Independence. The India-Russia relationship serves not just the two

countries in question, but the world.

Source: Indian Express

NINE YEARS OF PARIS AGREEMENT

Context: The Paris Agreement was supposed to save the world from the worst impacts of climate change. But nine years after it was finalised — on December 12, 2015 — it is perhaps more fragile than ever, appearing increasingly ineffective and helpless in containing worsening climate situation.

Background: -

- The main goal of the Paris Agreement — holding global annual average temperatures within 1.5 degree Celsius of pre-industrial averages, two degrees Celsius in the worst case scenario — seems more distant than ever.

Key takeaways

- In the nine years, annual global emissions have grown 8% from about 49 billion tonnes of CO2 equivalent to 53 billion tonnes. Average annual global temperatures have increased from 1.1 degree Celsius above the pre-industrial average to 1.45 degree Celsius above that level.

Erosion of Trust Among Developing Nations

- **Unmet Financial Obligations:**
    - Developed countries failed to meet the $100 billion annual climate finance goal by 2020.
    - A finance deal in Baku only proposed increasing this to $300 billion by 2035, which is grossly inadequate given the trillions needed annually by developing nations.
- **Equity Concerns**:
    - The Paris Agreement replaced the Kyoto Protocol, which held developed countries primarily accountable for emissions reductions.
    - The Kyoto Protocol had assigned specific emissions reduction targets on developed countries, but placed virtually no responsibilities on the rest of the world. The Paris Agreement mandated everyone to take climate actions, but only in a "nationally-determined" manner, essentially freeing developed countries of their assigned responsibilities.

Geopolitical Dimensions

- **Role of Developed Nations:**
    - Developed nations have consistently resisted stringent climate obligations, fearing economic repercussions.
    - The United States' potential withdrawal under Donald Trump's presidency could further weaken global climate action.
- **Emerging Economies**: The growing economic power of countries like China has shifted the climate narrative, with developed nations demanding greater contributions from such nations while ignoring their historical emissions.

Alternative Strategies by Developing Nations

- **Vanuatu's Initiative**: The resolution passed by the UN General Assembly to seek the ICJ's advice on defining countries' climate obligations is a significant step by vulnerable nations.
- Small island nations aim to establish clearer legal consequences for failing to meet climate commitments.

Source: Indian Express

EUROPEAN FREE TRADE ASSOCIATION (EFTA)

Context: India said that its double taxation treaty with Switzerland may require renegotiation in view of its trade pact with the member states of the European Free Trade Association (EFTA).

Background: -

- The remarks from the Ministry of External Affairs (MEA) came after the Swiss government suspended the most favoured nation status (MFN) clause in the India-Switzerland Double Taxation Avoidance Agreement (DTAA).

About European Free Trade Association (EFTA)

- EFTA is an intergovernmental organization of four member countries that are not part of the European Union (EU): Iceland, Liechtenstein, Norway, and Switzerland.
- The organization operates in parallel with the European Union (EU), and all four member states participate in the European single market and are part of the Schengen Area.
- **EFTA vs. EU:**
    - While EFTA countries are not part of the EU, three of them (Iceland, Liechtenstein, and Norway) are part of the European Economic Area (EEA), which gives them access to the EU's single market.
    - Switzerland has bilateral agreements with the EU but is not in the EEA.
- India and EFTA recently signed a landmark trade agreement, the Trade and Economic Partnership Agreement (TEPA), on March 10, 2024. This agreement aims to boost trade and investment between the two sides.

Key Features of the TEPA:

- **Tariff Reductions**: EFTA will eliminate tariffs on 92.2% of its tariff lines, covering 99.6% of India's exports. India will eliminate tariffs on 82.7% of its tariff lines, covering 95.3% of EFTA exports.
- **Investment Promotion**: EFTA is unique for its inclusion of a binding $100 billion investment commitment by companies in those countries into India over the next 15 years, with one million direct jobs to be created.
- **Market Access**: The agreement improves market access for both sides in various sectors, including industrial products, fish and marine products, processed agricultural products, and services.
- **Intellectual Property Rights**: The agreement includes provisions for the protection and enforcement of intellectual property rights.

- **Sustainable Development**: The agreement also addresses issues related to sustainable development, including environmental protection and labor rights.

Source: Indian Express

MINERAL DIPLOMACY

Context: As India seeks to expand its manufacturing and technological capability, critical minerals will become vital to fulfil this ambition.

Background: -

- India is a major critical mineral importer, still depends on other countries, primarily China, for its mineral security, which has become a cause of strategic concern.

Key takeaways

- To address India's mineral security challenge, New Delhi has started an attempt to engage in mineral diplomacy.This attempt is based on the pillars of: developing international engagement with mineral-producing countries, and establishing strategic partnerships with intergovernmental organisations.
- The first pillar focuses on building bilateral ties with resource-rich countries such as Australia, Argentina, the United States, Russia, and Kazakhstan to secure the supply.
- To facilitate, India established the Khanij Bidesh India Ltd. (KABIL), a joint venture company with a mandate to ensure a consistent supply of critical and strategic minerals to the Indian domestic market.
- In March 2022, KABIL signed a Memorandum of understanding with Australia for a critical mineral investment partnership, identifying two lithium and three cobalt projects.
- Latin America's Lithium Triangle, which constitutes Argentina, Chile, and Bolivia, has attracted India.India signed a $24 million lithium exploration pact with a state-owned enterprise in Argentina for five lithium brine blocks. KABIL is actively working to secure mineral supplies by facilitating the buying of assets from Bolivia and Chile.
- Central Asia has also caught India's attention. India and Kazakhstan formed a joint venture, IREUK Titanium Limited, to produce titanium slag in India.
- The second pillar of mineral diplomacy is forging and strengthening partnerships with minilateral and multilateral initiatives related to mineral security, such as the Quad, the Indo-Pacific Economic Framework for Prosperity (IPEF), Mineral Security Partnership (MSP) and the G-7, for cooperation in supply chain.

The missing pieces

- India's mineral diplomacy still lacks three essential ingredients. These are: a lack of private sector participation; weak diplomatic capacity, and insufficient sustainable partnership.
- India's private sector has largely been missing from the equation.The absence of a critical mineral supply chain strategy and a clear road map for the private sector are two primary variables responsible fortheir absenteeism.

- Second, India must strengthen its mineral diplomacy engagement. Having a dedicated mineral diplomacy division within the Ministry of External Affairs, similar to the New and Emerging Strategic Technologies (NEST) division and a special position for mineral diplomacy in selected diplomatic missions can be a step.
- Third,Delhi must forge strategic, sustainable, and trusted partnerships with bilateral partners and multilateral forums. Among all its partners, working with EU, South Korea, and the other Quad members is critical to India's mineral security due to its domestic capabilities, diplomatic network and technological know-how.

INDIA, KUWAIT LIFT TIES TO 'STRATEGIC PARTNERSHIP'

Context: Kuwait and India elevated their relationship to a "strategic partnership" and signalled that trade and defence cooperation would form the key pillars of their ties.

Background: -

- PM Modi arrived in Kuwait on Saturday for a two-day visit — the first by an Indian PM in 43 years. The last Indian PM to visit Kuwait was Indira Gandhi in 1981.

Key takeaways

Defence Cooperation

- The two sides institutionalised defence cooperation through an overarching agreement that includes training, exchange of personnel and experts, joint exercises, supply of defence equipment, and collaboration in research and development, among others.

Cooperation in Other Sectors

- Besides defence, three other MoUs (Memoranda of Understanding) were inked to facilitate cooperation in the areas of:Sports, Culture and Solar energy.

India-GCC Cooperation

- India showed keen interest in intensifying its cooperation with the Gulf Cooperation Council (GCC) through Kuwait's presidency of the influential grouping, which includes the United Arab Emirates, Bahrain, Saudi Arabia, Oman, and Qatar.
- The total volume of India's trade with GCC countries stood at US$ 184.46 billion in the financial year 2022-23. Both sides also stressed the importance of early conclusion of the India-GCC Free Trade Agreement.

India-Kuwait Relations

- Kuwait is among India's top trading partners, with bilateral trade valued at US$ 10.47 billion in 2023-24.
- The Indian community forms the largest expatriate group in Kuwait.

Source: The Hindu

TRUMP THREAT TO BRICS: GIVE UP IDEA OF REPLACING DOLLAR OR FACE 100% TARIFFS

Context: Setting the stage to counter any challenge to the dollar's domination in global trade, US President-elect Donald Trump has threatened the BRICS grouping with "100 per cent tariffs" if they moved to create a

new currency or back any other option as the world's reserve.

Background: -

- BRICS stands for Brazil, Russia, India, China and South Africa, the original five members. This year, the group admitted four new members — Egypt, Ethiopia, Iran and UAE — and now represents almost half the world's population and almost one quarter of its economy.

Key takeaways

- USD accounts for over 90 per cent of global transactions.
- Trump's latest remarks come amid divergent views on the issue at the BRICS summit in October. **Russian President Vladimir Putin** had warned that the "dollar is being used as a weapon". But Prime Minister Modi had cautioned that the grouping should not acquire the image of one that is trying to replace global institutions.
- Several countries have been looking at other "mechanisms" after the US "weaponised the global financial infrastructure" by throwing Iran and Russia out of the **Society for Worldwide Interbank Financial Telecommunication (SWIFT),** which is the key to international transactions.
- IMF's Currency Composition of **Official Foreign Exchange Reserves (COFER**) has pointed to a gradual decline in the dollar's share of central bank and government foreign reserves. But the reduced role of the US dollar over the past two decades has not been matched by corresponding increases in the shares of the other "**big four" currencies, the euro, yen and pound.**
- Rather, this has been accompanied by a rise in the share of what we refer to as non-traditional reserve currencies, including the Australian dollar, Canadian dollar, Chinese renminbi, South Korean won, Singaporean dollar, and the Nordic currencies.
- Significantly, the IMF also said that one non-traditional reserve currency gaining market share is the Chinese renminbi, whose gains match a quarter of the decline in the dollar's share.
- The Chinese government has been advancing policies on multiple fronts to promote renminbi internationalization, including the development of a cross-border payment system, the extension of swap lines, and piloting a central bank digital currency.
- In India, an effort to reduce reliance on the US dollar and internationalise the rupee saw the RBI allowing invoicing and payments for global trade in rupees in 2022 after sanctions were imposed on Russia amid the Ukraine war.
- According to the **BIS Triennial Central Bank Survey 2022**, foreign exchange market turnover — daily averages — shows that the US dollar accounted for 88 per cent of the global forex turnover while the rupee accounted for 1.6 per cent. The survey stated that if rupee turnover rises to equal the share of non-US, non-Euro currencies in global forex turnover of 4 per cent, it will be regarded as an international currency.

Source: Indian Express

Economy

SOCIAL DIALOGUE REPORT OF THE INTERNATIONAL LABOUR ORGANISATION (ILO)

Context: The Social Dialogue Report of the International Labour Organisation (ILO), released recently, has recommended the governments to uphold fundamental principles and rights at work, especially freedom of association and the effective recognition of the right to collective bargaining.

Background: -

- Report found that countries' compliance with freedom of association and the effective recognition of the right to collective bargaining had deteriorated by 7% between 2015 and 2022.

Key takeaways

What is Social Dialogue?

- **Definition**: Social dialogue refers to discussions, consultations, negotiations, and other interactions between governments, employers, and workers on issues related to economic and social policy.
- **Purpose**: To promote consensus-building, resolve workplace conflicts, and ensure equitable economic and social development.
- **The International Labour Organisation (ILO),** a United Nations agency, champions social dialogue as one of its four strategic objectives under the Decent Work Agenda.
- **The Social Dialogue Report provides a global perspective on:**
    - The effectiveness of social dialogue in different countries.
    - The role of tripartite structures (governments, employers, and workers) in promoting decent work.
    - Best practices and challenges in achieving workplace harmony.

Highlights of the Latest Social Dialogue Report:

- The report has highlighted the experience of Rajasthan that brought in the Platform Based Gig Workers (Registration and Welfare) Bill to provide for the establishment of the Rajasthan Platform Based Gig Workers Welfare Board.
- The report argues that social dialogue can enable countries to pursue economic development alongside social progress, while ensuring fair and inclusive low-carbon and digital transitions.
- The ILO has also recommended the national social dialogue institutions (NSDIs) of various countries to expand their outreach to under-represented groups.

Source: The Hindu

GREEN DEPOSITS

Context: Considering the threat that climate change poses globally, the Reserve Bank of India (RBI) in April last year issued a comprehensive framework for lenders to accept green deposits. However, more than 20 months after the framework has been issued, lenders have made little to no progress in garnering green

deposits.

Background: -

- Bankers say a reduction in cash reserve ratio (CRR) requirement for green deposit will help.

What is green deposit?

- They are essentially interest-bearing deposits, received by the lenders for a fixed period and the proceeds of which are earmarked for being allocated towards green finance.
- The deposits shall be denominated only in Indian rupees as per RBI norms.
- Capital raised via green deposits can be used in funding projects related to solar, wind, biomass, and hydropower energy projects that integrate energy generation and storage. Further, the funds can be used in sectors which enable energy efficiency, clean transportation, climate change adaptation and sustainable water and waste management. Green deposits also can be used for funding green buildings, projects relating to coastal and marine environments, certified organic farming, among others.
- To ensure compliance, RBI said that allocation of funds raised through green deposits during a financial year shall be subject to an independent third-party audit.

Challenges to Green Deposits in India

- **Limited Customer Interest and Awareness**: Many customers lack awareness of these products and their potential impact. Without a strong alignment of values or incentives, green deposits fail to attract interest from the general public.
- **Lower Interest Rates**: Green deposits typically offer lower interest rates compared to standard deposit products.
- **Slow Adoption among Private Banks**: While most public sector banks have started offering green deposits, private banks have been slower to adopt these products. This hesitance limits the overall availability and visibility of green deposit options.
- **Competing Priorities for Lending**: Given the country's population and economic structure, banks must prioritize lending to sectors like small and medium enterprises (SMEs) and job creation. This focus can divert attention and resources away from green projects.

Source: Hindu Businessline

REAL EFFECTIVE EXCHANGE RATE (REER) SOARS TO AN ALL-TIME HIGH

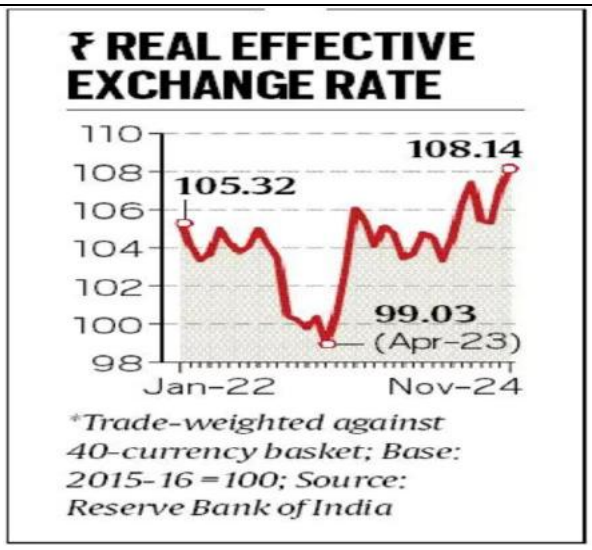
Context: The rupee is hitting fresh lows against the US dollar each day, yet its exchange rate has scaled an all-time-high in “real effective” terms.

Background: -

- **Real effective exchange rate (REER)** is a measure of a currency's value against its trading partners, adjusted for inflation.

Key takeaways

- **The real effective exchange rate (REER**) index of the rupee touched a record 108.14 in November, strengthening by 4.5 per cent during this calendar year, according to the latest Reserve Bank of India (RBI) data.



- The REER measures the rupee's value vis-à-vis not only the dollar, but other global currencies as well. In this case, it is a weighted average of the rupee's exchange rate against a basket of 40 currencies of countries that account for about 88 per cent of India's annual exports and imports. The REER also adjusts for inflation differentials between India and each of these trading partners.

- **The rupee's REER** — with 2015-16 as the base year— fell from 105.32 in January 2022 to 99.03 in April 2023. But since then, it has been on an appreciating trajectory.

- The main reason for the divergence — the rupee's simultaneous weakening and strengthening — has to do with the dollar's behaviour over the past three months, especially post Trump's victory.
- In other words, the rupee isn't weakening as much as the dollar is strengthening — against all currencies. The dollar is strengthening because of Trump's public pronouncements favouring tariff hikes, income tax cuts anddeportations of illegal immigrants.
- From a longer timeframe, the rupee has, since the start of 2022, dipped against the dollar (from 74.30 to 85.19), euro (84.04 to 88.56) and pound (100.30 to 106.79), while firming up only against the yen (0.6454 to 0.5425). Despite that, its REER has increased. And that is a result of inflation in India being higher relative to its major partners.
- Assuming the rupee was "fairly" valued in 2015-16, when the REER was set to 100, any value above 100 signifies overvaluation and the exchange rate not falling enough to offset higher domestic inflation. The rupee is, to that extent, is overvalued today, making imports cheaper and exports less competitive.

Source: Indian Express

CASH RESERVE RATIO (CRR)

Context: Reserve Bank of India (RBI) governor Shaktikanta Das announced a 50 basis point reduction in the Cash Reserve Ratio (CRR) to 4 per cent during the monetary policy (MPC) address on December 6.

Background: -

- This marks the first CRR cut in over 4.5 years.

Key takeaways

- **The Cash Reserve Ratio** is a key monetary policy tool that requires banks to maintain a certain percentage of their total deposits as liquid reserves with the RBI.
- Currently set at 4.5 per cent of a bank's Net Demand and Time Liabilities (NDTL), this means that for every Rs 100 in deposits, banks must keep Rs 4.50 with the RBI.
- **The primary objectives of the CRR include liquidity management**, ensuring that banks can meet

depositor demands and maintain stability in the financial system.

- By adjusting the CRR, the RBI influences the amount of money available for lending, which can help control inflation or stimulate economic growth.

How will a CRR cut impact customers?

- The 50 basis point reduction in CRR is expected to inject Rs 1.16 trillion into the banking system. This surplus liquidity could enable banks to extend more loans, which may help spur economic growth.
- The decision comes amid tight liquidity conditions in the banking system and a decline in GDP growth, which slowed to 5.4 per cent in the July-September quarter of 2024 — a seven-quarter low.

Source: Business Standard

HEDGE AGAINST DOLLAR RELIANCE

Context: Reserve Bank of India Governor Shaktikanta Das said recently that India is not pursuing "de-dollarisation", and that recent measures promoting transactions in domestic currencies are intended to de-risk Indian trade.

Background: -

- The clarification came days afterDonald Trump threatened "100 per cent tariffs" against BRICS countries if they sought to reduce reliance on the US dollar in international trade.

Key takeaways

- A key reason India is not backing de-dollarisation is the rise of the Chinese yuan as a challenger to the US dollar. India has resisted using the yuan for Russian oil imports, even as the acceptance of the currency is growing in Russia.
- At the same time, India is wary of over-dependence on the dollar. The RBI has increased gold purchases in recent times.

Why are central banks on a gold-buying spree?

- Central bankshave increased their gold holdings sharply so as to diversify away from a dollar-dominated financial system.
- **The Currency Composition of Official Foreign Exchange Reserves (COFER) of the International Monetary Fund (IMF)** shows a gradual decline in the share of the dollar in central bank and government foreign reserves. The gains of the yuan, especially, "match a quarter of the decline in the dollar's share", the IMF said.

How does the high cost of holding dollars play out in this scenario?

- Depleting dollar reserves amid surging oil prices has recently caused considerable social and political unrest in India's neighbourhood. Sri Lanka, Bangladesh, Nepal, and Pakistan witnessed sharp declines in their dollar reserves following the Ukraine war, which upset their trade relations with India.
- While India has managed to keep a robust reserve, the surging value of the dollar has become a

concern.

- India is pushing for trade with Russia and the UAE in domestic currencies that could help cut reliance on the US dollar. However, the domestic currency trade has not yet picked up as expected because of India's low foothold in goods and services trade internationally.
- India's efforts toward internationalising the rupee could get a boost if oil exporters begin accepting rupee payments. But they have remained hesitant due to the high transaction costs.
- A reason for the rise of the yuan has been its use in purchasing Russian oil. As China and Russia have a bilateral trade balance, both countries have been able to reduce reliance on the US dollar by successfully trading in domestic currency. India has a bilateral trade deficit with most countries except the US.

Source:Indian Express

CESS AND SURCHARGE

Context: Arvind Panagariya, Chairman, 16th Finance Commission, termed the grievance of States regarding the Centre's increasing reliance on cesses and surcharges as a "complicated issue."

Background: -

- While it was a worrisome factor for many States, it was also, "in a way," the Centre's response to the reduction of its own fiscal space due to the increase in the share of States in the divisible tax pool over the years, Aravind Panagariya said.

Key takeaways

- **Definition**:A cess is a tax levied by the government for a specific purpose, such as education, health, or infrastructure development.

Key Features:

- **Earmarked Purpose**: The revenue collected from a cess is meant to be used exclusively for the purpose for which it is levied (e.g., Education Cess for funding education).
- **Temporary Nature**: Cess is usually imposed for a limited duration until the specific purpose is fulfilled.
- **No Sharing with States**: Unlike regular taxes under divisible pool arrangements, cess collections are not shared with states; the Union government retains the entire amount.
- **Article 270** of the Constitution allows cess to be excluded from the purview of the divisible pool of taxes that the Union government must share with the States.
- **Examples of Cess**:
    - Health and Education Cess
    - Infrastructure Cess

Surcharge

- Definition:A surcharge is an additional charge or tax applied on an existing tax.It is usually imposed on individuals/entities earning higher income or engaging in certain high-value transactions.

Key Features:

- No Earmarked Purpose: Unlike cess, the revenue from surcharge can be used for any purpose as deemed fit by the government.
- Progressive Taxation Tool: Surcharges target high-income groups or high-value transactions, promoting equity in taxation.
- No Sharing with States: The revenue from surcharge is entirely retained by the Union government.
- **Examples of Surcharge:**
    - Surcharge on Income Tax for individuals earning above ₹50 lakh.
- Constitutional Provision: Empowered by Article 271 of the Constitution.

Source:The Hindu

PRODUCTION-LINKED INCENTIVE (PLI) AND JOB CREATION

Context: The Government's flagship Production-Linked Incentive (PLI) scheme to boost domestic manufacturing has been a mixed bag so far in terms of job creation.

Background: -

- Data obtained through RTI reveals that sectors such as textiles and advanced chemical cells are yet to make a mark, some others such as mobile phones, food processing and pharma have done very well, and some like auto, IT hardware and specialty steel are slow to gain momentum.

Key takeaways

- The PLI scheme aims to boost domestic manufacturing and generate employment across 14 sectors, including textiles, advanced chemical cells (ACC), solar modules, auto and auto components, IT hardware, specialty steel, mobile phones, telecom, medical devices, white goods, pharmaceuticals, food processing, drones, and drug intermediates.

Job Creation under PLI Scheme

- **Overall Performance:**
    - The scheme has created 5.84 lakh direct jobs till June 2024.
    - This constitutes 36% of the total 16.2 lakh direct jobs targeted over the next five years or so across the 14 sectors.
- **Sector-Wise Contribution:**
    - Just three sectors – food processing, pharmaceuticals, and mobile phones (large-scale electronics manufacturing) – accounted for over 75% (4.47 lakh) of the total jobs created.

Performance of sectors under PLI:

- Mobile Phones (Large-Scale Electronics Manufacturing):
    - Created 1.22 lakh jobs, establishing a strong assembly base in India.
    - Companies like Apple have contributed significantly via contract assemblers such as Foxconn, shifting production from China to India.
- Food Processing Sector: Created 2.45 lakh jobs (against a target of 2.5 lakh jobs by 2026-27).
- Pharmaceuticals Sector: Performed well, contributing significantly to job creation.

Underperforming Sectors an slow moving sectors:

- Automobiles and Auto Components: Created 32,081 jobs against a five-year target of 1.45 lakh jobs.
- **Solar Modules**: Created 9,521 jobs against a target of 1.95 lakh over five years.
- **Textiles**:
  - Target: 2.5 lakh jobs by 2026.
  - Actual: Only 12,607 jobs created over two years and three months till June 2024.
  - Stakeholders cite difficult eligibility criteria for smaller entities.
- **Advanced Chemical Cell (ACC) Battery Storage:**
  - Aims to establish giga-scale battery facilities.
  - Actual: Only 802 jobs created as production has not yet commenced.
  - Selected Bidders: Ola, Reliance Industries, etc.
- Specialty Steel and IT Hardware: Progress is slow, with employment targets yet to be met.

Source: Indian Express

GDP GROWTH RATE SLUMPS TO NEAR TWO-YEAR LOW OF 5.4% IN JULY-SEP

Context: India's Real Gross Domestic Product growth slumped to a seven-quarter low of 5.4 per cent in July-September 2024.

Background: -

- A 5.4% growth rate in Q2 has set alarm bells ringing in the government. The key question going forward is, has India entered a cyclical growth slowdown phase.

Key takeaways

- GDP was pulled down by "sluggish growth" in manufacturing and a deceleration in mining and quarrying.
- Manufacturing, which accounts for over 17 per cent of the total Gross Value Added (GVA) output, grew by just 2.2 per cent in July-September as against 7 per cent growth in April-June and 14.3 per cent growth in the corresponding period last year.
- Mining and quarrying seem to have been sharply hit by the extended rainfall as it recorded a contraction of 0.1 per cent in July-September compared with 7.2 per cent growth in the previous quarter and 11.1 per cent in the year-ago period.
- According to Chief Economic Advisor V Anantha Nageswaran, doubling down on deregulation, expanding state capacity for public investment, and improving hiring and compensation policies in the private sector will improve growth prospects

Source: Indian Express

GEOGRAPHY

SILIGURI CORRIDOR

Context: Union Home MinisterAmit Shah highlighted the significance of the Siliguri corridor as a crucial link to Northeast India and said that the presence of the Sashastra Seema Bal (SSB) in the area came as an assurance to the entire country.

Background:

- Home Minister made the remarks while addressing the 61st Raising Day celebrations of the SSB in Siliguri.The SSB guards the 2,450-km border with Nepal and Bhutan.

Key takeaways:

- The Siliguri Corridor, often referred to as the "Chicken's Neck", is a strategically critical narrow stretch of land in the Indian state of West Bengal. It connects mainland India to its northeastern states and is surrounded by Nepal to the west, Bhutan to the north, and Bangladesh to the south.
- **Geography**:

  - Approximately 22 km wide at its narrowest point.
  - Lies between the Himalayan foothills and Bangladesh.

- **Strategic Importance**:
  - Serves as a lifeline for India's northeastern states.
  - Facilitates military and trade connectivity to the Northeast and Bhutan.
  - Vital for India's counter-insurgency operations and border security.

- **Economic Significance**:
  - Acts as a transit hub for trade with Bhutan, Nepal, and Bangladesh.
  - Key transport routes, including National Highway 10 and major railway lines, pass through the corridor.

Strategic Challenges

- **Vulnerability to Blockades**:
  - The narrowness makes it susceptible to disruption during conflicts.
  - It is close to the India-China-Bhutan tri-junction, including the contentious Doklam plateau.
- **Surrounding Geopolitical Sensitivities**:
  - Proximity to China's Tibet Autonomous Region and Bangladesh's northern border.

- China's strategic interest in the region heightens its importance in India's defense planning.

- **Security Concerns**:
  - Risks of infiltration, insurgency, and smuggling due to porous borders.

Source: The Hindu

HYDROTHERMAL VENT

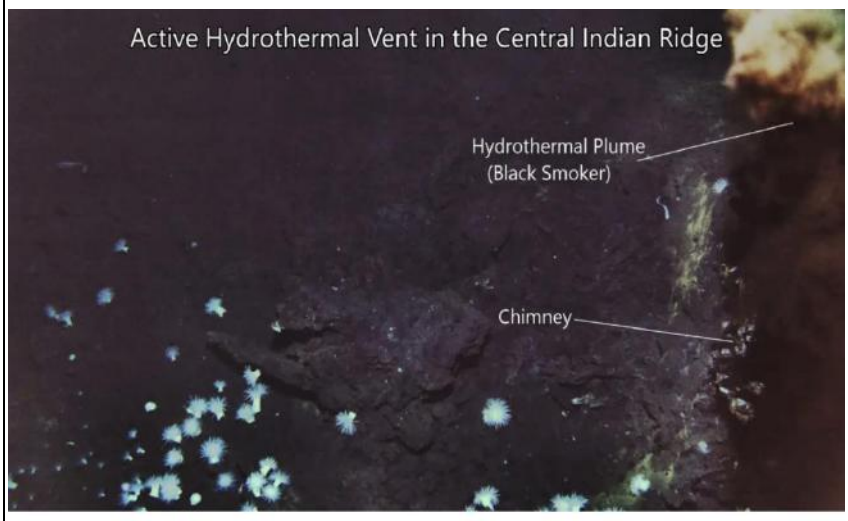
Context: In a first, Indian oceanographers have captured the image of an active hydrothermal vent located 4,500 metres below the surface of the Indian Ocean.

Background: -

- This discovery could significantly enhance India's Deep Ocean mission, especially the Samudrayaan mission, focusing on mineral exploration from inactive vents.

Key takeaways

- **Hydrothermal Vents** are underwater geothermal systems found on the ocean floor, typically near tectonic plate boundaries. These vents emit mineral-rich, superheated water due to volcanic activity beneath the Earth's crust.



The high resolution image showcasing the hydrothermal vent and the plume. (Credit / NCPOR)

- **Formation**:
  - Occur at mid-ocean ridges or subduction zones where tectonic plates diverge or converge.
  - Cold seawater infiltrates the Earth's crust, heats up due to magma, and re-emerges through cracks, carrying dissolved minerals.

- **Types of Vents:**
  - Black Smokers: Emit dark, mineral-rich plumes due to high concentrations of metals like iron and sulfides.
  - White Smokers: Release cooler, lighter-colored fluids rich in silica and barium.

- Chemical Composition:Rich in sulfides, methane, and minerals like iron, manganese, and copper.

Ecological Importance

- **Unique Ecosystems:**
  - Support chemosynthetic organisms (e.g., bacteria and archaea) that derive energy from chemical reactions rather than sunlight.
  - Host diverse life forms like giant tube worms, clams, and shrimp.

- **Biological Discoveries**:
  - Provide insights into extremophiles, organisms thriving in high-pressure, high-temperature environments.

- Offer clues about the origins of life on Earth.

Scientific and Economic Importance

- **Mineral Deposits**:
  - Potential sources of valuable metals like gold, silver, and copper.
  - Can aid in deep-sea mining initiatives.
- **Astrobiology**:Analogous environments might exist on other planets or moons, like Europa or Enceladus, offering insights into extraterrestrial life.
- **Climate Studies**:Play a role in understanding carbon and sulfur cycles in Earth's oceans.

Source: Indian Express

PORT OF LATAKIA

Context: Israel Defense Forces (IDF) has attacked Syria's naval fleet at the ports of Al-Bayda and Latakia.

Background:

- Attacks are part of Israel's effort to neutralise military assets in the country after the fall of the Assad regime.

Key Concerns:

- **The Port of Latakia** is a significant seaport located on the Mediterranean coast in the city of Latakia, Syria.
- When Syria became independent in 1945 it was the only seaport in the country.
- Since 2019, Iran leases parts of the port of Latakia for civilian and military use. This was followed closely by Russia, which operates its only naval base in the Mediterranean in nearby Tartus.

Source: BBC

SCHENGEN AREA

Context: Romania and Bulgaria will become full members of Europe's Schengen free-travel area from next month.

Background: -

- Although the Schengen agreements guarantee free travel, several members including Germany and the Netherlands have recently increased controls to stem illegal immigration.

About Schengen Area

- The Schengen Area is a zone comprising 29 European countries that have officially abolished border controls at their mutual borders.
- **Establishment**: The Schengen Area was established on March 26, 1995.

- **Member Countries**: The Schengen Area includes 25 EU member states and 4 non-EU countries (Iceland, Liechtenstein, Norway, and Switzerland).

Key Features:

- **Free Movement**: Citizens of Schengen countries can travel freely within the area without needing to show a passport or go through border checks.
- **Common Visa Policy**: The Schengen Area has a common visa policy, allowing travelers to use a single visa to visit multiple Schengen countries.
- **External Borders**: Schengen countries have harmonized controls at their external borders, ensuring security while allowing free movement within the area

Significance:

- **Economic Benefits**: The Schengen Area facilitates trade and tourism, benefiting the economies of member states.
- **Cultural Exchange**: It promotes cultural exchange and strengthens ties between European countries.
- **Security**: Harmonized external border controls enhance security while maintaining the freedom of movement within the area.

Source: Reuters

MAYOTTE

Context: Rescuers raced against timeto reach survivors and supply urgent aid after the devastating cyclone Chido ripped through the French Indian Ocean territory of Mayotte.

Background: -

- Mayotte is France's poorest region with an estimated third of the population living in shanty towns.

About Mayotte

- Mayotte is an overseas department and region and single territorial collectivity of France.
- It is located in the northern part of the Mozambique Channel in the Indian Ocean off the coast of Southeastern Africa, between Northwestern Madagascar and Northeastern Mozambique.
- Mayotte consists of a main island, Grande-Terre (or Maore), a smaller island, Petite-Terre (or Pamanzi), as well as several islets around these two.
- It is an outermost region of the European Union and, as an overseas department of France, part of the eurozone.
- Mayotte is the oldest of the four large islands of the Comoros archipelago (The Comoro Islands are a group of volcanic islands in the Mozambique Channel).

Source: BBC

KERCH STRAIT

Context: Two Russian oil tankers have been badly damaged in the Black Sea, causing an oil spill. The incident took place in the Kerch Strait, which separates Russia from Crimea - the Ukrainian peninsula illegally annexed by Moscow in 2014.

Background:

- The Kerch Strait is a key route for exports of Russian grain and it is also used for exports of crude oil, fuel oil and liquefied natural gas.

Key takeaways:

- The Kerch Strait is a narrow waterway in Eastern Europe that connects the Black Sea with the Sea of Azov.
- Location: The strait separates the Kerch Peninsula of Crimea (part of the Russian-occupied Crimean Peninsula) to the west from the Taman Peninsula of Russia's Krasnodar Krai to the east.
- **Dimensions**: The strait is approximately 35 kilometers long and varies in width from 3.1 kilometers to 15 kilometers. The average depth of the strait is around 18 meters.

Historical Significance:

- Ancient Names: In ancient times, the strait was known as the Cimmerian Bosporus or Cimmerian Strait, named after the Cimmerians, a group of steppe nomads.
- **Roman Era**: The Romans referred to it as the Strait of Cimmerian Bosphorus.
- **World War II**: The strait was a significant site during World War II, witnessing naval battles and strategic operations.

Modern Developments:

- Crimean Bridge: The Crimean Bridge, also known as the Kerch Strait Bridge, was completed in 2018. It is the longest bridge in Europe, spanning 19 kilometers (12 miles) and includes both road and rail connections.
- **Conflict**: The strait has been a point of conflict, especially after Russia's annexation of Crimea in 2014. The Kerch Strait incident in 2018 saw a naval confrontation between Russia and Ukraine.

Source: BBC

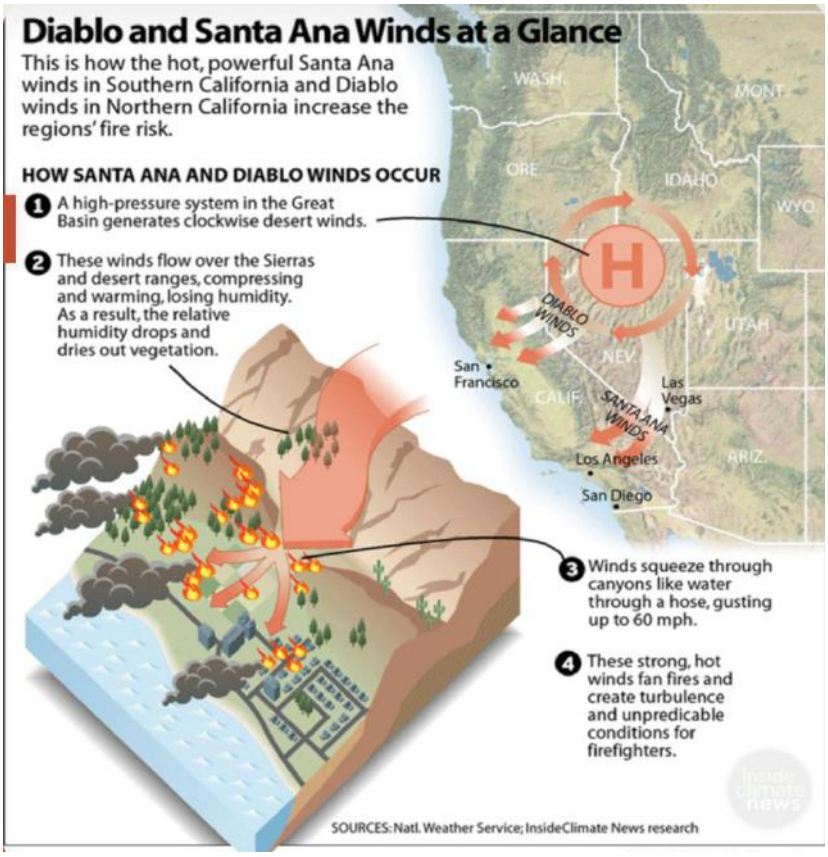
SANTA ANA WINDS

Context: Fire crews continue to battle a wildfire in the wealthy coastal town of Malibu, California. Although the cause of the fire is yet to be determined, experts suggest that the fire has been destructive because of two reasons, the “Santa Ana” winds and climate change.

