DHYEYA IAS
most trusted since 2003

PERFECT

Monthly Current Affairs Magazine

May 2024
Year: 06 No: 07
Price: ₹140

India-Philippines BrahMos Missile Trade

SPECIAL FEATURES

State News
Brain Boosters
Power Packed News
One Liners
UPSC Prelims Mock Paper

FEATURED INSIDE

Prelims Special

ENVIRONMENT & ECOLOGY

GM Crops
Wetlands
Bioremediation
Food Chains

DHYEYA IAS PERFECT
Monthly Current Affairs Magazine
May 2024

ध्येय IAS®
most trusted since 2003

ADYATAN "अद्यतन"

Current Affairs Based Programme

by VINAY SIR
(Founder Dhyeya IAS)

"We are commited to excel you"
UPSC & UPPCS 2025

STARTING FROM: 25th MAY 2024

3:00 - 5:00 PM

To Register
Scan QR Code

Open For
DHYEYA STUDENTS
(Both Old & New)

Lucknow

9506256789

Team Perfect 7

Founder	:	Vinay Singh
Managing Director	:	Q.H. Khan
Managing Editor	:	Vijay Singh
Editor	:	Vivek Ojha
Co-Editor	:	Ashutosh Mishra
	:	Saurabh Chakraborty
Sub-Editor	:	Hari Om Pandey
	:	Bhanu Pratap
	:	Rishika Tiwari
Reviewer &	:	Nitin Asthana
Advisor	:	Shashank Tripathi
Designing	:	Arun Mishra
Social Media	:	Keshari Pandey
Marketing Support	:	Priyank, Ankit
Technical Support	:	Waseef Khan
Office Attendent	:	Chandan,
	:	Guddu, Arun
	:	Rahul

Message

An officer with a right mindset is an officer that a nation aspires for. A right mindset doesn't necessarily comprise unlimited jargon of knowledge rather a right amount of knowledge and its appropriate execution. Especially, when it comes to UPSC and State PSCs preparation, the crux is not to accumulate the knowledge but its effective implementation and utilization in tackling any situation. The situation here can be anything from UPSC CSE Prelims to the major issues that need to be addressed. The journey is hard but it is worth.

Perfect 7 has been part of many UPSC and State PSCs aspirants in their journey of becoming well reputed officers serving nationally and internationally. The magazine itself had gone through constant ebb and flows of change and improvements. Now, that the magazine is in its monthly era, I hope it becomes your perfect preparation partner and guides you through this ever learning endeavor of Civil Services Preparation.

With Best wishes.

Vinay Singh
Founder
Dhyeya IAS

-: Credits :-

PIB, PRS, AIR, ORF, Prasar Bharati, Yojana, kurukshetra, The Hindu, Down to Earth, The Indian Express, India Today, WION, Deccan Herald, HT, ET, ToI, BBC, Dainik Jagran and Others

Yearly Subscription

Price	Issue	Total	After Discount
140	12	1680	1200

Half Yearly Subscription

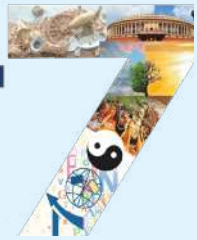
Price	Issue	Total	After Discount
140	6	840	600

*Postal charges exta

DHYEYA IAS
most trusted since 2003

PERFECT

Monthly Current Affairs Magazine



In This Issue

Attaining 100% Voting and Its Role in Strengthening Democracy in India

To cultivate a healthier political culture and deepen political socialisation, it is imperative to raise voter awareness. Leading up to the 18th Lok Sabha elections in India, there has been a notable emphasis on achieving 100% voter turnout, underscoring its significance. While the voter turnout in the country continues to increase steadily, there still exists a lingering sense of political apathy among individuals. It is crucial to address this issue promptly. When a large segment of the population is disinterested in the political system or experiences political apathy regarding voting, it becomes challenging to establish a vibrant and effective government.

The famous political thinker JS Mill considered voting to be an extremely important process. He considered voting to be a very sacred act. So he even recommend not to allow illiterate people to be a part of voting process. However, many countries have diverged from this view, granting voting rights to their entire populace without discrimination based on factors such as religion, language, sex, or education level.

In democratic countries, the principle of universal adult suffrage is paramount. However, some political analysts argue against granting voting rights to illiterate or less educated individuals. They believe that such individuals may vote based on factors like caste, religion, or language, which may lead to the politicisation of these identities. Additionally, there is concern that this group may inadvertently support candidates with criminal backgrounds, contributing to the criminalisation of politics. However, in countries like India, the right to vote is granted without considering the individual's level of intelligence, discretion, decision-making abilities or political understanding.

Why is voter awareness and 100% voting important:

- Given the liberal approach to granting the right to vote in the Indian democratic system, it becomes the imperative duty of voters to strive for 100% voter turnout. Additionally, voters should support candidates from political parties committed to public welfare. Parties focusing on better policymaking, improving the country's economy through sound economic decisions, and overall national development deserve greater support from voters. It is essential to view politics through the lens of national interest, transcending caste and regional issues. The mature political understanding demonstrated by Indian voters over the last decade has led to a consistent increase in voter turnout.
- According to India's Chief Election Commissioner, Rajiv Kumar, a staggering 96.8 crore individuals are eligible to vote in the upcoming elections across more than 12 lakh polling stations. Notably, the participation of women voters has shown a rapid increase, with the number of women voters per thousand men rising from 928 in 2019 to 948 in 2024. The upcoming Lok Sabha elections will be conducted in 7 phases. It is anticipated that the growing political and voting literacy in India will lead to widespread voter turnout.
- In a democratic country like India, voting is not just a process of pressing the election button to cast a vote. It is a process which is a medium to materialise the

aspirations of the people in the country, a tool to lead the government towards good governance, the basis for strengthening representative democracy, a dimension of people's participation in the governance of the country.

- In a country like India, achieving 100% voter turnout is crucial because higher voter participation leads to the selection of a more competent government by politically aware citizens. Voting allows us to exercise our right and select capable representatives to govern the country. Through voting, we can elect competent MPs, MLAs, councillors, district panchayat members, and panchayat members. Every election holds significance, making it imperative to exercise our right to vote.

Registration of Non-Resident Indians as Voters in India:

- Prior of the 18th Lok Sabha election, the Government of India has urged NRIs to cast their votes. Non-resident Indians, who are citizens of India but reside temporarily abroad due to employment or educational commitments and have not acquired citizenship of any other country, have the opportunity to register as voters in India. NRIs must fill Form 6A, available on the Election Commission website, filling their Indian residential address mentioned in their passport.
- As per the Election Commission website, applicants must paste a recent passport-size colour photograph along with Form 6A. Additionally, they must provide a self-attested photocopy of the passport containing a photograph, Indian address and a valid visa endorsement. Upon submitting the form, a booth-level officer will visit the address mentioned in the passport to verify the copies of the documents.
- The Electoral Registration Officer (ERO) will inform the applicant about the decision by post to the address and through SMS to the mobile number provided in Form 6A. The voter list is accessible on the Chief Electoral Officer's website. Additionally, the Election Commission website indicates that Form-8 can be used to make any corrections in the voter list.

Relevance of National Voter's Day in India:

- National Voter's Day is observed annually on 25 January in India. The day was initiated to motivate more young voters to engage actively in the political process. It was first celebrated on 25 January 2011 to commemorate the foundation day of the ECI, which plays a pivotal role in ensuring the conduct of free and fair elections in the country.
- It serves as a reminder of the significance of voting and seeks to educate and involve citizens in the electoral process. Various states in India are undertaking efforts to raise voter awareness through diverse means. These initiatives include voter awareness advertisements in schools, colleges, media, newspapers, social media, radio, metro stations, and other such locations. Some incidents have come to lime-light in India, where appeals for voting have been made via wedding cards.

Artificial Intelligence in Elections:

- In future, AI is also likely to impact elections, making it crucial for the Election Commission to monitor these developments closely.
- Reports have revealed that in the Tamil Nadu elections, Artificial Intelligence was used to simulate the voice of former CM Jayalalithaa, making an emotional appeal to voters in an attempt to secure votes.
- Furthermore, deep fake technology under Artificial Intelligence can be utilised to create convincing election masks that could sway political opponents. Reports indicate that in the elections of India's neighbouring country Pakistan, deep fake technology was employed to malign political rivals. The possibility of something similar happening in India cannot be ignored.
- In light of this, it is crucial for both the ECI and the State Election Commissions to approach this issue with the same sensitivity as they do with the model code of conduct. They must take measures to curb excessive spending in election campaigns, prevent corrupt practices aimed at influencing voters, and address the potential misuse of technologies like deep fake.

Conclusion:

- Elections in India are akin to a festival, symbolising the illumination of public sovereignty. The peaceful organisation of elections involving such a vast and diverse population in a non-violent manner stands as a remarkable achievement, unparalleled in the world.
- While it may seem idealistic, voters have demonstrated a growing understanding by rejecting corruption, black marketing, and caste-based social engineering in states like Uttar Pradesh.
- Therefore, it is incumbent upon Indian voters to continue contributing to the advancement of this democratic journey. They should have the understanding about limitations of electoral populist slogans and promises. Importantly, voters should prioritize capable, hardworking and morally upright candidates over those with a criminal background.

ICCC

Why in News:

Union agriculture minister Arjun Munda inaugurated the Krishi Integrated Command and Control Centre (ICCC) setup at Krish Bhavan in New Delhi.

About Krishi ICCC:

- The ICCC is tech based solution involving multiple IT based solutions and platform, which is designed to help in making informed decision.
- The ICCC uses state of art technologies such as artificial intelligence, remote sensing to collect and process large amount of data such as temperature, rainfall etc and present in graphical format.

Data sources:

- Remote sensing data
- IMD data
- Digital crop survey data
- Krishi Mapper data
- Geo tagging data
- General crop estimation survey data

Objective of ICCC:

- ICCC will enable comprehensive monitoring of the farm sector by making available of information at one place.

Benefits of ICCC:

- Farmers will get the information related to crop yields, production and drought situation.
- It can increase the crop diversification in farm field by the crop diversification in farm field with the help of necessary inputs.
- It will provide farm data reposit to the government which would help in making informed policy related to agriculture.

About digital farming:

- Digital farming refers to the use of digital technologies to improve the efficiency and productivity of agriculture. This can include technologies such as remote sensors, drones, precision irrigation systems, and GPS-guided machinery, as well as the use of data analytics, AI, and machine learning to make informed decisions about crop management and farm resource allocation.

Government initiatives related to digital farming:

- Government is actively encouraging and promoting various innovations in the Agriculture sector through different schemes like digital agriculture mission, Kisan Drones, E- NAM, Agri-startups, kisan call centre, e-kisan and digital marketing etc .

Benefits of digital farming:

- Incorporates end-to-end solutions.
- Higher yields.
- Low inputs.
- Better quality of food grain.
- Less waste due to customized practices.
- Supply chain management from farm to fork.

Conclusion:

ICCC will generate customised advisory in the local languages of farmers. ICCC can create an ecosystem on which individual farmer specific advisories can be generated through Kisan e mitra and chat bot.

Preventive Detention for Law & Order

Why in News:

Supreme court held that government can not invoke preventive detention to tackle the law and order situation of state. Court said that preventive detention can be invoked only in case of public disorder situation in state.

Difference between public disorder and law & order:

- Court observed that the distinction between the two concepts is based on degree of disturbance and effect on life of community.
- Court noted that law and order offences primarily involve individual level disturbances, while public disorder offences directly harm the public interest and have a broader impact on the community.

What the court observed?

- To qualify a situation of public disorder, activities must be of such nature that the ordinary law can not deal with them.
- Court said that advisory board, setup under the preventive detention act, which approve preventive detention, should not mere act as rubber stamping authority.
- Advisory board must play an active role to ascertain whether detention is justified under law or not.

About preventive detention:

- Preventive detention means detention of a person without trial and conviction by a court.
- The detention of a person cannot exceed three months

unless an advisory board reports sufficient cause for the extension of detention.
- Article 22 grants protection to persons who are arrested or detained.

Article 22(4):
- This clause reiterates that preventive detention of a person shall not be authorised extending three months period except on the report by an advisory board which contains a sufficient cause of detention.

Types of Detentions:
Preventive detention:
- In Preventive detention person is held in police custody only on the basis of a suspicion that he would conduct a criminal act or cause harm to society. The police have the authority to hold anyone they suspect of committing a criminal offence and also to make arrests without a warrant or a magistrate's authorization in certain cases.

Grounds of Preventive Detention:
- Security of the State.
- Maintenance of public order.
- Maintenance of supplies and essential services and defense.
- Foreign affairs of the state.

Punitive detention:
- Punitive detention occurs after an offence is actually committed, or an attempt has been made towards the commission of that crime.

Conclusion:
This judgment is a important development in the protection of civil liberties in India. The Court emphasized that the arbitrary power conferred on the state through preventive detention laws can not be invoked in every case and it should be used for very rare cases.

Pre-Trial Injunctions Against the Media

Why in News:
Supreme Court raised concerns about wealthy individuals obtaining court orders, before trials, to silence the media and restrict free speech and public access to important information.

Freedom of Press in India:
- It upholds the principle that communication and expression through various media, including printed and electronic media, should be exercised freely.
- While not expressly mentioned in any legal system, it is impliedly protected under Article 19(1)(a) of the Constitution of India, 1950 (COI).
- India ranks 159 out of 180 countries in the World Press Freedom Index 2024, which considers "legal interference" in journalism

Supreme Courts view:
- A three-judge Bench headed by Chief Justice of India D.Y. Chandrachud said such ex-parte interim injunctions granted by courts rather mechanically spell a death sentence to journalistic stories even before the allegations against them are proven right. It opined that the courts should be careful about blocking media reports before trials in defamation cases.
- **Bonnard vs Perryman Rule:** This principle states that injunctions in defamation suits should only be granted if the content is undoubtedly defamatory and cannot be justified during the trial.
- **Criteria for Granting Injunctions:** The Court emphasized the three-fold test for granting injunctions: a prima facie case, the balance of convenience, and preventing irreparable harm. It emphasized the importance of thoroughly examining the facts in every case.