Background: -

- The wildfire has charred more than 4,000 acres and affected about 22,000 people.

Key takeaways



- Santa Ana winds blow when high pressure builds over the Great Basin — the area between the Rocky Mountains and Sierra Nevada (a mountain range in the Western United States) — and the pressure is low over California's coast.
- The difference in pressure triggers the movement of powerful winds from the Basin's inland deserts, east and north of Southern California, over the mountains toward the Pacific Ocean.
- As the wind comes down the mountains, it compresses and heats up. The wind's humidity also drops, sometimes to less than 20% or even less than 10%. The extremely low moisture turns vegetation dry, making it ready to burn. This process helped fuel the flames in Malibu.

- Santa Ana winds usually occur from October to January.

Source: BBC

INLAND WATERWAYS IN INDIA

Context: The government unveiled a major policy for cargo promotion, 'Jalvahak', to boost long-haul cargo movement via inland waterways across National Waterways (NW) on rivers Ganga, Brahmaputra, and Barak.

Background: -

- India has about 14500 kilometres of navigable waterways. Despite this, Inland waterways remain underutilized at a share of 2% in India's modal mix, compared to 35% in Bangladesh.

Inland Waterways:

- They are navigable water bodies located within the boundaries of a country, typically away from coastal areas.
- The National Waterways Act of 2016, has identified 111 navigable water courses and declared them "national inland waterways".

Significance/advantages of Inland Waterways in India:

- It reduces transport costs as it is reported to be 60% cheaper than road transport and 20-30% cheaper than rail.
- According to the findings of the Integrated National Waterways Transportation Grid Study, one litre of fuel will move 24 tons through 1km on the road, 85km on the rail, and 105 km on inland

water transport. So inland waterways are a fuel and energy-efficient medium of transportation as compared to the other modes of transport like rail and road.

- It is an environment-friendly mode of transport as it emits 10 times less carbon dioxide per ton-kilometer compared to road transport, contributing to lower greenhouse gas emissions.
- It does not require extensive land acquisition like that of road and rail projects.
- It helps in employment generation as the development of inland waterways creates jobs in various sectors such as river conservancy, vessel operation, terminal management, and tourism.
- It helps in creating seamless interconnectivity connecting hinterlands along navigable river coasts and coastal routes.
- It is likely to play a crucial role in connecting the northeastern states to the mainland.

- It enhances tourism development through initiatives like river cruises which help to promote cultural and heritage tourism along riverbanks.

Issues/Challenges related to Inland Waterways in India:

- Indian rivers do not have adequate depth and northern rivers suffer from high siltation which extensive dredging a necessity.
- The operational efficiency is affected due to the shortage of modern terminals and **maintenance, repair, and overhaul (MRO)** facilities for vessels.
- There have been concerns regarding environmental pollution caused due to dredging activities necessary for maintaining navigability.
- The safe navigation at night is hampered due to the lack of Night Navigation Facilities such as **Differential Global Positioning Systems (DGPS).**
- The passage of bigger vessels may get obstructed due to low vertical clearances from bridges.
- It is often burdened by regulatory complexities and overlapping jurisdictions among various government agencies.
- Both public and private funding in the sector is low but dredging as well as infrastructure for IWT requires huge investments.

Source:Business Standard

ARCTIC TUNDRA IS EMITTING MORE CARBON THAN IT IS ABSORBING

Context: Arctic tundra, which has stored carbon for thousands of years, has now become a source of greenhouse gases (GHGs), according to a new analysis report by the National Oceanic and Atmospheric

Administration's (NOAA).

Background:

- The analysis, 'Arctic Report Card', is a yearly report on the polar region and was published last week.

How does the Arctic tundra store carbon?

- In a typical ecosystem, **plants absorb carbon dioxide (CO2)** from the atmosphere through photosynthesis. These plants grow, die, or are eaten by animals which also grow and die. When they die, the carbon in their corpse feeds microorganisms such as bacteria or fungi which break down larger molecules and return CO2 to the atmosphere, thereby completing the carbon cycle.
- However, in the case of Arctic tundra, the decomposition of organic matter is dramatically slowed down due to the cold climate. Plant and animal remains can stay trapped for thousands of years **inpermafrost thwarting CO2** from getting released back into the atmosphere.
- **Scientists estimate that Arctic soils** store more than 1.6 trillion metric tonnes of carbon across the region. That is about double the amount of carbon in the atmosphere.

Why is the Arctic tundra emitting more carbon than absorbing it?

- In recent years, however, the Arctic tundra's ability to emit less and absorb more carbon has taken a hit. The new analysis confirmed that the ecosystem has now become a **source of CO2 and methane (CH4) emissions.**
- **That has happened for two main reasons:**
    - One is rising temperatures. The report said the Arctic is warming four times the global rate.As a result, the Arctic's permafrost is thawing, meaning microbes in the soil are becoming active and breaking the organic matter down, releasing CO2 and CH4 into the atmosphere.
    - Another reason is that, in recent years, the Arctic has witnessed an increase in the frequency and intensity of wildfires. Last year was the worst wildfire season in the Arctic on record. Wildfire smoke adds GHG emissions to the atmosphere while also speeding up the thawing of permafrost.
- Wildfires and rising temperatures together, between 2001 and 2020, caused the Arctic tundra to release more carbon than its plants removed from the air, probably for the first time in many millennia, the report said.

Source: Indian Express

HINDON RIVER

Context: Once a lifeline for communities settled along its banks, the Hindon River in Western Uttar Pradesh, often called India's Sugar Bowl, has been reduced to a drain carrying domestic and industrial waste.

Background: -

- Since the 1970s, experts have warned about industries and untreated domestic waste polluting the river. In Saharanpur district alone, over 45 industries discharge waste into the Hindon, with 12 drains carrying effluents directly into the river. This pollution seeps into groundwater,

affecting health & agriculture.

Key takeaways

- The Hindon River is a **significant tributary of the Yamuna River in northern India.**
- **Origin**: The Hindon River originates from the Shakumbhari Devi Range (Upper Sivaliks) in the Saharanpur district of Uttar Pradesh.
- **Course**: It flows through several districts, including Muzaffarnagar, Meerut, Baghpat, Ghaziabad, and Gautam Buddh Nagar, before joining the Yamuna River in Noida.
- **Length**: The river spans approximately 400 kilometers (about 250 miles).
- **Catchment Area**: The Hindon River has a catchment area of around 7,083 square kilometers.

Key Features:

- **Tributaries**: The Kali River is a major tributary of the Hindon River. The Kali River merges with the Hindon near Sardhana.
- **Rainfed River**: The Hindon River is entirely rainfed, relying on monsoon rains for its water supply.
- **Pollution**: The river faces significant pollution challenges due to urban, agricultural, and industrial waste. In 2015, it was declared a 'dead river' by the Central Pollution Control Board (CPCB).

Historical Significance:

- Indus Valley Civilization: An Indus Valley civilization site, Alamgirpur, is located along the Hindon River, about 28 kilometers from Delhi.
- 1857 Revolt: The Hindon River was a site of several skirmishes during the Indian Rebellion of 1857, including the Battle of Badli-ki-Serai.

Source: Down To Earth

KAILASH MANASAROVAR

Context: In a major boost to bilateral relations, India and China on Wednesday agreed to strengthen cross-border exchanges and take concerete steps towards resumption of the Kailash-Mansarovar Yatra.

Background: -

- **The Kailash-Mansarovar Yatra** has been suspended since 2020 due to the Covid-19 pandemic and the Chinese side'snon-renewal of arrangements.

Key takeaways

- It's a revered pilgrimage undertaken by devotees from across the world to visit Mount Kailash and Lake Manasarovar in the Tibetan Autonomous Region of China.
- **Mount Kailash**: It lies in the Kailash Range of the Transhimalaya, in the western part of the Tibetan Plateau. The peak of Mount Kailash is located at an elevation of 6,638 m (21,778 ft), near the western trijunction between China, India and Nepal.

- **Lake Manasarovar**: Is a fresh water lake situated about 20 kilometers from Mount Kailash, at an altitude of 4,590 meters (15,015 feet).
- Manasarovar overflows into the salt-water endorheic lake of Rakshastal via the natural Ganga Chhu channel
- The Kailash Mansarovar is sacred in Hinduism, Buddhism, Jainism and Bon religion.
- **Kailash MansarovarPilgrimage Routes:**
  - Lipulekh Pass Route: Through Uttarakhand.
  - Nathu La Pass Route: Through Sikkim.

Source: Times Of India

PANAMA CANAL

Context: Incoming U.S. President Donald Trump slammed unfair fees for U.S. ships passing through the Panama Canal and threatened to demand that control of the waterway be returned to Washington.

Background: -

- Trump's comments were an exceedingly rare example of a U.S. leader saying he could push a sovereign country to hand over territory.

Key takeaways

- The Panama Canal is an artificial 82-kilometer (51-mile) waterway in Panama that connects the Atlantic Ocean with the Pacific Ocean, cutting across the Isthmus of Panama.

- It greatly reduces the time for ships to travel between the Atlantic and Pacific oceans, enabling them to avoid the lengthy, hazardous route around the southernmost tip of South America via the Drake Passage, the Strait of Magellan or the Beagle Channel.

History:

- **Early Attempts**: The idea of creating a water passage across the isthmus of Panama dates back to at least the 1500s. The French first attempted to build a canal in the 1880s but failed due to disease and financial difficulties.
- **U.S. Construction**: The United States took over the project in 1904, and the canal was completed in 1914. The U.S. maintained control over the canal zone until 1999, when it was handed back to Panama.
- **Modern Era**: Panama took full control of the canal in 1999, and it continues to be a vital artery for international shipping.

Structure:

- **Locks**: Locks at each end lift ships up to Gatun Lake, an artificial fresh water lake 26 metersabove sea level, created by damming up the Chagres River and Lake Alajuela to reduce the amount of excavation work required for the canal. Locks then lower the ships at the other end.
- **Water Usage**: An average of 200 million liters (52 million gallons) of fresh water is used in a single passing of a ship.

Source: Reuters

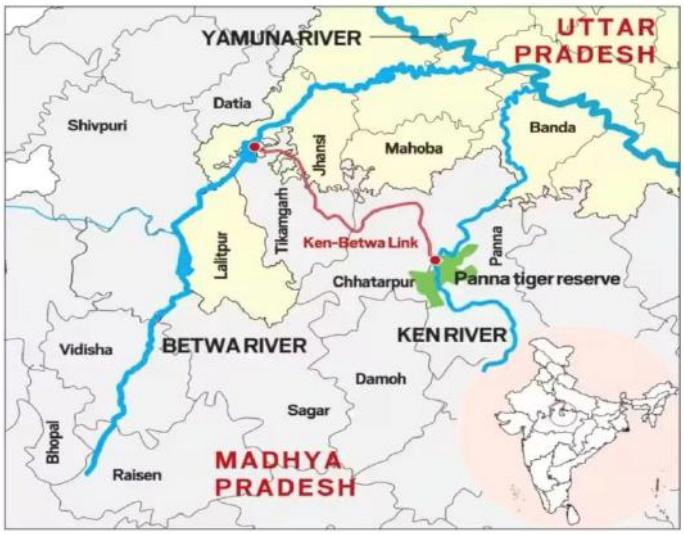
KEN-BETWA LINK PROJECT (KBLP) LAUNCHED

Context: Prime Minister Narendra Modi laid the foundation stone for the Ken-Betwa river-linking project in Madhya Pradesh's Khajuraho, aimed at solving the water woes of the Bundelkhand region, spread across parts of Uttar Pradesh and Madhya Pradesh.

Background:

- **The Ken-Betwa Link Project** is the first project under India's National Perspective Plan for interlinking rivers, which was prepared in 1980.This plan has 16 projects under its peninsular component, including the KBLP. Apart from this, 14 links are proposed under the Himalayan rivers development plan.

Key takeaways



- **The Ken-Betwa Link Project (KBLP**) is a major river interlinking project in India with a project outlay of ₹45,000 crore.
- **Objective**: The project aims to transfer water from the Ken River to the Betwa River, both tributaries of the Yamuna. This will provide irrigation to 10.62 lakh hectares (8.11 lakh hectares in Madhya Pradesh and 2.51 lakh hectares in Uttar Pradesh), supply drinking water to about 62 lakh people, and generate 103 MW of hydropower and 27 MW of solar power.
- **Components**: The project includes the construction of the Daudhan Dam, a 77-meter-high, 2.13-kilometer-long dam within the Panna Tiger Reserve, and a 221-kilometer canal linking the Ken and Betwa Rivers.
- **The Ken-Betwa Link Project has two phases.**
    - **Phase-I** will involve building the Daudhan Dam complex and its subsidiary units such as the Low Level Tunnel, High Level Tunnel, Ken-Betwa Link Canal and power houses.
        - Daudhan dam is 2,031 m long, out of which 1,233 metre will be earthen and the rest 798 m will be of concrete. According to the Jal Shakti Ministry, the dam will submerge about 9,000 hectares of land, affecting 10 villages.
    - **Phase-II** will involve three components — Lower Orr Dam, Bina Complex Project and Kotha Barrage.

What are the project's likely environmental and social impacts?

- **The Supreme Court's Central Empowered Committee (CEC)** had questioned the project on multiple counts while examining its wildlife clearance. The CEC had raised questions on the economic viability of the project, advocating for first exhausting other irrigation options in the upper Ken basin.
- The submergence of around 98 sq km of Panna national parkand felling of about two to three million trees has been one of the most controversial aspects of the project. The Daudhan dam is situated inside the national park.
- **The Union environment ministry** approved its construction inside the core of the Panna tiger reserve, despite no precedent of such heavy infrastructure projects deep within national parks and tiger reserves.
- **Downstream of the national park, the Daudham dam is also likely to affect the Gharial population** in the Ken Gharial sanctuary along with vulture nesting sites, the CEC had noted.

Source: The Hindu

WESTERN DISTURBANCE

Context: A western disturbance swept across northern India recently, bringing fresh snowfall to Kashmir and widespread rain to Delhi, Rajasthan, Punjab, and Haryana.

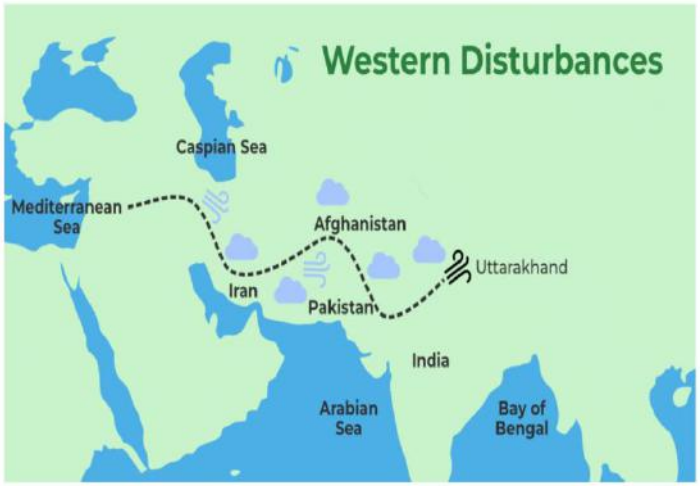
Background: -

- Weather experts note that the western disturbances, earlier predicted, seem to be more intense than expected.

Key takeaways

- **A Western Disturbance (WD)** is an extra-tropical storm originating in the Mediterranean region, characterized by its movement from west to east. It is carried towards South Asia by the subtropical westerly jet stream.
- **Formation and Origin:**
    - Formed over the Mediterranean Sea, Caspian Sea, or Black Sea.
    - Develops as low-pressure systems with associated upper-air cyclonic circulations.
- **Movement**:Moves eastwards, influenced by the jet stream, entering India through the northwestern regions.
- **Seasonality**:Primarily active during winter (November to March) but can occasionally occur in other seasons.
- **Regions Affected**:
    - **Northwestern India**: Punjab, Haryana, Rajasthan, and Western Uttar Pradesh.
    - Extends to the Himalayan states: Himachal Pradesh, Uttarakhand, and Jammu & Kashmir.
    - Sometimes influences central and eastern India.

Weather Impact:



- **Rainfall and Snowfall**:
  - Causes winter rainfall in the northwestern plains.
  - Triggers snowfall in the Himalayan regions, critical for replenishing glaciers and water reserves.
- **Temperature Effects:**
  - Leads to a decrease in daytime temperatures (due to cloud cover and rain).
  - Increases nighttime temperatures (acts as a blanket by trapping terrestrial radiation).
- **Agricultural Significance**:Beneficial for Rabi crops like wheat and mustard due to moisture availability.
- **Disruptive Effects**:Can lead to flash floods, landslides, and avalanches in mountainous regions.
- **Interaction with Local Systems**:When WDs interact with moist easterly winds (originating from the Bay of Bengal), they intensify, leading to widespread precipitation.

Source: Financial Express

AZERBAIJAN

Context: Russian President Vladimir Putin apologised to his Azerbaijani counterpart for the crash of an Azerbaijani airliner in Kazakhstan that killed 38 people.The plane was flying on December 25th from Azerbaijan's capital of Baku to Grozny, the regional capital of the Russian republic of Chechnya, when it turned toward Kazakhstan and crashed while making an attempt to land.

Background: -

- In an official statement, Russia said that air defence systems were firing near Grozny on Wednesday due to a Ukrainian drone strike, but stopped short of saying one of these hit the plane.

Key takeaways

- Azerbaijan is a transcontinental country located at the boundary of West Asia and Eastern Europe.
- **Location**: Bordered by the Caspian Sea to the east, Russia to the north, Georgia to the northwest, Armenia and Turkey to the west, and Iran to the south.
- **Capital**: Baku, which is also the largest city.
- **Terrain**: Varied landscapes including lowlands, highlands, and the Caspian Sea
- **Azerbaijan was part of the Soviet Union** until its independence on August 30, 1991, following the USSR's dissolution.

- **Economic Profile**
    - **Economy**: Primarily driven by oil and natural gas resources. The country is a key player in regional energy politics due to its reserves and strategic location.
    - **Major Pipelines**: Baku-Tbilisi-Ceyhan (BTC) pipeline, a significant route for transporting oil to Europe.

- The country is famous for its Mugham music and UNESCO World Heritage Sites, including the Walled City of Baku.
- **Geopolitical Importance**
    - Azerbaijan holds strategic significance due to its location in the South Caucasus, acting as a bridge between Europe and Asia.
    - It is a founding member of the Organization of Turkic States and part of the Non-Aligned Movement (NAM).
    - The Caspian Sea region makes it critical for energy security and transportation corridors like the Middle Corridor, connecting Europe and China.
- **Nagorno-Karabakh Conflict**: The region of Nagorno-Karabakh, internationally recognized as part of Azerbaijan, has been a focal point of conflict with Armenia.

Source: The Hindu

KAMARAJAR PORT

Context: The cargo-handling capacity at Indian ports has risen from 871.52 million tonnes per annum (MTPA) in 2014-15 to 1629.86 MTPA in 2023-24.Minister for Ports, Shipping and Waterways Sarbananda Sonowal said the capacity increased by 87 per cent in the last nine years, with Tamil Nadu's Kamarajar Port registering a whopping swell of 154 per cent.

Background:

- India is a maritime nation with a 7,517-km coastline Ninety-five per cent of trade by volume and 70 per cent by value is done through maritime transport.

Key takeaways

- Kamarajar Port Limited (KPL), formerly known as Ennore Port, is located on the Coromandel Coast about 24 km north of Chennai Port in Tamil Nadu, India.
- **History and Establishment**
    - **Foundation**: Kamarajar Port was declared a major port under the Indian Ports Act, 1908, in March 1999 and incorporated as Ennore Port Limited under the Companies Act, 1956, in October 1999.
    - **Name Change**: It was renamed Kamarajar Port Limited in 2014 to honor the former Chief Minister of Tamil Nadu, K. Kamarajar.

Key Features

- **First Corporatized Port**: Kamarajar Port is the first corporatized major port in India.
- **Strategic Location**: The port is designed to decongest Chennai Port and improve environmental quality.
- **Capacity**: The port has a permissible draught of 13.5 meters and handled a total volume of 11.01 million tonnes in 2010-2011.
- **Cargo Handling**: The port handles a variety of cargo, including thermal coal, automobiles, project cargo, LPG, chemicals, and other bulk and liquid products.

Source: New Indian Express

OILFIELDS (REGULATION AND DEVELOPMENT) AMENDMENT BILL, 2024

Context: Rajya Sabha recently passed the Oilfields (Regulation and Development) Amendment Bill, 2024.

Background: -

- The Bill amends the Oilfields (Regulation and Development) Act of 1948. It draws a clear line between the law governing the mining of "minerals" — defined under the Mines and Minerals (Development and Regulation) Act, 1957 — and the Oilfields Act.

What is the Oilfields Bill?

- When the Oilfields Act was first passed it was known as the Mines and Minerals (Regulation and Development) Act, 1948. This sole legislation governed and regulated oilfields, mines and minerals until 1957, when the present-day Mines and Minerals Act came into force.
- To demarcate the spheres in which the two Acts would operate, the 1948 legislation was renamed the Oilfields (Regulation and Development) Act, 1948, and its language was amended to replace references to "minerals" with "mineral oils". However, the Act does not define "mineral oil", an oversight that the current Oilfields Bill aims to correct.

Key provisions of the bill

- **Expanded Definition of Mineral Oils:**
  - Includes unconventional hydrocarbons: coal bed methane, oil shale, shale gas, shale oil, tight gas, tight oil, and gas hydrates.
  - Excludes coal, lignite, and helium occurring in the petroleum process.
- **Petroleum Lease**:
  - It has been defined as a lease granted for "prospecting, exploration, development, production, making merchantable, carrying away or disposing of mineral oils".
- **Expanded Regulatory Powers of the Centre**:
  - Includes emission reduction, oilfield usage for green technologies (e.g., hydrogen production, carbon capture), lease mergers, and dispute resolution.
- **Decriminalization of Offences**:
  - Shifts focus from criminal penalties to administrative fines for lease-related infractions.
  - Raises fines to ensure compliance.
- **Opening No-Go Areas for Exploration**:Allows exploration in previously restricted areas, such as near missile testing sites.

Significance and Impact

- **Boost to Domestic Output**:
  - Enhances exploration and production of both conventional and unconventional resources.
  - Reduces reliance on oil imports, which currently outpace exports by threefold.
- Policy Stability for Producers:Enables efficient operations by reducing redundant approvals and providing a predictable regulatory environment.
- **Green Energy Integration**:
  - Encourages use of oilfields for green initiatives like hydrogen production and carbon capture.
  - Lays groundwork for future incentives to make decarbonization projects viable.
- **Economic Implications**:
  - Streamlined processes improve private sector participation.
  - Supports long-term goals of energy security and reduced import dependency.

Source: Indian Express

LAKE EFFECT SNOW

Context: Recently, parts of USnorth-east saw substantial snowfall thanks to a phenomenon known as "lake-effect snow".

Background: -

- Western New York state was hit particularly hard, with nearly 4ft (1.22m) of snow accumulating in just four days. In response to the heavy snowfall, New York and Pennsylvania declared states of emergency.

Key takeaways

- Lake-effect snow is a weather phenomenon that occurs when cold air moves over relatively warmer lake waters. This process can lead to significant snowfall, especially in regions downwind of the lakes.

Formation:

- **Cold Air**: Cold air moves over the warmer waters of large lakes.
- **Moisture Uplift**: The warm lake water heats the lower layer of air, causing it to rise. As the moist air rises, it cools and condenses, forming clouds.
- **Snowfall**: These clouds can produce heavy snowfall, often in narrow bands. The snowfall rates can exceed several inches per hour.

Key Factors:

- Temperature Difference: A significant temperature difference between the lake surface and the air above is crucial for lake-effect snow formation.
- Wind Direction: The direction and speed of the wind determine where the snow bands will form and how far they will travel inland.
- Lake Size: Larger lakes, like the Great Lakes in North America, can produce more intense lake-

effect snow.

Examples:

- **Great Lakes Region**: The areas around the Great Lakes, such as Buffalo, New York, and parts of Michigan, often experience significant lake-effect snow.
- **Other Locations**: Similar phenomena can occur near other large lakes, such as the Great Salt Lake in Utah and Lake Baikal in Russia.

Source: Guardian

SYRIA

Context: Syrian rebels declared President Bashar al-Assad's ouster after seizing control of Damascus on Sunday (December 8, 2024), ending his family's iron-fisted rule after more than 13 years of civil war in a seismic moment for West Asia.

Background: -

- The Islamist rebels also dealt a major blow to the influence of Russia and Iran in the region, key allies who propped up Assad during critical moments in the civil war.
- **Hayat Tahrir al-Sham (HTS),** which spearheaded the rebel advances, was formerly an al Qaeda affiliate known as the Nusra Front until its leader Abu Mohammed al-Golani, severed ties with the global jihadist movement in 2016. HTS is Syria's strongest rebel group and some Syrians remain fearful it will impose draconian Islamist rule.

Key takeaways

- Syria is a country located in West Asia, in the region known as the Eastern Mediterranean and the Levant.
- Location: Bordered by the Mediterranean Sea to the west, Turkey to the north, Iraq to the east and southeast, Jordan to the south, and Israel and Lebanon to the southwest.
- **Capital**: Damascus, which is also the largest city.
- **History**:
    - **Ottoman Rule**: The region was part of the Ottoman Empire until the end of World War I.
    - French Mandate: After World War I, Syria came under French mandate until it gained independence in 1946.
    - Modern State: The modern Syrian state was established in the mid-20th century, with Damascus as its capital.

Culture and Religion:

- **Ethnic Groups**: The population is predominantly Arab, with significant Kurdish, Armenian, Assyrian, and other minority groups.
- **Religion**: The majority of the population follows Islam (87%), with Sunni Islam being the largest group (74%), followed by Alawism and other Shia Islam (13%), and Christianity (10%).
- **Cultural Significance**: Cities like Damascus and Aleppo hold great cultural significance, with Damascus being the seat of the Umayyad Caliphate during Islamic rule.

Economy:

- **GDP**: The GDP (PPP) is approximately $50.28 billion, with a per capita GDP of around $2,900.
- **Currency**: Syrian pound (SYP).
- **Economic Challenges**: The ongoing conflict has severely impacted the economy, leading to significant challenges in infrastructure and development.

Source: The Hindu

LONAR LAKE

Context: The Maharashtra government plans to submit a proposal to the Archaeological Survey of India (ASI) to include the famous Lonar Lake in Buldhana district in the Unesco World Heritage Sites list.

Background:

- After reaching ASI, the proposal will undergo a detailed review before being submitted to the United Nations Educational, Scientific and Cultural Organisation.If accepted, Lonar Lake will become India's 41st Unesco World Heritage Site, alongside iconic places like the Ajanta and Ellora Caves, Elephanta Caves, and Mumbai's Chhatrapati Shivaji Maharaj Terminus.

Key takeaways

- Lonar Lake is a geological and ecological marvel located in the Buldhana district of Maharashtra.
- **Formation**: Lonar Lake is a meteor crater lake formed approximately 50,000 years ago by a high-velocity meteor impact.
- **Geological Significance**: It is one of only four known hyper-velocity impact craters in basaltic rock on Earth.The other three basaltic impact structures are in southern Brazil.
- **It is a notified National Geo-heritage Monument**.National Geological Monuments are geographical areas of national importance and heritage, as notified by Geological Survey of India (GSI), for their maintenance, protection, promotion and enhancement of geotourism.
- **Dimensions**: The lake has a diameter of 1.2 kilometers (3,900 feet) and a depth of 150 meters (490 feet).

Physical Characteristics:

- **Water Composition**: The lake's water is both saline and alkaline, making it unique. It is seven times saltier than seawater.
- **Color Variations**: The lake's color changes from green to pink depending on the season and water conditions, caused by microorganisms thriving in its saline and alkaline environment.
- **Ramsar Site:** Declared a Ramsar Wetland in November 2020, highlighting its ecological importance.

Cultural Significance:

- **Temples**: The lake is surrounded by over 15 ancient temples, some dating back 1,200 years. The most significant temple is the Daitya Sudan temple, dedicated to Lord Vishnu.
- **Local Legends**: A popular local legend attributes the lake's formation to the mythical demon Lonasura, who was vanquished by Lord Vishnu.

Source: Business Standard

CASPIAN SEA

Context: Kazakhstan's state-owned energy company said recently that it had decontaminated Soviet-era oil waste on the shores of the Caspian Sea.

Background: -

- In Central Asia, work to remove toxic waste dating back to Soviet times has gathered pace in recent years, particularly in Tajikistan and Kyrgyzstan, where millions of cubic metres of radioactive waste are stored.

Key takeaways

• Location: Lies between Europe and Asia, bordered by five countries: Russia, Kazakhstan, Turkmenistan, Iran, and Azerbaijan.

• Unique Feature: Largest enclosed inland water body, often called a sea due to its size and salinity.

Geographical Features

• **Salinity**: Lower than seawater but higher than freshwater.

• **Important Rivers**: Volga, Ural, and Kura rivers flow into the Caspian Sea.

Economic Importance

• **Energy Resources**: Rich in oil and natural gas reserves, contributing significantly to regional economies.

- **Fishing Industry**: Famous for sturgeon and caviar production.
- **Trade and Transportation**: Strategic hub for trade routes connecting Europe and Asia.

Environmental Significance

- **Biodiversity**: Home to unique species, including the endangered Caspian seal.
- **Environmental Concerns**: Pollution from oil exploration, industrial activities, and declining water levels due to climate change.

Source:The Hindu

UGANDA

Context: Fifteen people have died and at least 100 more are missing after a landslide buried dozens of homes across several villages in eastern Uganda.

Background: -

- The landslides happened after heavy rainsin the mountainous district of Bulambuli, where landslides are common. The district is about 280 kilometers (173miles) east of the capital, Kampala.

Key takeaways

- Uganda, officially known as the Republic of Uganda, is a landlocked country located in East Africa.

- Independence: Uganda gained independence from the United Kingdom on October 9, 1962.
- Colonial Period: Before independence, Uganda was a British protectorate established in 1894.
- Historical Events: The country has experienced significant political turmoil, including the brutal regime of Idi Amin in the 1970s and subsequent periods of instability.
- Location: Uganda is bordered by Kenya to the east, South Sudan to the north, the Democratic Republic of the Congo to the west, Rwanda to the southwest, and Tanzania to the south.
- **Lake Victoria**: A significant portion of Uganda's southern border is formed by Lake Victoria, the largest freshwater lake in Africa.

- **Climate**: Uganda has a varied equatorial climate, with two rainy seasons and two dry seasons.
- **Population**: As of 2024, Uganda has a population of around 49 million people.
- **Capital City**: The capital and largest city is Kampala, which is home to about 8.5 million people.
- **Ethnic Groups**: Uganda is home to dozens of ethnic groups, with the Baganda being the largest at 16.5% of the population.
- **Official Languages**: English and Swahili are the official languages.

Source: Indian Express

Environment and Ecology

CARBON MARKET

Context: COP29, held at Azerbaijan's capital Baku, has given a fillip to the idea of using carbon markets to curb carbon emissions by approving standards that can help in the setting up of an international carbon market as soon as the coming year.

Background: -

- Carbon credits were first used in the 1990s in the U.S.

What is a carbon market?

- A carbon market allows the buying and selling of the right to emit carbon. Suppose a government wants to limit the amount of carbon emitted. It can issue certificates called carbon credits that allow certificate holders to emit a certain amount of carbon. One carbon credit is equivalent to **1,000 kilograms of carbon dioxide**. By limiting the number of carbon credits that are issued, governments can control how much carbon is released into the environment. It should be noted that anyone who doesn't hold carbon credits would not be allowed to emit any carbon into the atmosphere.
- Individuals and firms that hold carbon credits but don't actually need them for any reason can sell their credits to interested buyers. The price is determined by market forces, which in this case are the supply of carbon credits and the demand for these certificates.
- A carbon market can also include the trading of carbon offsets. In this case, a business that pollutes the environment for example, can purchase carbon offsets sold by aNGO that promises to plant trees that suck a certain amount of carbon emissions out of the atmosphere for each offset that it sells.

What is Good about Carbon Markets?

- **Addresses Externalities:**
    - Carbon emissions are a negative externality where the cost of pollution is not accounted for in market prices.
    - Carbon markets impose a financial cost on polluters, incentivizing firms to reduce emissions.
- **Monetary Incentive to Reduce Pollution**:Firms must purchase the right to pollute, encouraging them to minimize emissions to save costs.
- **Improved Carbon Accounting**:Technological advancements and standardized accounting frameworks have enhanced the ability of corporations to monitor and report emissions.
- **Flexibility for Firms**:Firms can purchase credits from others that don't need them, optimizing resource allocation.

What Can Go Wrong with Carbon Markets?

- **Manipulation by Governments:**
    - Governments disinterested in reducing emissions may flood the market with carbon

credits, reducing their price and effectiveness.

- Conversely, excessive restrictions on carbon credits may unnecessarily slow economic growth.

- **Cheating and Non-Compliance**:Firms may find ways to cheat the system and emit carbon illegally without purchasing credits.Enforcement of compliance is critical for market success.
- **Ineffective Carbon Offsets**:Firms may invest in carbon offsets as a form of virtue signaling without ensuring they truly reduce emissions.
- **Limited Incentives for Small Businesses**:Small businesses, particularly in developing nations, face challenges in accurately monitoring emissions.
- **Varied Production Processes**:Diverse supply chains and production methods make it difficult to establish uniform carbon budgets for all facilities.

Source: The Hindu

OLIVE RIDLEY TURTLES

Context: Carcasses of Olive Ridley turtles, which are currently in their breeding season, continue to wash ashore along the Visakhapatnam coast.

Background:

- Environmental experts say that a majority of the deaths are due to marine pollution and trawling activities for catching fish.

Key takeaways:

- The Olive Ridley Turtle (**scientific name: Lepidochelys olivacea**) is the smallest and most abundant sea turtle species in the world.
- **Size:** Olive Ridley turtles grow to about 2 feet in length and weigh around 50 kg.
- **Habitat**: They inhabit warm and tropical waters of the Pacific, Atlantic, and Indian Oceans.
- **Appearance**: They get their name from their olive-colored carapace (shell), which is heart-shaped and rounded.
- **Carnivorous**: Olive Ridley turtles are carnivores, feeding mainly on jellyfish, shrimp, snails, crabs, mollusks, and various fish and their eggs.

Unique Behavior:

- **Arribada**: Olive Ridley turtles are best known for their unique mass nesting behavior called arribada, where thousands of females come together on the same beach to lay eggs.
- **Nesting Sites**: The coast of Orissa in India is the largest mass nesting site for Olive Ridley turtles, followed by the coasts of Mexico and Costa Rica.
- **Major nesting sites in India include:**
  - **Odisha**: Gahirmatha Beach, Rushikulya River mouth, and Devi River mouth.
  - Andhra Pradesh, Tamil Nadu, and the Andaman and Nicobar Islands.

Life Cycle:

- **Egg Laying**: Females lay eggs in conical nests about 1.5 feet deep, which they dig with their hind flippers.
- **Hatching**: After about 45-65 days, the eggs hatch, and the hatchlings make their way to the ocean.
- **Survival Rate**: Only about 1 in 1,000 hatchlings survive to adulthood.
- **Conservation Status**: The Olive Ridley turtle is listed as Vulnerable on the IUCN Red List due to threats like habitat loss, pollution, and poaching.

Source: The Hindu

GREEN HYDROGEN AND THE FINANCING CHALLENGE

Context: As India charts its path to net-zero emissions by 2070, **green hydrogen offers a crucial pathway to decarbonise its industrial sectors**

Background: -

- India's success in green hydrogen will depend on leveraging its abundant renewable resources through efficient project execution, access to low-cost capital, and strategic investments.

Key takeaways

- India aims to produce 5 **million metric tonnes (MMT)** of green hydrogen annually by 2030.
- Based on a recent analysis by BloombergNEF, India is on track to meet only 10% of its stated goal.
- The sluggish progress is attributable to the substantial disparity between green hydrogen production costs ($5.30-$6.70 per kg) and traditional grey/blue production costs ($1.9-$2.4 per kg). This wide price differential makes it challenging to drive domestic offtake and attract private investment.
- The economics of green hydrogen production hinge on two factors — the **levelised cost of electricity (LCOE)** and electrolyzer costs, both driven by the cost of capital.
- In emerging markets like India, perceived higher risks push up borrowing costs, leading to a high **weighted average cost of capital (WACC).** As investment costs make up 50-80% of LCOE in renewable energy projects, WACC significantly impacts overall costs.
- India needs to adopt innovative financing mechanisms and policy frameworks to effectively de-risk investments and attract capital to scale its green hydrogen sector.

Policy Reforms

- The U.K.'s Low Carbon Hydrogen Standard Certification provides a model for building market confidence.
- Strategic hydrogen hubs in the U.S., Japan, and Australia reflect a shift from traditional industrial development approaches — rather than letting infrastructure follow demand, these nations are fostering integrated ecosystems where infrastructure, production, innovation, and consumption co-evolve. Adapting this approach, with localised industrial clusters linked to renewable energy

sources, could create self-sustaining hydrogen corridors in India that attract investment.