-: You should also know :-
Media trails:
R. Surette defines Media trials as "certain regional or national news 'events' in which the criminal justice system is co-opted by the media as a source of high drama and entertainment
The notion "Media Trial" or "Trial by Media" got its name in the United States of America during the period of 19th Century and became familiar with the Indian legal system in the case of "K.M Nanavati v. State of Maharashtra"

Risk of Preemptive Judgment:
- The Bench highlighted the increasing prevalence of 'SLAPP suits' or 'Strategic Litigation against Public Participation' in various jurisdictions.
- SLAPP is an umbrella term used for legal actions often started by powerful entities against the media or civil society members. They aim is to stop the public from

learning about or engaging in important public matters

Important cases related to Media:

- **Romesh Thappar v. State of Madras (1950):** The Supreme Court (SC) observed that freedom of the press lays at the foundation of all democratic organizations.
- **Maneka Gandhi vs Union of India (1978):** The SC held that the freedom of speech and expression is not confined to National boundaries.
- **Indian Express v. Union of India (1985):** The SC held that the Press plays a very significant role in the democratic machinery. The courts have a duty to uphold the freedom of press and invalidate all laws and administrative actions that abridge that freedom.
- **Bijoe Emmanuel v. State of Kerala (1986):** The SC held that the right to speak includes the right to be silent or to utter no words.

Conclusion:

Media in the form of newspapers have historically fueled social and political change, making press freedom essential for maintaining democracy. In the present world too, journalism and media forms a major backbone for the democracy and hence, any form hindrance between their operational capabilities directly or indirectly impacts the democracy. Strengthening a responsible journalism is therefore vital for democracy, propelling it toward progress. At the same time, the media must also embrace its democratic responsibility rather than serving narrow agendas.

Common Election Symbol

Why in News:

Viduthalai Chiruthaigal Katchi (VCK) leader Thol Thirumavalavan approached the Election Commission of India seeking the pot symbol for his party. But ECI has denied a common symbol (Pot) to the VCK party. However, another party named NTK which secured more than 6% of votes polled is not allotted the previous common symbol of its choice.

Reasons for denial of the symbol:

- The VCK was declined allotment of a common symbol as it had failed to secure 1% of votes polled in the elections to the State Legislative Assembly in 2021.
- The VCK notably has one Lok Sabha MP and four MLAs in Tamil Nadu after contesting on the 'Pot' symbol in 2019 and 2021 elections.

What are the rules?

- Rule 10B of the Election Symbols Order provides that the concession of a common free symbol shall be available to a 'registered unrecognised party' for two general elections.
- Furthermore, a party shall be eligible for a common symbol in any subsequent general election if it had secured at least 1% of votes polled in the State on the previous occasion.
- Such an unrecognised party however should apply for a symbol every time in the prescribed format. This application can be made any time during the period commencing six months prior to the expiry of the term of the Lok Sabha or State Assembly as the case may be. The symbols are thereafter allotted on a 'first-come-first-served' basis.
- A recognised political party has a reserved symbol that is not allotted to any other candidate in any constituency.

About Election Symbols (Reservation and Allotment) Order, 1968:

- The Election Symbols (Reservation and Allotment) Order, 1968 allows the Election Commission of India to recognize political parties and allot symbols. The order also provides for the specification, reservation, choice, and allotment of symbols at elections in Parliamentary and Assembly Constituencies.

Types of symbols:

As per the Election Symbols (Reservation and Allotment) (Amendment) Order, 2017, party symbols are either:

- Reserved: Eight national parties and 64 state parties across the country have "reserved" symbols.
- Free: The Election Commission also has a pool of nearly 200 "free" symbols that are allotted to the thousands of unrecognised regional parties that pop up before elections.

Conclusion:

The candidates fielded by recognised parties enjoy the advantage of being listed at the top of the ballot in the Electronic Voting Machine. Nevertheless, ECI may consider amending the rules that registered unrecognised parties that secure at least 1% of votes polled in a previous election or have an elected representative in the Lok Sabha or State Assembly, shall have the right to be allotted a common symbol of their choice.

Supreme Court ruling on Directorate of Enforcement

Why in News:

Supreme Court endorsed the sweeping powers of the Directorate of Enforcement (ED), saying the Central agency could call "anybody for any information". The Court castigated four Tamil Nadu District Collectors for failing to appear in person in response to summons issued to them by the anti-money laundering body.

What court observed?

- Court Observed that 50(2) of the PMLA empowered the ED to summon "any person" whose attendance was considered necessary for giving evidence or production of records in the course of "any investigation or proceeding" under the statute. Section 50(3) mandated that the individual summoned was "bound to attend in person or through authorised agents" and would be required to make truthful statements and produce the required documents.

Other important ruling by the Court:

- On August 21, 2023, in a significant ruling, the Supreme Court of India clarified that Enforcement Directorate (ED) officials are not equivalent to police officers and hence, cannot make arrests under the Prevention of Money Laundering Act (PMLA).
- The apex court's decision came in response to the case presented by V. Senthil Balaji and liquor syndicate racket in Chhattisgarh. Emphasizing the importance of adhering to the rule of law, the Supreme Court stated that the ED cannot operate as "a law unto itself."
- This landmark judgment underscores the boundaries of power and authority vested in the ED, ensuring checks and balances in its operations

About ED:

- ED is a multidisciplinary organization mandated to investigate money laundering offenses and violations of foreign exchange laws.
- It functions under the Department of Revenue, Ministry of Finance.
- It is headquartered in Delhi, headed by a Legal Services Officer as Director of Enforcement.
- The Directorate has 10 regional offices, each headed by a Deputy Director and 11 sub regional offices, each headed by an Assistant Director.

Objectives of the ED:

- The prime objective of the Enforcement Directorate is the enforcement of three key Acts of the Government of India namely:
  - Foreign Exchange Management Act, 1999 (FEMA),
  - Prevention of Money Laundering Act, 2002 (PMLA),
  - Fugitive Economic Offenders Act, 2018 (FEOA)

Conclusion:

ED cases have increased six-fold in recent times, leading opposition parties to allege that the central government is misusing the ED for its political purposes. Before accepting such power of ED, the court should pay attention to what is the intention of ED in summoning a person.

Bail is the Rule, Jail is the Exception

Why in News:

Flagging concern over the rising apprehension that district courts are increasingly reluctant to entertain matters regarding to bail, During his inaugural address at the All India District Judges Conference, Kachchh, Gujarat, Chief Justice of India, Justice DY Chandrachud reminded the district judges that "bail is the rule, jail is the exception."

View of CJI:

- The longstanding principle that 'bail is the rule, jail is the exception' seems to be losing ground, evidenced by the growing number of cases reaching high courts and the Supreme Court as appeals against the rejection of bail by trial courts.
- Backlog and pendency of cases is a formidable challenge to the efficient administration of justice.
- One of the reasons of Pendency is adjournment culture. This practice, characterised by repeated requests for delays in proceedings.
- The problem of pendency of cases requires a multi-faceted approach encompassing systemic reforms, procedural enhancements and deployment of technology.
- The role of a district judge is crucial in streamlining court procedures, expediting case disposal and promoting alternative dispute resolution mechanisms.

About Bail is the rule, jail is the exception:

- Bail is rule, jail is an exception' is a legal principle that was laid down by the Supreme Court in a landmark judgement of State of Rajasthan v. Balchand alias Baliya in 1978.
- The judgement was based upon fundamental rights

that have been guaranteed by the Constitution of India with Article 21 being the most important one.
- Detention of an individual infringes his right to life and liberty as guaranteed under Article 21 of the Constitution of India.
- The main purpose of detention is to ensure easy proceedings by availing the accused for the trials without any inconvenience. Thus, if it can be ensured that the accused will be available as and when required for the trial, then, detaining the person is not necessary.
- Therefore, it was held that the provisions of the Criminal Procedure Code, 1973 (CrPC) regarding the arrest of an individual must be interpreted in a sense that unless indispensable, detention of a person must be done.

Pendency of cases in India:
- As of May 2022, over 4.7 crore cases are pending in courts across different levels of the judiciary. Of them, 87.4% are pending in subordinate courts, 12.4% in High Courts, while nearly 1,82,000 cases have been pending for over 30 years. Amid the rising trend of litigation, more people and organisations are approaching courts, this increase the cases in the court.

Conclusion:
It is need of hour that personal liberty should be protected and district and subordinate court should follow the rule of "Bail is the rule, jail is the exception". It is also need of hour that Alternative Dispute Redressal should be applied at prelitigation stage.

Organ Transplantation

Why in News:
Ministry of Health and Family Welfare has ordered an investigation into organ transplants involving foreign nationals in India. Data in the registry of the National Organ & Tissue Transplant Organisation (NOTTO) revealed the substantial increase in foreign nationals getting organs through private hospitals. Worried over the surge in the number of organ transplants linked to foreigners in the country, the Ministry has called for close monitoring of such transplants by authorities of States and Union Territories concerned and action on the hospitals found to be violating the organ transplantation rules.

About Organ transplantation:
Organ transplantation is a surgical process that involves replacing a failing organ with a healthy one from a donor. There are two types of organ donors:
- **Living donors:** These are people who donate organs and tissues while they are still alive. They can donate organs like kidneys, a lung, or a portion of the pancreas, liver, or intestines.
- **Deceased donors:** These are people who donate organs after they have passed away. They can donate two kidneys, two lungs, the heart, pancreas, corneas and intestines. They can also donate body tissue like heart valves, tendons or skin.

Reasons behind rise in organ transplantation in India:
- **Removed Age Cap:** The upper age limit has been removed, allowing people above 65 years to receive organs from deceased donors.
- **No Domicile Requirement:** Patients can now register to receive organs in any state and there is no need to furnish a domicile certificate.
- **No Registration Fees:** States have been directed not to charge registration fees from patients awaiting organ transplants.
- **Increase in Organ Transplants:** India has seen a significant increase in organ transplants, with over 15,000 transplants recorded in 2022, a 27% increase from the previous year.
- **Deceased Organ Transplants:** Deceased organ transplants have also seen a significant increase, with 2,765 transplants in 2022, up from 837 in 2013.
- **Increase in Organ Donors:** The number of donors (including deceased) grew from 6,916 in 2014 to about 16,041 in 2022.
- **Increase in Awareness:** There is a greater awareness about organ donation and according to doctors, more families are coming forward for this noble deed.

Rules and regulations:
- **Transplantation of Human Organs Act (THOA) 1994:** The act regulates the removal of human organs, storage and transplantation of human organs for therapeutic purposes and prevention of commercial dealings in human organs.
- **Transplantation of Human Organs and Tissues Rules 2014:** The act made commercialization of organs a punishable offense and legalized the concept of brain death in India. It allowed donation by deceased for obtaining organs from brain stem dead person.
- **National Organ Transplantation Guidelines 2023:** The Ministry of Health and Family Welfare has modified these guidelines, allowing those above 65

years of age to receive an organ for transplantation from deceased donors.

Conclusion:

This issue highlight the need for increased awareness, regulation, and investment in the organ transplant system in India. It will address the significant demand of organs for actual needy person and ensure ethical and safe transplants.

Right Against Adverse Effects of Climate Change

Why in News:

The Supreme Court has recently recognised right against the adverse effects of climate change as a distinct fundamental right in the Constitution. The judgement focuses mainly on protection of the Great Indian Bustard.

Background:

- The bench was hearing a plea to protect the Great Indian Bustard (GIB) from losing its habitat due to power transmission lines. On April 19, 2021, a Supreme Court bench had ordered restrictions on the setting-up of overhead transmission lines in an area covering about 99,000 square kilometres and mooted conversion of overhead low and high voltage lines into underground power lines.
- However, it was met with resistance from the centre and it was pointed out that India has given international commitments on transition to non-fossil fuels and reduction of emissions, and the area contains a large share of the country's solar and wind energy potential. It was also contended that putting high voltage power lines underground was technically not feasible.

Climate change and Human Rights:

- The Supreme Court emphasized the significance of the fight against climate change, linking it to Articles 21 and 14 of the Indian Constitution and stated that the rights to life and equality could not be fully realized without a clean, stable environment.
- The court underscored the interconnectedness of climate change with various human rights, including the right to health, indigenous rights, gender equality, and the right to development. The judgment further recognized the right to a healthy environment, safe from the adverse impacts of climate change, as a "fundamental human right."

Significance of Solar Power in India:

- The court underscored the important role solar power would play in arresting the ills of climate change.
- India urgently needed to shift to solar power due to three issues:
  - The country is likely to account for 25% of global energy demand growth over the next two decades.
  - Rampant air pollution emphasises the need for cleaner energy sources.
  - Declining groundwater levels and decreasing annual rainfall.
- The court noted that the country was endowed with vast solar energy potential and received about 5,000 trillion kWh per year of solar energy.

Important cases related to Article 21:

- In Francis Coralie Mullin vs The Administrator (1981), Justice P. Bhagwati had said that Article 21 'embodies a constitutional value of supreme importance in a democratic society'.Article 21 is regarded as the heart of rights.
- The Supreme Court has emphasized that the right to life is about more than just staying alive; it includes all the rights necessary for a person to lead a meaningful and dignified life. In a significant decision during the 1980s, the Court expanded the scope of Article 21 to include the right to a clean environment.
- **Right to Speedy Trial:** In Hussainara Khatoon Vs. the State of Bihar (1979), the Supreme Court declared that the right to speedy trial is an essential component of fairness in criminal justice.
- **Right to Livelihood:** In the Olga Tellis Vs. Bombay Municipal Corporation (1985) case.
- **Right to Health:** In the case of Parmanand Katara Vs. Union of India (1989), the Supreme Court held that every doctor has a professional obligation to protect human life in emergencies.
- **Right to Clean Environment:** In Subhash Kumar Vs. State of Bihar and Ors (1991).
- **Right to Education:** In Mohini Jain Vs. State of Karnataka (1992) case
- **Virender Gaur v. State of Haryana (1994):** Right to a clean environment is an integral facet of the right to a healthy life.
- **Right to Shelter:** In Chameli Singh Vs. State of UP (1996) case.
- **Right against Torture and Inhuman Treatment:** In the DK Basu case (1996).
- **Protection against Illegal Detention:** In DK Basu Vs. State of West Bengal (1997) case.
- **Right against Sexual Harassment at Workplace:** In Vishaka Vs. State of Rajasthan (1997) case.