How to de-risk investments

- **First**, the government must implement a policy framework that extends beyond production incentives to address fundamental financing barriers. This includes establishing long-term hydrogen purchase agreements and partial loan guarantees. It should also create "regulatory sandboxes" that allow for experimentation with novel business models while maintaining safety standards, similar to how fintech innovation was accelerated in India.
- **Second**, India's financial sector must move beyond traditional project finance paradigms. Indianfinancial institutions must develop products that address hydrogen's distinctive challenges — long development timelines, uncertain demand, and complex value chains.
- **Third**, India's international collaboration should aim to tackle practical market-making challenges. Key trade corridors, such as the Hydrogen Energy Supply Chain Project between Australia and Japan, show how cross-border partnerships can provide the demand certainty needed for large-scale investments.

Source:The Hindu

PERSISTENT ORGANIC POLLUTANTS (POPs)

Context: Scientists conducted a 10-year study on orcas in the North Atlantic Ocean. Despite these orcas living far from human settlements, researchers found high levels of **persistent organic pollutants (POPs)** in their blubber (the fat layer under their skin).

Background: -

- One of the POPs found were **polychlorinated biphenyls (PCBs).** Used as coolants and lubricants in electrical components, they were banned in the US and Canada 50 years ago. The blubber samples also contained several other categories of POPs, whose "production, use, and/or release" were to be reduced or eliminated under Stockholm Convention on Persistent Organic Pollutants, signed in 2001.

Key takeaways

- **Persistent Organic Pollutants (POPs)** are a group of toxic chemicals that are resistant to environmental degradation through chemical, biological, and photolytic processes.

Characteristics:

- **Persistence**: POPs remain in the environment for extended periods without breaking down.
- **Bioaccumulation**: These pollutants accumulate in the fatty tissues of living organisms.
- **Lipophilicity**: POPs are highly soluble in fats and oils, leading to their accumulation in the food chain.
- **Toxicity**: They are toxic to both humans and wildlife, causing adverse health effects.
- **Long-range Transport**:Can be carried by wind and water to regions far from their source.

Sources:

- **Pesticides**: Many POPs are pesticides or insecticides, such as DDT and aldrin.
- **Industrial Chemicals**: Some POPs are industrial chemicals like polychlorinated biphenyls (PCBs).
- **Unintentional By-products**: POPs can also be unintentional by-products of waste burning and

industrial processes, such as dioxins and furans.

International Regulation:

- **Stockholm Convention:** The Stockholm Convention on Persistent Organic Pollutants is a global treaty aimed at eliminating or restricting the production and use of POPs. It was adopted in 2001 and became effective in 2004.
- India is a signatory and has ratified the convention.
- **Control Measures:** The convention includes measures to prohibit or restrict the production, use, and release of POPs, as well as to ensure their safe disposal.
- **Examples of POPs:**
    - **The Dirty Dozen:** The initial list of POPs identified by the Stockholm Convention includes aldrin, chlordane, dieldrin, endrin, heptachlor, hexachlorobenzene, mirex, toxaphene, PCBs, DDT, dioxins, and furans.
    - **New Additions**: Over time, additional POPs have been added to the list, such as perfluorooctane sulfonic acid (PFOS).

Source: Down To Earth

HINDU KUSH HIMALAYA FACES RISKS AMID RECORD GLACIER MELTING

Context: The State of the Cryosphere 2024 report, presented at the UN Climate Change Conference in Baku, warns that rising carbon emissions could increase global temperatures by over 3°C by century's end, causing unprecedented glacier melting, including in the Indian Himalayan Region.

Background: -

- **The glaciers of the HKH region, also known as the "Third Pole" or the "Water Tower of the Earth",** are the source of some of the world's major river systems like the Indus, Ganga, and Brahmaputra.

Key takeaways

- **Cryosphere** refers to the frozen water part of the Earth's surface. Its components include snow, glaciers, ice caps, ice sheets, sea ice and permafrost. These elements are primarily found in polar regions, high latitudes and high-altitude areas of the Earth's surface.
- Rising temperatures are affecting every part of the Cryosphere. This year's summer is the third in a row when sea ice in Antarctica was reduced to less than 2 million square kilometers.
- If the current warming trend continues to grow, there is a possibility of complete sea ice loss around Antarctica during the summer months. This would cause the warming of water and further melting of Antarctica's ice sheet.
- Also, it is estimated that exceeding the 1.5°C limit could cause a rise above 10 meters in sea level in the coming centuries.
- Venezuela lost its last glacier, 'Humboldt,' this year, while Indonesia's 'Eternity Glacier' will likely melt completely within the next two years.

- As the temperature increases, there will be less solid precipitation (snow) and more liquid precipitation, even at higher altitudes, resulting in less seasonal snow occurrence overall.
- Additionally, thawing permafrost will lead to increased concentration of CO2 in the atmosphere.

Hindu Kush Himalayan region

- The HKH region witnessed record-low snowfall during the winter of 2023-2024. This decline in seasonal snow availability will also have an impact on food, energy and water security for both the country and the region.
- The Indian Himalayan Region, which spans 13 states and Union Territories, will be directly affected by these changes. It is projected that even a 2°C rise in global temperatures could result in a 50 per cent loss of ice from High Mountain Asian glaciers.
- This will intensify catastrophic hazards, such as the **Glacial Lake Outburst Floods (GLOFs),** already occurring in High Mountain Asia, particularly in India. Recent GLOFat South Lhonak Lake in Sikkim (October 2023), led to the loss of human lives and extensive damage to infrastructure.

Source: Indian Express

NEXUS REPORT

Context: Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), a global group of scientific experts, has released an **Assessment Report on the Interlinkages among Biodiversity, Water, Food and Health – known as the Nexus Report.**

Background: -

- This is a first-of-a-kind report looking at the interconnections between themultiple crises. The group examined five major challenges — climate change, biodiversity loss, food insecurity, water scarcity, and health risks — and found that they were strongly interconnected.

What is IPBES?

- IPBES is to biodiversity and natural ecosystems what **Intergovernmental Panel on Climate Change (IPCC)** is to climate change. It periodically examines all the existing scientific knowledge on biodiversity and nature to make an assessment of their current state.
- Just like IPCC, IPBES too does not produce new science. It only evaluates the existing knowledge to make consolidated assessments.
- IPBES, set up in 2012, informs several multilateral environmental processes, including the UN Convention on Biological Diversity (CBD), the Convention on Combating Desertification (CCD), the Ramsar Convention on Wetlands, Convention on International Trade in Endangered Species, and the Cartagena Protocol on Biosafety.
- IPBES produced its first report in 2019 in which it assessed the threat to global biodiversity.The information in this report became the basis for the Kunming-Montreal Global Biodiversity Framework.

What does the latest report say?

- Nexus Report has highlighted the strong interlinkages between the five identified global

challenges. Its key takeaway is that responses to all these challenges need to be harmonised so that positive actions taken on any one of these does not result in negative impacts on others.

- For example, an attempt to scale up food production, a positive action to deal with hunger and malnutrition, could have the unintended consequence of increasing stress on land and water resources and biodiversity. Exclusive focus on climate change could also go down on the same pathway.
- The report, therefore, argues that it was important to adopt synergistic approaches that deliver benefits across the spectrum.
- Report identified over 70 synergetic approach response options that produced positive outcomes across the five elements. Examples of such response measures included restoration of carbon-rich ecosystems such as forests, soils and mangroves, effective management of biodiversity to reduce risks of diseases spreading from animals to humans, promotion of sustainable healthy diets, and reliance on nature-based solutions wherever possible.
- The report pointed out that more than half of the global GDP — was moderately to highly dependent on nature.

Transformative Change Report

- In another report released simultaneously, IPBES called for fundamental and transformative shifts in the way people view and interact with the natural world in pursuit of its well-being.
- **This report, being called the Transformative Change Report,** said current, and previous, approaches to deal with ecological decline had failed, and a new and different approach was needed.
- **This new and transformative approach**, it said, must be based on four fundamental principles — equity and justice, pluralism and inclusion, respectful and reciprocal human-nature relationships, and adaptive learning and action.
- It said the world needed to act immediately on new approaches because the cost of delaying action would increase the costs. There were also benefits to be had from immediate action.
- It said recent estimates suggested that **more than 10 trillion dollars in business opportunities**, and about 400 million jobs, could be generated by 2030 through sustainable economic approaches that rely on nature-positive economic models.

Source: Indian Express

PANGOLINS

Context: Recent incidents in Telangana have renewed concerns about the smuggling of pangolins, a scaly nocturnal mammal known for its huge demand in the international market. This has prompted renewed vigilance against its illicit trafficking.

Background: -

- The creatures are strictly nocturnal, repelling predators by curling up into scaly spheres upon being alarmed. The same defence mechanism however, makes them slow and easy to catch once spotted.

Key takeaways

- Globally there are eight pangolin species, four each in Africa and Asia. India is home to two species – Indian pangolin Manis crassicaudata and Chinese pangolin Manis pentadactyla.
- Indian pangolins are found in Bangladesh, India, Nepal, Pakistan, and Sri Lanka.
- In India, the species (Indian pangolin) is widely distributed and has been recorded in Andhra Pradesh, Assam, Bihar, Chhattisgarh, Goa, Gujarat, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Meghalaya, Odisha, Rajasthan, Tamil Nadu, Uttarakhand, Uttar Pradesh, and West Bengal.
- In India, both Indian pangolins and Chinese pangolins are listed in Schedule I of the Wildlife (Protection) Act, of 1972. Therefore hunting, trade, or any other form of utilisation of the species or their body parts and derivatives is banned.
- Since 2017, all pangolin species have been listed in Appendix I of the **Convention on International Trade in Endangered Species (CITES),** prohibiting their commercial trade.
- Chinese Pangolin is classified as 'Critically Endangered' on the **International Union for Conservation of Nature (IUCN)** Red List while the Indian Pangolin is classified as 'Endangered' on the IUCN Red List.
- They are the only known mammals with large keratin scales covering their skin. They are also toothless.
- These animals are inherently shy and have minimal requirements for sustenance. Their diet primarily consists of ants, termites, and their eggs and larvae. Their sense of smell is extraordinary but vision and hearing are poor.
- Pangolins are the most trafficked mammal in the world—with demand primarily in Asia and in growing amounts in Africa—for their meat and scales. There is also demand in the United States for pangolin products, particularly for their leather to be used in boots, bags, and belts.

Significance of Pangolins

- Pangolins are "**ecosystem engineers**" that build burrows that help circulate soil organic matter, increase soil moisture and aeration, and affect plant community succession through their burying behaviour.
- The burrows made by pangolins also get utilised as shelters by other species within their ecosystem.

Source: Indian Express

MARKHOR

Context: A male markhor, one of the most elusive large mammals in India, was rescued by wildlife authorities after straying into Noorkhah village near Baramulla in north Kashmir.

Background: -

- The village, located close to the Kazinag National Park and the Line of Control, forms part of the species.

Key takeaways

- **The Markhor (Capra falconeri)** is a large wild goat species native to the mountainous regions of South Asia and Central Asia, particularly in Pakistan, Afghanistan, and parts of India (Jammu and Kashmir).

- **Conservation Status:** Listed as Near Threatened on the IUCN Red List since 2015.
- **CITES:** Listed under Appendix I, prohibiting international trade of the species.
- **National Animal:** The national animal of Pakistan, where it is also known as the "screw-horned goat" due to its distinctive corkscrew-shaped horns.
- **Etymology:** The name "Markhor" comes from the Pashto and Persian words meaning "snake-eater," referencing an ancient belief that the Markhor would consume snakes.

Physical Characteristics:

- **Horns**: Both males and females have tightly curled, corkscrew-like horns, with males' horns growing up to 160 cm (63 in) long.
- **Coat**: The coat is grizzled, light brown to black in color, and varies in length and thickness with the seasons.

Habitat:

- **Elevation**: They inhabit mountainous terrain between 600 and 3,600 meters (2,000 and 11,800 feet) in elevation.
- **Environment**: They are typically found in shrub forests with oaks, pines, and junipers.

Behavior:

- **Activity**: Diurnal, with peak activity in the early morning and late afternoon.
- **Diet**: Herbivorous, grazing on grasses in spring and summer, and browsing on leaves and shoots in winter.
- **Reproduction**: Mating season occurs in winter, with males engaging in horn-locking fights to establish dominance.

Threats:

- **Habitat Loss**: Deforestation and land conversion for agriculture.
- **Illegal Wildlife Trade**: Poaching for meat and prized horns.

- **Predation**: Natural predators include snow leopards, brown bears, lynxes, jackals, and golden eagle.

Source: Times of India

EXTENT OF THE GLOBAL SOLAR

Context: The World Solar Report 2024 by the International Solar Alliance (ISA) was released recently.

Background: -

- From 1.22 GW in 2000, the world's solar capacity has surged to 1,419 GW in 2023, charting a CAGR of about 36%. Today, solar capacity represents three-quarters of all renewable capacity additions worldwide.

What are new solar technologies?

- **Quantum dot solar cells** have achieved a record-breaking efficiency of 18.1%. Researchers are creating self-healing solar panels to extend the lifespan and reduce the maintenance of existing solar cell technologies.
- **Solar-powered phyto-mining uses solar energy** to power the extraction of valuable metals from soil-using plants, offering a sustainable alternative to traditional mining practices.
- Solar paver blocks integrated with building infrastructure and BIPV (Building Integrated PV), like transparent solar panels, allow light transmission and visibility. The development of these alternative technologies will reduce reliance on critical materials like lithium and rare earth elements.
- The solar sector is also prioritising recycling panels and implementing circular economy practices to minimise environmental impact.

Have reducing costs helped?

- The 2024 World Solar Report shows that the average auction prices for utility-scale solar photovoltaic (PV) projects have consistently decreased across all regions. Utility-scale solar PV costs averaged $40/MWh in 2024.
- India topped the global charts in solar PV capacity granted through auctions, securing a notable auction price of $34/MWh.
- As of 2023, China dominates solar PV as 43% (609 GW) of the cumulative capacity of solar panels installed globally is from China. The U.S. contributes 10% (137.73 GW). Japan, Germany, and India each captured a 5-6% share.

Has solar impacted other industries?

- Employment in the solar PV sector rose to 7.1 million jobs in 2023, up from 4.9 million in 2022 worldwide, underscoring the sector's role in job creation and economic development.
- Solar-powered irrigation systems are transforming agriculture. Agrivoltaics systems are being used in livestock management, with solar panels installed in pastures to provide shade for animals while simultaneously generating electricity.
- One of the key factors driving the adoption of solar systems has been the introduction of pay-

as-you-go business models, allowing users to pay for their systems in small, regular instalments.

- Technological advancements have made solar energy more affordable, while new applications are further driving adoption.

Source: The Hindu

UNITED NATIONS CONVENTION TO COMBAT DESERTIFICATION (UNCCD)

Context: Indigenous peoples of the world have a very important role to play in combating desertification, the 16th Conference of Parties (COP16) to the **United Nations Convention to Combat Desertification (UNCCD)** recognised in Riyadh, Saudi Arabia.

Background:

- Other COPs which resulted from the 1992 Earth Summit – United Nations Framework Convention on Climate Change and Convention on Biodiversity – have already recognised indigenous communities' traditional wisdom.

Key takeaways

- The **United Nations Convention to Combat Desertification (UNCCD)** is a global agreement aimed at addressing desertification, land degradation, and drought (DLDD), with a focus on sustainable land management and ecosystem restoration.
- **Established**: Adopted in 1994 and came into force in 1996.
- **Objective**: To combat desertification and mitigate the effects of drought through national action programs (NAPs) that incorporate a bottom-up approach.
- **Secretariat Headquarters**: Bonn, Germany.
- It is one of the Rio Conventions, alongside the UNFCCC (Climate Change) and CBD (Biodiversity), adopted during the Earth Summit in 1992.
- **Focus Areas:**
    - Prevention of desertification in drylands (arid, semi-arid, and dry sub-humid areas).
    - Land degradation neutrality (LDN).
    - Community participation and sustainable land management practices.
- **Binding Treaty**:It is the only legally binding international agreement linking environment, development, and land management.
- **Strategic Framework**:Current framework (2018–2030) aligns with the Sustainable Development Goals (SDGs), particularly SDG 15.3, which targets achieving a land degradation-neutral world.

India and UNCCD

- India ratified the convention in 1996.
- Hosted the 14th Conference of Parties (COP 14) in September 2019 in New Delhi.
- Indian Initiatives aligned with UNCCD:
- Desertification and Land Degradation Atlas (2021): Maps degradation across states.
- National Action Plan on Climate Change (NAPCC) and National Afforestation Programme.

Source: Down To Earth

CLIMATE IMPACT OF EXPLORING SPACE

Context: As the world becomes more reliant on space technologyfor vital functions like climate monitoring, the environmental consequences of space activities need more attention. The rapid growth of the number of satellites in orbit has led to concerns about interference with climate monitoring systems and the accumulation of orbital debris.

Background:

- Space activities currently fall outside international sustainability instruments like the Paris Agreement.

Key Concerns:

Climate Change:

- Rocket emissions (CO_2, black carbon, water vapor) contribute to global warming.
- Chlorine-based propellants deplete the ozone layer.
- Satellite re-entry and burn up releases metallic ash, potentially altering the atmosphere.
- Energy-intensive satellite production and mining activities have significant carbon footprints.

Orbital Debris:

- Rapid growth of satellites and debris poses collision risks to functional satellites.
- Debris interferes with scientific observations and communication systems.
- Increases the cost and complexity of space missions.
- Poses a threat to human-crewed missions.

Challenges to Space Sustainability:

- **Lack of International Regulation:**
    - No specific international regulations address space debris and environmental impact.
- **Technological Limitations:**
    - Reusable rockets have limitations in terms of payload capacity and fuel efficiency.
    - Cleaner fuels like hydrogen and biofuels face challenges in production and storage.
    - Biodegradable satellite materials lack durability for space environments.
    - Autonomous debris removal technologies are expensive and require legal clarity.
- **International Cooperation:**
    - Data sharing and coordination among nations are hindered by security and commercial concerns.

Path Towards Space Sustainability:

- **International Cooperation:**
    - International cooperation through bodies like the **Committee on the Peaceful Use of Outer Space (COPUOS)** is necessary to create enforceable standards.
    - Standardize emission limits, debris mitigation, and data-sharing practices.
- **Technological Innovation:**
    - Invest in research and development of cleaner fuels, biodegradable materials, and

autonomous debris removal technologies.

- **Policy and Incentives:**
    - Implement strict regulations and incentives for sustainable space practices.
    - Encourage public-private partnerships to accelerate technological advancements.
    - Establish a global space traffic management system to monitor and coordinate satellite activities.

Source: The Hindu

BEIJING'S WAR AGAINST AIR POLLUTION

Context: Beijing, with a yearly average air quality index (AQI) of 144, was as polluted in 2015 as Delhi is today (Delhi's average is 155 for 2024). But in the interim, Beijing has managed to cut its pollution level by one-thirdwith the most significant fall spanning between 2013 and 2017.

Background: -

- Beijing is the capital of an emerging economy, as is Delhi. So, if Beijing could manage what it did at its stage of development, Delhi could and needs to, as well.

Similarities between Beijing and Delhi:

- **Rapid Urbanization and Economic Growth:** Both cities have experienced rapid industrialization and urbanization, leading to increased emissions.
- **Heavy Reliance on Fossil Fuels:** Both cities heavily rely on fossil fuels for energy generation and transportation, contributing to air pollution.
- **Regional Impact:** Both cities are influenced by regional pollution sources, particularly during winter months.

Beijing's Successful Strategies:

- **Long-Term Planning and Implementation:** Beijing's 20-year anti-pollution programme can be divided into three phases — 1998-2008; 2009-12; 2013-17. It was not shock-and-awe approach but a careful and slowly built-up plan with people's participation, run by the local government of Beijing.
- **Targeted Pollution Sources:** Sources of pollution in Beijing were broadly identified as energy structures and coal combustion, transportation structures, and construction and industrial structures.
- For the first source, three steps were taken — ultra-low emission renovation and clean energy alternatives in power plants, renovation of coal-fired boilers, and elimination ofcoal consumption used for residential heating.
- For transportation infrastructure, the government first retrofitted cars and public service vehicles with **diesel particulate filters (DPF)** and gradually tightened emission standards. Then it went for scrapping, through subsidies. Subway and bus infrastructure was overhauled and expanded along with optimising the urban layout.
- As for the industrial and construction activities, tightening **environmental requirements,**

intensifying end-of-pipe (EOP) treatment, eliminating obsolete industrial capacity, creating a green construction management model, efficient washing facilities, and implementing video monitoring with penal action against violators were some steps taken.

- The last leg of the plan (2013-17) especially focused on the need for regional cooperation, with five adjoining provinces around Beijing coming together for reducingpollution in the region.

Lessons for Delhi:

- **Strong Political Will and Leadership:** A strong commitment from the government is crucial to implement and enforce effective policies.
- Since private transport is a big contributor to pollution, an efficient and comfortable bus-metro integrated transport system needs to be in place. Delhi's DTC bus fleet is not only old but also inadequate for population size. The metro has almost zero last-mile connectivity.
- Old vehicles need to be scrapped at the earliest through a well-thought-out subsidy-for-scrap programme.
- Exclusive cycling and walking lanes should be built. Other ideas, such as cross-subsidisation through affordable public transport and expensive private transport using congestion or high parking charges, as well as separate fuel costs for the two modes of transport, could be experimented with.
- An urban layout is needed where places of work and residence are brought closer, alleviating the need for long travel.
- Delhi's electricity is supplied primarily through coal fired plants. This need overhaul both from supply and demand side. Subsiding solar roof tops and connecting it to the grid with electricity bill discounts could be one step.
- Much like the Beijing plan, Delhi needs to coordinate with neighbouring regionsto control other sources which originate in these regions.

Source: The Hindu

ARAVALI GREEN WALL PROJECT (AGWP)

Context:At United Nations Convention to Combat Desertification (UNCCD) CoP16,India showcased its ambitious 'Aravali Green Wall' project to the global community.

Background:

- AGWP, launched in 2023, is a major initiative to green the 5 km buffer area around the Aravalli range in four states.

Key takeaways

- **The Aravalli Green Wall Project** is part of the Union Environment Ministry's vision to create green corridorto combat land degradation and desertification.
- The project covers states of Haryana, Rajasthan, Gujarat and Delhi - where the Aravalli hills landscape span over 6 million hectares of land.
- The project will involve planting native species of trees and shrubs on scrubland, wasteland and

degraded forest land, along with rejuvenating and restoring surface water bodies such as ponds, lakes and streams.

- The project will also focus on agroforestry and pasture development to enhance the livelihoods of local communities.

The major objectives of Aravalli Green Wall Project are:

- Improving the ecological health of the Aravalli range.
- **To prevent eastward expansion of Thar Desert** and to reduce land degradation by creating green barriers that will prevent soil erosion, desertification and dust storms.
- Promote sustainable development and livelihood opportunities by involving local communities in afforestation, agro-forestry and water conservation activities that will generate income, employment, food security and social benefits.
- Contribute to India's commitments under various international conventions such as **UNCCD (United Nations Convention to Combat Desertification), CBD (Convention on Biological Diversity) and UNFCCC (United Nations Framework Convention on Climate Change).**

Source: Times Of India

ASHTAMUDI LAKE

Context: The **State Level Monitoring Committee (SLMC)** appointed by the National Green Tribunal, has recommended implementation of projects in a time-bound manner to check the illegal discharge of wasteinto Ashtamudi Lake.

Background: -

- A preliminary examination indicates the presence of excessive ‘algae bloom’, which is the direct result of discharge of biowaste, including septage into the waterbody, SLMC said in its report on the mass fish kill reported in Ashtamudi Lake on October 27.

Key takeaways

- **Location: Ashtamudi Lake** is situated in the southern part of Kerala, near the city of Kollam.
- Shape: The lake is palm-shaped (also described as octopus-shaped) with multiple branches, hence the name "Ashtamudi," which means "eight-hills" in Malayalam.
- Size: It is the second-largest lake in Kerala, covering an area of 61.4 square kilometers.

Ecological Significance:

- **Ramsar Wetland:** Ashtamudi Lake is designated as a Ramsar Wetland of International Importance, recognizing its ecological significance.
- **Biodiversity**: The lake supports a rich variety of flora and fauna, including mangroves, marshy vegetation, and various fish species.
- **Water Source:** The primary inflow to the lake is the Kallada River, and it connects to the Arabian Sea through the Neendakara estuary.

Cultural and Historical Importance:

- **Historical Port:** Kollam, located on the banks of Ashtamudi Lake, was an important port city in ancient times, known as Quilon.
- **Trade Hub:** The lake has historical significance dating back to the 14th century, serving as a major trading center.
- **Houseboats:** Ashtamudi Lake is famous for its houseboat cruises, offering a serene experience through the backwaters.

Source: The Hindu

THE TOXINS OF THE BHOPAL DISASTER

Context: Forty years after the Bhopal disaster on December 2-3, 1984, several hundred tonnes of toxic waste still remain around the ill-fated Union Carbide plant.

Background: -

- Despite pleas from locals and activists — bolstered over the years by orders from the National Green Tribunal and the Supreme Court — to dispose of the waste, the Madhya Pradesh government has only been able to get rid of a small fraction.

Key takeaways

- **Union Carbide India, Ltd. (UCIL)** built the Bhopal plant in the 1960s to manufacture an insecticide called carbaryl using a reaction of methyl isocyanate (MIC) with 1-naphthol.
- MIC is a highly toxic compound. It reacts with water at high temperatures and its reaction with water also releases heat.
- On the night of December 2, 1984, a large quantity of water entered a tank storing MIC at the plant such that the MIC was soon boiling. Facilities at the plant to cool the tank were otherwise diverted, leaving MIC vapours to escape to the environment and spread.
- MIC doesn't have a particular smell at concentrations at which other gases may become noticeable but it can irritate the eyes. However, given the hours, most of the people exposed to the gas were asleep.
- The Union Carbide Corporation has never officially specified which gases were leaked from the plant, including MIC. This decision also compromised health workers' ability to respond effectively to the hordes of people who showed up in clinics and hospitals in Bhopal that night and the next day.
- Some visual cues, including the blood-red colour of the viscera of those who died, also raised concerns that hydrogen cyanide was present in the fumes.

What are the toxins at the plant?

- A report by Greenpeace released in 1999, based on analyses of samples collected at the site reported the presence of mercury, chromium, copper, nickel, and lead. The report also noted the presence of hexachlorobutadiene, chloroform, carbon tetrachloride, and trichlorobenzene, among other compounds.

How toxic are heavy metals?

- Chromium, copper, lead, mercury, and nickel are classified as heavy metals because their density is at least 5x that of water.
- Mercury has been known to damage multiple organs even at low concentrations by accumulating in soft tissue and preventing normal cellular function.
- There is evidence for arsenic and its compounds being able to cause cancers of the urinary bladder and the lungs; for hexavalent chromium to cause cancers of the lungs; and for nickel and its mixtures to cause cancers of the lungs, nose, nasal cavity, and the paranasal sinuses.
- Chromium is an essential nutrient required by the human body to promote the action of insulin for the utilisation of sugars, proteins and fats. But high doses of chromium and long exposure can give rise to various cytotoxic and genotoxic reactions that affect the immune system of the body.
- Lead is capable of damaging chlorophyll and disrupting photosynthesis in plants and rendering structural damage to cells and hampering their ability to produce energy in animals.

How are organic compounds harmful?

- **Hexachlorobutadiene** is a possible carcinogen. When inhaled, ingested, or brought in contact with skin, this compound can cause the liver to store too much fat (hepatic steatosis), destroy cells in the kidneys involved in producing urine, and inhibit brain activity, among other effects.
- **Chloroform** by another name is trichloromethane, and is infamous for its effects on the central nervous system. At a sufficient concentration, it can cause an adult to faint, but at even higher ones it can cause death.
- **Carbon tetrachloride, a.k.a. carbon tet, is classified as an "acute toxin" and a "health hazard".** According to at least one review, ingesting 1 ml of carbon tet can also blur vision, damage nerves, and/or cause heartbeat to become irregular.
- **Trichlorobenzene** is volatile and spread easily through the air, although they have also been found in groundwater and in surface water bodies like lakes. These compounds build up in the body's fatty tissues and at high concentrations can damage the liver and the kidneys.

Source: The Hindu

RATAPANI TIGER RESERVE

Context: The Ratapani Wildlife Sanctuary in Madhya Pradesh was declared a tiger reserve following in-principle approval from the Ministry of Environment, Forest, and Climate Change through the National Tiger Conservation Authority.

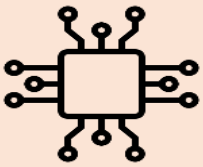
Background: -

- This development comes against the backdrop of Madhav National Park (Madhya Pradesh) also receiving approval to be declared a tiger reserve.
- Ratapani is the 57th tiger reserve in India, marking a significant step in tiger conservation efforts

Key takeaways

- The notification delineates the core and buffer areas, making Ratapani the eighth tiger reserve in Madhya Pradesh.
- The core area spans 763.8 square kilometers, while the buffer area covers 507.6 square kilometers, making the total area of the Ratapani Tiger Reserve 1,271.4 square kilometers.
- The notification was issued under Section 38V of the Wildlife (Protection) Act, 1972, acknowledging the core area as a critical tiger habitat.
- Sitting in the lap of the Vindhya hills, the sanctuary encompasses a World Heritage Site – the Bhimbetka Rock Shelters – and many historical and religious destinations.
- The reserve is home to a rich variety of flora and fauna, including teak forests, bamboo, and a diverse range of wildlife.

Source: Indian Express



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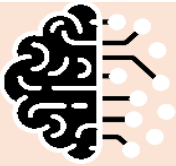


STARLINK SATELLITE INTERNET

Context: Elon Musk has denied claims that his space company SpaceX's satellite internet technology Starlink is being used by militants in Manipur.

Background: -

- This came after the Indian Army and police seized weapons and what looked like a Starlink-branded satellite router and antenna. Starlink is still pending regulatory approval in India, though it will be starting in neighbouring Bangladesh and Bhutan in 2025

What is Starlink and how does it work?

- Starlink uses an extensive low Earth orbit satellite constellation to deliver broadband internet that has high speeds and low latency.
- It is a popular choice for users worldwide in remote areas, sea vessels, disaster-struck regions, or places where oppressive regimes have throttled access to more mainstream internet services.
- There are thousands of satellites in the Starlink system, and they orbit Earth at around 550 km. Though they cover the entire globe, per SpaceX, the company is not authorised to provide its services to users in some regions.

What is the controversy surrounding Starlink?

- Indian army on December 16 shared photos of guns, ammunition, and country-made mortars seized from Manipur in X.
- X users spotted a small satellite device and router, with the latter bearing the SpaceX logo sparkling speculation that Musk's technology was being used by terrorists. Elon Muk responded that Starlink satellite beams are turned off over India.
- This is not the first time SpaceX has become embroiled in controversy in India. Last month, smugglers originating from Myanmar were caught by the Andaman and Nicobar islands police with over 6,000 kg of meth and a Starlink device that was allegedly used for navigation and communication, despite service being prohibited in Indian waters.
- Furthermore, in August this year, Starlink equipment was seen being sold on the B2B platform IndiaMART.

Can Starlink satellite internet be controlled?

- International borders are not solid and it is not easy to refine satellite internet coverage to such a precise degree that service is activated or halted exactly in line with a nation's border. An additional complication is that many international borders are contested or unclear
- More information is needed from SpaceX to understand how the company ensures that Starlink satellite internet does not reach the countries yet to allow Starlink, while enabling service for neighbouring countries or waters that do allow Starlink service.

What does Indian law say?

- India strictly regulates and restricts the use of satellite-based communication devices. Everyday gadget users within the country would have noticed that even key satellite-based emergency features on premium phones that are easily available for users overseas are not enabled for use in India.
- Under section 6 of the Indian Wireless Act and Section 20 of the Indian Telegraph Act, the use of thuraya/iridium satellite phones is illegal in the country. Indian embassies worldwide warn both Indian and foreign travellers that they cannot carry satellite phones into the country and may face confiscationand legal action if they do so without permission.
- These restrictions are in place largely to combat militancy and terrorism. In 2022, Indian officials reported that evidence of iridium satellite phone usage was discovered in the Kashmir Valley.
- Starlink is currently trying to enter the Indian market. The latest discovery of the Starlink hardware in Manipur could further affect SpaceX's entry, due to doubts over its compliance with Indian regulations and possible misuse by non-state actors.

Source: The Hindu

MIRROR BACTERIA

Context:A group of 38 scientists working in nine countries has sounded an alarm about the potential creation of mirror bacteria.

Background: -

- While the science and technology necessary to create mirror bacteria in a laboratory is a decade or more away, the scientists argued that the possibly lethal risks posed by this new field of research are "unprecedented" and "overlooked."

Key takeaways

- Mirror bacteria are a hypothetical form of synthetic life that scientists are exploring. These organisms are constructed from molecules that are mirror images of those found in natural life forms.

What are Mirror Bacteria?

- **Chirality**: Natural life forms use molecules with specific orientations, known as chirality. For example, DNA and RNA are composed of right-handed molecules, while proteins are made from left-handed amino acids. Mirror bacteria would have reversed chirality, with left-handed DNA and right-handed proteins.
- **Synthetic Creation**: Scientists are working on creating bacteria with these mirror-image molecules, which could have unique properties and behaviors.

Potential Risks:

- **Immune Evasion**: Mirror bacteria could potentially evade natural immune defenses, as these defenses rely on recognizing specific molecular shapes. This could make infections caused by mirror bacteria difficult to control.
- **Environmental Impact**: These bacteria might also evade natural predators like viruses and protists, potentially leading to uncontrolled spread in the environment.

- **Health Threats:** There is concern that mirror bacteria could cause lethal infections in humans, animals, and plants, posing a significant health risk.

Source: CNN

VARMAM THERAPY

Context: The National Institute of Siddha (NIS) has set a Guinness World Record for providing Varmam therapy to 567 individuals simultaneously.

Background: -

- The Guinness World Record event is a part of the NIS's ongoing efforts to bring global attention to the benefits of Siddha medicine and Varmam therapy.

Key takeaways

- Varmam Therapy, also known as Varma Kalai, is an ancient Indian practice rooted in the Siddha system of medicine. It focuses on the manipulation of specific vital points, or "varmam," located throughout the human body to promote healing and alleviate various ailments.

Key Aspects of Varmam Therapy:

- **Vital Points (Varmam):** The human body is believed to contain 108 vital points where life energy resides and flows. These points are situated at intersections of nerves, muscles, bones, and joints. Proper stimulation of these points can restore energy balance and treat health issues.
- **Techniques**: Practitioners employ various methods to stimulate varmam points, including:
    - **Thadaval Murai:** Massage techniques applied to specific points.
    - **Adangal Murai:** Applying pressure in a particular pattern.
    - **Thiravukol Murai:** Techniques used for instant relief by opening blocked energy channels.
- Varmam Therapy is utilized to address a range of conditions, such as:
    - **Neurological Disorders:** Including nerve weakness and paralysis.
    - **Musculoskeletal Issues:** Such as arthritis, back pain, and cervical spondylosis.
- The origins of Varmam Therapy are attributed to the sage Agastya, who is said to have documented the knowledge of vital points and disseminated it among his disciples. This practice has been traditionally passed down through generations and remains prevalent in parts of Tamil Nadu and Kerala.
- In recent years, there has been a resurgence of interest in Varmam Therapy as a non-invasive, non-pharmacological treatment option for various health issues. Efforts are underway to standardize treatment guidelines and integrate this traditional practice into modern healthcare systems.

Source: PIB

SPADEX MISSION

Context: The satellites for the SpaDeX mission are set to launch onboard the PSLV C60 mission on December 30, 2024.

Background:

- If the SpaDeX test is successful, India will become the fourth country in the world to have a space

programme capable of docking in space.

Key takeaways:

- The **SpaDeX mission (Space Docking Experiment)** is an ambitious project by the **Indian Space Research Organisation (ISRO)** aimed at demonstrating in-space docking technology.
- The primary goal of the SpaDeX mission is to develop and demonstrate the technology required for rendezvous, docking, and undocking of two small spacecraft in low-Earth orbit.
- ISRO needs to master in-space docking so that satellites launched in separate rocket launches can link up to perform more sophisticated tasks. The technology will be essential for the 'Bharatiya Antariksh Station,' a new India-made space station ISRO has begun work on.
- **Mission Details:**
    - **Spacecraft**: The mission involves two small spacecraft, SDX01 (Chaser) and SDX02 (Target), each weighing approximately 220 kg.
    - **Launch**: The spacecraft will be launched aboard the Polar Satellite Launch Vehicle (PSLV-C60) from the Satish Dhawan Space Centre.
    - **Orbit**: Both spacecraft will be injected into a 470 km circular orbit at a 55° inclination.
    - **Docking Process:** The mission will demonstrate the docking of the two spacecraft, followed by the transfer of electrical power between them. After successful docking, the spacecraft will undock and operate their respective payloads for up to two years.

Source: ISRO

BIO-BITUMEN

Context: Union minister for road transport and highways, Nitin Gadkari, inaugurated a 1km stretch of Asia's first highway with a bio-bitumen blended surface.The highway stretch is located on NH-44 in Mansar, Nagpur, Maharashtra.

Background: -

- The project's success is still two years away. **Central Road Research Institute (CRRI),** a govt body, will observe whether the road withstands heavy traffic and changing seasons.

Key takeaways

- **Bitumen, a black, viscous material** derived from crude oil, is commonly used as a binder in road construction. Lignin, on the other hand, is a natural polymer found in plant cell walls and is abundant in agricultural waste.
- **Processing lignin into bio-bitumen** offers an environmentally friendly solution with up to a 70% reduction in greenhouse gas emissions compared to conventional bitumen.

Composition and Production of bio bitumen

- **Feedstock**:
    - Agricultural residues (e.g., straw, husks, and lignocellulosic biomass).
    - Algae, waste cooking oil, and animal fats.

- Organic waste from municipal solid waste (MSW) and industrial processes.

- **Process**:
  - **Pyrolysis**: Thermal decomposition of biomass in the absence of oxygen to produce bio-oil, which is refined into bio-bitumen.
  - **Hydrothermal Liquefaction**: Converts wet biomass into bio-bitumen through high temperature and pressure.
  - **Catalytic Upgradation**: Enhances the physical and chemical properties of bio-bitumen for improved performance.

Benefits

- **Reduced Imports**: Bio-bitumen helps reduce dependency on imported bitumen.
- **Environmental Impact**: It addresses issues like stubble burning by utilizing agricultural waste as feedstock. It is estimated to cut greenhouse gas emissions by at least 70% compared to fossil-based alternatives.

Source: Times of India

THORIUM

Context: India's largest power generator NTPC Limited has signed a strategic pact with US-based Clean Core Thorium Energy (CCTE) to explore development and deployment of advanced nuclear energy for enriched life (Aneel). Aneel is a thorium-based fuel for pressurised heavy water reactors (PHWRs), and the deal is subject to approval from both the governments.

Background: -

- The move is aimed at NTPC's efforts to venture into nuclear energy and use it as a clean, dispatchable, and baseload source of energy.

Key takeaways

- **Thorium is a weakly radioactive**, silvery metal found naturally in the Earth's crust.
- **Thorium (chemical symbol Th)** is found at trace levels in soil, rocks, water, plants and animals.
- All known thorium isotopes are unstable. The most stable isotope, 232Th, has a half-life of 14.05 billion years, or about the age of the universe.
- It is fertile, meaning it can be converted into fissile material (Uranium-233) when bombarded with neutrons.

Thorium in Nuclear Energy

- **Role in Nuclear Reactors:**
  - Unlike uranium, thorium is not fissile but is fertile.
  - When irradiated in a nuclear reactor, thorium-232 absorbs a neutron and converts into uranium-233, a fissile isotope that can sustain a nuclear chain reaction.
- **Advantages of Thorium-Based Reactors:**
  - **Abundance**: Thorium is three to four times more abundant in the Earth's crust than uranium.
  - **Low Nuclear Waste:** Thorium reactors produce less long-lived radioactive waste

compared to uranium reactors.

- **Safety**: Reactors using thorium have inherent safety features due to their operation at lower pressures and temperatures.
- **Resistance to Proliferation**: Thorium fuel cycles are less susceptible to misuse for weapons-grade material.

- **Challenges in Using Thorium:**
  - **Technology Readiness**: The thorium fuel cycle is not as commercially established as uranium-based cycles.
  - **Initial Infrastructure**: Requires uranium or plutonium to kickstart the reaction.
  - **Separation Complexity**: Extraction of uranium-233 from thorium is a challenging and costly process.

Thorium Availability in India

- India has one of the largest reserves of thorium in the world, with about 25% of the global reserves.
- **Indian Reserves**:Found in monazite sands, primarily in the coastal regions.
- **Key Locations**:
  - **Kerala**: Chavara and Alappuzha
  - **Tamil Nadu**: Kanyakumari
  - **Odisha**: Ganjam
  - **Andhra** Pradesh

Source: Business Standard

PROBA 3

Context: Recently, **the Indian Space Research Organisation (ISRO**) successfully launched the European Space Agency's (ESA) Proba-3 mission aboard the Polar Satellite Launch Vehicle (PSLV)-C59 rocket.

Background: -

- The PSLV-C59/PROBA-3 Mission is the 61st flight of PSLV and the 26th using PSLV-XL configuration.

Key takeaways

- PROBA-3, a **European Space Agency (ESA)** mission consisting of two satellites, is designed to study the solar corona—the outer layer of the Sun's atmosphere.
- The mission is designed with two satellites that fly in tandem. This will be the first-ever attempt at "**precision formation flying", where two satellites** will fly together and maintain a fixed configuration in space.
- **The two satellites** — Occulter Spacecraft (weighing 200 kg) and the Coronagraph Spacecraft (weighing 340 kg) — will mimic a natural solar eclipse. They will manoeuvre precisely in Earth's orbit so that one satellite casts a shadow onto the other.
- A naturally occurring solar eclipse allows solar physicists to observe and study the Sun's corona for 10 minutes, across an average of about 1.5 eclipse events per year. Proba-3 will give six

hours, equivalent to 50 such events annually, which will help deepen understanding of the Sun's corona like never before.

- Both the Occulter and the Coronagraph will face the Sun at all times. They will maintain a formation of a few millimetres and then move to a position where they will be 150 metres apart for six hours at a time.
- One satellite will act as a viewing telescope, kept at the centre of a shadow cast by the other satellite positioned 150 metres away. This positioning will facilitate observing the Sun's corona and will be autonomously achieved through precise flight formation.
- If done successfully, the Occulter will create an artificial yet stable eclipse, by masking large parts of the Sun. As a result, the Sun's blinding light will get blocked and only the solar corona will be visible to the coronagraph, which will photograph and facilitate studies of the lesser-known features.

Source: Indian Express

MARBURG VIRUS DISEASE (MVD)

Context: The World Health Organisation (WHO) has issued a warning for the Marburg virus disease.

Background: -

- An outbreak of deadly Marburg virus disease (MVD), often referred to as the 'bleeding eye virus', has killed at least 15 people, and infected at least 66 in Rwanda.

Key takeaways

- The **Marburg virus** is a highly infectious pathogen that causes severe hemorrhagic fever in humans and non-human primates.
- **Causative Agents**: The Marburg virus (MARV) and Ravn virus (RAVV) are the causative agents of Marburg virus disease (MVD).
- **Family**: Both viruses belong to the Filoviridae family, which also includes the Ebola virus.
- **First Detection**: The virus was first identified in 1967 in Marburg and Frankfurt, Germany, and in Belgrade, Serbia, during laboratory work with African green monkeys imported from Uganda.

Transmission:

- **Natural Host:** The natural host of the Marburg virus is the Egyptian fruit bat (Rousettus aegyptiacus).
- **Animal to Human:** Direct contact with bat feces, saliva, or tissues of infected animals.
- **Human-to-Human Transmission:** The virus spreads among humans through direct contact with the blood, secretions, organs, or other bodily fluids of infected individuals.
- **High-Risk Activities:** Transmission can occur through close contact with infected individuals, contaminated objects, and during burial ceremonies involving direct contact with the body of the deceased.

Symptoms:

- **Initial Symptoms:** High fever, severe headache, chills, muscle aches, and a rash with flat and

raised bumps.

- **Severe Symptoms**: As the disease progresses, symptoms can include liver failure, delirium, shock, bleeding (hemorrhaging), and multi-organ dysfunction.
- **Fatality Rate**: The average case fatality rate is around 50%, but it can vary from 24% to 88% depending on the virus strain and case management.

Diagnosis and Treatment:

- **Diagnosis**: MVD is diagnosed through blood tests such as ELISA or RT-PCR.
- **Treatment**: There is no specific antiviral treatment for MVD. Supportive care, including rehydration therapy and symptomatic management, improves survival.
- **Preventive Measures**: Preventive measures include avoiding contact with bats in mines or caves, using protective clothing, and isolating infected individuals.

Source: Hindustan Times

MULEHUNTER.AI

Context: The RBI recently asked banks to collaborate with its initiative MuleHunter.AI to weed out mule accounts which are used to commit financial fraud.

Background: -

- RBI has been taking various measures in coordination with banks and other stakeholders to prevent and mitigate digital fraud in the financial sector.

Key takeaways

- **MuleHunter.ai** is an advanced artificial intelligence tool developed by the Reserve Bank Innovation Hub (RBIH) to combat financial fraud, particularly focusing on detecting and flagging mule accounts.
- **The Reserve Bank Innovation Hub (RBIH)** is a wholly-owned subsidiary of the Reserve Bank of India (RBI), established to foster innovation and technology in the financial sector
- **Purpose of MuleHunter.AI:** To detect and prevent the misuse of mule accounts for money laundering and other illicit financial activities.

Key Features:

- **AI/ML-Based Detection**: Utilizes artificial intelligence and machine learning algorithms to analyze transaction data and account details.
- **Pattern Recognition**: Identifies patterns of mule account behavior with greater precision and speed compared to traditional rule-based systems.
- **Near-Real-Time Monitoring**: Provides near-real-time monitoring of accounts to quickly detect suspicious activities.

What is a mule bank account?

- A mule account is a bank account that is used by criminals for illegal activities, including the laundering of illicit funds.

- A mule account is typically bought over by the criminals from their original users, individuals who are often from lower income groups, or have low levels of technical literacy.
- The related term "**money mule**" is used to describe the **innocent victims who are used by the criminals to launder stolen or illegal money via their bank accounts**. When such incidents are reported, the money mule becomes the target of police investigations, while the actual criminals remain undetectable.

Source:Business Standard

EXPANSION OF UNIVERSE

Context: Two years of data from NASA's James Webb SpaceTelescope has corroborated the observation by Hubble Telescope that the universe is expanding more rapidly than expected.

Background: -

- The observations by Webb, the most capable space telescope ever deployed, appear to rule out the notion that the data from its forerunner Hubble was somehow flawed due to instrument error

Key takeaways

- Data from James Webb Space Telescope have now validated the Hubble Space Telescope's earlier finding that the rate of the universe's expansion is faster — by about 8% — than would be expected based on what astrophysicists know of the initial conditions in the cosmos and its evolution over billions of years. The discrepancy is called the Hubble Tension.
- According to scientists, the current understanding of the universe contains a lot of ignorance about two elements — dark matter and dark energy — and these make up 96% of the universe.
- **Dark matter**, thought to comprise about 27% of the universe, is a hypothesised form of matter that is invisible but is inferred to exist based on its gravitational effects on ordinary matter - stars, planets, moons, all the stuff on Earth - which accounts for roughly 5% of the universe.
- **Dark energy**, believed to comprise approximately 69% of the universe, is a hypothesised form of energy permeating vast swathes of space that counteracts gravity and drives the universe's accelerating expansion.

More about Hubble Tension

- **Hubble Constant (H_0):** Represents the rate of expansion of the universe, typically expressed in kilometers per second per megaparsec (km/s/Mpc)
- **Hubble Tension**: Discrepancy between values of H_0 measured using different methods, challenging our understanding of cosmology.

About James Webb Space Telescope (JWST)

- The James Webb Space Telescope (JWST) is the most powerful space telescope ever built, designed to explore the universe in unprecedented detail.
- **Launch Date**: JWST was launched on December 25, 2021.
- **Location**: It orbits the Sun at the second Lagrange point (L2), about 1.5 million kilometers (1 million miles) from Earth.

- **Design and Features:**
    - Sunshield: It has a 5-layer sunshield the size of a tennis court, which protects its instruments from the Sun's heat and light.
    - Mirrors: JWST uses 18 hexagonal mirrors that unfold like a "Transformer" in space to form a single large mirror with a diameter of 6.5 meters (21 feet).
- **Scientific Instruments:**
    - Instruments: JWST is equipped with four main instruments: Near-Infrared Camera (NIRCam), Near-Infrared Spectrograph (NIRSpec), Mid-Infrared Instrument (MIRI), and Fine Guidance Sensor/Near InfraRed Imager and Slitless Spectrograph (FGS/NIRISS).
    - Capabilities: These instruments allow JWST to observe the universe in infrared light, which can penetrate dust clouds and reveal objects that are too faint or distant for visible light telescopes.
- **Scientific Goals**:
    - **Early Universe**: JWST aims to study the first galaxies formed after the Big Bang, providing insights into the early universe.
    - **Planetary Systems**: It will observe the atmospheres of exoplanets to search for signs of habitability and possibly life.
    - **Star and Planet Formation**: JWST will study the formation of stars and planets within dust clouds.

Source: The Hindu

DISEASE X

Context: The recent outbreak reported in the first week of December 2024 in the Democratic Republic of Congo, which has claimed over 400 lives and remains unclassified, has raised concerns that it could be an instance of Disease X.

Background:

- While investigations continue to determine the cause in Congo, the outbreak underscores the importance of Disease X.

Key Concerns:

- **Disease X is not an actual but a hypothetical disease** or in other words, disease X is not a specific illness but a placeholder for an unpredictable and as-yet-undiscovered pathogen capable of sparking a global health crisis.
- The World Health Organization (WHO) coined the term in 2018.
- It was conceptualised by the WHO to prepare for future outbreaks that are difficult to predict or identify.
- COVID-19 is widely regarded as the first instance of a real Disease X. When SARS-CoV-2 emerged as

an unknown pathogen causing a global pandemic, it exemplified the scenario that Disease X was meant to represent — an unpredictable, novel threat requiring rapid global response and adaptation.

- Forecasting the next Disease X is daunting, as its emergence depends on numerous unpredictable factors. Zoonotic diseases are the most likely source, given their history of driving major epidemics. However, other scenarios, such as pathogens mutating to evade treatment, laboratory mishaps, or deliberate biological attacks, cannot be ruled out.

Source: The Hindu

NAFITHROMYCIN

Context: Recently, the government announced the soft launch of Nafithromycin, India's first indigenously developed antibiotic designed to combat antimicrobial resistance (AMR).

Background: -

- This development brings hope for treating drug-resistant pneumonia, which is responsible for over two million deaths globally each year.

Key takeaways

- **Nafithromycin is designed for the treatment of Community-Acquired Bacterial Pneumonia (CABP), a serious illness caused by drug-resistant bacteria that affects vulnerable populations**, including children, the elderly, and immunocompromised individuals such as patients with diabetes and cancer.
- India currently has 23 per cent of the world's community pneumonia burden.
- **Nafithromycin is marketed as "Miqnaf" by the pharmaceutical company Wolkardt**.
- It has been developed with support from the **Biotechnology Industry Research Assistance Council (BIRAC),** which is a unit of the Department of Biotechnology.
- Nafithromycin **targets both typical and atypical pathogens**, providing a strong solution in a time when no new antibiotics in this class have been developed globally for over thirty years.

Pneumonia

- Pneumonia is a disease that affects the lungs. The lungs have small air sacs called alveoli, which fill with air when you breathe in. When an individual has pneumonia, the alveoli are filled with pus and fluid, which makes breathing painful and limits oxygen intake.
- **Pneumonia can be caused by bacteria, viruses, fungi, or mycoplasma**. The most common bacterial cause is Streptococcus pneumoniae, while common viral causes include influenza and COVID-19.

Source: Indian Express

HISTORY AND ART & CULTURE

THRISSUR POORAM

Context: In a relief for organisers and fans of Kerala's famed Thrissur Pooram, the Supreme Court effectively stayed the directions of the state High Court regarding the parading of elephants.

Background: -

- SC said that the Kerala High Court's directions that mandated a three-metre distance between the elephants paraded at festivals and prohibition on procession using them on public roads between 9 am and 5 pm were impracticable.

Key takeaways

- **Thrissur Pooram is a grand Hindu temple festival held annually in Thrissur, Kerala**. Known as the "**Festival of Festivals**," it is one of the largest and most vibrant temple festivals in India, showcasing Kerala's rich cultural heritage.
- **Historical Significance**:
    - Introduced in the late 18th century by Sakthan Thampuran, the Maharaja of Cochin.
    - Aimed to unify regional temple celebrations into a grand event.
- **Date and Venue**:
    - Celebrated in April or May, depending on the Malayalam calendar (Pooram star in the month of Medam).
    - The main venue is the Vadakkunnathan Temple in Thrissur.
- **Participants**:
    - Two main temple groups, Paramekkavu Bhagavathy Temple and Thiruvambady Krishna Temple, lead the festivities, along with smaller temples in the region.

Cultural Highlights

- **Elephant Procession (Kudamattam)**:
    - Caparisoned elephants carry deity idols in a grand procession.
    - The synchronized display of decorated umbrellas (Kudamattam) atop elephants is a major attraction.
- **Panchavadyam**:Traditional ensemble of five percussion instruments (Chenda, Maddalam, Edakka, Thimila, and Kombu) performed in unison, creating a mesmerizing rhythm.
- **Fireworks Display**:Renowned for its spectacular and competitive fireworks show, held at the end of the Pooram.

Source: Indian Express

CARNATIC MUSIC

Context: The Supreme Court in an interim order said that musician T M Krishna should not be recognised as a recipient of the Sangita Kalanidhi M S Subbulakshmi award and also restrained him from projecting himself as a recipient of the honour till it decides an appeal challenging the grant of the same to him.

Background: -

- The top court's order came a day after Mr. Krishna was conferred the award instituted by The Hindu and awarded by the Music Academy at the inauguration of its 98th annual Conference and Concerts in Chennai.

About Carnatic music

- Carnatic music is a classical music tradition from Southern India, deeply rooted in the cultural and religious practices of the region.

Origins and History:

- **Ancient Roots**: Carnatic music has ancient origins, with influences from the Sama Veda, one of the four Vedas containing hymns set to music.
- **Temple Traditions**: Temples played a significant role in the development and preservation of Carnatic music, with musical performances being integral to temple rituals.
- **Bhakti Movement**: The Bhakti movement, which gained prominence between the 6th and 17th centuries, contributed to the development of devotional music.
- **Medieval Composers**: Composers like Purandaradasa (1480-1564) systematized Carnatic music methods and authored numerous compositions.
- **The Trinity: The 18th century saw the emergence of the Trinity of Carnatic music—Thyagaraja, Shama Shastri, and Muthuswami Dikshitar**—who compiled compositions that define the Carnatic music repertoire.

Key Concepts:

- Raga (Rāga): A melodic framework for improvisation and composition.
- Tala (Tāḷa): The rhythmic aspect of music, marked by mathematical precision.
- Bhava (Bhāva): The expression of emotions and thoughts through music.

Instruments:

- Vocal: The human voice is the primary instrument in Carnatic music.
- Melody Instruments: Violin, Veena, Nadaswaram, and Flute are commonly used.
- Percussion Instruments: Mridangam, Ghatam, Kanjira, and Thavil are essential for rhythm.

Performance Structure:

- Kriti (Kṛti): A structured composition that includes a pallavi (refrain), anupallavi (second verse), and charanam (final verse).
- Ragam Tanam Pallavi (Rāgam Tāṇam Pāḷavi): A complex and highly improvisational section showcasing the performer's skill.
- Thillana (Tillāṇa): A rhythmic piece that concludes the performance.

Notable Composers:

- **Purandaradasa**: Known as the father of Carnatic music.
- **The Trinity**: Thyagaraja, Shama Shastri, and Muthuswami Dikshitar

Source: The Hindu

KASHMIRI PAPIER-MÂCHÉ

Context: This Christmas, papier-mâché artisans in Srinagar have created thousands of dodos, a bird that

went extinct in 1681.

Background: -

- This year, over 50,000 papier-mâché dodos have been exported to markets in Europe and Mauritius, just in time for Christmas.

Key takeaways

- **Kashmiri papier-mâché is a traditional handicraft of Jammu and Kashmir, known for its intricate designs and vibrant colors.**
- The tradition of the Kashmir Papier Machie has its origin rooted in the 15th century when king Zain-ul-Abidin invited accomplished artists and craftsmen from Central Asia.
- Over time, the craft evolved, and during the Mughal era, it gained significant popularity. The Mughal emperors patronized this art, and it became an integral part of Kashmiri culture
- Derived from the French term "papier-mâché," meaning "chewed paper."

- **Process of Making**:
  - **Raw Material:** Waste paper soaked, pulped, and molded into various shapes.
  - **Lacquer Work**: Layers of glue and adhesive applied for durability.
  - **Painting**: Hand-painted using natural pigments and intricate floral or geometric patterns.
  - **Varnishing**: Polished to give a glossy finish.
- Papier-mâché is deeply embedded in Kashmiri culture and is protected under the Geographical Indication (GI) Act, 1999.

Source: The Hindu

MIRZA GHALIB

Context:A three-day event titled 'Remembering Ghalib' organised by Delhi government commemorated the birth anniversary of poet Mirza Ghalib.

Background: -

- The event conceptualised by Kathak exponent Padma Bhushan Uma Sharma aimsed to bring the essence of Ghalib's life and works to contemporary audiences.

Key takeaways

- **Mirza Ghalib** (1797-1869) was a renowned Urdu and Persian poet, often considered the last great poet of the Mughal era.

Early Life:

- Birth: Born as Mirza Asadullah Beg Khan on December 27, 1797, in Agra, India.
- Family: His father, Mirza Abdullah Baig, was killed in battle when Ghalib was just five years old. He was then raised by his unclewho passed away when Ghalib was nine.
- Education: Ghalib did not receive formal education but was self-taught, learning Persian and

Arabic literature.

Literary Career:

- **Pen Names: Ghalib, meaning "dominant," and Asad, meaning "lion," were his pen names**.
- Works: He wrote extensively in both Urdu and Persian, with his Urdu poetry being particularly celebrated. His famous works include Diwan-e-Ghalib, a collection of his poetry, containing some of the most profound Urdu ghazals ever written.
- **Themes**: His poetry often explored themes of love, loss, and existential reflection, reflecting the socio-political landscape of 19th-century India under British colonial rule.
- Financial Struggles: Ghalib faced financial difficulties throughout his life and relied on patrons for support.
- Recognition: Despite his struggles, he was eventually recognized and appointed as the poet laureate in the court of the last Mughal emperor, Bahadur Shah Zafar.

Source:PTI

BELGAUM CONGRESS SESSION

Context: The centenary celebrations of the historic 1924 Belgaum Congress session was inaugurated on December 26 in Belagavi (as Belgaum is now called).

Background: -

- The session remains historic because it is the only one chaired by Mahatma Gandhi (39th All-India Congress session). The leader, who arrived from South Africa became a Congress members in 1915, and became president of the all-India session after nine years.

Key takeaways

- Held from **December 26 to December 28, 1924, in Belgaum (now Belagavi, Karnataka),** this session marked a crucial phase in India's struggle for independence.

Key Features and Importance:

Mahatma Gandhi at the historic Congress session in Belagavi in 1924. In the foreground is Pandit Jawaharlal Nehru. | Photo Credit: The Hindu Archives

- **Gandhi's Leadership**: This session highlighted Mahatma Gandhi's influence within the Congress. It allowed him to address growing differences within the party and reaffirm his commitment to non-violence and Swaraj (self-rule).
- Resolution on Unity: The session emphasized Hindu-Muslim unity, a theme central to Gandhi's vision for a united struggle against colonial rule.
- Focus on Grassroots Movements: Gandhi advocated for strengthening grassroots movements, including promoting khadi and

boycotting foreign goods, as part of the larger non-cooperation strategy.

- Strategic Recalibration: Coming after Gandhi's release from prison following the Non-Cooperation Movement, the session provided an opportunity to reassess the movement's direction and strategies.
- As chairman of the session, Gandhiji reduced the annual membership fee by 90% and urged all party members to realise that the Congress was a movement, and that they were all social workers, working not only for political liberation from the British, but also from social evils like untouchability.
- Apart from the routine sessions, the Belgaum session held separate conferences against untouchability and in favour of khadi and village industries, students, municipal administration, and formation of States on linguistic grounds.

Source: The Hindu

SRISAILAM TEMPLE

Context: The Archaeological Survey of India (ASI) has made a significant discovery at the Srisailam Templein Andhra Pradesh, uncovering several copper plates and other ancient inscriptions in the temple's Ghantamandapam.

Background: -

- **The Srisailam temple, also known as the Mallikarjuna Swamy Temple**, is one of the most revered and ancient pilgrimage sites in India.

Key takeaways

- **Location**: Situated in the Nallamala Hills, on the banks of the Krishna River, in Kurnool district, Andhra Pradesh.
- **Deity**: Dedicated to Lord Mallikarjuna (Shiva) and Goddess Bhramaramba (Parvati).
- **Significance**:
  - It is one of the 12 Jyotirlingas of Lord Shiva and one of the 18 Shakti Peethas of Goddess Parvati, making it unique for housing both.
  - The temple is a **prominent center for Shaivism and Shaktism**.
- There are inscriptional evidence from the **Satavahana dynasty** which place the temple to be existent from the 2nd century.
- Most modern additions were done during the time of king Harihara I of Vijayanagara Empire (14th and 15th centuries).The veerasheromandapam and paathalaganga steps was constructed during the time of Reddi Kingdom (12th and 13th centuries).

- Style: **Dravidian style of architecture** with intricately carved gopurams and mandapas.

Source: Times of India

AKAL TAKHT

Context: President of the Shiromani Akali Dal (SAD) Sukhbir Singh Badal faced an attempt on life at the entrance of the Golden Temple where he was on guard duty (as punishment).

Background:

- The former Deputy Chief Minister of Punjab has been awarded religious punishment by the Akal Takht, for the alleged misrule of the SAD government from 2007 to 2017.

Key takeaways

- The Akal Takht, situated within the Golden Temple complex in Amritsar, was established by the sixth Sikh Guru Hargobind in 1606 following the execution of his father, Guru Arjan Dev, by the Mughals.
- **Guru Hargobind used this platform for governance**, and is believed to have issued the first directive (Hukamnama) from here, urging Sikh congregations to contribute horses and weapons to the Panth.
- The Akal Takht was also a symbol of the Sikh defiance of Mughal authority. The 12-foot-high platform of the Akal Takht symbolised a challenge to the Mughal government in Agra (and later Delhi), where Emperor Jahangir, on whose order Guru Arjan Dev was executed, sat on an 11-foot-high throne.
- The Akal Takht became the focal point for Sikhs during the period following the execution of Banda Singh Bahadur, the general of the Khalsa army, in 1716. Members of the community would gather at the Akal Takht on Baisakhi and Diwali for Sarbat Khalsa (assembly of all Sikhs)where crucial decisions would be made.
- Initially, the Sarbat Khalsa appointed the Jathedar(head) of Akal Takht during the annual congregations. After the British established control, the appointment of the Jathedar came under the influence of the Darbar Sahib committee, which was dominated by leaders who were loyal to the regime.
- Following the enactment of the Sikh Gurdwaras Act in 1925, the Jathedar began to be appointed by the Shiromani Gurdwara Parbandhak Committee (SGPC), a body formed in 1920 to manage Sikh shrines and free them from British-supported mahants.
- The SGPC is currently the apex governing body of all Sikh gurdwaras in the states of Punjab and Himachal Pradesh, and the Union Territory of Chandigarh.

How does the Akal Takht hand out religious punishment?

- As the head of the highest seat of temporal power of the Sikhs, the Jathedar of the Akal Takht is the supreme temporal and religious authority of the Sikhs, and the final word on the affairs of the community.
- Any person who identifies as a Sikh can be summoned to the Akal Takht, tried, and sentenced. The

Akal Takht's justice applies only to those who voluntarily submit to its authority.

- Among the prominent Jathedars of the Akal Takht was Akali Phoola Singh, who summoned Maharaja Ranjit Singh for a moral transgression, resulting in the Maharaja receiving punishment of a public flogging at the Akal Takht.

Source: Indian Express

MAHAPARINIRVAN DIWAS

Context: Mahaparinirvan Diwas is observed annually on December 6 to commemorate the death anniversary of Bharat Ratna Dr. Bhimrao Ramji Ambedkar.

Background:

- According to Buddhist texts, Lord Buddha's death is considered to be Mahaparinirvan, the Sanskrit term for 'nirvana after death'. Parinirvan is considered liberation from Samara, karma, and the cycle of death and birth. Ambedkar's followers believe he was as influential as Lord Buddha, which is why his death anniversary is observed as Mahaparinirvan Divas.

Key takeaways

- Dr. B.R. Ambedkar, born on April 14, 1891, in Mhow, Madhya Pradesh, dedicated his life to uplifting marginalized communitieswho faced systemic social discrimination.
- He proposed revolutionary steps to empower the oppressed, including reservations in education, employment, and politics.
- He launched the newspaper Mooknayaka (Leader of the Silent) to amplify the voices of the downtrodden. He established the Bahishkrit Hitkarini Sabha (Outcastes Welfare Association) in 1923 to spread education, improve economic conditions, and address societal inequalities.
- His leadership in historic movements such as the Mahad March (1927) for access to public water and the temple entry movement at Kalaram Temple (1930) challenged caste hierarchies and priestly dominance.
- Dr. B R Ambedkar's pivotal role in the Poona Pact of 1932, which replaced separate electorates with reserved seats for Dalits, marked a turning point in India's fight for social justice.
- Ambedkar's doctoral thesis inspired the establishment of the Finance Commission of India. At the same time, his ideas were instrumental in framing the guidelines for the Reserve Bank of India (RBI) Act, 1934. He was one of the founders of Employment Exchanges in our country.
- He championed systemic advancements such as the foundation of Employment Exchanges, the establishment of the National Power Grid System, and pivotal projects like the Damodar Valley Project, Hirakud Dam Project, and Sone River Project, showcasing his foresight in infrastructure and resource management.
- As Chairman of the Constitution Drafting Committee, Ambedkar played a pivotal role in crafting the Indian Constitution, presenting a draft in 1948 that was adopted with minimal changes.
- Dr. BR Ambedkar's multifaceted contributions from economic policy and infrastructure to constitutional law cemented his legacy as a nation-builder, committed to fostering a just and equitable India.

Source: PIB

SUBRAMANIA BHARATI

Context:A complete and annotated version of the works of C. Subramania Bharati will be released by Prime Minister Narendra Modi.

Background: -

- The release will be the first time that the writings of Mr. Bharati, a prominent leader of the Independence movement and a prolific writer and poet, are compiled in one place. Mr. Bharati's writings were nationalised by the Madras government in 1949, a rare honour.

Key takeaways

- Subramania Bharati, also known as Bharathiyar, was a **renowned Indian writer, poet, journalist, teacher, Indian independence activist, social reformer, and polyglot.**

Early Life:

- **Birth**: Born on December 11, 1882, in Ettayapuram, Tirunelveli district, Madras Presidency (present-day Thoothukudi district, Tamil Nadu).
- **Education**: Bharati had his early education in Tirunelveli and later lived in Varanasi, where he was exposed to Hindu theology and new languages.
- **He considered Sister Nivedita, a disciple of Swami Vivekananda, as his guru**.

Career and Contributions:

- **Journalism**: Bharati worked as a journalist with several newspapers, including Swadesamitran, The Hindu, Bala Bharata, Vijaya, Chakravarthini, and India.
- He belonged to the Extremist wing of the Indian National Congress.
- **Exile**: In 1908, the British Government issued an arrest warrant for Bharati, leading him to live in exile in the French-controlled Pondicherry for about ten years until 1918.
- **Literary Works:** Bharati was a pioneer of modern Tamil poetry and wrote extensively on political, social, and spiritual themes.
- Some of his notable works include Panjali Sabatham, Kannan Paatu, Kuyil Paatu, Paapa Paatu, Chinnanchriu Kiliye, Vinayagar Nanmanimalai, and Tamil translations of Patanjali's Yoga Sutra and Bhagavat Gita.

Social Reforms:

- **Women's Emancipation**: Bharati fought for the emancipation of women and opposed child marriage.
- **Caste System**: He opposed the caste system and advocated for social reforms.
- **Religious Reforms**: Bharati promoted reforms in society and religion, emphasizing the importance of unity and equality.

Source: The Hindu

VAIKOM SATYAGRAHA

Context: Kerala Chief Minister Pinarayi Vijayan and his Tamil Nadu counterpart, M.K. Stalin, came together

at Vaikom in Kottayam district of Kerala to inaugurate the renovated memorial to Tamil reformist leader E.V. Ramasamy Naicker, fondly known as Thanthai Periyar.

Background: -

- The programme marks the valedictory function of the centenary celebrations of the Vaikom Satyagrahain which Periyar E V Ramasamy Naicker actively participated.

Key takeaways

- The Vaikom Satyagraha was a significant social reform movement in Kerala that aimed to challenge the practice of untouchability and secure temple entry rights for all, irrespective of caste.
- **Location**: Vaikom, a town in present-day **Kottayam district, Kerala**.
- **Issue**: The temple roads around the Vaikom Mahadeva Temple were restricted for use by upper-caste Hindus, denying access to lower-caste communities.
- **Larger Aim**: Address caste-based discrimination and ensure equal rights in public spaces.

Key Events:

- **Start of the Movement (March 30, 1924):**
    - Led by leaders of the Sree Narayana Dharma Paripalana (SNDP) movement inspired by Sree Narayana Guru's philosophy of "One Caste, One Religion, One God for Man."
    - Organized by leaders such as T.K. Madhavan, K. Kelappan, and A.K. Gopalan with support from the Indian National Congress.
- **Participation of Mahatma Gandhi**:Gandhi advised the satyagrahis to adopt non-violence and resolve the issue through negotiations and public awareness.
- **Resolution**:After prolonged protests, dialogues, and arrests of satyagrahis, partial success was achieved in 1925, with the opening of three out of four roads (except the eastern road) surrounding the temple to people of all castes.
- Only in 1936, after the Temple Entry Proclamation, was access to the eastern road and entry into the temple allowed to the lower castes.

Source: Statesman

LOTHAL

Context: Recently, near the Harappan site of Lothal, a 23-year-old researcher from IIT Delhi lost her life while trying to collect soil samples from a trench that collapsed. She was part of ongoing research on the impact of climate change on the Indus Civilisation.

Background:

- Lothal stands out for its engineering marvels, including the world's oldest dockyard, with an innovative water-locking mechanism. Artefacts such as bead necklaces, axes and fish-hooks of copper or bronze point to maritime trade with ancient civilisations like Mesopotamia, Egypt, and Persia.

Key takeaways

- **Lothal was one of the southernmost sites of the Indus Valley civilization, located in the Bhāl region of what is now the state of Gujarat.** It is situated between the Sabarmati and Bhogavo rivers

in Saurashtra region. The port city is believed to have been built in 2,200 BC.

- The meaning of Lothalin Gujarati is "**the mound of the dead**". Incidentally, the name of the city of Mohenjo-daro (also part of Indus Civilisation, now in Pakistan) means the same in Sindhi.
- Lothal was first discovered in 1954 by Archaeologist SR Rao, who discovered over 30 Harappan sites. It is he who identified the excavated Lothal structure as a dockyard.
- **According to the Archaeological Survey of India (ASI), Lothal had the world's earliest known dock, connecting the city to an ancient course of the Sabarmati River.**
- Other evidence that Lothal served as a hub for maritime commerce came from the presence of seals — that were likely used to seal documents or mark packages, the discovery of various items that were likely traded, a warehouse, and what Rao referred to as stone anchors for ships.
- But not everyone was convinced. In 1968, anthropologist Lawrence S Leshnik posited the "port" was actually a reservoir for drinking water and irrigating crops. He held that the dimensions of the inlet for ships to dock were inadequate to support seafaring vessels. As was the depth of the "dock". He also questioned the inlet's orientation.
- These doubts have been addressed by a study by the Indian Institute of Technology-Gandhinagar that has found fresh evidence that can confirm the dockyard's existence. The study has revealed that the Sabarmati River used to flow by Lothal (currently, it flows 20 km away from the location) during the Harappan Civilisation.
- **Lothal's archaeological record indicates its settlements were rebuilt multiple times**. Rao identified five distinct phases in the site's stratigraphic record dated circa 2400-1900 BCE. At its peak, late 3rd millennium BCE, Lothal may have been home to 15,000 people.
- The decline, and eventual destruction of Lothal, occurred due to catastrophic flooding, and the Sabarmati changing course.

Source: Indian Express

NANDALAL BOSE

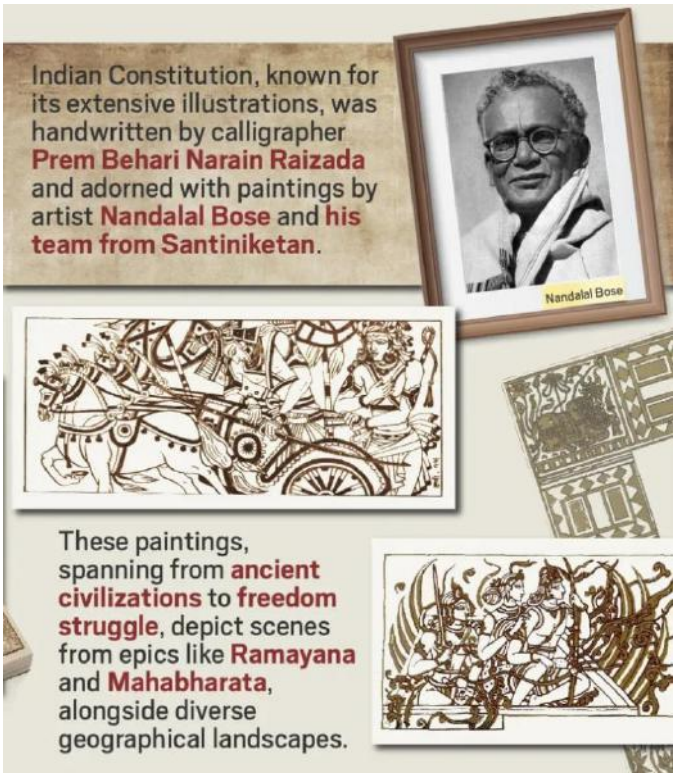
Context: 3rd December marked the birth anniversary of Nandalal Bose, who is recognized as one of the pioneers of modern Indian art and a prominent figure in the neo-Bengal school.