- **Right to Privacy:** In KS Puttaswamy Vs. Union of India (2017) judgment.
- **Right to Good Roads:** In the Road Accident case of 2004, the Supreme Court ruled that good roads free from potholes and safe for pedestrians and vehicles are a part of the right to life under Article 21.
- **Right to Sleep:** In the case of Amir Khan vs. State of Gujarat in 2012.
- **Right to Die With Dignity:** In Aruna Ramachandra Shanbaug vs. Union of India 2011 case.

Conclusion:

Implementation of laws and formulation of policies to address climate change are essential for ensuring citizens' rights against its impacts. This fundamental right against climate change should be included in the political agendas of parties contesting Lok Sabha Polls, with clear action plans outlined. Governments should also uphold Supreme Court rulings that emphasize the connection between ecology and human dignity, aiming to bridge the gap between environmental law and policy, as seen in the Delhi Air Pollution issue.

Electric Mobility Promotion Scheme

Why in News:

Ministry of Heavy Industries launched the Electric Mobility Promotion Scheme 2024 to promote electric vehicles in India.

About the scheme:

- **Objective:** EMPS aims to boost the adoption of electric two-wheelers and three-wheelers.
- **Duration:** The scheme is valid from April 1, 2024, to July 31, 2024.
- **Fund Allocation:** The government has allocated INR 500 crore for the scheme.
- **Eligible Vehicles:** The scheme applies to electric two-wheelers (e-2W) and three-wheelers (e-3W), including registered e-rickshaws and e-carts.
- **Incentives:** EMPS offers subsidies and demand incentives for eligible EVs, with a focus on vehicles equipped with advanced battery technology.
- **Target:** The scheme aims to support 3,72,215 EVs, including e-2W and e-3W.
- **Implementation:** The Ministry of Heavy Industries is implementing the scheme, which is aligned with the Atmanirbhar Bharat initiative to promote a competitive and resilient EV manufacturing industry in India.
- **Phased Manufacturing Programme (PMP):** The scheme adopts PMP to encourage domestic manufacturing and strengthen the EV supply chain, leading to employment opportunities across the value chain.

Scheme related to electric vehicle in India:

- **Scheme to Promote Manufacturing of Electric Passenger Cars in India:** A pioneering scheme to foster the local production of electric vehicles by enticing global OEMs to invest in manufacturing facilities.
- **Faster Adoption and Manufacturing of (Hybrid and) Electric vehicles (FAME):** India's flagship scheme for promoting electric mobility, is currently in its second phase of implementation.
- **e-AMRIT:** A web portal on electric vehicles launched at the COP26 Summit.

About EV industry:

- The Indian EV market is estimated at $34.80 billion in 2024 and is expected to reach $110.74 billion by 2029, growing at a CAGR of 26.05% during period of 2024-2029.
- The Indian EV market is moderately consolidated, with the top five companies occupying 53.49% of the market share. Major players include Audi AG, Hyundai Motor India, Mahindra & Mahindra Ltd, MG Motor India Pvt. Ltd. and Tata Motors.
- Commercial Vehicles are the largest segment by vehicle type, with passenger vehicles having the largest sales in electric vehicles in India.

Challenges faced by EV industry in India:

- **Limited Charging Infrastructure:** Insufficient public charging stations and uneven distribution across the country.
- **High Upfront Costs:** EVs are pricier than traditional internal combustion engine vehicles, making them less affordable for many consumers.
- **Limited Model Options:** Fewer EV models available in the market compared to traditional vehicles.
- **Battery Durability:** Concerns about battery lifespan and replacement costs.
- **Dependence on Imported Components:** India relies heavily on imported EV components, affecting the industry's growth and profitability.
- **Limited Awareness and Education:** Many consumers lack understanding about EVs, their benefits, and how they work.
- **Inadequate Government Support:** While the government has implemented some initiatives, more

support is needed to drive the adoption of EVs.
- **Recycling and Disposal:** Lack of infrastructure and regulations for recycling and disposing of EV batteries and other components.

Conclusion:
The Electric Mobility Promotion Scheme (EMPS) is a significant initiative by the Indian government to promote the adoption of electric vehicles (EVs) and reduce the country's dependence on fossil fuels. EMPS is a crucial step towards promoting electric mobility in India; this scheme marks a milestone journey towards a more sustainable transportation sector in India.

Naxalite Encounter

Why in News:
29 Naxalites were killed in an encounter with security personnel in Chhattisgarh's Kanker district as part of anti-Naxal operation. The operation was launched based on inputs about the presence of senior cadres of north Bastar division of the outlawed CPI (Maoist) Shankar, Lalita, Raju and others.

About Naxalism:
- Naxalism or Left Wing Extremism (LWE) is one of the major challenges to India's internal security. The Maoists' motto, "Power flows from the barrel of the gun", is their driving force. Naxalites want to overthrow the state through violent means. They openly declare their lack of faith in the democratic means of the ballot and adhere to violence as a means to achieve their goals. Naxal affected areas in India are known as 'Red Corridor'.
- The Naxalite movement began in 1967 with a tribal-peasant rebellion against landlords in Naxalbari village in the Darjeeling district of West Bengal. This rebellion was led by leaders like Charu Majumdar, Kanu Sanyal. Later, this militant movement spread throughout West Bengal and was carried on by a large number of other groups in different states.
- Naxalite groups control large areas in several states of eastern India notably Andhra Pradesh, Bihar, Chhattisgarh, Jharkhand, Orissa and West Bengal and their influence extends far beyond those regions. National and state governments in India have consistently labelled Naxalite groups as terrorist organizations and outlawed them.

How do naxalites influence elections?
- **Political polarization:** Naxalite violence can be used as a political tool to polarize voters, with some parties accusing others of being soft towards Maoism or even colluding with the rebels. This could create a divisive political environment, making it challenging for parties to focus on issues and governance.
- **Voter intimidation:** Naxalites can intimidate voters, especially in areas where they have significant influence, into voting for their preferred candidates or boycotting the elections altogether. This can undermine the democratic process and lead to flawed electoral results.
- **Disruption of campaigns and voting:** Naxalite violence can disrupt political campaigns, rallies and even voting. This may limit the ability of political parties to reach voters and present their agenda, creating an uneven playing field.
- **Impact on voter turnout:** Fear of violence and intimidation may reduce voter turnout, especially in areas affected by Naxalite activity. This could distort election results and make it difficult to assess the true mandate of the people.
- **Political instability:** Prolonged Naxalite violence could create political instability, making it challenging for the government to maintain law and order and ensure a peaceful electoral process. This may lead to delay or postponement of elections in the affected areas.

Way Forward:
To mitigate these impacts, the government and political parties should work together to ensure a peaceful and secure election environment. Enhanced security measures should be taken to protect voters, political workers and polling stations. Political dialogue and negotiations should be conducted to address the grievances of Naxalite groups and reduce violence. Democratic institutions must ensure the strengthening and fairness of the electoral process so that people maintain trust in the electoral system. The socio-economic issues driving the Naxalite insurgency such as poverty, inequality and lack of development must be addressed.

Voter Verifiable Paper Audit Trail

Why in News:
The Supreme Court has rejected prayers for 100 per cent verification of the votes polled in Electronic Voting Machines (EVMs) with slips printed by the Voter Verifiable Paper Audit Trail (VVPAT) machines or, in the alternate, a return to the system of ballot paper.

About VVPAT:

- The Voter Verifiable Paper Audit Trail (VVPAT) machine is connected to the ballot unit of the Electronic Voting Machine (EVM) and provides visual confirmation of the voter's choice by printing a paper slip.
- This slip, displaying the candidate's details, is briefly shown behind a glass window for 7 seconds before dropping into a compartment below. Voters cannot take the VVPAT slip home as it is used to verify votes in five randomly selected polling booths.
- This concept aims to enhance trust in the voting process by allowing physical verification of electronically cast votes, providing assurance to both voters and political parties regarding the accuracy of the votes.

Supreme Court's observation:

- Although, the Election Commission's polling organization remains largely unchanged, the Supreme Court has directed the EC to implement new procedures post-polls.
- **New Procedure Post Poll:** The court has instructed the EC to seal and store symbol loading units (SLUs) for 45 days after results are declared. SLUs are memory units used to load election symbols onto VVPAT machines, with one to two SLUs used per Assembly constituency. These units will now be treated like EVMs, subject to the same examination and handling protocols. This directive aims to address any potential election petition related to them.
- **Verification of EVMs:** The SC has granted candidates the ability to request verification of EVMs. Candidates who come in second or third place can request verification of the burnt memory semi-controllers in 5% of EVMs per Assembly segment of each Parliamentary constituency. This verification process will occur upon written request by the candidate and will be conducted by a team of engineers from the EVM manufacturers.
- The court also suggested that the Election Commission (EC) could consider the possibility of counting VVPAT slips using a machine, rather than manual counting. It was suggested that VVPAT slips could be printed with a barcode to facilitate machine counting.

Conclusion:

Granting the right to 100% counting of VVPAT slips or physical access to them would significantly extend the counting process, potentially delaying result announcements. This would necessitate doubling the required manpower. Manual counting, while prone to human error, also raises concerns about deliberate tampering. Such manual intervention could result in accusations of result manipulation.

JJ Act for Children Committing POSCO Crimes

Why in News:

The Kerala High Court has held that a child charged with the offences under the Protection of Children from Sexual Offences (POCSO) Act, 2012, is to be prosecuted as per the provisions of the Juvenile Justice (Care and Protection of Children) (JJ) Act.

Court's Observation:

- The Court made the observation while disposing of a petition filed by a 13-year-old boy seeking to quash the case registered against him under the POCSO Act and various sections of the Indian Penal Code (IPC). The prosecution case is that the petitioner had sexually assaulted another boy.
- The petitioner's counsel argued that prosecuting a child for such offenses was not possible due to the absence of criminal intent in children. The court pointed out that while the POCSO Act did not define 'child,' the JJ Act, 2015, defined it as a person under 18 years of age.
- The court further observed if the offender is a child in conflict with law, whether for the offences under the POCSO Act or under any other statute, shall be inquired into only by a Juvenile Justice Board.
- In the event of filing a final report by the investigating agency, after due investigation with a finding that the petitioner has committed the offence, the board is obliged to inquire as provided under the JJ Act.

About Juvenile Justice Act:

- Under the law for juveniles, a child involved in a crime is not termed as accused but rather referred to as a Juvenile in Conflict with Law (JCL). On the other hand, if the victim is a minor, they are referred to as a juvenile in need of care and protection.
- The arrest is referred as apprehension, trial is called inquiry and conviction is disposition. Under the Juvenile Justice Act, there is no provision for conviction.

Recommendations by Verma Committee:

- A three member Committee headed by Justice J.S. Verma, former Chief Justice of the Supreme Court, was constituted On December 23, 2012. This committee made recommendations regarding amendments to the Criminal Law so as to provide for quicker trial

and enhanced punishment for criminals accused of committing sexual assault against women.

- The Committee submitted its report on January 23, 2013. It made recommendations on laws related to rape, sexual harassment, trafficking, medical examination of victims, police, electoral and educational reforms. It also made recommendations on child sexual abuse.
- The Committee has recommended that the terms 'harm' and 'health' be defined under the Juvenile Justice Act, 2000 to include mental and physical harm and health, respectively, of the juvenile.

Conclusion:

In cases involving juveniles, the social investigation report carries more weight than evidence in determining the punishment. This report considers various factors such as family history, past behavior, religious and ethical values at home, socio-economic status, family members' criminal records, living conditions, and parent-child relationships.

International

India-Philippines BrahMos Missile Trade: The beginning of India's defense partnership in the Asian region

India is actively expanding its defense partnerships with multiple countries and striving to bolster its defense capabilities. Transitioning from solely importing defense technologies, India now seeks to earn the reputation of a defense exporter by exporting defence technologies to various countries. In a significant development, India has delivered its first consignment of BrahMos supersonic cruise missiles to the Southeast Asian country of the Philippines, marking a pivotal step in India's journey towards becoming a defense exporting nation.

The Philippines is the first country to receive the BrahMos missile from India, following a $375 million (Rs 3130 crore) deal signed in January 2022. It is worth mentioning that the production of the BrahMos missile has been significantly aided by the longstanding friendship between India and Russia. The transfer of BrahMos missiles to the Philippines is expected to facilitate future sales to other Southeast Asian nations. Additionally, the Indian Air Force has delivered C-17 Globemaster aircraft to the Philippines Marine Corps, which will be equipped with BrahMos missiles. The speed of these missiles is 2.8 Mach and the range is 290 km. It is noteworthy that one Mach is the speed of sound 332 meters per second.

Philippines' right to take Brahmos:

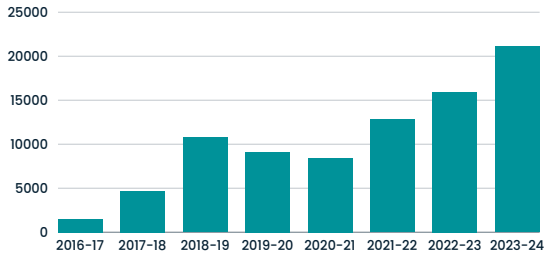
- The Philippines is embroiled in a dispute with China over maritime territories in the South China Sea. China's claim over maritime area of Philippines and its aggressive actions, including naval warfare, surveillance, and espionage, have escalated tensions. Despite an International Court of Justice ruling in favor of the Philippines, China continues its illegal territorial claims. This underscores the Philippines' need to bolster its defense capabilities for self-protection.