Background: -

- Bose played a significant role in training generations of artists. He was greatly admired by his contemporaries and inspired his students to draw inspiration from both nature and various art traditions, just as he did.

Key takeaways

- Born in Munger, Bihar, on December 3, 1882, Bose was one of the greatest exponents of modern art.
- **He was mentored by Abanindranath Tagore** and was renowned for his distinctive "Indian style" of painting. In 1922, he became the principal of Kala Bhavan in Santiniketan.
- His influences encompassed many styles, including Japanese Nihonga traditions, Mughal and Rajasthani miniatures, palm-leaf manuscripts, and murals found in the Ajanta Caves.



- **Notable Works**: **Some of his famous works include "Yama and Savitri" (1913) and "Kirat-Arjuna".**

- During a period when India's artistic traditions had significantly diminished due to years of British colonial rule, Nandalal Bose played a pivotal role in the cultural regeneration and independence of the nation through his contributions in art and education.

- Nandalal Bose passed away in 1966, in Santiniketan, West Bengal. He received numerous accolades including the Padma Vibhushan. The National Gallery of Modern Art houses over 6,800 of his works in its collection.

- **Archaeological Survey of India has recognised the works of Nandalal Bose as "art treasures" under the Antiquities and Art Treasures Act of 1972.**

Source: Indian Express

DEFENCE& SECURITY.

CRIME AND CRIMINAL TRACKING NETWORK AND SYSTEMS (CCTNS)

Context: Nearly 15 years after it was launched, all 17,130 police stations in the country have been linked through the Crime and Criminal Tracking Network and Systems (CCTNS).

Background: -

- Launched in 2009, the CCTNS has also become key to the implementation of the three new criminal laws that were rolled out on July 1.

About CCTNS

- CCTNS is a flagship project under the Indian Ministry of Home Affairs (MHA) aimed at creating a comprehensive and integrated system for enhancing the efficiency and effectiveness of policing through technology.

Objective:

- To provide a nationwide integrated platform for investigation, detection, and prevention of crimes.
- To enhance citizen services like online registration of complaints and tracking case status.

Scope:

- Link all police stations across India through a unified network.
- Enable seamless sharing of information on crimes and criminals among law enforcement agencies.

Components:

- **Core Application Software (CAS):** Provides a standardized platform for data entry, retrieval, and sharing.
- National Database: Centralized repository of criminal records, FIRs, and investigation reports.
- Integration with Other Systems: Links with databases such as Fingerprint Identification Systems, Vehicle Registration, and Passport Verification.

Some of the Citizen-Centric Services:

- Filing complaints online.
- Viewing the status of registered complaints and FIRs.
- Searching for missing persons or stolen vehicles.

Integrated Criminal Justice System (ICJS) :

- The scope of the CCTNS has been enhanced over the years to integrate the police data with other pillars of the criminal justice system namely courts, prisons, prosecution, forensics and finger prints, and accordingly a new system called the Integrated Criminal Justice System (ICJS) has been developed.

Source: The Hindu

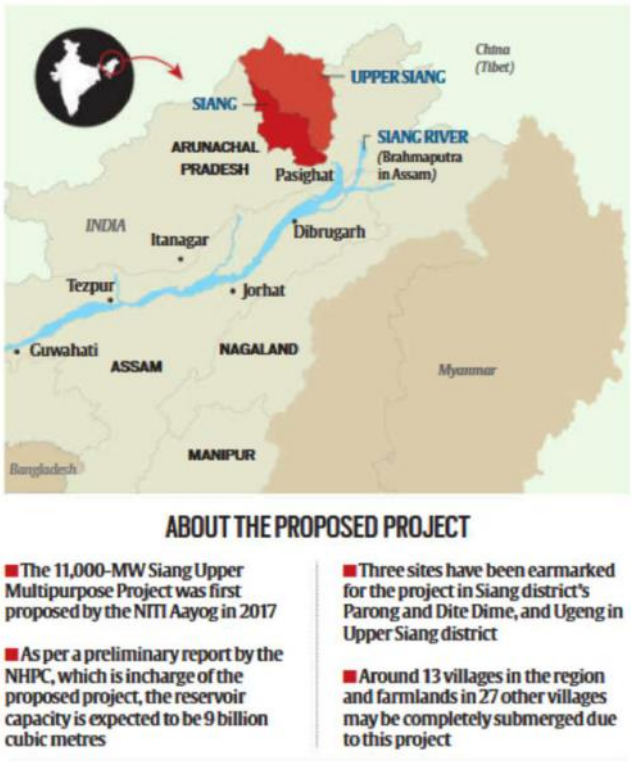
SIANG UPPER MULTIPURPOSE PROJECT (SUMP)

Context:A sense of unease prevails in two districts along the Siang River in Arunachal Pradesh, as protests intensify against the proposed Siang Upper Multipurpose Project (SUMP).

Background: -

- The government asserts that SUMP is not merely another hydropower initiative but a measure to save the river by mitigating the impacts of China's dam-building activities upstream in Tibet. According toreports, China has approved the construction of world's largest hydropower damon the eastern edge of the Tibetan Plateau near Arunachal Pradesh.

Key takeaways



• **The Siang originates near Mount Kailash in Tibet, where it is known as the Yarlung Tsangpo**. It traverses over 1,000 km eastward before forming a horseshoe bend around the Namcha Barwa peak and entering Arunachal Pradesh as the Siang.

• **Further downstream, in Assam, it joins tributaries like the Dibang and Lohit to become the Brahmaputra.**

• SUMP has faced opposition since it was first proposed by the NITI Aayog in 2017.

• While the precise scale of the project will only be ascertained after feasibility surveys, a preliminary report submitted by the **National Hydroelectric Power Corporation (NHPC)** in December 2022 to the Central Electrical Authority was for an 11,000-MW project with a reservoir capacity of 9 billion cubic metres.

- This makes the project several times larger in scale than other projects currently in the works in the country.
- **The three sites earmarked for SUMP are Parong and Dite Dime in Siang district, and Ugeng in Upper Siang district.**
- **The Adi tribe here revere the Siang as a provider**, **referring to it as Aane (mother) Siang**. Cultivation on its banks was encouraged and facilitated by the state after Independence to move away from shifting cultivation in the hills. So while settled agriculture along the river is 60 years old among the farmers of this belt, they are now completely dependent on it.

Source: Indian Express

GOVT. INITIATIVES, SCHEMES AND POLICIES, ORGANISATION

JALVAHAK SCHEME

Context: The Centre on Sunday launched the Jalvahak scheme to boost long-haul cargo movement via inland waterways.

Background: -

- India has an extensive inland waterway network spanning 20,236 km, but its freight transport potential remains under-utilised compared to countries like the US and China.

About Jalvahak scheme

- The Jalvahak Scheme is an **initiative by the Indian government aimed at boosting cargo movement via inland waterways.**
- Launch Date: Unveiled on December 15, 2024.
- The scheme will **remain valid for three years** and is designed to **optimise supply chains for major shipping companies, freight forwarders, and trade bodies.**
- **Objective**: To promote sustainable and cost-effective transportation across National Waterways 1 (Ganga), 2 (Brahmaputra), and 16 (Barak river).
- **Implementation**: Jointly implemented by the Inland Waterways Authority of India (IWAI) and Inland & Coastal Shipping Ltd (ICSL), a subsidiary of the Shipping Corporation of India.

Key Features:

- **Incentives**: Cargo owners transporting goods over distances exceeding 300 km via waterways will receive up to 35% reimbursement on operating costs.
- **Economic Impact**: The scheme aims to facilitate a modal shift of 800 million tonne-kilometres with an estimated investment of Rs 95.4 crore by 2027.

Significance:

- **Decongestion**: The scheme aims to reduce logistics costs and decongest road and rail networks.
- **Environmental Benefits**: Promotes eco-friendly cargo transportation.
- **Economic Value**: Provides a positive economic value proposition to trade and advances Prime Minister Narendra Modi's vision of transformation via transportation.

Source:The Hindu

POLAVARAM PROJECT

Context: The Andhra Pradesh government has prepared an action plan and set a broad milestones for various works, including completing the first phase of the Polavaram Irrigation Project by October 2026.

Background:

- The Polavaram project, considered the lifeline of Andhra Pradesh, has witnessed multiple delays over the last few years.

Key takeaways:

- **The Polavaram Project is a significant multi-purpose irrigation project** on the Godavari River in the Eluru District and East Godavari District of Andhra Pradesh.
- Also known as the **Indira Sagar Project**.
- The project aims to provide irrigation, drinking water, and hydroelectric power.
- Project was approved initially in 2004 and declared a national project under the Andhra Pradesh Reorganisation Act, 2014.

Key Features

- **Dam Type**: Earth-cum-rock fill dam.
- **Reservoir Capacity**: Gross storage capacity of 194.6 TMC.
- **Irrigation Potential**:4.36 lakh hectares in Andhra Pradesh.
- **Hydroelectric Power**: Generation of 960 MW.
- In this project, Godavari-Krishna inter-linking will be implemented under the inter-linking of rivers project. The project envisages transfer of 80 TMC of surplus water of Godavari river to Krishna river.

Source: The Hindu

SVAMITVA SCHEME

Context: Four years after the Union government launched the Svamitva scheme to digitise property records in rural areas, Prime Minister Modi will distribute 58 lakh property cards providing a "record of rights" to owners in over 50,000 villages across 12 States on Friday at a virtual event.

Background: -

- The **Ministry of Panchayati Raj (MoPR)** is the Nodal Ministry for implementation of the scheme. In the States, the Revenue Department / Land Records Department will be the Nodal Department and shall carry out the scheme with support of State Panchayati Raj Department. Survey of India is the technology partner for implementation.

Key takeaways

- **The SVAMITVA Scheme (Survey of Villages Abadi and Mapping with Improvised Technology in Village Areas)** is a central sector scheme launched by the Government of India on April 24, 2020, aimed at empowering rural property owners by providing them with official documentation of their residentialproperties.

Objectives of the SVAMITVA Scheme:

- **Financial Empowerment**: Enable rural property owners to use their property as a financial asset for securing loans and other financial benefits.
- **Accurate Land Records**: Create precise land records for rural planning and reduce property disputes.
- **Property Tax Assessment**: Facilitate accurate determination of property tax, enhancing revenue for Gram Panchayats.
- **Infrastructure Development**: Establish survey infrastructure and GIS maps that can be utilized by

various departments.

- **Improved Planning**: Support the preparation of better-quality Gram Panchayat Development Plans (GPDP) by utilizing GIS maps.

Key Features:

- **Drone Technology**: Utilizes drone surveying technology for the demarcation of rural inhabited areas, ensuring high accuracy in mapping.
- **Property Cards**: Issuance of property cards (also known as 'Title Deeds') to property owners, providing them with legal ownership documents.

Benefits to Rural Communities:

- **Legal Recognition**: Provides official recognition of property rights, reducing disputes and enhancing security.
- **Economic Opportunities**: Empowers property owners to leverage their assets for economic activities, including securing loans.
- **Enhanced Governance**: Assists local governments in effective planning and resource allocation through accurate land records.

Source: PIB

PRADHAN MANTRI AYUSHMAN BHARAT HEALTH INFRASTRUCTURE MISSION (PM-ABHIM)

Context: The Delhi High Court directed that the Aam Aadmi Party government in Delhi needed to sign an MoU with the Ministry of Health and Family Welfare before January 5 for implementation of the Pradhan Mantri Ayushman Bharat Health Infrastructure Mission (PM-ABHIM), irrespective of imposition of Model Code of Conduct in the run-up to the Assembly elections.

Background: -

- PM-ABHIM is a Central government scheme that aims to strengthen public health infrastructure to respond to future pandemics and outbreaks.

Key takeaways

- **Pradhan Mantri Ayushman Bharat Health Infrastructure Mission (PM-ABHIM) is a Centrally Sponsored Scheme (CSS)** with some Central Sector Components (CS) which has an outlay of Rs. 64,180 Crores for the scheme period (2021-22 to 2025-26).
- The measures under the scheme focus on developing capacities of health systems and institutions all levels viz. primary, secondary and tertiary level and on preparing health systems in responding effectively to the current and future pandemics/disasters.
- The objective of the scheme is to fill critical gaps in health infrastructure, surveillance and health research – spanning both the urban and rural areas.

The following are the components under CS Component of the scheme:

- **12 Central Institutions as training and mentoring sites with 150 bedded Critical Care Hospital Blocks (CCBs);**
- Strengthening of the National Centre for Disease Control (NCDC), 5 New Regional NCDCs and 20 metropolitan health surveillance units;
- Expansion of the Integrated Health Information Portal to all States/UTs to connect all public

health labs;

- **Operationalization of 17 new Public Health Units** and strengthening of 33 existing Public Health Units at Points of Entry, that is at 32 Airports, 11 Seaports and 7 land crossings;
- Setting up of 15 Health Emergency Operation Centres and 2 container based mobile hospitals; and
- Setting up of a national institution for One Health, 4 New National Institutes for Virology, a Regional Research Platform for WHO South East Asia Region and 9 BioSafety Level III laboratories.

Following support is provisioned for States/UTs under CSS component of the scheme:

- Construction of 17,788 rural Health and Wellness Centres (HWCs).
- Support for 11,024 urban Health and Wellness Centres in all the States with the focus on slum like areas.
- Establishing 3382 Block Public Health Units (BPHUs) at block levels.
- Setting up of Integrated Public Health Labs (IPHLs) in 730 districts.
- **Establishing Critical Care Hospital Blocks (CCBs)** in 602 districts (with population more than 5 lakhs) and with referral linkages in other districts.

Source: Indian Express

BRAIN ROT

Context: Oxford University Press (OUP) has announced 'brain rot' as the Oxford Word of the Year for 2024.

Background: -

- The selection process for the word of the year 2024 involved over 37,000 public votes from a shortlist of six words compiled by Oxford University

Key takeaways

- The word 'Brain Rot' **highlights the growing concerns around the effects of consuming trivial social media content on mental health.**
- Brain Rot describes the **cognitive decline attributed to excessive exposure to mindless social media content.**
- The term gained momentum alongside the rise of trends like 'digital detoxes,' where individuals consciously take breaks from screens to counteract feelings of burnout or mental stagnation.
- According to OUP, 'Brain Rot' reflects the increasing concern over how technology is shaping human thought processes and habits. Its usage surged in recent years, particularly among younger demographics, to describe the mental fatigue caused by binge-watching videos, doomscrolling, or engaging with low-quality online content.

Source:The Hindu

PM SURYA GHAR MUFT BIJLI YOJANA

Context: Around 1.45 crore registrations have been made under the PM Surya Ghar Muft Bijli Yojana and

6.34 lakh installations completed, Parliament was informed recently.

Background:

- As per official data, Gujarat has seen the maximum solar installations under the scheme at 2,86,545, followed by Maharashtra with 1,26,344 installations and Uttar Pradesh at 53,423.

Key takeaways

- The PM Surya Ghar Muft Bijli Yojana is a Central Sector Scheme.
- **Launch Date**: February 15, 2024.
- **Objective**: PM Surya Ghar Muft Bijli Yojana targets to achieve 1 crore rooftop solar installations in residential sector by FY27 with an outlay of Rs 75,021 crore.

Key Features:

- **Subsidy**: The scheme offers a subsidy of 60% for systems up to 2 kW capacity and 40% for systems between 2 to 3 kW capacity.
- **Free Electricity**: Eligible households will receive up to 300 units of free electricity every month.
- **Eligibility**: Indian citizens who own a house with a suitable roof and have a valid electricity connection.
- **Application Process**: Interested households can register on the national portal, select their state and electricity distribution company, and apply for the rooftop solar system.

Benefits:

- **Financial Relief**: Reduces electricity costs for households.
- **Sustainable Energy**: Promotes the use of renewable energy and reduces carbon emissions.
- **Energy Independence**: Enhances energy security by reducing reliance on traditional power sources.

Model Solar Village

- Under the "Model Solar Village" component of the scheme, the focus is on establishing one Model Solar Village per district throughout India.
- This initiative aims to promote solar energy adoption and empower village communities to achieve energy self-reliance. An allocation of ₹800 crore has been designated for this component, with ₹1 crore provided to each selected Model Solar Village.
- To qualify as a candidate village, it must be a revenue village with a population of over 5,000 (or 2,000 in special category states). Villages are selected through a competitive process.

Source: Economic Times

DIGITAL AGRICULTURE MISSION

Context: Gujarat became the first State in the country to generate Farmer IDs for 25% of the targeted number of farmers in the State.The Farmer ID is part of **Digital Agriculture Mission**.

Background: -

- A Farmer ID is a unique digital identity of farmers based on Aadhaar, linked dynamically to the

State's land records system, which means the Farmer ID gets automatically updated with the changes in the land record details of an individual farmer.

Key provisions of the Copyright Act

- The Digital Agriculture Mission is designed as an umbrella scheme to support various digital agriculture initiatives. These include creating Digital Public Infrastructure (DPI), implementing the Digital General Crop Estimation Survey (DGCES), and supporting IT initiatives by the Central Government, State Governments, and Academic and Research Institutions.
- **The scheme is built on two foundational pillars:**
    - Agri Stack
    - Krishi Decision Support System.
- Additionally, the mission includes 'Soil Profile Mapping' and aims to enable farmer-centric digital services to provide timely and reliable information for the agriculture sector.

AgriStack: Kisan ki Pehchaan

- AgriStack is designed as a farmer-centric Digital Public Infrastructure (DPI) to streamline services and scheme delivery to farmers. It comprises three key components:
    - 1. Farmers' Registry
    - 2. Geo-referenced village maps
    - 3. Crop Sown Registry
- A crucial feature of AgriStack is the introduction of a 'Farmer ID', similar to Aadhaar card, serving as a trusted digital identity for farmers.

Krishi Decision Support System

- The Krishi Decision Support System (DSS) will integrate remote sensing data on crops, soil, weather, and water resources into a comprehensive geospatial system.

Soil Profile Mapping

- Under the mission, detailed soil profile maps on a 1:10,000 scale for approximately 142 million hectares of agricultural land have been envisaged, with 29 million hectares of soil profile inventory already being mapped.
- The Digital Agriculture Mission focuses on grassroots implementation, targeting farmers as the primary beneficiaries.

Some of the key benefits of the mission include:

- Digital authentication for accessing services and benefits, reducing paperwork and the need for physical visits.
- Enhanced efficiency and transparency in government schemes, crop insurance, and loan systems through accurate data on crop area and yield.
- Crop map generation and monitoring for better disaster response and insurance claims.
- Development of digital infrastructure to optimize value chains and provide tailored advisory services for crop planning, health, pest management, and irrigation.

Source: PIB

AMRIT GYAAN KOSH PORTAL

Context: Union Minister Dr. Jitendra Singh launched "Amrit Gyaan Kosh" Portal to strengthen governance training.

Background: -

- The Minister underscored the importance of Amrit Gyaan Kosh as more than a repository—it is a platform to promote self-reliance in governance training.

Key takeaways

- The Amrit Gyaan Kosh portal is a **comprehensive repository designed to strengthen governance training and capacity building for public administrators in India.**
- **Development**: It is jointly developed by the Capacity Building Commission and Karmayogi Bharat.
- **Platform**: The portal is hosted on the iGOT (Integrated Government Online Training) platform.

Purpose:

- **Governance Training**: The primary aim is to enhance governance training by providing a repository of best practices and case studies.
- **Self-Reliance**: It promotes self-reliance in governance training by offering indigenous resources.
- **Global Standards**: The resources align with global standards while addressing India's unique administrative challenges.

Content:

- **Case Studies**: The portal features case studies that bridge the gap between theory and practice in governance training.
- **Teaching Notes**: It includes teaching notes to help educators develop structured case studies and enhance their teaching methods.
- **Policy Themes**: The repository covers diverse policy themes such as health, education, agriculture, and digital governance.

Significance:

- **Sustainable Development Goals**: The portal aligns with 15 of the 17 Sustainable Development Goals (SDGs).
- **Collaboration**: It fosters collaboration and innovation across academies and sectors.
- **Transformative Outcomes**: The initiative aims to empower educators and public administrators with advanced skills in case writing and teaching methodologies.

Source:PIB

VADHAVAN PORT

Context: The Vadhavan greenfield port, which is under construction near Dahanu in Maharashtra, will double India’s container trade from the current levels upon completion.

Background: -

- Scheduled to be finished by 2034, it is projected to be among the top 10 ports in the world.

Key takeaways

- Vadhavan Port is a proposed greenfield deep-sea port located in the Palghar district of Maharashtra, India.

- Location:Situated on the Arabian Sea coast, about 70 km north of Mumbai and 111 km north of Jawaharlal Nehru Port (JNPT).
- Ownership: The port will be developed by the Jawaharlal Nehru Port Authority (JNPA) in collaboration with the Maharashtra Maritime Board (MMB).
- Stakeholders: JNPA will hold a 74% stake, while MMB will hold 26%.

Features:

- **Natural Depth**: The port will have a natural depth of 20 meters, making it the deepest seaport in India.
- **Infrastructure**: The port will include 9 container terminals, 4 multipurpose berths, 4 liquid cargo berths, a Ro-Ro berth, and a Coast Guard berth.
- **Capacity:** The port is designed to handle a cumulative capacity of 298 million metric tons (MMT) per annum.
- **Draft Depth:** The port will have a draft depth of 18 meters, allowing it to accommodate large vessels.

Economic Impact:

- **Cost**: The total estimated cost of the project, including land acquisition, is ₹76,220 crore (approximately US$9.1 billion).
- **Employment**: The project is expected to create around 10 lakh (1 million) direct and indirect employment opportunities.
- **Strategic Importance**: Vadhavan Port is a key project under the Indian government's Sagarmala initiative, aimed at enhancing the performance of the country's logistics sector.

Source: The Hindu

MISCELLANEOUS

CONCERN OVER PLAN TO REDESIGN SIKKIM DAM WASHED AWAY IN 2023

Context: A Union environment ministry expert panel has expressed serious concerns about the redesign of the 1,200 MW Teesta-III Chungthang Dam in Sikkim, which was washed away after a glacial lake outburst in October 2023, and deferred its nod for restarting the project with a new dam.

Background: -

- The expert appraisal committee (EAC) appraising hydroelectric and river-valley-sector projects said it had concerns regarding the dam's design and stability and its ability to withstand potential natural disasters in the future.

Key takeaways

- Government enterprise Sikkim Urja Limited has sought an amendment to the project's old environmental clearance as it has proposed to redesign the project dam. It wants to replace the washed-away, concrete-faced rockfill dam with a concrete gravity dam.

Before and after images of Chungthang Hydro-Dam in Sikkim

- On the intervening night of October 3 and October 4, an ice avalanche hit the South Lhonak Lake, located at an altitude of 5,200 metres, breaching the glacial lake. The avalanche created giant waves, leading to a glacial lake outburst flood (GLOF), and triggered a flash flood downstream in Teesta.
- The force of the floodwaters breached the Chungthang dam, exacerbating the floods, killing 40 people across four districts of Sikkim. Across Mangan, Gangtok, Pakyong, and Namchi districts, about 100 villages were affected and 76 people were reported missing.
- The Teesta-III project is in Mangan district and utilises a drop of about 800m in the Teesta River between Chungthang and Sankalang villages. The flash floods triggered by the GLOF event had overtopped the project dam and flooded the underground powerhouse, bringing power generation to a halt.
- Following the GLOF event, the Centre and Sikkim government are collaborating on reducing levels of potentially risky glacial lakes in the upper reaches of Mangan district. The Centre has approved a Rs 150 crore National GLOF Risk Mitigation Programme and 189 lakes have been identified as high-risk glacial lakes, to mitigate the risks they pose.

Source: Indian Express

FREE MOVEMENT REGIME (FMR)

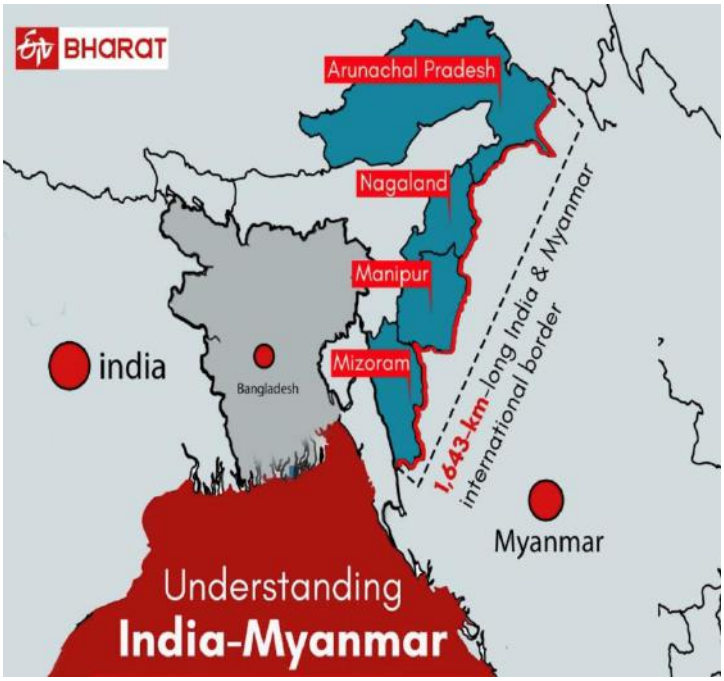
Context: Months after announcing that the Free Movement Regime (FMR) along the Myanmar border has been entirely suspended, the Union Home Ministry has brought in fresh protocol to regulate the movement of people living within 10 kilometres on either side of the largely unfenced international border.

Background: -

- Home Minister Amit Shah had announced in February that the FMR had been scrapped to ensure internal security and to maintain the demographic structure of the northeast. However, the new guidelines indicate that the regime has not been done away with but stricter regulations, such as reducing the range of free movement to 10 km from the earlier 16 km, have been introduced.
- The Assam Rifles is the primary border guarding force along the 1,643-km-long border with Myanmar along the States of Arunachal Pradesh (520 km), Nagaland (215 km), Manipur (398 km) and Mizoram (510 km).

Key takeaways

- **The Free Movement Regime (FMR) is a bilateral agreement between India and Myanmar** that allows people living along the border to move freely within 16 (now reduced to 10) kilometers on either side without needing a visa.



What is the genesis of the FMR?

- The roots of this regime go back to the late 19th century when both nations were part of the British Empire. The regulation allowed free movement across borders within British territories. After independence in 1947 (India) and 1948 (Myanmar), the two countries continued the arrangement under a revised bilateral agreement in 1967.
- However, India and Myanmar established the FMR in 2018 as part of New Delhi's Act East Policy promoting cross-border movement of people up to 16 km without a visa.

- The FMR facilitates easier movement and interactions for people residing in the border areas of both nations, allowing them to meet relatives and carry out economic activities.

New rules

- For entry into India from Myanmar, individuals will have to report at the designated border crossing points and fill a form.
- The Assam Rifles will conduct the document inspection followed by a security and health check by the State police and health department officials, respectively.
- The Assam Rifles will upload all the forms on the Indo-Myanmar Border portal, record biometrics, and issue a border pass with a photograph of the applicant and a QR code. The pass will have to be deposited on return at the same crossing point before completion of seven days.
- The protocol stated that the police will do physical checks to verify the visit of Myanmar nationals as per the details provided in the border pass and anyone violating the conditions will face legal action.

Source: The Hindu

NATION MOURNS FORMER PM MANMOHAN SINGH

Context: Former Prime Minister Manmohan Singh, 92, passed away.

Background: -

- Dr. Singh, who was PM for two terms in the Congress-led United Progressive Alliance government from 2004 to 2014, had been in poor health for the past few months

Key takeaways

- Manmohan Singh (1932–2024) was a distinguished economist and statesman, renowned for his pivotal role in transforming India's economic landscape.
- **Early Life and Academic Pursuits**
    - Born on September 26, 1932, in Gah, Punjab (now in Pakistan), Singh's academic brilliance led him to the University of Cambridge and the University of Oxford, where he earned his doctorate in economics.

Architect of Economic Reforms

- As Finance Minister from 1991 to 1996, Singh introduced groundbreaking economic reforms that transitioned India from a closed, state-controlled system to a more liberalized and globally integrated economy.
- Facing a severe balance of payments crisis, he implemented policies that reduced trade barriers, encouraged foreign investment, and deregulated domestic markets, setting the stage for India's rapid economic growth in subsequent decades.

Prime Ministerial Tenure (2004–2014)

- Singh served as Prime Minister from 2004 to 2014, becoming the first Sikh to hold the position.
- Economic Growth: Under his leadership, India experienced substantial GDP growth, lifting millions out of poverty and expanding the middle class.
- Social Programs: Singh's government launched key initiatives, including the National Rural Employment Guarantee Act (NREGA) and the National Rural Health Mission, aiming to improve employment and healthcare access for rural populations. Other notable achievements include :
    - Right to Information (RTI) Act: Enacted in 2005, this act empowered citizens to access information from public authorities, promoting transparency and accountability.
    - National Food Security Act: Introduced in 2013, this act ensured subsidized food grains to approximately two-thirds of India's population.
- US-India Civil Nuclear Agreement: In 2008, Singh finalized a landmark civil nuclear deal with the

United States, ending India's nuclear isolation and enabling access to nuclear technology and fuel for civilian purposes.

Source: The Hindu

VIKRAM SARABHAI

Context: Vikram AmbalalSarabhai, the father of India's space programme, died on December 30, 1971, in Kovalam, Kerala, at the age of 52.

Background: -

- Late President APJ Abdul Kalam once had called the "Mahatma Gandhi of Indian Science".

Key takeaways

- Born to Ambalal and Sarla Devi, Ahmedabad's leading textile-mill owners on August 12, 1919.
- After studying from Gujarat University in Ahmedabad, Sarabhai went to study physics and mathematics at Cambridge University, but was forced to return when World War II broke out.
- He completed his post-graduation at the Indian Institute of Science in Bengaluru under Dr CV Raman, where he also met Dr Homi Bhabha, and returned later to Cambridge for a PhD in cosmic rays.

Key Contributions to Indian Science and Technology:

- **Space Research and ISRO Formation:**
  - Visionary Leader: Recognized the importance of space technology for India's development.
  - Played a significant role in establishing the Physical Research Laboratory (PRL) in Ahmedabad in 1947, focusing on fundamental physics and space sciences.
  - Establishment of ISRO (1969): Played a pivotal role in setting up the Indian Space Research Organisation (ISRO) to promote space exploration and satellite-based communication.
  - Instrumental in India's first satellite, Aryabhata (1975), launched posthumously.
- **Atomic Energy and Research Institutes:**
  - Worked with Homi Bhabha to strengthen India's atomic energy program.
  - Sarabhai succeeded Homi Bhabha as the chairman of the Atomic Energy Commission of India.
- **Indian Institute of Management (IIM), Ahmedabad**:Co-founded IIM Ahmedabad in 1961, establishing it as a premier management institute globally.

- **Satellite Technology and Applications:**
    - Conceptualized the **Indian National Satellite System (INSAT)** to advance communication, education, and meteorology.
    - **Satellite Instructional Television Experiment (SITE)** : Sarabhai started a dialogue with NASA that formed the base for Satellite Instructional Television Experiment.Launched in 1975 from village Pij in Gujarat's Kheda district, it would beam TV programmes to villages and was the first Indo-US space venture using technology for education.

Source: Indian Express

POTATO CRISIS

Context: Odisha food supplies and consumer welfare minister accused the West Bengal government of creating an artificial scarcity of potatoes to "tarnish the reputation" of the Odisha government.

Background: -

- Odisha has been grappling with high prices of Potato for months. Recently, the government of Bengal, a major potato supplier to Odisha, restricted the shipment of the tuber as prices rose in its own markets.

Key takeaways

- **India is the second largest producer of potato in the world, after China.**
- Between 1991-92 and 2020-21, potato area has doubled from 11 to 22 lakh hectares, and production tripled— from 181.95 to 561.72 lakh metric tonnes. Productivity increased by over 50 per cent—from 16 to 25 metric tonnes per hectare.
- In India, potatoes are grown during the rabi (winter-spring) season, mainly in Uttar Pradesh, West Bengal, Bihar, Gujarat, Madhya Pradesh, Punjab, Haryana, Assam, Jharkhand and Chhattisgarh.
- A small quantity of potato is also grown during the kharif (monsoon) season in Uttarakhand, Karnataka, Himachal Pradesh, Tamil Nadu and Maharashtra.
- **Uttar Pradesh was the biggest producer of potato** in the country in 2021-22. It was followed by West Bengal. These two states accounted for almost half of the country's total potato production during 2021-22.
- Potato is a temperate climate crop, requiring low temperatures from 15°C to 25°C, and Odisha's agro-climatic conditions are not conducive for potato cultivation. Thus, the state is dependent on supply from other states, particularly from West Bengal, to meet its demand.

Source:Indian Express

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MAINS

PAPER 1

Tsunami

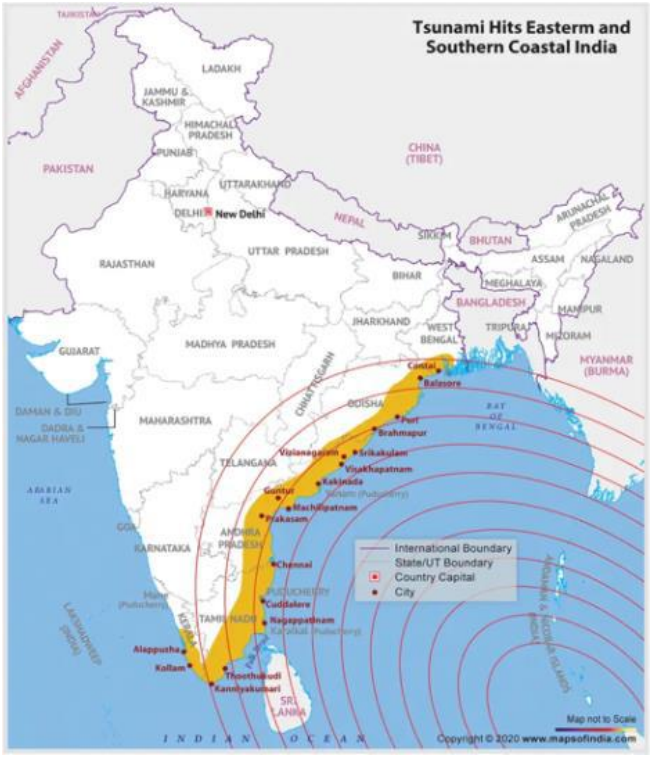
GS I –Important Geophysical Phenomena

Context: The scene played out at the Synergistic Ocean Observation Operations Services (SYNOPS) at the Indian National Centre for Ocean Information Services (INCOIS), the centre, which issues tsunami warnings in India, simulated an earthquake measuring 9.3 — enough to trigger massive tsunami waves in the Indian Ocean — with its epicentre in Indonesia's northern Sumatra.

Tsunami:

- A tsunami is a series of giant ocean waves caused by earthquakes or volcanic eruptions under the ocean.
- It is a series of ocean waves with extremely long wavelengths and high energy.
- Tsunamis can travel across entire ocean basins and can cause widespread destruction when they reach coastlines.

Causes for Tsunami:



- When tectonic plates beneath the Earth's surface shift, they can generate seismic waves that propagate through the water, creating a tsunami.
- The impact of a large meteorite or asteroid in the ocean can displace water and create tsunami-like waves.
- Human activities, such as underwater explosions, can also potentially generate tsunamis.
- Volcanic activity, especially if it occurs beneath the ocean, can displace a large volume of water, triggering a tsunami. This can happen when there is a sudden collapse of a volcanic island or an explosive eruption.
- Underwater landslides, whether caused by volcanic activity, coastal erosion, or other factors, can displace a significant amount of water and generate tsunami waves.

Impacts of Tsunami:

- It causes coastal devastation. Ex: The 2004 Indian Ocean tsunami caused widespread destruction along the coasts of Indonesia, Thailand, Sri Lanka, and India, resulting in the loss of human lives and damage to infrastructure.
- It leads to economic losses. Ex: The 2011 Tohoku tsunami resulted in billions of dollars in economic losses, including damage to industries, ports, and transportation networks.
- It leads to the destruction of the environment and biodiversity. Ex: The 2011 Tohoku event in Japan damaged ecosystems and led to the release of pollutants, affecting marine life and coastal environments.
- It leads to huge loss of lives. Ex: The 2004 Indian Ocean event led to the tragic loss of over 230,000 lives across multiple countries.

Tsunami Preparedness in India:

- India is a part of the Indian Ocean Tsunami Warning System (IOTWS) which includes a network of seismic and sea-level sensors strategically placed to detect underwater earthquakes and monitor sea-level changes. The information collected is used to issue timely warnings to coastal communities.
- India's Tsunami Early Warning Centre (ITEWC) is located at the Indian National Centre for Ocean Information Services (INCOIS) in Hyderabad and provides tsunami advisories to stakeholders.
- Creation of public awareness and education in coordination with the National Disaster Management Authority (NDMA), INCOIS conducts mock drills as well as organizes workshops/training on tsunami awareness and preparedness.
- INCOIS is coordinating the implementation of the UNESCO-IOC "Tsunami Ready" initiative to enhance community preparedness. Ex: Venkatraipur and Noliasahi villages of Odisha have been recognized as tsunami-ready communities by the UNESCO-IOC. India is the first country in the Indian Ocean region to achieve this distinction.
- Software developed for monitoring earthquakes and multimode dissemination of early warning of tsunamis by INCOIS. Ex: INCOIS has developed interfaces to the NDMA Common Alert Protocol (CAP) system.

Tsunami-Prone Regions:

- 78% Pacific Ocean
- 9% Atlantic Ocean and Caribbean Sea
- 6% Mediterranean Sea
- 5% Indian Ocean
- 1% Other Seas

Indian National Centre for Ocean Information Services (INCOIS):

- It is an autonomous body under the Ministry of Earth Sciences (MoES) established in 1999 and is located in Pragathi Nagar, Hyderabad.
- Its role is to monitor and manage ocean-related events and provide information to stakeholders.

Same-Sex Marriage

GS I– Salient features of Indian society

Context: In a 3:2 verdict, the Supreme Court says no to same-sex marriage.

Arguments in favour of same-sex marriage:

- Legalizing same-sex marriage aligns with the principles of equality and non-discrimination. Articles 14 and 15 of the Constitution forbid discrimination based on sex. Further, the Supreme Court, in the Navtej Singh Johar case (2018), interpreted "sex" to include "sexual orientation".
- Legalizing same-sex marriage offers legal safeguards for homosexual couples, ensuring their rights in areas like wages, adoption, surrogacy, inheritance, property ownership, and healthcare. Further, legalizing same-sex marriage is a logical step after the decriminalization of Section 377.
- Recognizing same-sex marriage upholds the right to privacy, established by the Supreme Court in the K.S. Puttaswamy case (2017). This right encompasses personal choices, including intimate relationships, and legalizing same-sex marriage safeguards the privacy of homosexual couples.
- Same-sex marriage is a human rights issue recognized by the United Nations, which advocates for the protection of LGBT individuals' human rights, including the right to marry. Further, legalizing same-sex marriages fosters social acceptance of LGBT individuals and relationships, helping reduce discrimination and stigma.
- Recognizing same-sex marriage aligns with the global trend, as it is legal in 34 countries, and denying this right in a democratic society contradicts international principles. For ex: In 32 countries, same-sex marriage is legal.

Arguments against same-sex marriage:

- Same-sex marriage contradicts Indian religious and cultural beliefs as marriage laws, and customs are traditionally designed for heterosexual couples.
- Legalizing same-sex marriages may lead to complications in areas like adoption, child custody, inheritance, tax, and property rights.
- The adoption of children by queer couples can result in social stigma, discrimination, and adverse effects on the emotional and psychological well-being of the child.
- Marriage is a public policy issue that should be determined by Parliament and the executive, necessitating changes in various related laws and regulations if same-sex marriage were to be legalized.
- Given the limited acceptance of same-sex marriage in Indian society, its legalization could disrupt social norms and values, potentially leading to social unrest.

Observation of the Supreme Court (SC):

- A five-judge Constitution Bench of the apex court headed by the **Chief Justice of India ruled in a 3:2 verdict** against giving constitutional validity to same-sex marriages.
- The CJI, in his opinion, concludes that the **court can neither strike down or read words into the Special Marriage Act (SMA) 1954** to include same-sex members within the ambit of the **SMA 1954.The top court said it is for Parliament and state legislature to formulate laws on it.**
- However, at the same time, the **SC says the relationship of marriage is not a static one.**
- **SC holds that** queer persons have an **equal right and freedom to enter into a "union".**
- **All five judges** on the Bench agreed that **there is no fundamental right to marry** under the Constitution.

Special Marriage Act (SMA) of 1954:

- It has provisions for civil marriage for the people of India and all Indian nationals in foreign countries, irrespective of religion or faith followed by either party.
- When a person solemnized marriage under this law, then **the marriage is not governed by personal laws but by the Special Marriage Act.**

Global position on same-sex marriages:

- The **Netherlands** was the **first country in 2001** to legalise same-sex marriage by amending one line in its civil marriage law.
- Since the first same-sex marriages took place in the Netherlands in 2001, more than 30 other jurisdictions have enacted laws allowing **same-sex marriages**, some through **legislation** and others through **judicial pronouncements**.
- Many countries first recognised same-sex civil unions as the **escalatory step to recognise homosexual marriage**.
- Most countries in **North and South America** and **Europe** have legalisedsame-sex marriage.

Mauryan Architecture

GS I –Indian Culture

Context: Over the last few days, a rectangular patch of open ground at the Mauryan archaeological site of Kumhrar, a little over five km from the Patna railway station,has come alive with engineers and workers drawing circles on the ground with white powder. Under the green grass top, the earth hides an ancient architecturalmarvel – stumps and pits where 80 sandstone pillars once stood, holding up what was possibly a Buddhist assembly hall from the Mauryan era.

Features of Mauryan Architecture:

- It was predominantly built with wood.

- It featured intricate carvings and designslike KumraharPalace in Patna.
- It had multifunctional palaces used for governance, administration, and hosting guests.
- It reflected the empire's prosperity as Mauryan palaces demonstrated opulence through their design and construction.
- It demonstrated diversity in architecture from wooden palaces to rock-cut cavesexhibiting versatility and adaptation to different terrains.
- It reflects the cultural richness and administrative acumen of the Mauryan Empire.

Mauryan Architecture:
Court Art includes palaces, pillars, stupas, caves, and viharas.

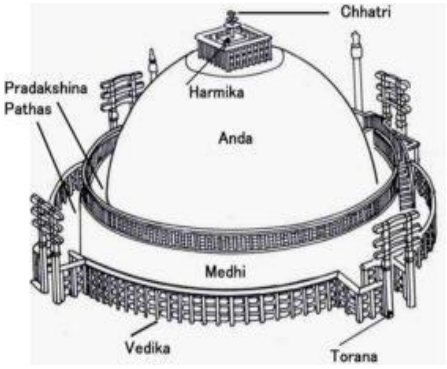
Palaces:

- They were primarily constructed from wood, a material favoured by both Chandragupta Maurya and Ashoka.
- Kumrahar in modern-day Patna stands out as a hub of Mauryan palace architecture.
- They were adorned with intricate carvings and designs and served multifaceted purposes for the Mauryan rulers.
- They functioned as centers for governance, administration, and the hosting of esteemed guests.

Pillars:

- They were monolithic, tall, lustrous, well-proportioned, free-standing structures with tapering shafts.
- Its primary purpose was to disseminate Ashoka's edicts and teachings to a wide audience that often emphasized the importance of moral conduct, non-violence, tolerance, and respect for all religious beliefs.
- They were made of sandstone and were erected at key locations throughout the Mauryan Empire, including present-day India, Nepal, Pakistan, and Afghanistan.
- Some of the examples includeSarnath, Rampurva, Prayag -Prashasti, etc.

Stupas:



- They were burial mounds prevalent in India from the Vedic period.
- It consists of a cylindrical drum with a circular dome a Harmika and a Chhatra on the top.
- A circular terrace(Medhi) enclosed by a railing, surrounds the dome, on which the faithful are to circumnutate in a clockwise direction this gallery is known as
- The entire structure is enclosed by a low wall called Vedika, which is punctuated at the four cardinal points by Toranas(gateways).
- Stupas of the Mauryan PeriodincludeKapilvastu, Kushinara, Ramgram, Vaishali, Pavapuri, Rajgir, Piplavan, Vidthapida, and, Allakappa.

Caves:

- The Mauryan period saw the beginning of rock-cut cave architecture.
- The caves are simple but have highly polished interiors.
- The Barabar and Nagarjuni hills contain several caves which are built by Ashoka and Dasharatha.
- These caves were dedicated by Ashoka and Dashratha to the Ajivakas.
- Examples of caves from the Mauryan period include the following:
  - Lomas Rishi Caves are part of the Barabar Hills Caves and stand out for their intricate rock-cut architecture, showcasing the mastery of Mauryan artisans.
  - Sudama Cave was another creation within the Barabar Hills Caves reflecting the artistic finesse of the Mauryan period.
  - Karnchopar Cavelocated in the Barabar Hills, is an example of the architectural brilliance of the Mauryan era.
  - Vishwa Cave in the Barabar Hills Caves contributes to the rich heritage of rock-cut architecture during the Mauryan reign.
  - Gopi ka Kubha Cave situated in the Nagarjuni Hillsis a testament to the diverse rock-cut structures associated with the Mauryan period.

- VaDythika ka Kubha Cavein the Nagarjuni Hillsexemplifies the intricate craftsmanship of Mauryan artisans in rock-cut architecture.

Viharas:

- They were originally constructed to shelter the monks during the rainy season when it became difficult for them to lead the wanderer's life.
- Ashoka built Ashokaram vihara and Kakuttaram in Patliputra.
- Folk Art includes sculptures, terracotta, and pottery.

Sculptures:

- The sculptures in Mauryan times were widely used for religious expression. They were used in stupas and making stone figurines of Yaksha and Yakshini.
- They excel in carving reliefs on stone surfaces, showcasing intricate details and beautiful elements.
- Several large stone sculptures have been found at various sites in and around Patna, Mathura, Madhya Pradesh, and other places.

Terracotta:

- They flourished with the expansion of the urban centres.
- They include male and female figurines, animals, and carts.

Pottery:

- Pottery of the Mauryan period is generally referred to as Northern Black Polished Ware(NBPW).
- They were often used as luxury items due to their highly polished black finish, reflecting the aesthetic preferences of the Mauryan era.
- It was manufactured in prominent centers like Kosambi and Patliputra.

News:

- The exact time of construction of the 80-pillar hall surely belongs to the Mauryan period (321-185 BCE).
- King Ashoka is said to have called the third Buddhist Council here.

India's FallingFertilityRate

GS I –Population and associated issues

Context: RSS sarsangchalak Mohan Bhagwat's concern about India's falling fertility rate is misplaced. His advocacy of three or more children per couple, to avoid the problems being faced by developed economies — Japan, Korea, China, and several European countries — is problematic, especially in a country like India whose population threatens to cross the 1.6 billion mark by 2060.

Total fertility Rate (TFR):

- It refers to the total number of children born or likely to be born to a woman (15-49 years) in her lifetime.
- **India's Total Fertility Rate (TFR)** has reached 2.0 at the national level. The total fertility rate was as high as 6 or more in the 1950s.
- The TFR is at 1.6 in urban areas and 2.1 in rural India.

Reasons for the falling fertility rate in India:

- Family planning and welfare programmes introduced post-independenceincluded maternal and child health-related cash transfer inducements that have been a positive impactin reducing fertility.
- Government-led FP initiatives enable couples to decide on child number and spacing, resulting in declining TFR.
- It is due to the substantial decline in infant mortality and maternal mortality rates that guaranteed child survival and made small families a norm in India.
- The average age of first pregnancy has dropped from the mid-20 to mid to late 30's, due to delays in the age of marriage.
- **The behavioural changes due to campaigns such as 'hum do humaare do'** and the use of

contraceptives have changed the mindset of the Indian population and nudged them to reduce fertility rates.

- There is a significant increase in the exercise of choice of adoption over child-rearing, which has contributed to a decrease in the fertility rates in India.
- The reversal of intergenerational flow of wealth, parents do not receive much benefit from their children the way they used to receive which has influenced their decision to have an additional child that would involve a substantial cost of bringing them up.
- The rise of female literacy, women's participation in the workforce, career consciousness, financial returns, and economic independence have empowered Indian women to reconsider the option of having a second child.

Significance of falling fertility rates for India:

- It can enhance labour productivity leading to accelerated economic growth due to the increased amount of capital resources and infrastructure available in per capita terms.
- Due to the lower working force population, there will be improved working conditions and higher wages for the workers which would also lead to the elimination of wage discrimination for migrant workers and the mitigation of their security concerns in the industrially developed statesthat have low fertility rates.
- It enhances the participation of women in the workforce as there is less time needed for childcare.
- It improves theeducational, health, and skills of the Indian population due to an increase in the per capita availability of social sector resources and infrastructure like schools, colleges, and hospitals.
- It leads to lower pressure on land, water, and other resources that will help in reducing the impact on environmental problems such as global warming, desertification, loss of farmland, pollution, and use of non-renewable materials

PAPER 2

Vice-President

GS II – Parliament and State legislatures—structure, functioning, conduct of business, powers & privileges, and issues arising out of these.

Context: The uneasy relationship that Opposition parties share with the Rajya Sabha Chairman and Vice-President is set to come to a head as the INDIA bloc parties have decided to submit a notice to move a no-confidence or impeachment resolution against him.

Vice-President:

- It is the second-highest constitutional office in the country after the President of India.
- It is accorded a rank next to the President in the official warrant of precedence.
- Vice-President's main role is to act as the President if the President cannot perform his or her duties, such as due to death, resignation, or impeachment.
- The Vice President serves as the Chairman of the Rajya Sabha (Council of States), the upper house of the Indian Parliament.

Constitutional Provisions:

- According to Article 64, the Vice-President shall be ex officio Chairman of the Council of States and shall not hold any other office of profit.
- Article 89 of the Constitution provides provision for the Chairman (Vice-President of India) and the Deputy Chairman of the Rajya Sabha.

Electoral College:

As per Article 66 of the Constitution of India, the Vice-President is elected by the members of the Electoral College. The Electoral College consists of:

- Elected members of Rajya Sabha.
- Nominated members of Rajya Sabha.
- Elected members of Lok Sabha.

Qualifications:

To be eligible for election as Vice-President, a person should fulfill the following qualifications:

- He should be a citizen of India.
- He should have completed 35 years of age.
- He should be qualified for election as a member of the Rajya Sabha.
- He should not hold any office of profit under the Union government any state government or any local authority, or any other public authority.

Oath or Affirmation:

- The oath of office to the Vice-President is administered by the President or some person appointed by him.
- Before entering his office, the Vice President has to make and subscribe to an oath or affirmation. In his oath, the Vice President swears
  - to bear true faith and allegiance to the Constitution of India; and
  - to faithfully discharge the duties of his office.

Power and Functions:

- The Chairman of the Rajya Sabha is empowered to adjourn the House or to suspend its sitting in the event of the absence of a quorum.
- The 10th Schedule of the Constitution empowers the Chairman to determine the question as to disqualification of a member of the Rajya Sabha on the ground of defection;
- The Chairman's consent is needed to raise a question of breach of privilege in the House. Parliamentary Committees, regardless of whether set up by the Chairman or by the House, work under the direction of the Chairman.
- He nominates members to different Standing Committees and Department-related Parliamentary Committees. He is the Chairman of the Business Advisory Committee, the Rules Committee, and the General Purposes Committee.
- It is the duty of the Chairman to interpret the Constitution and rules so far as matters in or relating to the House are concerned, and no one can enter into any argument or controversy with the Chairman over such interpretation.

Removal of Chairperson:

- He can only be removed as the chairman of Rajya Sabha when he is removed from the office of Vice-President of India.
- While the resolution is in effect for the removal of Vice-President, he cannot preside over the house as chairman, although he can be part of the house.

Technology in public service delivery

GS II – Government policies and interventions

Context: The Comptroller & Auditor General (CAG) of India has emphasized the need for increased use of IT systems andtechnology in service delivery to the citizens

Usage of technology in public service delivery:

- Digital government services (also called e-government)are defined as service delivery within government — as well as between government and the public —using information and communication technologies.
- Traditionally, government services have been deliveredin person, by individual departments in differentlocations, and often using paper forms.
- With digital services, government can deliverinformation and services to citizens anytime, anywhere,and on any platform or device.

Significance of technology in public service delivery:

- It saves time and money for the citizens as they need not travel to different government offices and stand in queues to get their work done. e-Hastakshar service facilitates instant e-signing of documents online by citizens in a legally acceptable form without having to visit government offices
- It increases the efficiency of government departments as digital records can be shared easily and maintained for later reference. Vehicle data from different state registers are collected and processed in the VAHAN platform of the Ministry of Road Transport and Highways.
- It eliminates the Ghost beneficiaries and leakages to a larger extent as the digital records can be updated dynamically and the leakages can be traced back easily. The linking the Aadhar cards to the respective job cards of MGNREGA, lakhs of Ghost beneficiaries were identified and removed
- It increases accountability and reduces corruption, as the origin or initiator of a particular transaction can be traced back to the system from where it began. The detailed information available to the citizens on the platforms enables them to understand rules andregulations better and even raise complaints about erring officers
- The combination of data harnessed from various sources can be mined to design better public policies. The linking of the PAN card and Aadhar card helps the exchequer to collect data on persons earning above

athreshold income for reducing black money and increasing tax collection.

Issues/Challenges in using technology for public service delivery:

- The adigital divide among the people, where a majority of them are yet to get accustomed to the digital world and itsapplications.
- The lack of a skilled workforce within the governmentmakes it difficult for them to adapt technology at a major scale.
- One of the major concerns is cyber security threatsas these services handle important data of government and the public.
- There is a lack of sufficient digital infrastructure in government establishments across the country.
- The lack of interoperability in most services makes them work in isolation rather than as a collective network.

PM Kisan Samman Nidhi (PM-Kisan) Yojana

GS II – Government policiesand interventions

Context: Over 60,000 ineligible persons, including income taxpayers, in Kerala have been pocketing the central government's flagship Pradhan Mantri Kisan Samman Nidhi — an initiative to ensure minimum income support of Rs 6,000 per year for farmers in the country.

PM Kisan Samman Nidhi (PM-Kisan) Yojana:

- It is a central sector scheme for the families of farmers across the country.
- The scheme, which came into effect on December 1, 2018, provides Rs 2,000 each in three installments for every four months to the farmer families.
- It defines family as husband, wife, and minor children.
- The fund is directly transferred to the bank accounts of the beneficiaries.
- The entire identification of the family rests with the state and Union Territory governments.To enroll for the scheme, farmers are required to approach the local revenue officer or PM-KISAN Nodal Officer who has been nominated by the state government. Farmers can also self-register themselves through the Farmers Corner on the PM-Kisan website, pmkisan.gov.in.

Eligible for PM-Kisan Scheme:

- Landholding farmers' families with cultivable landholding in their names
- Farmers from both the urban and rural areas
- Small and Marginal farmers' families

Not Eligible for PM-Kisan Scheme:

- Institutional landholder
- Present or retired officers and employees of state/central government as well as PSUs and government autonomous bodies
- Beneficiaries with higher economic status are not eligible
- Those who pay income tax
- Farmer families holding constitutional posts
- Professionals like doctors, engineers, and lawyers
- Retired pensioners with a monthly pension of over Rs 10,000

Significance of PM-Kisan Scheme:

- It acts as a strong consumption stimulus by helping in economic growth especially due to ongoing slower economic growth due to decreased rural demand.
- It provides more autonomy to farmers by giving them the power to utilize money according to their needs. It provides ways to enhance agricultural productivity and output leading to overall growth and income.
- It helps in reducing poverty by ensuring sustainable food security, and inclusive growth of farmers.
- It encourages greater usage of bank accounts, leading to higher profits for banking correspondents (BC) and an endogenous improvement in financial inclusion.
- It reduces the pressures of finding a basic living dailyas they get guaranteed income thereby instilling farmers with confidence that motivates them to work more efficiently.

Prime Ministers Citizen Assistance and Relief in Emergency Situations Fund (PM CARES Fund)

GS II – Government policies and interventions for development in various sectors and issues arising out of their design and implementation

Context: The Prime Minister's Citizen Assistance and Relief in Emergency Situations Fund (PM CARES Fund) received Rs 912 crore in contributions during the financial year 2022-23 as donations continued to pour in even after the COVID-19 pandemic.

Prime Ministers Citizen Assistance and Relief in Emergency Situations Fund (PM CARES Fund):

- It was created to **combat, contain, and provide relief efforts** against the coronavirus outbreak and similar **pandemic-like situations** in the future.
- It **was created on 28 March 2020**, following the COVID-19 pandemic in India.
- It was registered as a Public Charitable Trust under the Registration Act, 1908 in New Delhi on March 27, 2020, three days after the lockdown in the country in the wake of the Covid-19 pandemic.
- **It was set up "keeping in mind the need for having a dedicated fund with the primary objective of dealing with any kind of emergency or distress situation, like posed by the COVID-19 pandemic, and to provide relief to the affected."**
- The Prime Minister is the ex-officio chairman of the PM CARES Fund, while the Defence Minister, Home Minister, and Finance Minister are ex-officio trustees of the Fund.
- The Prime Minister, as the chairperson of the Board of Trustees of the PM CARES Fund, has nominated Justice K T Thomas (retd.) and Kariya Munda as trustees.
- Objectives:
  - To undertake and support relief or assistance of any kind relating to a public health emergency or any other kind of emergency, calamity, or distress, either man-made or natural, including the creation or upgradation of healthcare or pharmaceutical facilities, other necessary infrastructure, funding relevant research or any other type of support.
  - To render financial assistance, provide grants of payments of money, or take such other steps as may be deemed necessary by the Board of Trustees to the affected population.
  - To undertake any other activity, which is not inconsistent with the above Objects.
- It consists **entirely of voluntary contributions** from individuals/organizations and does not get any budgetary support.
- The contributions to the Fund can be from any individuals or any organizations including companies, other charitable institutions, associations, etc.
- Donations to PM CARES Fund **would qualify for 80G benefits for 100% exemption under the Income Tax Act,** of 1961.
- Donations to the PM CARES Fund **will also qualify to be counted as Corporate Social Responsibility (CSR)** expenditure under the Companies Act, 2013.
- It has also got an **exemption under the** Foreign Contribution Regulation Act (**FCRA)**. This enables the PM CARES Fund to **accept donations and contributions** from individuals and organizations based in **foreign countries.**

Issues/Criticism of PM CARES Fund:

- **It has raised** concerns over the lack of public accountability in the use of the **PM CARES Fund**as it is not subject to audits by the Comptroller and Auditor General (CAG) and does not fall under the purview of the Right to Information (RTI) Act.
- **It has created questions regarding the duplicity of its purpose** as it overlaps with the existing disaster management and relief funds like the Prime Minister's National Relief Fund (PMNRF).
- **There have been issues regarding the utilization of funds, its planning, and execution as a**significant amount offunds remains unutilized.
- It accepts foreign donations whichhas sparked debates over the potential for external influence on domestic decision-making.

News:

- **The PM CARES Funds received Rs 909.64 crore as voluntary contributions and Rs 2.57 crore as foreign contributions during 2022-23,** the latest year for which audited accounts are available in the public domain.
- In addition to donations of Rs 912 crore, the Fund also received Rs 170.38 crore as interest income, of which Rs 154 crore came from interest on regular accounts and Rs 16.07 crore from foreign contributions account.
- It also received about Rs 225 crore in the form of refunds from various sources, including a refund (Rs 202 crore) from the procurement of 50,000 'Made in India' ventilators to government hospitals run by the Centre/States/UTs.
- In all, the PM CARES Fund received a total of Rs 13,605 crore — as voluntary contributions (Rs 13,067 crore) and foreign contributions (Rs 538 crore) — in the four years from 2019-20 to 2022-23. During this period, it received Rs 565 crore as interest income.

National Mission on Edible Oils – Oilseeds (NMEO-Oilseeds)

GS II – Government policies and interventions

Context: The Union cabinet approved the National Mission on Edible Oils – Oilseeds (NMEO-Oilseeds) for seven years, from 2024-25 to 2030-31.

Oil Seed Production in India:

- India is the fourth largest oilseeds producer in the world, behind the USA, China, and Brazil. It has 20.8% of the total area under cultivation globally, accounting for 10% of global production.
- The largest oilseed-producing states in India include Rajasthan, Madhya Pradesh, Gujarat, Maharashtra, Haryana, Uttar Pradesh, West Bengal, Karnataka, Tamil Nadu, and Telangana.
- In 2022-23, India imported 16.5 million tonnes (MT) of edible oils, with domestic production fulfilling only 40-45% of the country's requirements.

National Mission on Edible Oils – Oilseeds (NMEO-Oilseeds):

- Its primary focus is to increase the production of key primary oilseed crops such as Rapeseed-Mustard, Groundnut, Soybean, Sunflower, and Sesamum.
- It aims to enhance extraction efficiency from secondary sources like Cottonseed, Rice Bran, and Tree Borne Oils.
- It launches the 'Seed Authentication, Traceability & Holistic Inventory' (SATHI) Portal for an online 5-year rolling seed plan for timely availability of seeds which enables states to establish advance tie-ups with seed-producing agencies,including cooperatives, Farmer Producer Organizations (FPOs), and government or private seed corporations.
- It has plans to develop600 Value Chain Clusters across 347 unique districts, covering more than 10 lakh hectares annually.
- It focuses on adopting high-yielding high oil content seed varieties.
- It makes utilization of advanced technologies like genome editing for the development of high-quality seeds by setting up 65 new seed hubs and 50 seed storage units in the public sector.
  It includes an Information, Education, and Communication (IEC) campaign for awareness of recommended dietary guidelines for edible oils.
- It provides support to FPOs, cooperatives,andindustryplayerstoestablishorupgradepostharvestunits.

India-Kuwait Relations

GS II –Effect of policies and politics of developed and developing countries on India's interests, Indian diaspora

Context: As Indian Prime Minister Narendra Modi and Kuwait's Amir Sheikh Meshal Al-Ahmad Al-Jaber Al-Sabah held their first bilateral meeting, the two countries elevated their relationship to a "strategic partnership" and signalled that trade and defence cooperation would form the key pillars of their ties.

India-Kuwait Relations:

- India was one of the first countries to establish diplomatic relations with Kuwait following its independence from the British Protectorate in 1961.Recently a **Joint Commission on Cooperation (JCC)** was established between India and Kuwait, to review and monitor the entire spectrum of the bilateral relations between the two countries.
- Kuwait supplies about **3% of India's crude oil requirements, both nations plan to** transform energy ties from a buyer-seller dynamic to a **comprehensive partnership**, including collaborations in oil, gas, and renewable energy. Kuwait has expressed interest in India's **Strategic Petroleum Reserve Programme.**
- Indians constitute **21 percent (1 million)** of the total population of Kuwait and **30 percent** of its workforce (approximately 9 lakh).Indian workers top the private sector as well as the domestic sector workforce list.
- Kuwait remains one of India's top trading partners, with bilateral trade valued at **$10.47 billion** in the financial year**2023-24.**
- **Indian exports to Kuwait** surpassed $2 billion for the first time. Kuwait Investment Authority's investments in India exceeded $10 billion.
- The geopolitical location of Kuwait in the **Persian Gulf** and its image as a **neutral player** in the region make it a significant player for India.
- An MoU on Medical Cooperation was signed in **2012**, with a Joint Working Group set up to review progress.During the COVID-19 pandemic, Kuwait supplied over **425 metric tons** of liquid medical oxygen, oxygen concentrators, ventilators, etc.

Key Highlights from the Recent Visit:

- It was the first by an Indian Prime Minister since Indira Gandhi's visit in 1981.
- Both leaders agreed to elevate India-Kuwait relations to a 'Strategic Partnership' to enhance cooperation across various sectors viz. political, trade, defence, security, and cultural areas.
- An MoU was signed to strengthen defence ties through joint exercises, training, and development of defence technology.
- Kuwait is one of India's top trading partners, with bilateral trade valued at **$10.47 billion** (2023-24).
- A Cultural Exchange Programme for 2025-2029 was renewed to promote arts and cultural ties.
- Modi invited the Kuwaiti Investment Authority to explore opportunities in energy, pharma, food parks, and infrastructure in India.
- The Amir conferred upon the Indian Prime Minister Narendra Modi the highest award of Kuwait, **'The Order of Mubarak Al Kabeer'.**

Electronic Voting Machines (EVMs)

GS II –Constitutional Bodies

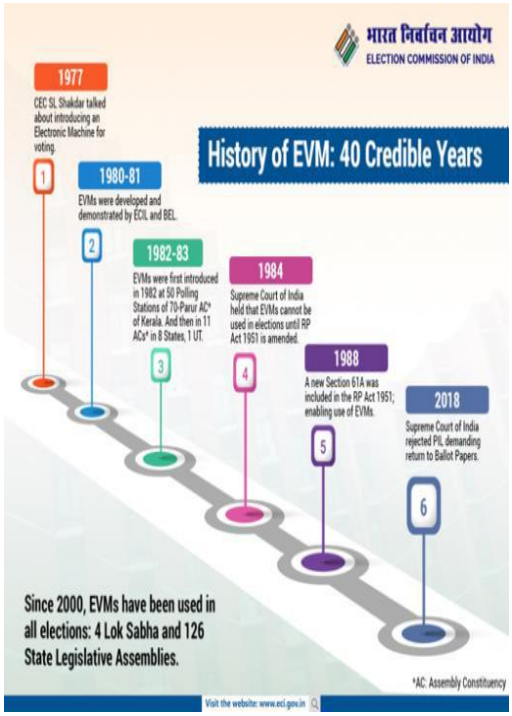
Context: After consecutive electoral losses, in the Haryana and Maharashtra Assembly elections, the Congresshas raised the tempo of its concerns about electronic voting machines (EVM).

Electronic Voting Machines (EVMs):

- It is a **portable microcontroller-based instrument** designed to modernize the Election process.
- It is manufactured and supplied to the ECI by **Bharat Electronics Limited** (under the Ministry of Defence) and the **Electronic Corporation of India Limited** (under the Departmentof Atomic Energy)**.**
- **It consists of 3-units as below:**
  - **Ballot unit that f**unctions like a keyboard with 16buttons/key.

- **The control unit which is a**lso called the master unit, remainswith the polling/presiding officer
- **VVPAT a**llows the voters to **verify that their votes are cast as intended.**
- When a vote is cast, **a slip is printed** containing the **serial number, name, and symbol of the candidate.** This **slip is visible through a transparent window for 7 seconds** before it automatically **cuts and drops into a sealed box.**It was introduced to have the **fullest transparency in the voting system** and to restore the confidence of the voters by ensuring the accuracy of the voting system using EVMs.

Significance/Benefits of Electronic Voting Machine:



- It reduces the time required for the overall voting and vote-counting process as it can quickly and accurately record and tally votes.
- **It is** designed with advanced security features to prevent errors and tampering, ensuring the accuracy and integrity of the voting process.
- **It eliminates the possibility of errors**caused by unclear or ambiguous markings on paper ballots**due to t**he digital interface of EVMs.
- **It provides** a **clear and verifiable record of votes cast** thus enhancing transparency in the electoral process.
- **It improves** accessibility for voters with disabilities **as it includes** features like Braille, audio output, and other assistive technologies.
- **It is easier to transport and set up polling stations even in remote areas due to its** compact and portable design.
- **It** reduces the expenses associated with printing, storing, and transporting paper ballots.
- It minimizes the need for a large workforce for manual vote-counting, leading to cost savings.
- **It** contributes to a more sustainable and eco-friendly electoral process by eliminating paper ballots.

Issues/Concerns Associated with Electronic Voting Machines(EVMs):

- It could be susceptible to hacking or manipulation, potentially compromising the integrity of the voting process and election results.
- It has raised concerns about the security protocols and encryption used in EVMs, as well as the secure handling of machines during storage, transport, and the chain of custody.
- It has raised issues about the proper upkeep and dependability of EVMs, especially in remote or resource-constrained areas, where technical glitches or malfunctions could disrupt the electoral process.
- Some voters and stakeholders are sceptical of EVM technology which can lead to doubts about the legitimacy of election outcomes and erosion of public confidence in the electoral process.
- It raises issues of equity and inclusivity as certain populations such as elderly voters and individuals with disabilities, may face barriers in accessing and using electronic voting technology.
- There is a lack of legal and regulatory frameworks governing the use of EVMs that may undermine the overall integrity of the electoral system.

Good Governance Day

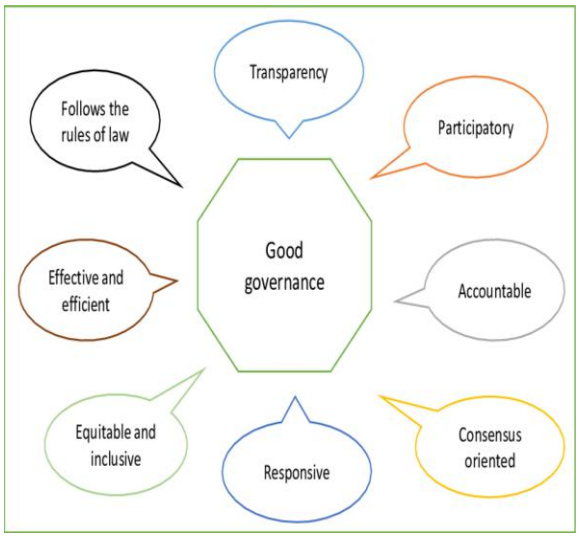
GS II – Important aspects of governance

Context: Sushasan Diwas, which is translated into Good Governance Day, is an annual observance in India that marks the birth anniversary of Atal Bihari Vajpayee, the former Prime Minister of India.

Good Governance Day:

- It was started in the year 2014 to honour the birth anniversary of former Prime Minister Atal Bihari Vajpayee.
- It is celebrated on 25th December to raise awareness among citizens about government accountability and

effective administration.



- The theme for 2024 is "India's Path to a Viksit Bharat: Empowering Citizens through Good Governance and Digitalisation."

Good Governance:

- It is the process of decision-making and the process by which decisions are implemented that are necessary to achieve the goals of development.
- According to the World Bank, good governance has 8 major characteristics. They are as follows:

  - Participatory: Gender-inclusive participation is vital for good governance, whether direct or through representatives or institutions.
  - Consensus-Oriented: Good governance involves mediating societal interests to build consensus on the community's best interests and sustainable development goals.
  - Accountable: An organization or an institution should be accountable to those who will be affected by its decisions or actions.
  - Transparent: Transparency means decisions are made according to rules, with information accessible to those affected by them.
  - Responsive: Institutions should serve all stakeholders within a reasonable timeframe.
  - Effective and Efficient: Good governance ensures processes and institutions meet societal needs while efficiently using available resources.
  - Equitable and Inclusive: A society's well-being depends on including all members, especially vulnerable groups, in opportunities to improve or maintain their well-being.
  - Rule of Law: It requires fair, impartial legal frameworks, supported by an independent judiciary and a corrupt-free police force.

The following Initiatives were launched on Good Governance Day 2024:

- The newiGOTKarmayogi Dashboardallows Ministry/Department/Organization (MDO) leaders and state administrators to monitor the progress and effectiveness of their entities more efficiently.
- 1600th iGOTKarmayogi Course aims to create a learning ecosystem for government employees, promoting continuous development and lifelong learning.
- Viksit Panchayat Initiative aims to strengthen PRIs' ability to deliver quality services, ensure effective governance, and empower Panchayat leaders with essential skills.
- CPGRAMS Annual Report, 2024underscores the progress made in enhancing the effectiveness of public service delivery through a robust grievance redressal mechanism.

Atal Bihari Vajpayee:

- He was born on December 25, 1924, in Gwalior, Madhya Pradesh, which is why Good Governance Day is celebrated every year in India on December 25.
- Atal Bihari Vajpayee, the first leader of the Bharatiya Janata Party, served as India's president three times: briefly in 1996, for 13 months in 1998 and 1999, and full-time from 1999 to 2004.
- His tenure saw transformational initiatives like the Kisan Credit Card, Pradhan Mantri Gram Sadak Yojana, Sarva Shiksha Abhiyan, and the National Rural Health Program.
- In 2014, the newly elected BJP announced that former PM of India and Bharatiya Janata Party's doyen Atal Bihari Vajpayee's birth anniversary will be commemorated as Good Governance Day.
- Sushasan Diwas, which is translated into Good Governance Day, is an annual observance in India that marks the birth anniversary of Atal Bihari Vajpayee, the former Prime Minister of India. This day aims to promote awareness among citizens about government accountability and administration while also instilling "good governance" as a practice for Indian civil servants. It is observed to guarantee that the nation's citizens are treated equitably by the government and that they get a chance to avail themselves of the benefits of

diverse government services.

Bangladesh Liberation War of 1971

GS II – India and its NeighborhoodRelations

Context: India commemorates December 16 as Vijay Diwasmarking the 53rd anniversary of its victory in the Bangladesh Liberation War of 1971 and the creation of Bangladesh.

Bangladesh Liberation War of 1971:

- It was an armed conflict between erstwhile East Pakistan (now Bangladesh) and West Pakistan (now Pakistan) resulting in the independence of Bangladesh from Pakistan.
- Its roots can be traced back to the 1947 Partition of India, which divided the subcontinent along religious lines. In response to Jinnah's demand, Pakistan was created as a Muslim-majority state. Even though united under religion, there werestark geographical, cultural, and linguistic differences between East and West Pakistan which sowed seeds for the war.

Causes of the Bangladesh Liberation War of 1971:

- After independence, West Pakistan perceived East Pakistan as culturally inferior due to its historical ties with the Hindu-dominated elite before Partition which fuelled systematic discrimination against the Bengali population.
- Pakistan's national language, Urdu, was imposed disregarding Bengali, the predominant language of East Pakistan which ledto widespread unrest and protests.
- The central government was dominated by West Pakistan whereas East Pakistan, despite its larger population, had minimal representation in decision-making.
- East Pakistan faced severe economic neglect and exploitation.East Pakistan, despite generating 62% of Pakistan's revenue,received only 25% of the national budget for its development.