China and Taiwan Malaysia Vietnam Brunei Philippines

- The sale of Brahmos to the Philippines has come at a time when its relations with China are tense. The navies of the two countries are constantly clashing in the South China Sea. In 2019, China increased tensions

in the South China Sea by sending its warships to the Sibutu Strait of the Philippines. Philippines had also alleged that two Chinese research vessels were operating in its exclusive economic zone. It is noteworthy that China has its eyes on the natural resources, natural oil, gas found in the SEZ of Southeast Asian countries and the islands of the South China Sea.

- Apart from Spratly and Paracel, there have been disputes between China and Vietnam over Vanguard Bank, Reed Bank, between China, Philippines and Malaysia over Luconia Shoal and with Taiwan over the ownership of Scarborough Reef. In 2019, China's survey vessel Haiyang Dizhi 8 entered the reef area Vanguard Coast controlled by Vietnam, which Vietnam considers its EEZ. China said that it wanted to conduct a seismic survey in this area.
- India's Foreign Ministry had clearly stated on this issue that India's fundamentals and legitimate interests lie in the free and fair access to the major waterways of the South China Sea, peace and stability in this region. India has supported the freedom of navigation in the South China Sea in accordance with the United Nations Convention on the Law of the Seas (UNCLOS), 1982.



India's Defence Exports

- International court gave a timely decision in favor of the Philippines, but China did not accept it. India is also officially saying that under the principles and law of UNCLOS, emphasis should be laid on making the Indian Ocean free and equal opportunity for all countries. In such a situation, the Philippines needed a powerful weapon like Brahmos to deal with a country like China, which India has delivered recently. It is noteworthy that India is moving towards implementing the free and open Indo Pacific Strategy in effective ways. More than 55 percent of India's maritime trade is from the South China Sea. In this way, India's maritime cooperation with Southeast Asian countries including the Philippines becomes natural. Last year, the first maritime exercise was also conducted between India and ASEAN.

Benefits of defense agreement with Philippines for India:

- This deal with the Philippines will help in making the country an exporter in the defense sector and promoting self-reliant India. This deal will also boost the morale of the defence industry and India will also be seen as a big reliable exporter in South-East Asia. Atul Dinakar Rane, Director General of BrahMos Aerospace, said in June 2023 - 12 countries including Argentina, Vietnam have shown interest in buying BrahMos missile system. The demand for BrahMos from foreign countries shows that this missile system is very reliable.
- Further, it will strengthen India-Philippines relations and will send a message of solidarity of both the countries to China. India sees the Philippines as a strategic partner. In this sequence, India had once given a statement about supporting the national sovereignty of the Philippines, which China took offense to. During his visit to the Philippines, Indian Foreign Minister S Jaishankar not only talked about giving full support to the Philippines regarding its national sovereignty but also talked about strengthening the existing defense and strategic cooperation between India and the Philippines in view of the situation in the Indo-Pacific region.
- Foreign Minister S Jaishankar has also talked about cooperation with the Philippines on issues like politics, defense security and maritime cooperation, business and investment, education, digital and supply chain. Global companies are considering both India and the Philippines as important countries under the China Plus One policy. In such a situation, new issues of economic cooperation is also being discussed between them.

India's growing defense exports:

- The Defense Ministry of India had recently announced a historic milestone that the India's defense exports have surged to over Rs 21,000 crore, marking a record high. This achievement, a first in independent India's history, was accomplished by selling defense products to 84 countries. The Defense Minister attributed this remarkable 32.5 percent increase in exports to India's strategic efforts in the defense sector.
- Last year, the Defense Ministry of the Government of India approved a defense deal worth Rs 84,560 crore. The Defense Acquisition Council (DAC), chaired by Defense Minister Rajnath Singh, gave its approval. The deal includes the purchase of anti-tank mines, air defense tactical control radar, fighter refueler aircraft, heavyweight torpedoes, and sea surveillance aircraft.

- About 50 Indian companies have made a significant contribution in bringing this success story of India's defense exports to a conclusion. With the policy initiatives of the government and the support of the defense industry, India achieved a significant milestone in defense exports in FY 2022-23. In the last financial year, India's defense exports reached a record level of about Rs 16 thousand crore, which is about Rs 3,000 crore more than FY 2021-22. India's defense exports have increased more than 10 times since 2016-17. Defense exports have jumped 32.5 percent in the financial year 2023-24 as compared to last year. This year defense exports have reached the level of Rs 21,083 crore.
- Further, India's defense exporters have reached every corner of the world geographically. The country's exported products are reaching many countries including Italy, Maldives, Sri Lanka, Russia, UAE, Poland, Philippines, Saudi Arabia, Egypt, Israel, Spain, Chile. India's defense products are in high demand globally, reflecting India's growing recognition for its security capabilities. Key exports include personal protective equipment, offshore patrol vehicles, ALH helicopters, coastal surveillance systems, light engineering mechanical parts and armor MOD. These state-of-the-art defense technologies have piqued the interest of international buyers, driving the increasing demand for Indian defense products.

Short Issues

International Seabed Authority

Why in News:

India has applied before International Sea Bed Authority (ISBA), for rights to explore two vast tracts in the Indian Ocean sea bed. Both tracts don't fall under the Indian jurisdiction.

About the region:

- The application is to explore a cobalt-rich crust long known as the Afanasy Nikitin Seamount (AN Seamount).
- The AN Seamount is a structural feature (400 km-long and 150 km-wide) in the Central Indian Ocean Basin, located about 3,000 km away from India's coast.
- India has also applied for permission to explore another region, spanning 3,00,000 square km, called the Carlsberg Ridge in the Central Indian Ocean to investigate for polymetallic sulphides.

Process of obtaining exploration rights on seabed:

- For any extraction activities, countries must first obtain an exploration license from the ISBA, created under the United Nations Convention on the Law of the Sea (UNCLOS).
- Around 60% of the world's seas are open ocean and believed to be rich for variety of mineral wealth.

Exclusive rights of countries in ocean:

- Countries have exclusive rights up to 200 nautical miles in ocean.
- Some ocean-bound states may have a natural stretch of land, connecting their border and the edge of the deep ocean that extends beyond this 200, as part of their so-called continental shelf.
- Claims to the continental shelf usually don't exceed beyond 350 nautical miles, but an exception allows Bay of Bengal countries, like Sri Lanka, to claim up to 500 nautical miles, through approval of IBSA.
- Beyond exclusive rights of countries, for any exploration, countries must apply before ISBA.

About International Seabed Authority (ISBA):

- The International Seabed Authority (ISA) is an autonomous international organization established under the 1982 United Nations Convention on the Law of the Sea (UNCLOS) and the 1994 Agreement relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea (1994 Agreement).
- ISBA headquarters is in Kingston, Jamaica.
- All States, Parties to UNCLOS are members of ISBA. ISBA has 169 Members, including 168 Member States and the European Union.
- It has the mandate to ensure the effective protection of the marine environment from harmful effects that may arise from deep-seabed-related activities.

Conclusion:

India's application to explore a cobalt-rich area is already claimed by Sri Lanka. ISBA requested India to comment on the overlapping claim. A high-level Indian delegation presented scientific evidence to support its claim for exploration rights. A final decision is awaited from IBSA. The Commission on the Limits of the Continental Shelf, which decides on the limits of a country's continental shelf, may impede India's exploration ambitions.

Group of Friends

Why in News:

India has launched a 'Group of Friends' to promote accountability for crimes against peacekeepers. External Affairs Minister S Jaishankar has recently announced that New Delhi will soon have a database that will record all crimes against the Blue Helmets.

About Group of Friends:

- Group of Friends seeks to facilitate the promotion of accountability for all acts of violence against United Nations peacekeepers and facilitation of capacity building and technical assistance to the host state authorities.
- It will actively engage and share information with the Secretary-General and assist the member states hosting or have hosted peacekeeping operations, in bringing to justice the perpetrators of such acts.
- Serve as an informal platform at the United Nations to exchange information.
- Share best practices and mobilise resources directed at facilitating accountability for crimes committed against peacekeepers.
- Monitor progress on bringing accountability for crimes against peacekeepers.

How this group will work?

- The Group of Friends will hold two member meetings each year, along with one event involving Permanent Missions and other stakeholders.
- These gatherings will aim to raise awareness and garner support for ensuring accountability for crimes against peacekeepers.
- Additionally, they will organize other meetings, briefings, and events as required, based on the annual work plan and relevant developments concerning the safety and security of peacekeepers..
- The Group will convene and be moderated by representatives of the Permanent Missions of Bangladesh, Egypt, France India, Morocco and Nepal as co-chairs and include all interested Member States and United Nations partners.

UN Security Council resolution 2589:

- UN Security Council resolution 2589, adopted in August 2023 during India's Presidency of the Council, urges member states hosting or having hosted UN peacekeeping operations to ensure perpetrators of violence against UN personnel are brought to justice. This includes acts like killings, detention, and abduction.
- The resolution also urges member states to investigate these acts and arrest and prosecute the perpetrators in accordance with their national laws and international obligations, including under international humanitarian law.

What is peacekeeping?

- Peacekeeping is an important tool used by the Security Council to maintain global peace and security.
- Peacekeepers from various countries play a crucial role in stabilizing conflict areas and working towards lasting peace. It is the responsibility of the member states to protect these peacekeepers who risk their lives to protect others.
- In recent years, there has been a sharp rise in crimes against peacekeepers. Disinformation campaigns about peacekeeping missions and their purposes have contributed to increasing risks for peacekeepers.
- India, one of the biggest contributors of troops to UN peacekeeping missions, has lost 177 peacekeepers in the line of duty, the highest number compared to any other contributing country.

Conclusion:

Technology can significantly enhance efforts to achieve these objectives. Comprehensive databases and analytical tools are crucial for recording and assessing crimes against peacekeepers, which are essential steps in combating impunity.

India-Malaysia Relationship

Why in News:

External Affairs Minister, S Jaishankar held a meeting with his counterpart and concluded his two-day official visit to the Malaysia. The two leaders held wide ranging discussions on bilateral cooperation including political, trade and economic, defence, digital, culture and education. They also exchanged views on issues of regional and global interest.

About India-Malaysia relations:

- India established diplomatic relations with Malaysia in

the year 1957.
- India and Malaysia have developed close political, economic, and sociocultural relations.
- Malaysia hosts the third largest PIO community in the world after the US and UAE.
- Diplomatic ties between Malaysia and India presents an opportunity to further strengthen and diversify the existing ties, especially in the economic sphere.
- Malaysia is a key pillar of India's Act East policy and critical to India's maritime connectivity strategies.
- The relations between India and Malaysia have grown from Strategic Partnership to an Enhanced Strategic Partnership with new cooperation in cultural diplomacy, digital economy, and agriculture commodity forthcoming.
- The India-Malaysia bilateral trade touched $19.4 billion during 2021-22.
- Malaysia is the third largest trading partner of India in the ASEAN region, after Singapore and Indonesia.
- Malaysia is the 13th largest trading partner for India while India stands amongst the 10 largest trading partners globally.
- This includes exports worth approx. US$ 12 billion and imports worth approx. US$ 7 billion.

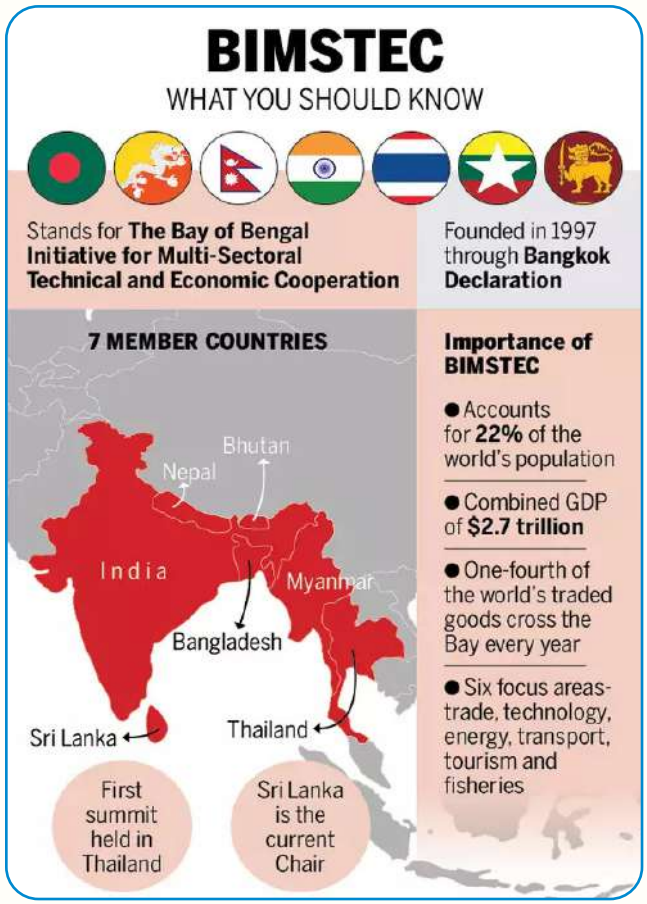
About Malaysia:
- The country of Malaysia is two separate areas of land known as Peninsular Malaysia and East Malaysia. The two regions are separated by the South China Sea by about 400 miles.
- Malaysia's capital, Kuala Lumpur, is located on the west side of Peninsular Malaysia, closer to the Indonesian island of Sumatra. East Malaysia is home to Mount Kinabalu, the country's highest point, which has an elevation of 13,455 feet (4,101 meters).
- Malaysia shares borders with the Thailand to the north and Indonesia and the island of Singapore to the south. Singapore is separated from Malaysia by a bridge.