Important Events of theBangladesh Liberation War of 1971:

- Operation Searchlight (25th March 1971) was launched by the Pakistani military in Dhaka and other regions of East Pakistan to suppress Bengali nationalist movements. It targeted students, intellectuals, and political leaders, leading to widespread killings and destruction.
- Sheikh Mujibur Rahman's proclamation of Bangladesh's independence marked the formal beginning of the Liberation War.The Mukti Bahini (Freedom Fighters) was formed to organize guerrilla warfare against Pakistani forces. The Provisional Government of Bangladesh was established in Mujibnagar and Sheikh Mujibur Rahman was declared President.
- The Mukti Bahini conducted guerrilla operations across East Pakistan, targeting Pakistani forces and disrupting supply chains.

India's Response to the Bangladesh Liberation War of1971:

- India extended strong diplomatic support to the Bengali nationalist movement led by **Sheikh Mujibur Rahman and the Awami League,** which sought **independence from Pakistan.**
- **The Indian government** also provided covert training and intelligence support to **Mukti Bahini in the months leading to its official involvement in the War.**
- The Government of India took a firm stand in **offering asylum to all those who were fleeing from East Pakistan** to save their lives.
- The military crackdown by Pakistan in East Pakistan led to a mass exodus of refugees- approximately 8-10 million, predominantly Hindus, fleeing to India.India set up refugee camps in eastern states, primarily in West Bengal, Bihar, Assam, Tripura, and Meghalaya.

53rd Vijay Diwas Celebrations:

- It was celebrated at Fort William, Kolkata.
- It saw a Bangladeshi delegation, including Mukti Joddhas recount their memories of the 1971 Liberation War.They highlighted India's significant support in training, supplies, and moral backing during the war.

PAPER 3

Unincorporated Non-Agricultural Units

GS III – Employment

Context: The Ministry of Statistics and Programme Implementation (MoSPI) has released the results of the Annual Survey of Unincorporated Sector Enterprises (ASUSE) for 2023-24 for the reference period October 2023 – September 2024 referred to as ASUSE 2023-24.

Unincorporated Non-Agricultural Units:

- It refers to enterprises in the unorganized or informal sector, comprising MSMEs, household units including those with hired workers, and own-account enterprises.

Significance/Importance of Unincorporated Non-Agricultural Units in the Indian Economy:

- It helps in employment generation. Around 93% of India's workforce is employed in the informal sector, making it the largest employment provider as reported by the Economic Survey of 2018-19.
- It industrializes rural areas byemploying individuals with limited capital which helps in reducing regional imbalances.
- It provides opportunities for entrepreneurship, particularly for vulnerable groups such as women, youth, and individuals in marginalized communities.
- It provides goods and services to the formal sector that may not be efficiently produced by larger firms, or by supporting the supply chains of formal enterprises.

Issues/Challenges Related to Unincorporated Non-Agricultural Units in India:

- It faces challenges of gender disparities as women face issues such as lower wages, income instability, and the absence of social security even though they form the largest share in the informal sector.
- It faces vulnerability due to uncontrollable factors such as the monsoon season which halts the construction activitiesleaving migrant workers without steady work.
- It lacks the protections and benefits associated with formal employment, such as written contracts, minimum wages, paid leave, and regulated working hours.
- Many firms evade taxes by concealing revenue and expenses from the legal system resulting in a substantial loss of government revenue.

Annual Survey of Unincorporated Sector Enterprises (ASUSE):

- Geographically, ASUSE covers the rural and urban areas of the whole of India (except the villages in the Andaman and Nicobar Islands, which are difficult to access).
- Sector-wise, this survey captures unincorporated non-agricultural establishments belonging to three sectors viz., Manufacturing, Trade, and Other Services.
- Ownership-wise, unincorporated non-agricultural establishments about proprietorship, partnership (excluding Limited Liability Partnerships), Self-Help Groups (SHG), co-operatives, societies/trusts, etc. have been covered in ASUSE.
- In ASUSE 2023-24, data were collected from a total of 4,98,024 establishments (2,73,085 in rural and 2,24,939 in urban) from 16,842 surveyed FSUs (8,523 in rural and 8,319 in urban).

Key findings of the Annual Survey of Unincorporated Sector Enterprises (ASUSE)2023-24:

- The total number of establishments increased by 12.84%, from 6.50 crore in 2022-23 to 7.34 crore in 2023-24.
- **The Gross Value Added (GVA)** rose by 16.52%, driven largely by a 26.17% growth in the "Other Services"

sector.

- **The Gross Value of Output (GVO) per establishment** grew by 6.15% from Rs. 4,63,389 to Rs. 4,91,862 in current prices.
- It employed over 12 crore workers, an increase of more than one crore from 2022-23, signaling robust labour market growth.
- It indicated a positive trend in women's business ownership as female-owned proprietary establishments rose from 22.9% in 2022-23 to 26.2% in 2023-24.
- The average emoluments for hired workers increased by 13% in 2023-24, with the highest growth observed in the manufacturing sector (16%).
- There was increased use of the Internet in establishments from 21.1% in 2022-23 to 26.7% in 2023-24, highlighting a strong trend toward digital adoption in business operations.

Surge in Agricultural Employment

GS III – Employment | Agriculture

Context: The sharp jump in the number of agricultural workers is happening when rural wages are not consistentlykeeping pace with the higher cost of living and agricultural productivity is low.

Factors Driving the Surge in Agricultural Employment:

- It is due to economic reversal as there as India saw a decline of 66 million agricultural workers between 2004-05 and 2017-18and witnessed a significant increase of 68 million agricultural workers between 2017-18 and 2023-24.
- The lockdown imposed due to the COVID-19 pandemic forced many workers, especially from urban informal sectors, to return to family farms which increased the trend of surge in agricultural employment.
- It is due to the employment dynamics as agriculture remains a fallback option due to the lack of sufficient non-agricultural job opportunities.
- There has been an increased generation of agricultural employment in economically weaker states like Uttar Pradesh, Bihar, and Madhya Pradesh, where limited employment opportunities have driven higher demand for agricultural labour.

Issues/ Concerns Regarding the Surge in Agricultural Employment:

- India's reversal of this trend highlights economic mobility issues, with workers unable to move from agriculture to more productive sectors.In 2023-24, agricultural productivity was significantly lower, with output 4.3 times lower than services and 3 times lower than manufacturing which indicates that workers are stuck in low-productivity, low-wage jobs with limited advancement opportunities.
- Even when there is growth in Gross Domestic Product (GDP), the rise in agricultural employmenthighlights insufficient job creation in higher productivity sectors such as manufacturing and services.
- It highlights the underemployment in agriculture as many jobs in the agricultural sector are seasonal and low-paying which perpetuates rural poverty and inequality.
- It worsens gender inequalities, with women earning less than men in informal, low-paid roles which deepens the gender pay gap, weakens rural income stability, and reduces women's participation in urban jobs.

Way Ahead:

- The rising dependence on agriculture for livelihoods in India **necessitates a thorough examination of underlying causes**.
- There should be the creation of sustainable employment opportunities outside of agriculture.
- There should be an increased focus on policymakers to **strengthen the agricultural sector while simultaneously promoting diversification into higher productivity sectors**.

Space Debris

GS III – Awareness in the fields of Space

Context: The rapid increase in satellites and space junk will make low earth orbit unusable unless companies and countries cooperate and share the data needed to manage that most accessible region of space, experts and industry insiders said

Space Debris:

- Space debris refers to **man-made objects in Earth's orbit** that no longer serve a useful purpose. This includes **defunct satellites, spent rocket stages**, and fragments of debris from collisions or other events.

Threats from Space Debris:

- Even when falling into the oceans, which is more likely since 70% of the earth's surface is ocean, **large objects can be a threat to marine life**, and a source of pollution.
- Due to the very high speed in low orbit of about 10 km/sec, space debris can damage satellites and spacecraft which can seriously hinder communication and other satellite services like weather forecasting.
- The floating space debris is a potential hazard for operational satellites and colliding with them can leave the satellites dysfunctional. This overpopulation of space with objects and debris is referred to as **Kessler Syndrome**.
- The accumulation of space debris in specific orbital regions can limit the availability of desirable orbital slots for future missions.
- The increasing amount of space debris makes it more challenging for satellite operators and space agencies to accurately track and predict the orbits of objects in space.

Lower Earth Orbit (LEO):

- **Low Earth Orbit (LEO)** refers to an orbit around Earth at altitudes typically ranging from 180 km to 2,000 km.
- It is closest to the Earth's surface and is the most frequently utilized orbital region for satellites, including the **International Space Station (ISS).**

Issues/Challenges related to LEO:

- Decommissioned satellites, broken parts, and spent rocket stages accumulate in this orbit, posing collision risks to active satellites and spacecraft in LEO.
- The increased congestion in LEO has led to increasing collision probability by posing risks of USD 556 million in damages between 2024-29.
- **Anti-satellite (ASAT) missile tests by nations like China, USA, India (2019, Mission Shakti), and Russia (2021, destruction of Cosmos 1408) have significantly increased space debris, posing long-term risks to LEO operations**.
- Due to national security concerns, countries are often reluctant to share satellite data, especially regarding dual-use satellites with both civilian and military functions which complicates international cooperation and the creation of a centralized space traffic management system.

Indian Initiatives to deal with Space Debris:

- In 2022, ISRO set up the **System for Safe and Sustainable Operations Management (IS 4OM)** to continually monitor objects posing collision threats, predict the evolution of space debris, and mitigate the risk posed by space debris.
- ISRO has set up a Centre for Space Debris Research to monitor and mitigate the threat of space debris.
- **'Project NETRA'** is an early warning system in space to detect debris and other hazards to Indian satellites.

GlobalInitiatives to deal with Space Debris:

- The **Inter-Agency Space Debris Coordination Committee (IADC)**, an international governmental forum, was established in 1993 to coordinate efforts between spacefaring nations to address the issue of space debris.
- The **United Nations** has established the Committee on the Peaceful Uses of Outer Space (COPUOS) to develop guidelines for the long-term sustainability of outer space activities, including the mitigation of space debris.
- The European Space Agency (ESA) has launched the Clean Space Initiative, aimed at reducing the amount of space debris and promoting sustainable space activities.

Rural Economy in India

GS III – Inclusive Growth

Context: The most serious development challenge facing the Indian economy has been the persistent backwardness of the rural economy, including poor living conditions, low-income earnings of workers, high incidence of poverty, and economic distress of marginal farmers, agricultural workers, and the landless.

Status of Rural Economy in India:

- According to Census 2011, 68.85% of India's population resides in rural areas and it is projected by NITI Aayog that it will remain above 50% even in 2045, indicating the sustained significance of rural India in the nation's socio-economic fabric.
- **The Tendulkar methodology** shows rural poverty was alarmingly high at 41.8% in 2004–05, declining to around 25% in 2011–12.
- **The PLFS Report 2023-24 highlights that rural employment** is largely characterized by self-employment (53.5%) and casual labour (25.6%). A significant portion of rural workers (58.4%) is engaged in agriculture (offers seasonal employment).
- According to Census 2011, around 39% of rural households resided in one-room accommodations,with only 53.2% having access to electricity compared to 92.7% in urban areas.
- **Salaried jobs in rural areas comprise only 12% of the workforce**, with most of these positions lacking contracts, paid leave, and job security.
- **The India Employment Report 2024 by the ILO** shows unemployment among educated youth has nearly doubled from 35.2% in 2000 to 65.7% in 2022, with women (76.7%) facing higher unemployment than men (62.2%).
- **Small and marginal farmers**, who constitute 86% of the farming population, hold only 43% of agricultural land, while larger farmers with economic holdings manage 53% of the land.

Issues/Challenges related to Rural Economy in India:

- **India's shift from agriculture to manufacturing** has been slow and uneven, with over 40% of the workforce still employed in agriculture.
- One of the major issues is the stagnation of the manufacturing sector. India's manufacturing sector is contributing only 15% to the GDP in 2023, down from 16.1% in 2014-15.
- Rural India faces challenges related to investment as private investment in rural manufacturing is limited due to various factors such as poor physical infrastructure, lack of reliable land records, and distorted capital markets.
- **The primary livelihood in rural areas of India** is provided through agriculture which is dependent on unpredictable weather patterns, market fluctuations, and crop failures.
- De-urbanization of manufacturing in India has shifted organized manufacturing from urban to rural areas, reducing costs but hindering growth due to inadequate rural infrastructure.
- Rural areas are experiencing a **high rate of out-migration**, especially of young and educated people, to urban and semi-urban areas in search of better opportunities and services that can lead to **labour shortages**, land fragmentation, social isolation, and loss of cultural identity in rural areas.

Government Schemes Related to Rural Development in India:

- **Samagra Shiksha Abhiyanaims** to provide quality education from preschool to senior secondary level in rural areas. It focuses on universal access, equity, and quality improvement.
- **Pradhan Mantri Awaas Yojana - Gramin** aims to provide pucca houses with basic amenities to rural households by 2022.
- **Mahatma Gandhi National Rural Employment Guarantee Act began in 2005** to provide at least 100 days of wage employment every year to rural households. It guarantees work to improve the livelihood of the rural poor.
- **Deen Dayal Upadhyaya Grameen Kaushalya Yojana** aims to provide skill training to rural BPL youth. It enables poor rural candidates to secure jobs according to their skills and aptitude.
- **Pradhan Mantri Gram Sadak Yojana** aims to provide all-weather roads to rural areas.

Quantum Technology

GS III – Indigenization of Technology and Developing New Technology

Context: Recently, the Chairman of the Mission Governing Board of the nascent National Quantum Mission, said India plans to launch a quantum satellite in "2-3 years for quantum communications".

Quantum Technology (QT):

- It is a **field of science and engineering that deals with the principles of quantum mechanics**, which is the study of the behaviour of matter and energy at the smallest scale.
- Quantum mechanics is the branch of physics that describes the behaviour of matter and energy at the atomic and subatomic levels.

Advantages of Quantum Technology:

- Quantum computers are much faster than the computers we today have with increased computing powers. They also can solve complex problems that are currently beyond our reach.
- Quantum sensors can detect extremely small changes in the environment, making them useful in areas such as medical diagnostics, environmental monitoring, and geological exploration.
- Quantum computers **provide high security as** they rely on principles of quantum mechanics, quantum encryption techniques are much more secure than traditional encryption methods.
- Quantum communication networks can transmit information faster and more securely than traditional networks, with the potential for completely unhackable communication.
- Quantum machine learning algorithms can potentially enable more efficient and accurate training of **artificial intelligence** models.

Disadvantages of Quantum Technology:

- Quantum technology requires specialized equipment and materials which makes it more expensive than traditional technologies.
- Quantum technology is highly sensitive to environmental interference, such as temperature changes, magnetic fields, and vibrations. **Qubits are easily disrupted by their surroundings which can cause them to lose their quantum properties and make mistakes in calculations.**
- Currently, quantum technology is only useful for specific applications such as cryptography, quantum computing, and quantum communication.
- It is difficult to control and manipulate quantum systems as **Quantum-powered AI systems could potentially arrive at conclusions that are unexpected or difficult to explain** as they operate on principles that are fundamentally different from classical computing.

National Quantum Mission (NQM):

- **It is a Department of Science & Technology programme** to accelerate the use of quantum physics in the

development of next-generation communicationsand sensing systems.
- It is a mission planned for **2023-2031, that aims to seed, nurture, and scale up scientific and industrial R&D and create a vibrant and innovative ecosystem in quantum technology.**
- It will be implemented by the Department of Science & Technology under the Ministry of Science & Technology.
- It will target **developing intermediate-scale quantum computers with 50-100 physical qubits in 5 years** and **50-1000 physical qubits in 8 years.**
- It aims to set up four thematic hubs in top academic and National Research & Development Institutes on the domains of quantum technology.They are **Quantum Computation**, **Quantum Communication,** Quantum Sensing and Metrology, and Quantum Materials and Devices.
- With the launch of this mission, **India will be the seventh country to have a dedicated quantum mission** after the US, Austria, Finland, France, Canada, and China.

Quantum Satellite:

- It is a term for a communications satellite that uses quantum physics to secure its signals.
- It utilizes quantum cryptography (a method that uses quantum mechanics to encrypt and transmit data), particularly Quantum Key Distribution (QKD), to protect data by detecting eavesdropping during transmission.

Natural Pearl Production in India

GS III – Agriculture

Context: The Department of Fisheries, Ministry of Fisheries, Animal Husbandry and Dairying, Government of India has taken several initiatives to promote natural pearl farming in collaboration with the State Governments, Research Institutes, and other concerned agencies.

Pearl Farming:

- Pearls are the only gemstones in the world that come from a living creature.
- Mollusks such as oysters and mussels produce these precious jewels
- It is the process of cultivating pearls within freshwater or saltwater oysters in a controlled environment.
- It involves the process of cultivating pearls by inserting an irritant (nucleus) into the body of a mollusk, which then secretes layers of nacre around it. Over time, these layers form a pearl.

The farming practice of the freshwater pearl culture operation involves six major steps sequentially:

- Collection of mussels
- Pre-operative conditioning (keeping mussels in crowded conditions in captivity)
- Implantation (Inserting nuclei or graft tissues into mussels)
- Post-operative care (antibiotic treatment)
- Pond culture (12-18 months)
- Harvesting of pearls

Issues/Challenges in Pearl Farming in India:

- One of the major challenges is due to limited freshwater pearl farmers and the sector is still unorganized.
- The lack of standardized protocols for broodstock management, breeding, and water quality tailored to diverse agro-climatic zones poses a major issue.
- The scattered availability of mussel broodstock (reproductively mature adults that breed and produce more individuals) and inadequate research supportposea challenge to pearl farming.
- The lack of network extensions to disseminate existing technologiesalso poses a challenge to pearl farming.

Indian Government Initiatives for Natural Pearl Production:

- The government has approved the establishment of bivalve cultivation unitsencompassingmussels, clams,

and pearls under the Pradhan Mantri Matsya Sampada Yojana (PMMSY) with a total investment of Rs 461 lakh across various states and union territories.
- The first Pearl Farming Clusterwas established in Hazaribagh, Jharkhand.
- The Department of Fisheries has included a sub-component for pearl culture in the Blue Revolution scheme to encourage the sector.
- Indian Council of Agricultural Research (ICAR) institutions have trained over 1900 participants on both freshwater pearl farming and marine pearl farming.

Microfinance

GS III – Indian Economy and issues relating to planning, mobilization, of resources, growth, development, and employment

Context: Early signs of stress in India's microfinance institutions, small finance lenders, and unsecured personal loans are beginning to show up, primarily driven by escalating borrower indebtedness.

Microfinance:

- It is defined as the provision of credit and other financial services and products of very small amounts to the poor in rural, semi-urban, or urban areas, enabling them to raise their income levels and improve living standards.
- It is an economic tool designed to promote financial inclusion which enables the poor and low-income households to come out of poverty.

Microfinance Institutions (MFIs):

- They provide micro-credit and other financial services like savings, insurance, and remittances.
- **Nobel Laureate Muhammad Yunus laid the foundation of modern MFIs with the establishment of Grameen Bank in Bangladesh in 1976.**
- Loans are typically provided through Joint Lending Groups (JLGs), informal groups of 4–10 members engaged in similar economic activities who jointly repay loans.
- RBI is the regulatory body for MFIs operating in the country.
- **Malegam Committee (2010)** constituted by RBI recommended a holistic framework to regulate NBFC–MFI.

Status of Microfinance in India:

- **According to NABARD, the SHG-Bank Linkage Programme covers 14.2 crore families through 119 lakh SHGs (87% of which are women) with savings deposits of INR 47,240.48 crore (March 31, 2022).**
- According to the study conducted by the **National Council of Applied Economic Research (NCAER),** microfinance contributes about 130 lakh jobs and 2% of our GVA.

Significance of the Microfinance Sector:

- It provides credit to poor people with low income and assets who face difficulty in accessing finance from formal banking institutions.
- It acts as a potent tool for financial inclusion and socio-economic transformation.
- It helps persons with little or no assets to access credit as there is no need for collateral to obtain loans.
- It plays a major role in empowering women through Self Help Groups.
- It helps small entrepreneurs set up/expand/scale up their operationswhichenables them to improve their income.
- It is a major tool in reducing poverty and enhances overall rural development.

Issues/Challenges associated with the Microfinance Sector:

- It needs high transaction coststo extend its services to a large number of small debtors.

- It is difficult to secure offered loans as there is an absence of collateral.
- There is a lack of transparency as many MFIs are not willing to convert to a corporate structure which also limits their ability to attract capital.
- It offers loans with higher interest rates as compared to those charged by commercial banks.
- Poor people are reluctant to approach the MFIs due to financial illiteracy about various MFIs.

GovernmentInitiatives to Improve Microfinance in India:

- **SHG-Bank Linkage Program** aimsto increase the loan volume of the SHGs and modify their money lending pattern from non-income generating activities to production-based activities.
- **Pradhan Mantri Mudra Yojana (PMMY)** provides loans up to 10 lakhs to non-corporate, non-farm small/micro enterprises through commercial banks, NBFCs, etc.

News:

- Microfinance institutions faced a significant rise in delinquencies during the first quarter of fiscal 2025, according to Crisil.
- Four key factors contributed to this decline in portfolio quality: lending to over-leveraged borrowers, debt-waiver campaigns, high field-staff attrition, and operational challenges due to elections and extreme weather.

Lentil Production in India

GS III – Cropping patterns

Context: As per the Ministry of Consumer Affairs, India is set to become the world's largest producer of lentils (masoor) during the 2023-24 crop year on account of higher acreage.

Lentil:

- Lentil is a bushy **annual herbaceous plant** of the **legume family.** These are edible legumes, known for their lens-shaped, flat disced seed.
- They are excellent sources of energy, carbohydrates, protein, fat, fibers, phosphorus, iron, zinc, carotene, vitamins, and antioxidants.

Factors that led to the significant increase in lentil production in India:

- The MSP for lentils was raised to Rs 6,425 per quintal for the Rabi Marketing Season 2024-25, a significant increase from Rs 2,950 per quintal in 2014-15. This move is aimed at promoting lentil cultivation and making it economically viable for farmers.
- The government has incentivized farmers to cultivate more pulses, leading to a reported increase in the area under lentil crops. As of January 12, 2024, there were 19.45 lakh hectares under lentil cultivation, marking a 6% increase from the previous year and a **substantial 37% higher than the normal area.**

Climatic conditions for lentil cultivation:

- Lentil is grown during the **rabi season.**
- It is primarily grown as a rainfed crop that requires **cold temperatures during its vegetative growth** and warm temperatures at the time of maturity.
- Lentils thrive in well-drained, sandy loam to clayey soils with a pH around 7.
- Lentils **do not tolerate flooding or water-logged conditions.**
- The ideal temperature for lentil cultivation ranges between 15°C to 25°C.

Lentil cultivation area:

- Lentils are grown in various states across India, with **major producing states including Madhya Pradesh, Uttar Pradesh, Rajasthan, Maharashtra, and Haryana.**

Note:

- According to the **Food and Agriculture Organization (FAO),** the world's top lentil growers in 2022 were **Canada, India,** Australia, Turkey, and Russia. Despite being the **second largest producer of lentils, India has so far been relying on imports** to meet its domestic requirements, buying mainly from Australia, Canada, Russia, Singapore, and Turkey.

Fertilizer Sector in India

GS III –Agriculture

Context: In India, where agriculture remains the backbone of the economy, soil degradation has emerged as a significant challenge, driven by nutrient deficienciesand the unsustainable use of fertilizers.

Fertilizers:

- They are substances that are applied to soil or plants to supply essential nutrients required for optimal growth and development.

Status ofthe Fertilizer Industry in India:

- India is the second largest consumer of urea after China and stands second in the production of nitrogenous fertilizer.
- It is one of eight core industries and receives the second biggest subsidy after food.

Significance/Importance of the Fertilizer Sector in India:

- **It sustains** India's agricultural output **by providing**essential nutrients such asnitrogen (N), phosphate (P), and potash (K) through both domestic production and imports.
- **It helps India to** maintain its status as a global agricultural powerhouse. India exported 85 million tonnes of cereals while providing near-free grain to over 813 million people during the pandemic between 2020-21 and 2022-23.
- **It enhances agricultural productivity and reduces environmental impact by** encouraging the use of advanced products like slow-release fertilisers and those fortified with micronutrients.
- **It educates** farmers about proper fertilizer application techniques, soil testing (Soil Health Card), and nutrient management for maintaining soil vitality.

Issues/Challenges faced by the Indian Fertilizer Sector:

- **The** overuse of nitrogen (N) fertilizers, especially urea, while other essential nutrients like phosphorus (P) and potassium (K) are underused is one of the major challenges faced by the sector.
- The efficiency of fertilizer use in India is very low as only 35-40% of fertilizersare absorbed by crops and the rest is wasted or lost to the environment.
- The lost fertilizers in the environment have harmful impacts on human health and biodiversity.
- **The** fertilizer subsidy system in India, especially for urea, has caused an imbalance in nutrient use. Urea is heavily subsidized, making it cheaper than other fertilizers like DAP and MOP, leading to overuse of nitrogen which has impacted soil health negatively.
- A significant portion of subsidized urea is diverted for non-agricultural uses or smuggled out of the country which deprives farmers of necessary fertilizers and strains government finances.
- **The neglect of m**icronutrients like zinc, boron, and iron is contributing to the decline in soil health and agricultural productivity.

Indian Government Schemes Related to Fertilizer Sector in India:

- **Pradhan Mantri Kisan Samrudhi Kendra (PMKSK)** caters to the needs of the farmers in the country and providesagri-inputs such as fertilizers, seeds, and implements including testing facilities for soil, seeds,

and fertilizers.

- Pradhan Mantri Bhartiya Jan UrvarakPariyojanais an initiative that aims to implement One Nation One Fertiliser by introducing a single brand for fertilizers and logo.
- **Nutrient-Based Subsidy (NBS)** aims to provide fertilizers to the farmers at subsidized prices based on the nutrients (N, P, K & S) present.
- Market Development Assistance Policy promotes the use of alternative fertilizers like green manure, organic compost of rural areas, and solid/liquid slurry.
- Soil Health Card provides two sets of fertilizer recommendations for six crops including recommendations for organic manures and recommendations for additional crops on demand.

e-cigarettes

GS III – Issues relating to Health

Context As per the **World Health Organization (WHO),** urgent action is needed to protect children and prevent the uptake of e-cigarettes.

e-cigarettes:

- The Prohibition of Electronic Cigarettes (Production,Manufacture, Import, Export, Transport, Sale, Distribution, Storage and Advertisement) Act, (PECA) 2019 defines electronic cigarettes or e-cigarettes (under Section 3) as:
  - An electronic device that heats a substance, which may or may not contain nicotine and flavors, to create an aerosol for inhalation. It includes all forms of Electronic Nicotine Delivery Systems, Heat Not Burn Products, e-Hookah, etc.
- They are sometimes called “mods,” “vape pens,” “vapes,” “tank systems,” and “electronic nicotine delivery systems (ENDS).”
- They produce an aerosol that is inhaled by the user, by heating a liquid that usually contains nicotine, flavourings, and other chemicals.
- The Prohibition of Electronic Cigarettes (Production,Manufacture, Import, Export, Transport, Sale, Distribution, Storage and Advertisement) Act, (PECA) 2019 banned e-cigarettes in India.

Concerns/Issues with e-cigarettes:

- E-cigarette emissions typically contain nicotine and other toxic substances that are harmful to both users and non-users who are exposed to the aerosols second-hand. Their use can increase the risk of heart diseaseand lung disorders. Nicotine exposure in pregnant women can limit the brain development of the fetus.
- Despite a ban on electronic cigarettes by the government of India in 2019, they are easily available in tobacco shops and online.
- E-cigarettes have attractive flavoring and sleek designs that hook the younger generation to nicotine addiction.
- Around 88 countries have no minimum age at which e-cigarettes can be bought and 74 countries have no regulations in place for these harmful products.
- E-cigarettes target children through social media and influencers.
- They are presented as devices to help quit smoking, however, the evidence of their use as a cessation aid is inconclusive.

Key findings of the WHO:

- Children 13–15 years old are using e-cigarettes at rates higher than adults in all WHO regions.
- Between 2017–2022, rates of e-cigarette use among 16–19-year-olds in Canada have doubled.

Drones in National Security

GS III – Drone Technology

Context: US aviation authorities have banned the use of drones in 22 infrastructure sites in New Jersey and another

29 in New York state for 30 days after a spike in drone sightings in the eastern US.

Role of Drones in National Security:

- Drones can be used in remote surveillance, reconnaissance, and intelligence-gathering operations by security agencies.
- Drones can be used to strike the enemy or its infrastructure in deep, inhospitable locations.
- Drones help in achieving military goals without the risk posed to pilots' lives during security operations.Indian army has planned to replace mules and choppers with drones for supplies at forward posts along the **Line of Actual Control (LAC)** in Ladakh, Leh, and Northeastern India.
- Artificial Intelligence-enabled drones are capable of communicating with each other, Automatic Target Recognition (ATR), and coordinating with ground-based conventional military operations.
- Police drones can be used to monitor large crowds, surveillance of illegal activities, search and rescue operations, etc.

Issues/Concerns associated with Drones:

- Drones falling in the hands of rouge elements can pose a threat to national security. For example, cross-border infiltration of drones along the international border with Pakistan for dropping improvised explosives, weapons, and drugs. Rogue drones also pose a threat to civilian aerospace and critical infrastructure, like, nuclear installations.
- There is an overall shortage of skilled drone operators, drone engineers, service engineers, quality inspectors, etc.
- Imported drones using **Global positioning system (GPS)** navigation devices may find operational issues in GPS-denied environments. For example, the Heron Mk II MALE UAV was purchased from Israel.
- Due to weight concerns, advanced Lithium-ion battery technologies are now being used for drone development instead of traditional Nickel-Cadmium and Silver-Zinc batteries. DRDO and ISRO are working on Lithium-Ion cell development, but the activity is still in the infant stage.
- Since the usage of long-range drone attacks by American -forces, they have been criticized for their disproportionate impact on civilian communities.

India's Initiatives for the use of Drone Technology in the defence sector:

- India has imported drone technology from various countries like the US and Israel. Heron Mark-II drone is a **Medium Altitude Long Endurance (MALE)** UAV, inducted by the Indian Air Force to carry out surveillance along Northern borders with Pakistan and China. Searcher Mk II drones developed by Israel Aerospace Industries, it is a reconnaissance drone used by the Indian Army and Navy.
- The Drone, Detect, Deter and Destroy (D4) System developed by the DRDO is an indigenous anti-drone system, inducted into the Indian Armed Forces.
- Border Security Force has deployed hand-held static and vehicle-mounted anti-drone systems to counter the rising drone threat along the Indo-Pak Border.
- DRDO has been developing indigenous UAV systems which are at varying stages of development.

Drone Regulations in India:

- National Counter Rogue Drone Guidelines were released in 2019 by the Ministry of Civil Aviation to lay out guidelines assessing drone threats.
- Drone Rules 2021 divides the Indian airspace into three zones Green, Yellow, and Red based on the acceptability of flying drones. Red zones are no-go zones where no drones can be operated except for permission given by the central government.

Deepfakes

GS III –Awareness in the fields of IT and Computers

Context: In the General Elections of 2024, the widespread misuse of deepfakes significantly complicated the battle

against misinformation.

Deepfakes:

- It refers to **synthetic media** created through **AI technology**, aiming to manipulate or generate visual and audio content to **deceive or mislead individuals.**
- The term **deepfake** was coined in **2017** by an anonymous **Reddit** user who identified as "Deepfakes." This individual utilized Google's open-source **deep-learning technology** to produce and share pornographic videos.
- The creation of deepfakes involves a technique known as **generative adversarial networks (GANs),** comprising two competing neural networks:
  - **The generator produces** fake images or videos that closely resemble reality, while
  - **The discriminator** to differentiate between authentic and fake content.
- Its creation necessitates a substantial amount of data, often sourced from the internet or social media without consent, including photos or videos of both the source and target individuals.
- It constitutes a component of deep synthesis, an umbrella term encompassing technologies such as deep learning and augmented reality, utilized to generate text, images, audio, and video to construct virtual scenarios.

Ways to spot Deepfakes:

- Deepfake videos often exhibit unnatural eye movements or gaze patterns.
- Deepfake creators may have difficulty replicating accurate colour tones and lighting conditions.
- Deepfake videos often use AI-generated audio that may have subtle imperfections.
- Deepfakes can sometimes result in unnatural body shapes or movements.
- Deepfake software may not always accurately replicate genuine facial expressions.
- Deepfakes may occasionally exhibit distortions or misalignments in these features, which can be a sign of manipulation.
- Deepfakes may struggle to maintain a natural posture or physique.

Issues/Concerns associated with the Deepfakes:

- Deepfake poses an alarming threat to the personal security and privacy of millions through audio-visual manipulation tactics. Deepfakes directly violate the fundamental right to privacy under Article 21 of the Constitution.
- According to WEF– Deepfake technology can be employed to alter medical scans, create fake tumours or remove real ones, or manipulate satellite images to fabricate entire geographical features or deepfake geography. Thus, the implications are profound, posing risks not only to personal privacy but also to various sectors, including healthcare and national security.
- They can lead to the creation and dissemination of morphed videos of elected representatives and public figures in a political sphere already reeling from an avalanche of disinformation and polarization.
- They have a more pernicious effect by fostering a zero-trust culture where individuals are unable or unwilling to discern fact from fiction.
- The biggest change that deepfakes have introduced is not about the nature of information but about the capability to trust one's judgment of this information thus creating a judgmental dilemma.

Global Initiatives Related to Deepfakes:

- Bletchley Declaration agreed by 28 countries, including the US, UK, and China, Bletchley Declaration is the first global pact on tackling frontier AI risks. The declaration lays out plans for greater transparency from AI developers regarding safety practices and more scientific collaboration on understanding AI's risks.
- **The European Union (EU)** has unveiled its comprehensive rulebook for governing the use of AI technologies. It also aims to tackle the issue of deepfakes by making it mandatory to label when content has been artificially generated or altered.
- **The United Statesintroduced the bipartisan Deepfake Task Force Act** to assist the Department of Homeland

Security (DHS) in its mission to counter deepfake technology.

- **Facebook's Deepfake Detection Challenge** is aimed at encouraging and incentivizing innovation in this regard.
- **Operation Minerva uses technology to compare and detect deepfakes** by cross-referencing with their catalogue of digitally fingerprinted videos, alerting users if a potentially doctored version of the existing media is detected.

Initiatives taken by the Indian Government to regulate Deepfakes:

- The sections of the Information Technology Act of 2000 criminalize the publication and transmission of intimate photos of any person without their consent and deal with the obligations of intermediaries.
- The provisions of the Copyright Act of 1957, concerning the doctrine of fair dealing and the right to integrity, can be applied. Furthermore, deepfakes directly violate the fundamental right to privacy under Article 21 of the Constitution.
- **The Ministry of Electronics and IT (MeitY)** has sent advisories to social media platforms, including Facebook, Instagram, and YouTube, to take down misleading content generated through artificial intelligence – deepfakes – within 24 hours.

De-dollarisation

GS III – Indian Economy and issues relating to planning, mobilization of resources, growth, development, and employment

Context: The Reserve Bank of India (RBI) Governor said that India is not pursuing "de-dollarisation", and that recent measures promoting transactions in domestic currencies are intended to de-risk Indian trade.

De-dollarisation:

- It refers to the process wherein countries tend to reduce their reliance on the US dollar as a reserve currency, medium of exchange, and also a unit of account.

Reasons For De-dollarisation:

- The imposition of US sanctions on countries like Russia and Iran has pushed them to seek alternatives to the US dollar to avoid economic isolation.
- Nations are looking to reduce their dependence on the dollar to mitigate risks associated with fluctuations in US monetary policy.It helps them maintain greater control over their own economic policies.
- A strong US dollar can lead to higher costs for imports and debt repayments in other countries, exacerbating economic challenges.
- The rise of other major economies, such as China, has led to increased use of their currencies in international trade.
- The BRICS nations have discussed the possibility of a shared currency to facilitate trade among member countries and reduce reliance on the dollar.

Advantages of De-Dollarisation:

- It helps in reducing dependence on the US Dollar by using other currencies or a basket of currencieswhich can help to mitigate the impact of economic and political changes in the US on their own economies.
- Countries can reduce their exposure to currency fluctuations and interest rate changeswhich can help to improve economic stability and reduce the risk of financial crises.
- Countries can increase trade and investment with other countries through other currencies that may not have a strong relationship with the US, which can open up new markets and opportunities for growth.
- Countries can reduce the influence of US monetary policy on their own economies.

Climate Migration

GS III – Disaster Management

Context: The issue of climate migration has garnered significant attention, yet the world still lacks a comprehensive legal framework to protect individuals forced to flee their homes due to increasingly severe weather disasters.

Causes of Climate Migration:

- Reports by the **UN Office for the Coordination of Humanitarian Affairs (OCHA)** highlight that sudden-onset disasters like **floods**, **hurricanes**, and **earthquakes** often cause significant internal displacement. People flee to safer grounds within their countries, but returning home can be difficult due to **destroyed infrastructure** and livelihoods.
- The **UN Refugee Agency (UNHCR)** emphasises how disasters often disproportionately affect**vulnerable populations.** These populations, lacking resources or living in high-risk areas, are more likely to be displaced and struggle to recover.
- The **IOM** reports that slow-onset disasters like **droughts, desertification, and salinization** degrade land and water resources. This makes it difficult for people to sustain their livelihoods, pushing them to migrate in search of better opportunities.
- Reports by the **Intergovernmental Panel on Climate Change (IPCC)** warn of **rising sea levels** threatening coastal communities. This can lead to permanent displacement as homes and farmland become submerged.
- The **UN Department of Economic and Social Affairs (UNDESA)** acknowledges that migration due to climate change is rarely caused by a single factor. **Poverty, political instability, and lack of social safety nets** often combine with disasters to force migration.
- **World Bank** highlights the challenges in accurately quantifying climate migration. This makes it difficult to develop effective policies to support displaced people and build resilience in vulnerable communities.