Conclusion:
Through Act East Policy (AEP), India should further strengthen its relations and cooperation with ASEAN countries including Malaysia and other East Asian regional powers. To reduce the increasing Chinese interference in the Indian Ocean, India should maintain relations with Malaysia through balanced diplomacy and an economic approach.

BIMSTEC Charter

Why in News:
Federal Parliament of Nepal has ratified the BIMSTEC charter. The BIMSTEC charter was adopted during the 5th BIMSTEC Summit, 2022, held in Sri Lanka.

About the BIMSTEC Charter:
- BIMSTEC charter is a principal document of BIMSTEC organisation, serve as a guiding principle and define the role and structure of BIMSTEC organisation.
- Except Nepal, all other members have already ratified the BIMSTEC charter.



About the BIMSTEC:
- Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) is a multilateral regional organisation established with aim to provide momentum of growth and cooperation among littoral and adjacent countries in the bay of Bengal region.
- It has total seven countries – five from south Asia (India, Bangladesh, Nepal, Bhutan and Srilanka) and 2 from south East Asia(Myanmar and Thailand).
- It was founded in 1997 with adoption of Bangkok declaration.

What is the significance of BIMSTEC?
- The BIMSTEC region hosts 22% of the world

population or 1.68 billion people; and the member states have a combined GDP of US$3.697 trillion/per year.

- For India, BIMSTEC aligns with its 'Act East' policy for greater regional cooperation in southeast Asia. It could also be seen as aligning with India's larger goal to gain trade and security prominence in the Indian Ocean region .
- For Bangladesh, BIMSTEC might be a platform to strengthen its much-needed economic development, while Sri Lanka sees the goal of becoming a hub for shipment in the Indo-Pacific region.
- For smaller members Nepal and Bhutan the two landlocked, mountainous states, the grouping serves as a pass to the sea. Lastly, for Myanmar and Thailand, it could be seen as a way to reduce over-dependence on China and as an opening to a huge consumer market for its commodities.
- The idea of BIMSTEC also gained prominence after the 2016 Uri attack when India was able to get SAARC (South Asian Association for Regional Cooperation) nations on its side to boycott the organisations' summit, which was to be held in Islamabad, Pakistan.
- In this context, India also made efforts to enhance the pace of BIMSTEC's progress in recent years. The BIMSTEC Energy Centre was set up in Bengaluru, along with the BIMSTEC Business Council, a forum for business organisations to promote regional trade.

Conclusion:

Before this, BIMSTEC did not had any formal document or organisational architecture, which was adopted recently in the form of the BIMSTEC Charter. Now, all members have ratified the BIMSTEC charter, which will strengthen the functioning of the organisation.

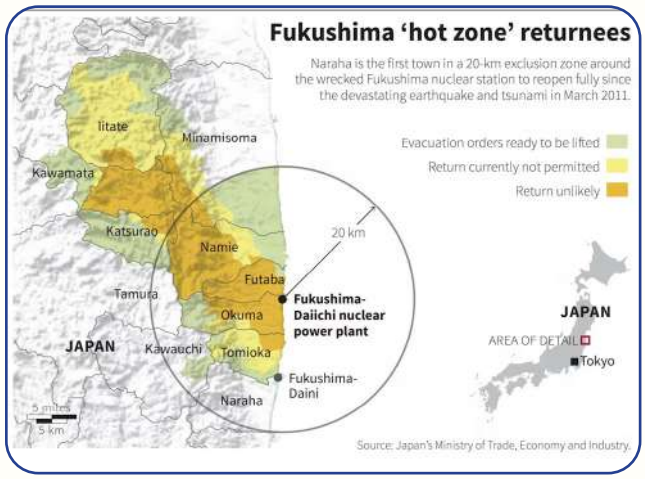
Fukushima Nuclear Plant

Why in News:

Japanese and Chinese experts held talks on release of treated wastewater from the stricken Fukushima nuclear plant. These were first such talks to be announced since Tokyo began releasing the water into the ocean last year.

What is main issue?

- Japan and China have been at loggerheads over the discharge of the wastewater, which was used to cool the reactors after the 2011 Fukushima nuclear accident.
- The Fukushima nuclear accident was a major nuclear accident at the Fukushima Daiichi nuclear power plant in kuma, Fukushima, Japan which began on March 11, 2011.
- Japan began gradually discharging some of the 1.34 million tonnes of wastewater into the, sparking a diplomatic row with China and Russia.
- Japan insists it has been safely treated, but China has criticised the release of water and banned Japanese seafood imports.
- China has accused Tokyo of treating the sea as a "sewer", but Japan insists the discharge is safe, a view backed by the UN atomic agency.



Concerns of Releasing Water:

- There is no known threshold below which radiation can be considered safe, therefore any discharge of radioactive materials will increase the risk of cancer and other known health impacts to those who are exposed.
- The water released may be poisonous to the fish and anyone who happens to live in the vicinity of the discharge point can be caught precarious.
- Japan hasn't removed tritium from the water because this is very difficult to do.
- Tritium is "easily absorbed by the bodies of living creatures" and "rapidly distributed via blood.

Nuclear power plant:

- Nuclear power plants are a type of power plant that uses the process of nuclear fission to generate electricity.
- In nuclear fission, atoms split to form smaller atoms, releasing energy.
- Fission occurs inside the reactor of a nuclear power plant. At the center of the reactor is the core, which contains uranium fuel.
- The heat generated during nuclear fission in the reactor core is used to boil water into steam, which turns the blades of a steam turbine.
- As the turbine blades rotate, they drive generators that

generate electricity.
- Nuclear plants cool the steam back into water in a separate structure at the power plant, called a cooling tower, or they use water from rivers, or oceans.

Conclusion:
Before releasing of water, researchers have also called for more studies to be conducted to understand the potential long-term effects on the Pacific Ocean and its ecosystem.

India's Stand on Iran-Israel Conflict

Why in News:
As tensions rise between Israel & Iran, India faces a precarious position due to its friendly ties with both the nations and its heavy reliance for energy imports from the region, particularly through the Strait of Hormuz. The potential disruption of this critical oil transit chokepoint could have far-reaching consequences for global energy markets and India's economy.

About Iran-Israel conflict
- The first direct Iranian attack on Israel marks a new phase in the two countries' strategic rivalry.
- For years, Iran has opted to act against Israel through its regional network of partners and proxies to retain deniability and minimize the risk of political or military consequences for its actions.
- Iranian Islamists have long championed the Palestinian people, whom they perceive as "oppressed".
- By supporting the Palestinians, Iran seeks greater acceptance among Sunnis and Arabs, both of whom dominate the Middle East.

Key events in the conflict include:
- **1979:** Iran cuts off relations with Israel after the Islamic revolution.
- **1982:** Iran trains and arms Hezbollah during Israel's invasion of Lebanon.
- **2006:** The Lebanon War takes place.
- **2011:** Stuxnet, an advanced computer worm discovered and believed to have been developed by the US and Israel to attack Iran's nuclear facilities.

Current conflict:
- **April 13, 2024:** Iran launched an unprecedented attack on Israel, which was the first time that Iran has ever directly attacked Israel.
- **April 18, 2024:** Israel carried out a strike inside Iran, which targeted the Iranian province of Isfahan, where significant nuclear facilities are located.
- **April 19, 2024:** At least three members of the Iranian-backed Popular Mobilization Units were wounded following explosions at a military base south of Baghdad, Iraq.
- The conflict between Iran and Israel continues, with both sides trading blows and engaging in a proxy war that has involved various countries in the region.

India's stand in this conflict:
- **Neutrality:** India maintains a neutral stance, avoiding taking sides in the conflict.
- **De-escalation:** India calls for immediate de-escalation of the conflict to maintain regional peace and stability.
- **Protection of Indian interests:** India prioritizes the safety and security of its citizens living and working in the region.
- **Energy security:** India's economic interests are tied to energy security and a conflict could impact oil supplies from the region.
- **Strategic relations:** India values its strategic relationships with both Iran and Israel, as well as with other countries in the region.
- **Regional stability:** India seeks to maintain regional stability and prevent the conflict from spreading to other countries.
- **Diplomatic efforts:** India supports diplomatic efforts to resolve the conflict through dialogue and negotiation.

Challenges faced by India due to Iran-Israel war:
- **Security of Indians in the region:** There are about 18,000 Indians in Israel and about 5,000-10,000 Indians in Iran. Additionally, about 90 lakh people are living and working in the Gulf and West Asia region.

Any conflict that expands, will end up posing a risk to the Indian community that is based in the region.

- **Economic interests:** India's economic interests are tied to energy security. The West Asia region contributes to India's 80% of oil supplies, which will be impacted by a conflict.
- **Strategic relationship:** India has invested in a strategic relationship with major Arab countries, Iran and Israel. New Delhi sees the region as its extended neighborhood, and it has been working with all sides in the turbulent region to push for the India-Middle-East-Europe Economic corridor, which has strategic as well as economic benefits for Delhi. A conflict has the potential to unravel the consensus that has been built.
- **Impact on oil prices:** Any disruption in oil production or transportation in the region could lead to supply shortages, impacting prices globally. A direct Israel-Iran war would have an effect on the energy market. Any direct hit to Iran's oil production would lead to a price rise.

Conclusion:

India's position is guided by its commitment to peace, stability and economic interests in the region, while also maintaining good relations with all countries involved.

Russia Withdrawing From Nagorno-Karabakh

Why in News:

Russian peacekeepers have begun withdrawing from Azerbaijan's Karabakh and other regions, ending a multi-year deployment which gave Moscow a military foothold in the strategic South Caucasus region.

News in detail:

- Nearly 2,000 Russian peacekeeping troops deployed to the breakaway region of Nagorno-Karabakh in November 2020 under a Moscow-brokered deal that halted six weeks of fighting between Azerbaijani and ethnic Armenian forces.
- Despite the deployment, Azerbaijan retook Karabakh by force in September,2023, in a move which triggered an exodus of 120,000 ethnic Armenians living there and the arrest of the breakaway area's ethnic Armenian leaders. Armenia's political leadership accused Moscow at the time of failing to protect Armenian interests, a charge Russia rejected.
- The early withdrawal of Russian peacekeepers, temporarily stationed in the territory of the Republic of Azerbaijan has been decided by the leaders of Russia and Azerbaijan. The peacekeepers had originally been stationed until 2025.

About the dispute:

- The dispute between Armenia and Azerbaijan is a complex and longstanding conflict over the Nagorno-Karabakh region, which is situated in the South Caucasus.
- **Historical Background:** Nagorno-Karabakh has been inhabited by Armenians for centuries, but it was incorporated into the Azerbaijani Soviet Socialist Republic in 1921 by the Soviet Union.

- **Ethnic and Religious Differences:** Armenians are predominantly Christian, while Azerbaijanis are mainly Muslim, contributing to the conflict's ethnic and religious dimensions.
- **Territorial Claims:** Armenia claims Nagorno-Karabakh as part of its historic territory, while Azerbaijan asserts its sovereignty over the region.
- **1988-1994 War:** The conflict escalated into a full-scale war in 1988, resulting in Armenian forces capturing Nagorno-Karabakh and surrounding territories.
- **Ceasefire and Stalemate (1994-2020):** A ceasefire agreement was signed in 1994, but a lasting peace settlement was not achieved, leaving the region in a state of limbo.
- **2020 War:** Tensions flared in September 2020, leading to a 44-day war that ended with Azerbaijan regaining control over parts of Nagorno-Karabakh and surrounding territories.
- **Territorial Adjustments:** The 2020 war resulted in Armenia returning control of several districts to Azerbaijan, while Nagorno-Karabakh's status remains unresolved.
- **Political and Diplomatic Tensions:** The conflict has led to ongoing political and diplomatic tensions between Armenia and Azerbaijan, with both sides accusing each other of aggression and violations of ceasefires.
- **International Involvement:** The conflict has drawn

international attention, with organizations like the OSCE Minsk Group (co-chaired by France, Russia, and the United States) attempting to facilitate a peaceful resolution. Russia successfully brokered a deal on November 9, 2020, which was reinforced by Russian peacekeepers and ended the six-week Second Nagorno-Karabakh War.

- **Humanitarian Impact:** The conflict has resulted in significant humanitarian consequences, including displacement, casualties and damage to infrastructure.

Conclusion:

The dispute between Armenia and Azerbaijan is a complex web of historical, ethnic, religious and territorial factors, requiring a comprehensive and inclusive approach to achieve a lasting peace.

Sweden & Slovenia Joins Artemis Accord

Why in News:

Sweden and Slovenia became the 38th and 39th country respectively to sign the Artemis Accords. The Artemis Accords are a set of principles and guidelines for global cooperation in space exploration, with 39 contributors including Australia, France, Germany, India, Japan, United Kingdom, United States of America and others.

Key points related to Artemis Accords:

- **Purpose:** The Artemis Accords are a set of guidelines to ensure safe, peaceful, and prosperous civil exploration and use of outer space, the moon, Mars, comets, and asteroids.
- **Established by:** NASA and the U.S. State Department in 2020 with seven other founding members.

Key Principles:

- **Peaceful Purposes:** All activities must be conducted for peaceful purposes.
- **Transparency:** Nations must publicly describe their policies and plans.
- **Interoperability:** Nations must use open international standards to ensure safe and robust space exploration.
- **Emergency Assistance:** Nations must provide assistance to those in need.
- **Registration of Space Objects:** Nations must register their space objects to ensure a safe and sustainable environment in space.
- **Release of Scientific Data:** Nations must release their scientific data publicly to ensure global benefit.

- **Protection of Heritage:** Nations must protect historic sites and artifacts in space.
- **Space Resources:** Nations can extract and utilize space resources under the Outer Space Treaty.
- **Deconfliction of Activities:** Nations must provide public information about their operations to prevent harmful interference.
- **Orbital Debris and Spacecraft Disposal:** Nations must plan for the mitigation of orbital debris and the safe disposal of spacecraft.

Signatories:

- As of April 19, 2024, 39 countries have signed the accords, including 19 in Europe, eight in Asia, five in

South America, three in North America, three in Africa, and two in Oceania.

- **India's Participation:** India joined the Artemis Accords in 2023, becoming the 27th country to sign.

Significance of the Artemis Accords for India:

- **Advancements in lunar exploration:** India will benefit from collaborating with other nations, including the United States, in future Moon missions.
- **Access to advanced training:** India's participation in the Artemis Accords facilitates access to advanced training, technological advancements, and scientific opportunities.
- **Enhanced capabilities:** Collaborating with NASA would enhance India's capabilities for the Gaganyaan human mission and future ambitious space missions.
- **Cost-effective missions:** India's cost-effective missions and innovative approach will benefit the Artemis program, promoting mutual advancements in space exploration.
- **Global space power:** India's decision to join the Artemis Accords highlights its dedication to global space cooperation and a keen interest in participating in lunar exploration missions.

Conclusion:

The Artemis Accords mark a significant step forward in the next chapter of space exploration, demonstrating that international cooperation can achieve great things in the pursuit of human progress and advancement.

State of World Population

Why in News:

Recently published, State of World Population 2024 report, by United Nations Population Fund's (UNFPA) has revealed that India's population is estimated to double in 77 years. India's population is estimated to have reached 1.44 billion, with 24% in the 0-14 age bracket.

Key findings of the report:

- India leads globally with an estimated population of 1.44 billion, followed by China at 1.425 billion.
- The report further detailed that an estimated 24 per cent of India's population is aged 0-14 while 17 per cent is within the 10-19 age range.
- The segment aged 10-24 is estimated to constitute 26 per cent, with the 15-64 age group making up 68 per cent. Additionally, 7 per cent of India's population is aged 65 years and above, with men having a life expectancy of 71 years and women 74 years.
- According to the report, the child marriage percentage in India was at 23 between 2006-2023.
- The report noted that maternal deaths in India have fallen considerably, accounting for 8 per cent of all such fatalities worldwide.
- India's success is often attributed to improved access to affordable, quality maternal health services as well as efforts to address the impact of gender discrimination on health outcomes. However, the report noted that India continues to see dramatic inequities in maternal death risk.
- The report noted that women with disabilities are up to 10 times more likely to experience gender-based violence than their peers without disabilities.
- Women and girls with disabilities, migrants and refugees, ethnic minorities, LGBTQIA+ people, people living with HIV and disadvantaged castes all face greater sexual and reproductive health risks and also unequal access to sexual and reproductive health care.

About the report:

- The State of the World Population Report is an annual report published by the United Nations Population Fund (UNFPA) that covers and analyzes the developments and trends in world population and demographics, as well as sheds light on specific regions, countries and population groups and the unique challenges they face.

About United Nations Population Fund:

- The United Nations Population Fund is a UN agency that focuses on improving reproductive and maternal health worldwide. It works in partnership with governments, along with other United Nations agencies, communities, NGOs, foundations and the private sector to raise awareness and mobilize the support and resources needed to achieve its mission to promote the rights and health of women and young people. The UNFPA supports programs in more than 144 countries across four geographic regions: Arab States and Europe, Asia and the Pacific, Latin America,

the Caribbean and Africa.

Conclusion:

The State of World Population Report 2024 highlights the need to address persistent inequalities and discrimination that hinder progress in sexual and reproductive health and rights. The report emphasizes the need for collective action to address these challenges and ensure a more equitable and sustainable future for all.

GCC's Vision For Regional Security

Why in News:

The Gulf Cooperation Council (GCC) announced the launch of its 'Vision for Regional Security'. It is a new initiative formulated by the six-country bloc in December, 2023.

Major Highlights of the vision:

- The vision outlines 15 specific points addressing regional security and stability, economy and development, as well as climate change.
- **Regional Security and Stability:** It seeks to resolve Israel's occupation of Palestinian territories, reaffirming the GCC's commitment to the Arab Peace Initiative. The vision also calls for the end of Israeli settlements in the occupied West Bank, identifying the conflict as a key destabilizing factor in the region.
- **Nuclear Non-Proliferation:** The vision acknowledges the long-standing issue of nuclear non-proliferation in the region, particularly concerning Iran's nuclear program. It expresses a commitment to the right to civil nuclear use, a policy sought by the UAE and Saudi Arabia.
- **Maritime and Waterway Security:** It emphasizes the importance of maintaining maritime and waterway security in the region.
- **Counterterrorism and Weapons Proliferation:** The vision commits to combating terrorism and its financing, aiming to prevent weapons, including ballistic missile technology and drone systems, from reaching armed groups. It also calls for the criminalization of all groups carrying out terrorist acts, irrespective of their political or sectarian affiliation.
- Other points include addressing cyber security issues, global energy market stability, climate change and the advancement of implementing a 'circular carbon economy' and securing water security.

Implication of this Vision:

- The timing of the vision's announcement was significant, coinciding with regional turmoil exacerbated by Israel's conflict with Gaza.
- It presents an opportunity to mend the divisions within the GCC, notably the blockade on Qatar by three bloc members following the Arab Spring.
- The vision addresses shared concerns about regional terrorism, the security of maritime waterways and the use of drones and ballistic missiles. These issues have escalated during the Gaza conflict, including the Houthi's attacks with ballistic missiles and drones on international shipping in the Red Sea. In response, a multinational force led by the US has been deployed to protect vessels, and retaliatory airstrikes against the Houthis have been conducted. Iran-linked militias in Iraq and Syria have also targeted US bases.

Conclusion:

The vision reflects the Gulf States' ambitions in promoting their visions for diplomacy, multilateral cooperation, and economic and energy stability. The divide resulting from US-China tensions, Russia's invasion of Ukraine and Israel's war on Gaza has led to the GCC states embracing increasingly non-aligned and/or multi-aligned approaches to geopolitics. Questions remain about what the vision would mean in practice, particularly with such divergent views and actions among members regarding the war on Gaza and conflict in Sudan.

UNESCO Global Geoparks Network

Why in News:

UNESCO's Executive Board has endorsed the addition of 18 sites to the UNESCO Global Geoparks network. This brings the total number of geoparks to 213 in 48 countries.

More information:

- The new geoparks are situated in Brazil, China, Croatia, Denmark, Finland, France, Greece, Hungary, Poland, Portugal and Spain. There is an additional new transboundary geopark spanning Belgium and the Kingdom of the Netherlands.
- The newly designated UNESCO Global Geoparks consist of:

S. No	Countries	Geoparks
1.	**Belgium and Kingdom of the Netherlands**	1. Schelde Delta UNESCO Global Geopark
2.	**Brazil**	2. Uberaba UNESCO Global Geopark
3.	**China**	3. Enshi Grand Canyon-Tenglongdong Cave UNESCO Global Geopark 4. Linxia UNESCO Global Geopark 5. Longyan UNESCO Global Geopark 6. Mount Changbaishan UNESCO Global Geopark 7. Wugongshan UNESCO Global Geopark 8. Xingyi UNESCO Global Geopark
4.	**Croatia**	9. Biokovo-Imotski Lakes UNESCO Global Geopark
5.	**Denmark**	10. The South Fyn Archipelago UNESCO Global Geopark
6.	**Finland**	11. Impact Crater Lake – Lappajärvi UNESCO Global Geopark
7.	**France**	12. Armorique UNESCO Global Geopark 13. Normandie-Maine UNESCO Global Geopark
8.	**Greece**	14. Meteora Pyli UNESCO Global Geopark
9.	**Hungary**	15. Bükk Region UNESCO Global Geopark
10.	**Poland**	16. Land of Extinct Volcanoes UNESCO Global Geopark
11.	**Portugal**	17. Oeste UNESCO Global Geopark
12.	**Spain**	18. Calatrava Volcanoes. Ciudad Real UNESCO Global Geopark

What are geoparks?

- The UNESCO Global Geopark designation was created in 2015. It recognizes geological heritage of international significance.
- The Global Geoparks are single, unified geographical areas where sites and landscapes of international geological significance are managed with a holistic concept of protection, education and sustainable development.
- UNESCO Global Geoparks are given this designation for a period of four years after which the functioning and quality of each UNESCO Global Geopark is thoroughly re-examined during a revalidation process.
- On 26 March, UNESCO and Gestalten released a book profiling all UNESCO Global Geoparks designated up to 2022.

Conclusion:

Geoparks fulfill a vital role for local communities by preserving their unique geological heritage while actively engaging the public and promoting sustainable development. UNESCO Global Geoparks, in particular, foster local pride and strengthen community ties by highlighting the region's geological significance. Additionally, they stimulate the creation of innovative local businesses, generate new job opportunities, and provide high-quality training courses, all supported by the revenue generated from geotourism.

Environment

Forest fire in Uttarakhand and other parts of India: What is the solution?

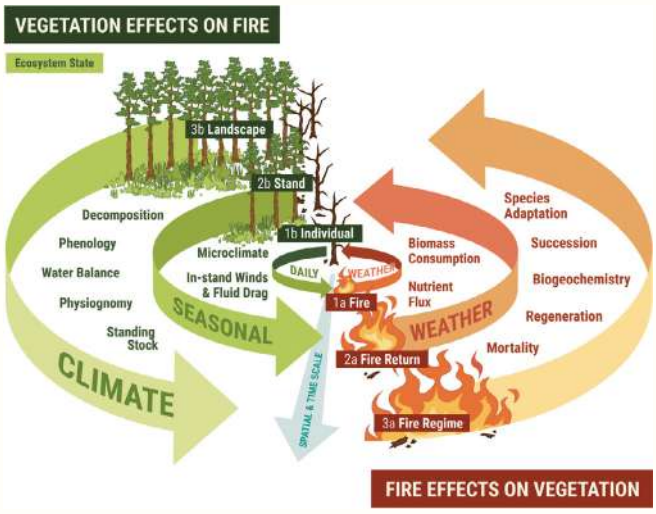
Forest fires pose a significant challenge, especially during the summer season, impacting the environment, ecology, biodiversity, and wildlife conservation. Both natural and man-made factors contribute to these fires. Recently, the Kumaon region of Uttarakhand has faced a resurgence of forest fires, highlighting the urgent need for effective management and conservation strategies.

Nearly 100 hectares of forest have been reduced to ashes in Uttarakhand due to a fire exacerbated by the ongoing heat wave, which has increased dryness in the region and hence has increased the fire instances. These fires are of such magnitude that they are visible from space. Images captured by the European Space Agency's Sentinel-2 satellite reveal extensive fires with billowing smoke across many parts of the state. Since its outbreak on April 27, the fire has ravaged trees and wildlife across an area exceeding 814 hectares. At least 40 active fires have been identified in Uttarakhand by MODIS sensors on US space agency NASA's Aqua and Terra satellites. Of the total active fires detected by the FSI in the last 24 hours, 10 have been classified as 'major'.

The frequency of forest fires in Uttarakhand is a recurring issue attributed to dry weather, human activities, lightning, and climate change. Despite government and administrative efforts, a lasting solution remains elusive. The severity has prompted the Indian Army and NDRF to collaborate in firefighting efforts. Additionally, a petition has been filed in the Supreme Court, underscoring the gravity of the situation. Efforts are being made to control the forest fire by filling bambi buckets from Air Force aircraft through Bhimtal Lake water.

How much have the incidents of fire increased in a year:

- There were 299 incidents of fire in Almora district in March-April 2023, while in the same March April months of 2024, 909 incidents of fire have taken place. Similarly, in Champawat district, there were 120 forest fire incidents in the year 2023 which increased to 1025 in 2024. In Garhwal district too, 378 fire incidents took place in March-April 2023, while this year the figure of 742 has been crossed. Similarly, in Nainital last year, 207 fire incidents were recorded in two months, which has increased to 1524 this year.

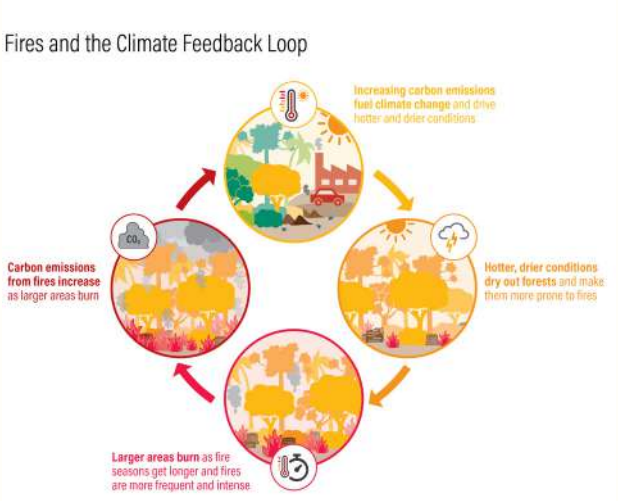


Causes of forest fires:

- Forest fires in Uttarakhand peak from February to June, fueled by the region's dry and hot weather conditions. Nainital's forests, in particular, suffer due to a lack of moisture, exacerbating the risk. The combination of dry leaves and other combustible materials readily ignites under the intense heat. Often, these fires result from the negligence of both local residents and tourists.
- Local residents sometimes set fires in forests to promote the growth of high-quality grass or to conceal illegal tree cutting and hunting activities, inadvertently causing widespread forest fires. Additionally, tourists may contribute to fires by carelessly discarding burning cigarettes or other materials. Forest fires also arise from natural causes such as lightning or the friction of electrical wires with dry leaves. Moreover, changing climate patterns are leading to hotter and drier weather conditions, further exacerbating the incidence of forest fires.