Issues/Challenges Faced by the Climate Migrants:

- The **International Labour Organization (ILO)** warns that climate migrants often **lose their skills** and assets due to displacement. This makes it difficult for them to find new jobs and rebuild their livelihoods in unfamiliar environments.
- The **UN Refugee Agency (UNHCR)** reports that climate migrants often end up in informal work sectors with low wages and poor working conditions. They may also be more vulnerable to exploitation due to their precarious situation.
- **The World Bank** highlights that climate migrants often struggle to access basic services like healthcare, education, and housing in their new locations. This can lead to social exclusion and marginalisation.
- The IOM emphasises the difficulties climate migrants face **adapting to new cultures and languages.** This can hinder their ability to integrate into new communities.
- Reports by the **UN Office of the High Commissioner for Human Rights (OHCHR)** point out that there's no clear legal framework to protect climate migrants. They don't qualify for refugee status under current international law.
- The Journal of Environmental Law claims that climate change-induced displacement can lead to **statelessness,** particularly for those who move across borders. In 2021, the **World Bank, in its Groundswell report**, estimated that by 2050, some **216 million people** worldwide would be **internally displaced** due to the impacts of climate change.
- **The WHO** highlights the **psychological distress and trauma** climate migrants experience due to displacement and loss. Access to mental health services is often limited, further exacerbating their struggles.
- Climate migrants may be exposed to **new health risks** in their new locations, such as infectious diseases or extreme weather events. This is especially concerning for **children and the elderly.**

Climate Refugees:

- According to the **International Organization for Migration (IOM)**, "climate migration" refers to the movement of a person or group of **people who are predominantly forced to leave their homes due to sudden or gradual environmental changes caused by climate change.**
- This movement can be temporary or permanent and can occur within a country or across borders. It highlights that climate migrants are primarily those who have **little choice** but to leave their homes due to

the impacts of climate change.

Arctic Tundra Biome

GS III –Climate Change

Context : Arctic tundra, a frozen treeless biome which has stored carbon for thousands of years, has now become a source of heat-trapping **greenhouse gases (GHGs**) which are the primary drivers of global warming, according to a new report by the **National Oceanic and Atmospheric Administration's (NOAA).**

Arctic Tundra Biome:

- The word "tundra" comes from the Finnish word *tunturi*, meaning 'treeless plain.'
- One of the important characteristics of the tundra is the **permafrost,** which starts within a meter of the soil surface.
- In the winter almost all of the soil is frozen.In the summer the soil near the surface thaws, but the permafrost at lower depths remains frozen.
- The permafrost limits how far roots of plants can extend down into the soil thus preventing trees from growing.
- The ground in the arctic tundra tends to be rocky and the soil has few nutrients due to the low decomposition rates of plants.
- Even though there is absence of trees, it is still considered a major carbon sink as there are large amounts of organic matter found in deposits of **peat** and **humus**.
- It is the northernmost biome and covers the lands north of the Arctic Circle up to the **polar ice cap**.
- Its temperatures range from 15.5 °C in summer to -60 °C in winter and mean temperatures are below 0°C for six to 10 months of the year.
- Summers are much shorter than the winters.
- The northernmost part of this biome receives close to 24 hours of sunlight during parts of the summer and it receives close to 24 hours of darkness during parts of the winter.
- It receives annual precipitation of around 150 to 250mm.
- Most vegetation in the tundra tends to be **herbaceousthat** includes grasses, mosses such as **reindeermoss**,**liverworts**and lichens**d**ue to the cold climate and short growing season.
- The few woody plants which live in the tundra, such as **dwarf willows**, tend to be short and spread across the ground.This is an adaptation to the high winds that are common in this biome.
- Many large mammals, such as caribou, **polar bears**, **arctic foxes**, and **musk ox**, are found in this biome.There are also several smaller mammals, such as **lemmings**and **arctic hare** which are prey to the larger mammals.

News:

- Arctic tundra emitting more carbon than storing it would have global consequences as this would exacerbate climate change, whose adverse impacts are already unfolding across the world.
- In the Arctic tundra, the decomposition of organic matter is dramatically slowed down due to the cold climate. Plant and animal remain can stay trapped for thousands of years in a layer of permafrost — any ground that stays frozen for at least two years straight — thwarting CO2 from getting released back into the atmosphere.
- The new analysisconfirmed that the ecosystem has now become a source of CO2 and methane (CH4) — a more potent GHG — emissions.One is rising temperatures. The report said the Arctic is warming four times the global rate, and that annual surface air temperatures in the Arctic in 2024 were the second-warmest on record since 1900.

Crowd Disaster Management

GS III –Disaster Management

Context : Data from the National Crime Records Bureau reveal that between 1996 and 2022, India recorded 3,935 stampede incidents, resulting in more than 3,000 deaths.

Crowd Disaster:

- A crowd is a group of people gathered together usually for a common purpose based upon emotions.
- Crowd movements involve a combination of voluntary and involuntary forces:
- Voluntary force: When crowd density is optimal, people's movement is governed by social force (a physical response to social interaction) which is a voluntary force.
- Involuntary: When crowd density is critical, people's movement is governed by involuntary forces which include pushing each other in a tightly packed situation.
- Such uncoordinated rush or push of peoplemay result in crowd disaster or stampede.
- The majority of the crowd disasters in India have occurred at religious places, venues of music concerts, nightclubs, and shopping malls.

Factors that may prompt crowd disasters are as follows:

- Disaster caused by collapse of structures.For example, the Morbi Bridge collapsed across the Machchhu River in Gujarat.
- Fire in the habitation or a shop, non-availability of fire extinguishers, short circuits from electrical generators, etc. For example, the Uphaar Cinema Fire in 1997 happened due to fire code violations.
- Underestimation of audience/staffing/services,closed/locked exit, the sudden opening of the entry door, etc.
- A mad rush to exit/parking space, last-minute change in platform for train arrival/departure, etc. For example, the stampede at the Maha Kumbh Mela in 1954.
- Security agency firing/teargas/using force leading to panic, weapon brandished in the crowd, Ineptitude ofthe police in effectively enforcing prohibitory orders, etc.
- Lack of coordination among stakeholders such as a lack of understanding of the range of duties entrusted,communication delays, coordination gaps between agencies, etc.

Crowd Management Strategies:

- Knowing crowd type (age, gender, region, etc.), motives of visitors (social, entertainment), and arrangements to provide timely information to the media personnel.
- A long-term perspective is needed for infrastructure development and will depend on popularity,periodicity of events, weather, terrain, local population, etc.
- Plan for physical or virtual locations through which each visitor must pass.Multiple routes to facilitate the movement of vulnerable groups such as children, women, etc.
- Individual behavior in a crowd is often influenced by the behavior of others. It is therefore essential to identify and separate trouble-creating persons at the earliest.
- Research has shown that understanding crowd behavior has led to a community-based approach to crowd control instead of force-based control.
- Crowd control enforces or restores order byrestricting or limiting group behavior by ensuring high visibility of crowd-controlling staff, involving variousstakeholders including organizers/temple trusts, lawenforcement agencies, and community stakeholders.
- Mock drills of the plan implementation may also lead to identifying the gaps in arrangements and fixing them in advance.
- Timely Information Management and Dissemination among stakeholders.
- Safety and security measures like CCTV monitoring of the entire crowd, special plans for VIPs, ensuring fire safety standards, etc.
- Health, Hygiene, and Medical Services as Immediate medical attention after a fatal incident can save lives.
- Use public transportation as much as possible and minimize the impact of undesired crowds and traffic.

18th India State of Forest Report 2023 (ISFR 2023)

GS III –Environmental Conservation

Context : The Minister for Environment, Forest and Climate Changereleased the India State of Forest Report 2023 (ISFR 2023) at Forest Research Institute, Dehradun.

18th India State of Forest Report 2023 (ISFR 2023):

- The ISFR has been brought out by the **Forest Survey of India (FSI) on a biennial basis since 1987.**
- FSI carries out an in-depth assessment of the forest and tree resources of the country based on the interpretation of Remote Sensing satellite data and field-based **National Forest Inventory (NFI),** and the results are published in the ISFR.
- It contains information on forest cover, tree cover, mangrove cover, growing stock, carbon stock in India's forests, instances of forest fire, Agroforestry, etc.
- As per the present assessment, the total forest and tree cover is 8,27,357sq km, which is 25.17 percent of the geographical area of the country.
- The forest cover has an area of about 7,15,343sq km (21.76%) whereas the tree cover has an area of 1,12,014 sq km (3.41%).
- As compared to the assessment of 2021, there is an increase of 1445 sq km in the forest and tree cover of the country which includes 156 sq km increase in the forest cover and 1289 sq km increase in tree cover.
- The top four states showing a maximum increase in forest and tree cover are Chhattisgarh (684 sq km) followed by Uttar Pradesh (559 sq km), Odisha (559 sq km) and Rajasthan (394 sq km).
- The top three states showing a maximum increase in forest cover are Mizoram (242 sq km) followed by Gujarat (180 sq km) and Odisha (152 sq km).
- Area-wise wise top three states having the largest forest and tree cover are Madhya Pradesh (85,724 sq km) followed by Arunachal Pradesh (67,083 sq km) and Maharashtra (65,383 sq km).
- Area-wise wise top three states having the largest forest cover are Madhya Pradesh (77,073 sq km) followed by Arunachal Pradesh (65,882 sq km) and Chhattisgarh (55,812 sq km).
- In terms of the percentage of forest cover with respect to total geographical area, Lakshadweep (91.33 percent) has the highest forest cover followed by Mizoram (85.34 percent) and Andaman & Nicobar Island (81.62 percent).
- The present assessment also reveals that 19 states/UTs have above 33 percent of the geographical area under forest cover. Out of these, eight states/UTs namely Mizoram, Lakshadweep, A & N Island, Arunachal Pradesh, Nagaland, Meghalaya, Tripura, and Manipur have forest cover above 75 percent.
- The total mangrove cover is 4,992 sq km in the country.
- The total growing stock of India's forest and trees outside forests is estimated as 6430 million cum, of which 4479 million cum is inside the forests and 1951 million cum outside the forest area. There is an increase of 262 million cum of total growing stock as compared to the previous assessment which includes an increase of 91 million cum inside the forest and 171 million cum outside the forest area.
- The extent of bamboo bearing area for the country has been estimated as 1,54,670sq km. As compared to the last assessment done in 2021 there is an increase of 5,227 sq km in bamboo area.
- The total annual potential production of timber from trees outside the forest has been estimated as 91.51 million cum.
- In the present assessment,the total carbon stock in the country's forest is estimated to be 7,285.5 million tonnes. There is an increase of 81.5 million tonnes in the carbon stock of the country as compared to the last assessment.
- **Regarding the status of achievement of the target under NDC** related to carbon sequestration, the current assessment shows that India's carbon stock has reached 30.43 billion tonnes of CO2 equivalent; which indicates that as compared to the base year of 2005, India has already reached 2.29 billion tonnes of additional carbon sink as against the target of 2.5 to 3.0 billion tonnes by 2030.

AI Surveillance in India

GS III –Awareness in the fields of IT

Context : There needs to be a comprehensive regulatory framework that addresses AI's implications for civil liberties.

Artificial Intelligence Surveillance:

- It involves the use of computer software and algorithms to analyze video footage from cameras.

Impact of AI Surveillance on Civil Liberties and Privacy Rights in India:

- **It** raises concerns about dragnet surveillance, where data is indiscriminately collected from individuals beyond just suspects or criminals. This can lead to significant infringements on citizens' rights.
- **There have been i**ncidents where sensitive information from social welfare databases was accessed without transparency or accountabilitylike the Telangana Police data breach highlighting vulnerabilities in data collection practices.
- **The b**iased AI systems can exacerbate social inequalities.
- **There have been imbalances in the legal framework** towards state surveillance capabilities at the expense of individual rights.

Legal Frameworks Governing AI Surveillance in India:

- The right to privacy is enshrined in Article 21 of the Indian Constitution, which was affirmed by the Supreme Court in the landmark case K.S. Puttaswamy vs Union of India (2017).
- **Digital Personal Data Protection Act (DPDPA)** aims to regulate data privacy and consent management. It is criticized for **skewing power** toward state surveillance over individual rights.

Measures to Enhance Regulatory Oversight of AI Surveillance Technologies:

- **There is a need for a comprehensive regulatory framework** that addresses the implications of AI surveillance on civil liberties. It should include clear guidelines on data collection practices, specifying what data is collected, its purpose, and retention periods.
- **A stringent transparent consent mechanisms** with narrow exemptions should be implemented involving independent judicial oversight for processing personal data to ensure that citizens' rights are protected.
- A risk-based regulatory approach similar to the European Union's Artificial Intelligence Actwhich categorizes AI activities based on their risk levels and imposes restrictions on high-risk technologies should be implemented.
- **Public accountability and oversight should be ensured through r**egular transparency reports and independent audits for all agencies utilizing AI surveillance technologies.
- **There is a need for p**rompt legislative action to fill existing regulatory gaps and establish clear guidelines governing the use of AI in law enforcement, ensuring that civil liberties are not compromised in the pursuit of technological advancement.

PAPER 4

Surrogate Advertising and Ethics

GS IV – Ethics

Context: The Ministry of Health and Family Welfareasked the Sports Authority of India and BCCI to take measures to prevent surrogate advertisement of tobacco/alcohol by sportspersons

Surrogate Advertising:

- It refers to a form of advertisement that duplicates the brand image of one product to promote another product of the same brand.
- Usually, brands use surrogate advertising to promote products that cannot be advertised directly due to legal or social restrictions.
- Surrogate goods could either resemble a similar commodity or an entirely different product. Meaning, that companies advertise their products and services by disguising them for some other product under the same brand name.
- In India, surrogate ads are common and used across several media platforms.
- It helps you get your message across subtly and legally. Its motive is to ensure thatthe customers can recall the original product in the disguise of another advertised product. This process is also called brand extension.

Ethical Concerns in Surrogate Advertising:

- It blurs the line between legitimate and unethical advertising as it operates deceptively by using unrelated products to covertly promote restricted goods. Hence it violates ethical principles of honesty and accountability, misleading consumers about the intent behind the advertisement.
- It lacks transparency through subtle brand associationsleading to the exploitation of consumer psychology.
- It poses substantial challenges to public health objectives by creating sophisticated marketing channels that potentially circumvent restrictions designed to protect community well-being and reduce exposure to harmful products.
- It associates restricted products with glamor and success, fostering early brand loyalty and contradicting ethical norms aimed at protecting impressionable demographics from harmful influences leading to the exploitation of vulnerable youths.
- It undermines governmentefforts to ban direct advertising of alcohol and tobacco to curb consumption and associated harmsby indirectly promoting usage and hindering harm reduction goals.
- Few companies promote harmful products by associating their brand with causes like education, health, or environmental conservation raising questions about the authenticity and true motive of CSR efforts.
- Businesses argue that they need brand visibility for growth that often comes at the expense of consumer trust, public health, and societal welfare reflecting a conflict between profit-driven corporate strategies and ethical responsibility toward society.
- The use of sophisticated marketing strategies to circumvent advertising restrictions raises fundamental questions about corporate integrity and the spirit of regulatory frameworks designed to protect public interests.

Legal Framework Related to Surrogate Advertisements in India:

- Cable Television Networks (Regulation) Act of 1995 with Cable Television Rules of 1994, and the Cigarettes and Other Tobacco Products Act (COTPA) of 2003 banned direct or indirectpromotion, sale, or consumption of liquor, tobacco, and cigarette advertisements.
- Central Consumer Protection Authority (CCPA) Guidelines for Prevention of Misleading Advertisements and Endorsements for Misleading Advertisements of 2022 defined surrogate advertisement for the first time.
- Consumer Protection Act of 2019 defines ‘misleading advertisements’ as an advertisement that falsely

describes; or misleads the consumers of such product or service.

- The Advertising Standards Council of India (ASCI) Code allows the use of a brand associated with a restricted good to be used for advertising unrestricted goods in case it is a 'genuine brand extension' which is determined by gauging the proportionality of the scale of advertisement with the production and sale of the unrestricted good.

Brain-Computer Interface

GS IV –Ethics and Human Interface

Context : The US Securities and Exchange Commission reopened an investigation into Elon Musk's Neuralink, preparing to press more charges against him.

Brain-Computer Interface:

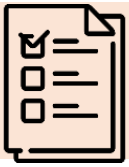
- A Brain-Computer Interface (BCI) is a technology that **enables direct communication between the brain and external devices, such as computers or prosthetics,** without using traditional neuromuscular pathways like nerves and muscles.
- BCI typically involves the use of sensors to detect brain activity, which is then translated into **commands or actions,** allowing individuals to control devices or interact with the external world **using their thoughts.**

Potential applications of Brain-Computer Interface:

- It monitors and treats n**eurological** conditions like **epilepsy, Parkinson's disease, and neurodegenerative disorders** by directly interfacing with the brain.
- It assists in **motor function recovery** and rehabilitation after a stroke.
- It enables individuals with paralysis or motor impairments to control devices, such as **prosthetics, wheelchairs, or robotic limbs,** using their thoughts. Restoring communication for individuals with conditions like **locked-in syndrome** (paralyzed except for the muscles that control eye movement).
- It provides real-time data for monitoring and managing mental health conditions, such as **depression or anxiety.**
- It enhances virtual and augmented reality experiences by allowing users to interact with digital environments using their thoughts.

Ethical considerations related to Brain-Computer Interface (BCI):

- It can potentially decode thoughts and emotions. Unauthorized access to this information raises **concerns about cognitive privacy.** As with any technology that involves the collection and storage of sensitive data, there are **risks of hacking and unauthorized access to brain data,** which could lead to identity theft or other malicious uses.
- There is a risk that BCIs could be manipulated to unauthorized control or manipulation of a person's thoughts or actions.
- BCIs could exacerbate existing social inequalities if only specific socioeconomic groups can afford the technology due to its high cost and may lead to a situation of **cognitive divide.**
- It is subjective to distinguish between **therapeutic uses of BCIs and threats** to normal cognitive function.



Practice Questions

Q1.) Which of the following statements about the Mauryan Empire is/are correct?
1. Chandragupta Maurya defeated Seleucus Nicator.
2. Ashoka embraced Buddhism after the Kalinga War and convened the Second Buddhist Council at Pataliputra.

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

Q2.) Which of the following statements about the Akal Takht is/are correct?
1. The Akal Takht was established by Guru Arjan Dev to symbolize the unity of spiritual and temporal power in Sikhism.
2. The Sarbat Khalsa held at the Akal Takht historically played a crucial role in making decisions for the Sikh community.

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

Q3.) Consider the following statements regarding the Cash Reserve Ratio (CRR):
1. The CRR is the portion of a bank's Net Demand and Time Liabilities (NDTL) that must be maintained with the Reserve Bank of India (RBI).
2. A reduction in the CRR increases the liquidity in the banking system, enabling banks to lend more.

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

Q4.) What is the primary objective of the European Space Agency's PROBA-3 Mission?
A. To study the Moon's surface in detail.
B. To map the Earth's magnetic field variations.
C. To study the Sun's corona for extended periods through precision formation flying.
D. To explore asteroids in the asteroid belt.

Q5.) Which of the following is NOT true about potato cultivation in India?
A. India is the second-largest producer of potatoes globally, after China.
B. Potatoes are primarily grown in the kharif season across all states.
C. Uttar Pradesh and West Bengal are the largest producers of potatoes in India.
D. Odisha depends on inter-state supply of potatoes due to unsuitable agro-climatic conditions.

Q6.) Which of the following contributions is associated with Dr. B.R. Ambedkar?
A. Launching the newspaper Mooknayaka to amplify the voices of marginalized communities.
B. Signing the Poona Pact of 1932 to replace separate electorates with reserved seats for Dalits.
C. Established the Bahishkrit Hitkarini Sabha.
D. All of the above.

Q7.) What is the primary objective of a carbon market?
a) To create a new source of revenue for governments
b) To allow unlimited carbon emissions without penalties
c) To trade the right to emit carbon and control overall carbon emissions
d) To replace traditional energy markets with renewable sources

Q8.) Which of the following rivers is located near the Golan Heights and serves as a vital water source for the region?
a) Narmada River
b) Hasbani River
c) Euphrates River

d) Tigris River

Q9.) What is the unique nesting behavior of Olive Ridley turtles known as?
a) Migration
b) Arribada
c) Transhumance
d) Parthenogenesis

Q10.) Consider the following statements regarding the SpaDeX Mission:
1. The SpaDeX mission is aimed at demonstrating in-space docking technology by ISRO.
2. The mission involves two spacecraft that will dock and undock in a geostationary orbit.
3. If successful, India will become the fourth country to achieve space docking capability.

Which of the statements given above is/are correct?
(a) 1 and 2 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) 1, 2, and 3

Q11.) Which of the following best describes "Green Deposits"?
(a) Deposits made exclusively by public sector banks for renewable energy projects.
(b) Interest-bearing deposits received by lenders for funding green projects.
(c) Government bonds issued for the purpose of promoting sustainable infrastructure.
(d) Savings accounts providing tax benefits for investments in green projects.

Q12.) With reference to the Panama Canal, consider the following statements:
1. It connects the Atlantic Ocean with the Pacific Ocean, cutting across the Isthmus of Panama.
2. The canal wasbuilt by the United States and handed over to Panama in 1999.
3. The waterway includes locks to lift and lower ships, making it a unique engineering structure.

Which of the statements given above is/are correct?
(a) 1 and 2 only
(b) 1 and 3 only
(c) 2 and 3 only
(d) 1, 2, and 3

Q13.) Which of the following is NOT a reason for India's reliance on imports of critical minerals from China?
A. Limited exploration and mining technologies in India.
B. Absence of incentives for private sector participation.
C. Lack of domestic mineral resources for all critical minerals.
D. Insufficient policy support for processing capabilities.

Q14.) National Farmers Day in India, celebrated on December 23, honors which of the following leaders?
A. Lal Bahadur Shastri
B. Jawaharlal Nehru
C. Chaudhary Charan Singh
D. Sardar Vallabhbhai Patel

Q15.) Which of the following statements about Greenland is INCORRECT?
A. Greenland is the world's largest island with significant ice coverage.
B. Greenland operates under the complete administrative control of Denmark.
C. It is rich in natural resources like coal, iron ore, and uranium.
D. Greenland was granted home rule in 1979 and further autonomy in 2009.

Q16.) Consider the following statements regarding malaria:
1. Malaria is caused by viruses transmitted through the bites of female Anopheles mosquitoes.
2. People with malaria can spread the disease to others through casual contact, like shaking hands.
3. Malaria parasites can be transmitted through blood transfusions or from mother to child.

Which of the above statements is/are correct?
A. 1 and 2 only
B. 3 only
C. 2 and 3 only
D. 1, 2, and 3

Q17.) Consider the following statements about the Caspian Sea:

1. It is the largest enclosed inland water body in the world.
2. The Caspian Sea has a higher salinity level than seawater.
3. The Caspian Sea is a significant hub for global sturgeon production.

Which of the statements given above is/are correct?
A. 1 and 2 only
B. 1 and 3 only
C. 2 and 3 only
D. 1, 2, and 3

Q18.) With reference to the James Webb Space Telescope (JWST), consider the following statements:
1. It operates in the visible light spectrum to study the early universe.
2. JWST is stationed at the second Lagrange point (L2), which is approximately 1.5 million kilometers from Earth.
3. It uses a 5-layer sunshield to protect its instruments from heat and light.

Which of the statements given above is/are correct?
A. 1 and 2 only
B. 2 and 3 only
C. 1 and 3 only
D. 1, 2, and 3

Q19.) What is the primary objective of the European Space Agency's PROBA-3 Mission?
A. To study the Moon's surface in detail.
B. To map the Earth's magnetic field variations.
C. To study the Sun's corona for extended periods through precision formation flying.
D. To explore asteroids in the asteroid belt.

Q20.) Which of the following is NOT true about potato cultivation in India?
A. India is the second-largest producer of potatoes globally, after China.
B. Potatoes are primarily grown in the kharif season across all states.
C. Uttar Pradesh and West Bengal are the largest producers of potatoes in India.
D. Odisha depends on inter-state supply of potatoes due to unsuitable agro-climatic conditions.

Q21.) Which of the following contributions is associated with Dr. B.R. Ambedkar?
A. Launching the newspaper Mooknayaka to amplify the voices of marginalized communities.
B. Signing the Poona Pact of 1932 to replace separate electorates with reserved seats for Dalits.
C. Established the Bahishkrit Hitkarini Sabha.
D. All of the above.

Q22.) With reference to MuleHunter.AI, which of the following statements is/are correct?
(Type: True/False style question)
1. MuleHunter.AI is an initiative by the Reserve Bank Innovation Hub to detect and prevent financial fraud.
2. It relies exclusively on Aadhar database to detect mule account behavior.
3. Mule accounts are primarily used for illegal activities like money laundering.

Select the correct answer using the code given below:
A. 1 and 2 only
B. 1 and 3 only
C. 2 and 3 only
D. 1, 2, and 3

Q23.) Which of the following states has seen the highest number of solar rooftop installations under the PM Surya Ghar Muft Bijli Yojana, as of recent data?
A. Maharashtra
B. Uttar Pradesh
C. Gujarat
D. Rajasthan

Q24.) Consider the following statements about Syria:
1. Syria is bordered by the Mediterranean Sea to the west and Iraq to the east.
2. Damascus, the capital of Syria, is the largest city in the country.
3. The Euphrates River flows through Syria, playing a significant role in its agriculture.

Which of the statements given above is/are correct?
A. 1 and 2 only
B. 1 and 3 only
C. 2 and 3 only
D. 1, 2, and 3

Q25.) Which of the following statements regarding the Digital Agriculture Mission is/are correct?
1. The Digital Agriculture Mission is designed as an umbrella scheme to support various digital agriculture initiatives.
2. It includes the creation of a Farmer ID linked to Aadhaar and the land records system of the state.
3. The Krishi Decision Support System integrates data on crops, soil, weather, and water resources.

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

Q26.) Consider the following statements regarding Lonar Lake:
1. It is a meteor impact crater formed in basaltic rock.
2. The lake has saline and alkaline water and is listed as a Ramsar Wetland.
3. Lonar Lake is already included in the UNESCO World Heritage Sites list.

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

Q27.) Which of the following statements about Markhor is/are correct?
1. It is listed as Near Threatened on the IUCN Red List.
2. It is native to the mountainous regions of South Asia, including India's Jammu and Kashmir.
3. They are strictly nocturnal.

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

Q28.) With reference to Disease X, consider the following statements:
1. Disease X is a hypothetical term used by the World Health Organization (WHO) to represent an unpredictable and unknown pathogen.
2. Zoonotic diseases are the only source of potential Disease X outbreaks.
3. COVID-19 is widely regarded as the first real instance of Disease X.

Which of the statements given above is/are correct?
(a) 1 and 3 only
(b) 2 only
(c) 1, 2, and 3
(d) 1 only

Q29.) With reference to the Vaikom Satyagraha, consider the following statements:
1. The movement was aimed at ensuring temple entry rights for all castes.
2. It was led by the Indian National Congress leaders without any involvement of local social reform movements.
3. The final resolution of complete access to the temple roads and entry was achieved only after the Temple Entry Proclamation of 1936.

Which of the statements given above is/are correct?
(a) 1 and 2 only
(b) 1 and 3 only
(c) 2 and 3 only
(d) 1, 2, and 3

Q30.) Which of the following statements is correct regarding 'Cess' and 'Surcharge' in India?
1. Cess is levied for a specific purpose, while surcharge is imposed for general revenue purposes.
2. Both cess and surcharge are part of the divisible pool of taxes shared with the states.

Options:
(a) Only 1
(b) Only 2
(c) Both 1 and 2
(d) Neither 1 nor 2

Q31.) Consider the following statements regarding La Niña and its impact on India:
1. La Niña conditions are associated with colder winters in North India.
2. During La Niña winters, wind speeds tend to decrease, leading to increased air pollution.
3. La Niña generally promotes above-normal monsoons in India.

Which of the statements given above is/are correct?
A) 1 and 2 only
B) 1 and 3 only
C) 2 and 3 only
D) 1, 2, and 3

Q32.) With reference to the Polavaram Project, consider the following statements:
1. The Polavaram Project is constructed on the Krishna River.
2. It involves the transfer of 80 TMC of surplus water from the Godavari River to the Krishna River.
3. The project was declared a national project under the Andhra Pradesh Reorganisation Act, 2014.

Which of the statements given above is/are correct?
A) 1 only
B) 2 and 3 only
C) 1 and 2 only
D) 2 only

Q33.) Mayotte, often in the news, is geographically located:
A) Between Madagascar and Mozambique in the Indian Ocean.
B) Near the eastern coast of Australia in the Pacific Ocean.
C) Between Sri Lanka and the Maldives in the Indian Ocean.
D) Off the west coast of South America in the Atlantic Ocean.

Q34.) Which of the following statements about Persistent Organic Pollutants (POPs) is/are correct?
1. POPs can bioaccumulate in the fatty tissues of organisms and magnify through the food chain.
2. India is not a signatory to the Stockholm Convention on Persistent Organic Pollutants.
3. POPs are completely biodegradable in the environment.

Options:
a) 1 only
b) 2 and 3 only
c) 1 and 3 only
d) 1, 2, and 3

Q35.) Consider the following statements regarding the Kerch Strait:
1. It connects the Black Sea with the Sea of Azov.
2. The Crimean Bridge, which spans the Kerch Strait, is the longest bridge in Europe.
3. The Kerch Strait separates Crimea from Ukraine's mainland.

Options:
a) 1 and 2 only
b) 2 and 3 only
c) 1 and 3 only
d) 1, 2, and 3

Q36.) Which of the following statements about Santa Ana winds is/are correct?
1. They are dry, warm winds originating from high-pressure areas in the Great Basin.
2. These winds primarily occur during the summer months in Southern California.
3. Santa Ana winds contribute to an increase in wildfire intensity.

Options:
a) 1 and 3 only
b) 2 only
c) 2 and 3 only
d) 1, 2, and 3

Q37.) Which of the following statements about the Mauryan Empire is/are correct?
3. Chandragupta Maurya defeated Seleucus Nicator.
4. Ashoka embraced Buddhism after the Kalinga War and convened the Second Buddhist Council at Pataliputra.

Options:
(a) 1 only

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

Q38.) Which of the following statements about the Akal Takht is/are correct?
5. The Akal Takht was established by Guru Arjan Dev to symbolize the unity of spiritual and temporal power in Sikhism.
6. The Sarbat Khalsa held at the Akal Takht historically played a crucial role in making decisions for the Sikh community.

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

Q39.) Consider the following statements regarding the Cash Reserve Ratio (CRR):
7. The CRR is the portion of a bank's Net Demand and Time Liabilities (NDTL) that must be maintained with the Reserve Bank of India (RBI).
8. A reduction in the CRR increases the liquidity in the banking system, enabling banks to lend more.

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

Q40.) Which of the following statements about the United Nations Convention to Combat Desertification (UNCCD) is correct?
1. It is a legally binding international agreement addressing desertification and land degradation.
2. The secretariat of UNCCD is headquartered in Geneva, Switzerland.
3. India hosted the 14th Conference of Parties (COP14) of the UNCCD.
4. UNCCD was adopted during the Stockholm Conference in 1972.

Options:
(a) 1, 3, and 4 only
(b) 1 and 3 only
(c) 2 and 4 only
(d) 1, 2, and 3 only

Q41.) Subramania Bharati is known for which of the following contributions to India's freedom struggle and social reform?
1. Advocating for the abolition of untouchability and caste discrimination.
2. Leading the Moderates in the Indian National Congress.
3. Writing nationalist poetry in Tamil to inspire the masses.
4. Opposing child marriage and advocating women's rights.

Options:
(a) 1, 2, and 4 only
(b) 1, 3, and 4 only
(c) 2 and 3 only
(d) 1 and 4 only

Q42.) What is the primary objective of the Amrit Gyaan Kosh Portal recently launched by the Government of India?
(a) To document case studies for governance training.
(b) To provide employment opportunities to rural youth.
(c) To facilitate research on space technology in India.
(d) To promote sustainable agricultural practices.

Q43.) With reference to the Jal Jeevan Mission, consider the following statements:
1. It aims to provide 100 liters of water per person per day to all urban households.
2. It involves a 90:10 funding pattern for Himalayan and North-Eastern states.
3. It is implemented by the Ministry of Jal Shakti.

Which of the statements given above is/are correct?
(a) 1 and 2 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) 1, 2, and 3

Q44.) With reference to the Port of Latakia, consider the following statements:
1. It is located on the Mediterranean coast of Syria.
2. It is the only operational seaport in Syria since its independence.

Which of the statements given above is/are correct?
(a) 1only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Q45.) With reference to the Schengen Area, consider the following statements:
1. It includes all member states of the European Union.
2. It allows for free movement of people without border checks between member countries.
3. Bulgaria and Romania is set to join the Schengen Area.

Which of the statements given above is/are correct?
(a) 1 and 2 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) 1, 2, and 3

Q46.) Consider the following statements regarding Mirror Bacteria:
1. Mirror bacteria are constructed from molecules with chirality opposite to natural life forms.
2. These bacteria, if created, could evade natural immune defenses and environmental predators.
3. Mirror bacteria are naturally occurring organisms found in deep-sea ecosystems.

Which of the statements given above is/are correct?
(a) 1 and 2 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) 1, 2, and 3

Q47.) With reference to Mirza Ghalib, consider the following statements:
1. He is widely regarded as one of the greatest poets of the Mughal era.
2. Ghalib's Diwan-e-Ghalib is a collection of his Urdu poetry.
3. Ghalib received formal education in Persian and Arabic literature.

Which of the statements given above is/are correct?
(a) 1 and 2 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) 1, 2, and 3

Q48.) Consider the following statements about the Crime and Criminal Tracking Network and Systems (CCTNS):
1. CCTNS aims to link all police stations in India through an integrated network.
2. It facilitates online complaint registration and case tracking by citizens.
3. CCTNS is entirely independent of the Integrated Criminal Justice System (ICJS).

Which of the statements given above is/are correct?
(a) 1 and 2 only
(b) 1 and 3 only
(c) 2 and 3 only
(d) 1, 2, and 3

Q49.) With reference to Infrared (IR) radiation, consider the following statements:
1. Infrared radiation has a longer wavelength than microwaves.
2. It can be naturally emitted by warm-blooded animals.
3. IR radiation is widely used in communication and defense technologies.

Which of the statements given above is/are correct?
(a) 1 and 2 only
(b) 2 and 3 only
(c) 3 only
(d) 1, 2, and 3

Q50.) With reference to Varmam Therapy, consider the following statements:
1. It is a practice rooted in the Siddha system of medicine.
2. The therapy exclusively focuses on the treatment of musculoskeletal disorders.
3. The human body is believed to contain 108 vital points that are manipulated in this therapy.

Which of the statements given above is/are correct?
(a) 1 and 2 only
(b) 1 and 3 only
(c) 2 and 3 only
(d) 1, 2, and 3

Q51.) With reference to the Kailash Manasarovar Yatra, consider the following statements:
1. Mount Kailash is located in India near the trijunction of India, Nepal, and China.
2. Lake Manasarovar is a saltwater lake situated at a higher altitude than Mount Kailash.
3. The Yatra can be undertaken via the Lipulekh Pass and the Nathu La Pass routes.

Which of the statements given above is/are correct?
(a) 1 and 2 only
(b) 2 only
(c) 3 only
(d) None of the above

Q52.) Which of the following statements about the Siliguri Corridor is correct?
1. It connects mainland India to its northeastern states and is surrounded by Nepal, Bhutan, and Myanmar.
2. The corridor is approximately 22 km wide at its narrowest point.
3. It is strategically significant for counter-insurgency operations and border security.

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

Q53.) Consider the following statements about Hydrothermal Vents:
1. They are underwater geothermal systems located at tectonic plate boundaries.
2. Black smokers release silica-rich, light-colored fluids.
3. They support unique ecosystems based on chemosynthesis.

Which of the above statements is/are correct?
(a) 1 only
(b) 1 and 3 only
(c) 2 and 3 only
(d) 1, 2, and 3

Q54.) Which of the following are features of the Thrissur Pooram festival?
4. It is held at the Vadakkunnathan Temple in Thrissur, Kerala.
5. The festival includes a synchronized display of decorated umbrellas (Kudamattam).
6. The use of elephants in the festival is prohibited by a Supreme Court order.

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

Q55.) Which of the following statements about Kashmiri Papier-Mâché is correct?
1. It originated during the Mughal era in the 18th century.
2. It is protected under the Geographical Indication (GI) Act, 1999.
3. The process involves hand-painting using natural pigments.

Options:
a) 1 and 2 only
b) 2 and 3 only
c) 1 and 3 only
d) 1, 2, and 3

Q56.) Consider the following statements about bio-bitumen:
1. It is produced from crude oil through pyrolysis and hydrothermal liquefaction.
2. It reduces greenhouse gas emissions by up to 70% compared to conventional bitumen.
3. It addresses environmental concerns by utilizing agricultural waste.

Which of the statements given above is/are correct?
a) 1 and 2 only
b) 2 and 3 only
c) 1 and 3 only
d) 1, 2, and 3

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