Global impact of forest fire:

- The number and duration of wildfires has been increasing alarmingly around the world in recent years, with profound impacts on biodiversity, ecosystem services, human well-being, livelihoods and national economies. Forest areas are particularly affected by this and about 100 million hectares of forest area is being affected every year which is equivalent to about 3 percent of the world's forest area.



- The severity of wildfires is exemplified by a number of high-profile accidents that have led to unhealthy air quality and loss of human life, wildlife, ecosystem services, including wildfire disasters this summer in the Northern Hemisphere. And there has been huge damage to property. The situation is no different in India too, because due to the changing climate in the country, forest fires are becoming a regular occurrence.
- Last year, India hosted the United Nations Forum on Forests to discuss forest fires and forest certification. The Ministry of Environment, Forest and Climate Change organized the 'Country Led Initiative' (CLI) program as a part of the United Nations Forum on Forests at the Forest Research Institute, Dehradun from October 26 to 28, 2023.
- The United Nations Forum on Forests promotes the management, conservation and sustainable development of all types of forests. India has the honor of being its founding member.
- The United Nations General Assembly has adopted the first United Nations Strategic Plan for Forests for the period 2017 to 2030. The Strategic Plan serves as a global framework for action at all levels to achieve sustainable management of all tree species while reducing deforestation and degradation of forest and forest cover.

Efforts of the Government of India to combat forest fires:

- The Ministry of Environment, Forest and Climate Change, Government of India has prepared a National Action Plan on Forest Fire to reduce forest fires. The scheme involves taking action by informing, enabling and empowering forest marginal communities and encouraging them to work closely with forest departments.
- This includes reducing the vulnerability of forests to fire hazards, enhancing the capabilities of forest personnel and institutions to fight fires and accelerating recovery after a fire event.
- The Environment Ministry, Government of India, has also constituted a Central Monitoring Committee (CMC) to monitor the implementation of the National Action Plan on Forest Fire.
- Along with this, the Environment Ministry also supports the efforts of the States/Union Territories in prevention and control of forest fires by providing financial assistance.
- Forest fire prevention and mitigation measures are funded under the centrally sponsored Forest Fire Prevention and Management Scheme, Development of Wildlife Habitats and Compensatory Afforestation Fund Management and Planning Authority.
- The funds are used for construction and maintenance of fire lines, construction of water conservation structures, purchase of firefighting equipment,

awareness generation and encouraging villages/ communities for forest fire safety, etc. Furthermore, forest fire prevention and its management have been made primarily the responsibility of the respective State Governments/Union Territory Administrations.

- The Central Government has from time to time issued advisories to the States to create awareness among the forest marginal communities to protect forests from fire. Under the centrally sponsored scheme, incentives are provided to communities, Joint Forest Management Committees, Eco Development Committees for better protection of forests from fire.

Ways through which the forest fires can be stopped:

- In remote mountainous or densely forested areas where fire brigades struggle to access water and supply is limited, traditional methods such as "cross fire" are employed. This technique involves deliberately setting smaller fires to create a barrier, depriving the main fire of fuel and halting its advance.
- In this, a second fire is started by digging a trench at some distance from the hill where the first fire is started. As soon as the flames already started by the strong wind reach the fire lit in the ditch, the fires on both sides subside as soon as they meet each other. Digging a trench also destroys the chain of dry grass.
- The scientific reason behind this is that fire needs oxygen to progress. But due to cross fire or new fire, the already started fire does not get oxygen. This calms the fire down. Also, in traditional methods, fire is extinguished by putting green leaves and wet wood. Wherever their is fire, green leaves and wet twigs are put there. Due to this, the grass fire does not spread further.
- Slash-and-burn practices should be avoided to increase cultivated land to control forest fires. In this, forests are cut and dry trees and leaves are burnt. Many times the fire gets out of control and spreads throughout the forest.
- Apart from this, if it is not possible for the fire brigade to reach the place of fire, then the fire brigade or special wildland fire engine reaches there. If it is an area where vehicles cannot reach then the help of smoke jumpers is taken. Smoke jumpers jump into the jungle with large backpacks of water and essential supplies using parachutes and extend their aid in extinguishing the fire.

Short Issues

Soil Erosion Surge in Western Ghats

Why in News:

A new study has sounded the alarm on the rate of soil erosion in the Western Ghat Region (WGR), particularly in the region comprising portions extending into south Gujarat.

About the study:

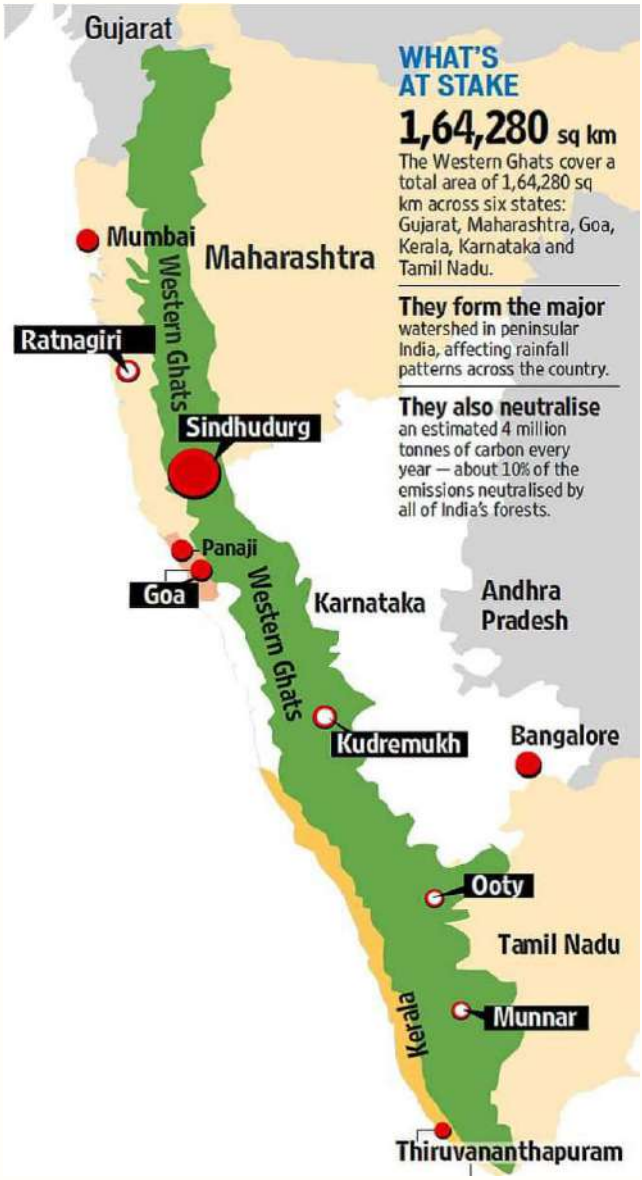
- The study reveals a staggering 94% increase in soil erosion rates across the WGR between 1990 and 2020. This soil loss was prevalent across all states bordering the Western Ghats.
- IIT-B conducted the study using data from LANDSAT-8, Digital Elevation Model (DEM), and rainfall records to estimate soil loss rates using the Universal Soil Loss Equation (USLE) method.
- The situation is particularly worrying in Gujarat and Tamil Nadu. Tamil Nadu and Gujarat registered 121% and 119% increase in soil erosion respectively since 1990.

Key findings of the study:

- **Gujarat:** According to the study, the WGR in Gujarat experienced staggering soil erosion of 119%, with soil loss reaching 75.3 tonnes per hectare per year by 2020.
- **Maharashtra and Goa:** Maharashtra also reported a significant rise of 97% in soil erosion over the same period. Goa witnessed 80% rise in soil loss reaching 54.3 tonnes per hectare per year in 2020.
- **Kerala, Karnataka and Tamil Nadu:** Kerala and Karnataka witnessed a increase of 90% and 56% respectively. Tamil Nadu witnessed a 121% increase, and soil loss reaching 68.3 tonnes per hectare per year in 2020.

About Western Ghats:

- **Topography:** The WGR is spread across six Indian states including Tamil Nadu, Kerala, Karnataka, Goa, Maharashtra, and Gujarat, ending at Marunthuvazh Malai in Kanyakumari District, near the southern tip of India.



- The Niligiri ranges southeast of Mysore in Karnataka, meet the Shevaroys (Servarayan range) and Tirumala range farther east, hence linking the Western Ghats to the Eastern Ghats.
- **Major rivers:** Major west flowing rivers in Western Ghats include Periyar, Bharathappuzha, Netravati, Sharavathi, Mandovi etc. Three main east flowing river include Godavari, Krishna and Kaveri.
- **Soil topography:** Red soil is typically found on the western side of the Ghats where the slopes are steep and the rainfall is high. These soils are rich in iron and aluminium oxides and are typically clayey in texture.

Conclusion:

Western Ghats are crucial in regulating the tropical climate of the area by intercepting the southwest monsoon, resulting in orographic rainfall and supporting a non-equatorial tropical evergreen forest ecosystem. The research highlights a pressing concern regarding climate change and unsustainable land practices, which contribute to the acceleration of soil erosion. The escalation of soil erosion in recent years can be attributed to the heightened rainfall erosivity factor. Immediate measures are imperative to mitigate human influence and enhance conservation endeavors.

Luna Structure

Why in News:

Scientist have confirmed that the crater in Gujarat, known as luna crator, has been formed due to one of the largest meteorite crash on earth about 50,000 years ago. Meteorite could have been made of iron or iron rock mix.

Prediction by the scientist:

- Luna crater has been formed due to meteorite action.
- When meteorite hits the earth, it generated colossal fire ball, shockwave and subsequently wildfire. It led to widespread loss of human and wildlife.
- In the soil iridium was present, means that crater was formed by iron meteorite.

About luna structure:

- Luna crater is an impact crater at Luna village in Bhuj taluka of Kutch district of Gujarat, India.
- An impact crater is formed when an object like an asteroid or meteoroid crashes into the surface of a larger solid object like a planet or a moon.
- The luna crater is 1.8 km wide.
- Luna region has long been associated with indus valley civilization.
- Luna structure remains submerged and inaccessible for a significant part of the year due to its location in the low lying banni plain of gujarat.

Impact craters in India:

- Dhala crater in Shivpuri district of Madhya Pradesh.
- Lonar crater at Lonar in Buldhana district of Maharashtra.
- Ramgarh Crater in Mangrol tehsil of Baran district of Rajasthan.

- Shiva crater, an undersea super crater west of India.

About meteorite:

- A meteorite is a solid piece of debris from an object, such as a comet, asteroid, or meteoroid, that originates in outer space and survives its passage through the atmosphere to reach the surface of a planet or moon.

First Nuclear Energy Summit

Why in News:

Prime Minister of Belgium and the Director General of the International Atomic Energy Agency (IAEA) co-chaired the first Nuclear Energy Summit held in Brussels on March 21.

About the summit:

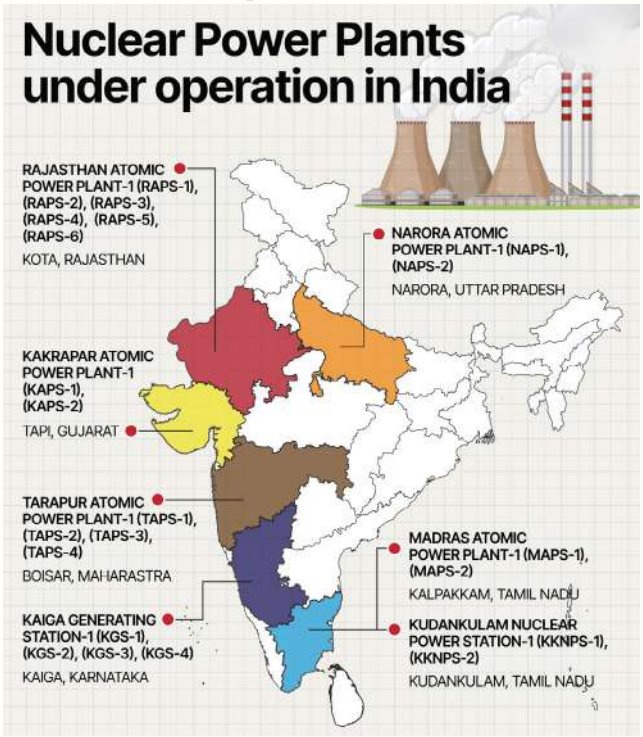
- The first Nuclear Energy Summit was held in Brussels on March 21-22, 2024.The summit marked a significant step forward for clean energy.
- The summit was collaborative effort between the International Atomic Energy Agency's (IAEA) program, Atoms4NetZero. Atoms4NetZero is harnessing the power of nuclear energy to achieve net zero carbon emissions.

Highlights of the summit:

- **Net zero emission:** The summit reaffirmed the commitment of net zero emission by promoting nuclear energy as a source of fuel and energy. The summit also focussed on integration of nuclear energy with renewable energy.
- **Collaboration:** Summit focussed on collaboration between countries related to nuclear energy particularly related to operation and maintenance.
- **Socio-Economic Benefits:** The summit explored the broader socio-economic benefits of nuclear energy. These include job creation in the nuclear industry, energy security through reduced dependence on fossil fuels and potential applications in areas like desalination and medical isotope production.
- **Rules and regulation:** Leaders emphasised the importance of transparency, robust regulatory frameworks, and effective communication strategies to build public trust in nuclear technology.
- **Financing and Investment:** A crucial aspect of the summit involved mobilising financing and attracting private investment for new nuclear projects. The summit explored innovative financing models and the role of multilateral organisations like the IAEA in facilitating investment flows towards safe and sustainable nuclear energy projects.

About Nuclear Energy:

- Nuclear energy is a form of energy released from the nucleus, the core of atoms, made up of protons and neutrons.
- This source of energy can be produced in two ways: fission and fusion process.



Nuclear fission:

- Nuclear fission is a reaction in which the nucleus of an atom splits into two or more smaller nuclei. The fission process often produces gamma photons, and releases a very large amount of energy even by the energetic standards of radioactive decay.

Nuclear fusion:

- In a fusion reaction, two light nuclei merge to form a single heavier nucleus. The process releases energy because the total mass of the resulting single nucleus is less than the mass of the two original nuclei. The leftover mass becomes energy.

Conclusion:

The summit could foster closer collaboration between nations on sharing best practices, technology transfer, and joint ventures in nuclear energy development. Advancing nuclear technologies like small modular reactors (SMRs) could address concerns about scalability and cost-effectiveness and help in mitigating of climate change. Open communication, robust safety regulations, and a clear commitment to transparency are crucial for overall

development of nuclear energy.

Afar Triangle

Why in News:

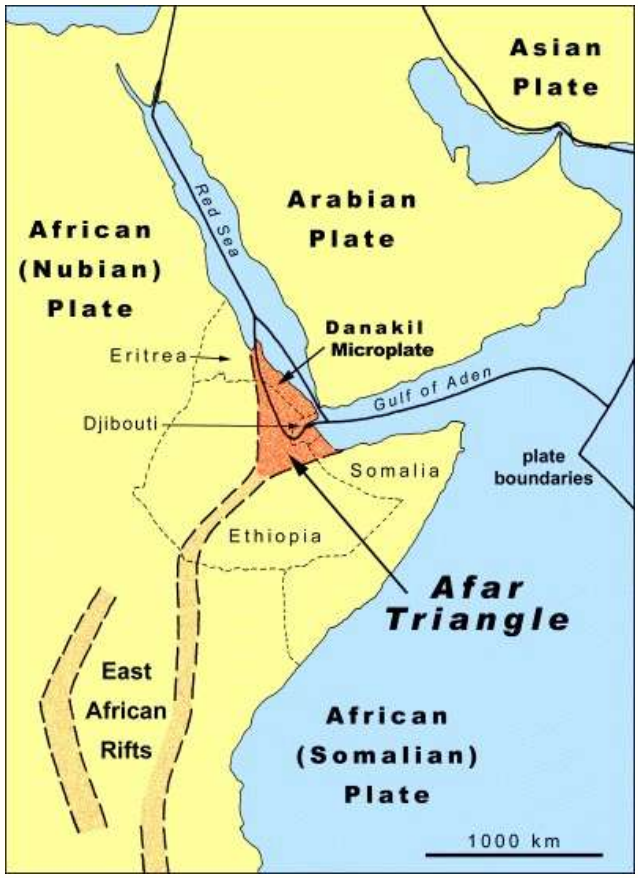
Geologists suggest that African continent which is rich and diverse in landscapes, is undergoing a unique geological event that might result in the creation of a new ocean.

Africa's Geological Dynamism: Afar Triangle

- Earth is covered by 71% water, encompassing the 5 distinct regions - Pacific, Atlantic, Indian, Southern and Arctic. The formation of a sixth distinct region could entail massive changes in the planets geography.
- Afar Triangle, also known as the Afar Depression, is located in the Horn of Africa. It is a geological depression where three tectonic plates the Nubian, Somali and Arabian plates converge
- This area is part of the East African Rift system, which stretches from the Afar region in the north to eastern Africa. Here, tectonic plates are slowly moving apart, a process that has been happening for millions of years.
- The region has disclosed fossil specimens of the very earliest hominins; that is, the earliest of the human clade, and it is thought by some paleontologists to be the cradle of the evolution of humans.

Future possibilities:

- In 2005, this process caught the world's attention when a 35-mile-long rift was opened up in the Ethiopian desert. This rift showed how the African continent is slowly splitting apart. It's caused by the Somali plate moving away from the Nubian plate, stretching and thinning the Earth's crust.
- One major factor behind the rifting process is thought to be a huge plume of very hot rocks moving up from the mantle beneath East Africa. This plume might be pushing on the crust above, making it stretch and break.
- The volcanic activity in the area, especially at the Erta Ale volcano, gives hints about this tectonic shift, showing features similar to those found at mid-ocean ridges.
- Geologists predict that in 5 to 10 million years, the tectonic movement will split the African continent into two, forming a new ocean. This ocean would form as the Red Sea and the Gulf of Aden flood over the Afar region and into the East African Rift Valley. This process would transform this part of East Africa into a new continent.



Conclusion:

The potential formation of a sixth ocean in Africa is a fascinating topic that shows how Earth is always changing. It highlights the importance of understanding our planet's geological processes, as they have profound implications for the future configuration of continents and oceans. The process takes millions of years, so we won't see it happen in our lifetimes. It's a reminder that our planet is dynamic, with tectonic plates constantly shifting and shaping the world over long periods.

Kallakkadal in Kerala

Why in News:

Swell waves recently inundated coastal areas in central and southern districts of Kerala, giving anxious moments to coastal communities and prompting district-level disaster management machineries to be in alert mode.

What is Kallakkadal event?

- Kallakkadal' is a colloquial term used by Kerala fishermen to refer to the freaky flooding episodes. During these events, the sea surges into the land causing

inundation. In 2012 UNESCO formally accepted this term for scientific use.

- Kallakkadal is caused by waves that are formed by an ocean swell, hence the name swell surge. Ocean swells occur not due to the local winds, but rather due to distant storms like hurricanes, or even long periods of fierce gale winds.
- During such storms, huge energy transfer takes place from the air into the water, leading to the formation of very high waves. Such waves can travel thousands of kilometres from the storm centre until they strike shore.
- Usually, Kallakkadal is a consequence of the strong winds in the southern part of the Indian Ocean, where an ocean swell is generated, and the waves then travel north to reach the coast in two or three days.

What are Swell Waves?

- Swell waves are a specific type of deep-water, linear, long-range wind-driven waves that result from wave dispersion during external weather events. They emerge or separate from a random wave system.
- These waves can vary greatly in form, type, shape, height, period, direction, and speed, and can be caused by any random disturbance in the sea.

Kallakkadal vs. Tsunami:

- Kallakkadal and tsunamis are distinct natural phenomena. A tsunami is a series of massive waves caused by underwater disturbances, typically associated with earthquakes near or beneath the ocean. In contrast, Kallakkadal is like a flash flood.

Conclusion:

Kallakkadal, which occurs without any precursors or local wind activity, has made it challenging for coastal communities to receive advance warnings. Nonetheless, early warning systems such as the Swell Surge Forecast System, introduced by the Indian National Centre for Ocean Information Services (INCOIS) in 2020, provide a seven-day advance warning.

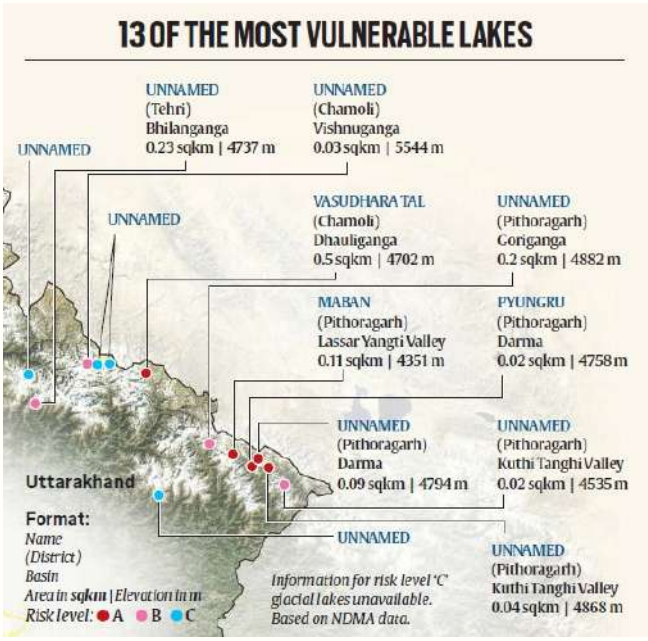
Assessment of GLOFs in Uttarakhand

Why in News:

The Uttarakhand government has constituted two teams of experts to evaluate the risk posed by five potentially hazardous glacial lakes in the region. These lakes are prone to Glacial Lake Outburst Floods (GLOFs), the kind of events that have resulted in several disasters in the Himalayan states in recent years.

More information:

- The National Disaster Management Authority (NDMA) under the Union Ministry of Home Affairs has identified 188 glacial lakes in the Himalayan states that could be breached due to heavy rainfall. Among them, thirteen are in Uttarakhand.
- The objective of the risk assessment exercise is to reduce the likelihood of a Glacial Lake Outburst Flood (GLOF) incident and to increase the time available for relief and evacuation in the event of a breach.
- Studies indicate that approximately 15 million people are at risk of sudden and deadly flooding from expanding glacial lakes, a trend attributed to global warming.



About GLOFs:

- Glacial Lake Outburst Floods (GLOFs) occur when water suddenly bursts out from glacial lakes, which are large bodies of water situated in front of, on top of, or beneath a melting glacier. As the glacier retreats, it creates depressions filled with meltwater, forming these lakes.
- These lakes are typically dammed by unstable ice or sediment made of loose rock and debris. If the dam breaks, massive amounts of water rush down the mountainside, leading to flooding downstream, known as a GLOF event.
- GLOFs can be triggered by different factors. For example, when large pieces of ice break off from a glacier and fall into a lake, they displace water suddenly.

- Avalanches or landslides can also disturb the boundary of a glacial lake, causing it to fail and release water rapidly.

Impact of such event:

- GLOFs can unleash large volumes of water, sediment, and debris downstream with formidable force and velocity. The floodwaters can submerge valleys, obliterate infrastructure such as roads, bridges, and buildings and result in significant loss of life and livelihoods.
- Since 1980, GLOF events have increased in the Himalayan region, especially in southeastern Tibet and the China-Nepal border area.

GLOFs in Uttarakhand:

- Uttarakhand has experienced two major GLOF events recently. The first occurred in June 2013, affecting large parts of the state, with the Kedarnath valley being the most severely affected, resulting in thousands of deaths.
- The second event took place in February 2021, causing flash floods in Chamoli district due to a glacier lake bursting.
- In Uttarakhand, 5 of 13 lakes are highly sensitive and are in the 'A' category. They include Vasudhara Tal of Dhauliganga basin in Chamoli district, and four lakes in Pithoragarh district.

Conclusion:

In recent years, there has been a rise in GLOF events in the Himalayan region due to higher global temperatures leading to increased glacier melting. The rapid development of infrastructure in vulnerable areas has also played a role in this increase. Regular monitoring of these events is essential for effective disaster management.

Cleanest Air in Southern Ocean

Why in News:

A recent study conducted in the Southern Ocean has revealed key factors contributing to the presence of the world's cleanest air in the region.

Reasons behind clean air in southern ocean region:

- **Minimal human activities:** The Southern Ocean experiences minimal human activity, leading to lower industrial emissions and reduced burning of fossil fuels compared to other parts of the world.
- **Aerosol levels:** Aerosol levels in Southern ocean are influenced by a range of factors. These include the amount of salt spray and seasonal variation in the growth of tiny plant-like organisms called phytoplankton, which are a source of airborne sulphate particles.
- **Role of clouds:** Clouds and rain play a crucial role in scrubbing the atmosphere clean. The Southern Ocean is the cloudiest place on Earth. It experiences short-lived, sporadic showers like nowhere else.
- **Distinctive honeycomb-shaped cloud patterns:** Research indicates that open honeycomb-shaped clouds, which are prevalent in the Southern Ocean (Open and closed Honeycomb cells) in the region influence the amount and distribution of rainfall. It generates intense rain showers that effectively wash aerosol particles out of the air.
- The study revealed that these open honeycomb clouds are more prevalent during the winter months, coinciding with the period when the Southern Ocean's air is at its cleanest.
- Large-scale weather systems, including storms, control the pattern of the cloud field over the Southern Ocean. These weather systems produce open and closed honeycomb cells, which further affect rainfall and aerosol levels.

About Southern Ocean:

- The Southern Ocean is the youngest and one of the five great ocean basins on Earth. It was formed when Antarctica and South America drifted apart, creating the Drake Passage.
- It is made up of the portions of the world ocean, south of the Pacific, Atlantic and Indian oceans and their tributary seas surrounding Antarctica below 60° S. It is known for its strong winds, intense storms and seasonal changes and cold temperatures.
- It is dominated by the Antarctic Circumpolar Current (ACC) which is the longest, strongest, deepest-reaching current on earth. The ACC circulates clockwise around the continent, carrying more water around the globe than any other current.
- It is one of the most productive marine ecosystems on Earth. In summer billions of microscopic algae (phytoplankton) proliferate, spreading into blooms large enough to be seen from space.

Conclusion:

The Southern Ocean remains less explored due to various factors, including the lack of high-quality observations of clouds, rainfall and aerosols in this poorly observed region. Further research in this area could enhance our understanding of weather patterns, the region's role in climate change, and other dimensions.

Renewable Energy Capacity in India

Why in News:

According to the latest data by the Ministry of New & Renewable Energy, India has added a record renewable energy capacity of 18.48 GW in 2023-24, which is over 21% higher than 15.27 GW a year ago.

More about the News:

- According to the data, India's installed renewable energy capacity is 143.64 GW as of March 31, 2024, excluding 47 GW of large hydropower capacity.
- Among the renewable energy capacity, the total solar installed capacity tops the chart at 81.81GW, followed by about 46 GW of wind energy, 9.43 GW of biomass cogeneration and 5 GW of small hydro (up to 25 MW capacity each). The solar installations of 12.78 GW led the renewable energy capacity addition of 15.27 GW in 2023-24, followed by 2.27 GW of wind energy.
- Among the states, Gujarat and Rajasthan have the largest renewable energy capacities of about 27 GW each, followed by Tamil Nadu at about 22 GW, Karnataka at about 21 GW and Maharashtra at about 17 GW. Himachal Pradesh and Andhra Pradesh have installed renewable energy capacity of about 11 GW each.
- Further it was pointed out that renewable energy capacity stood at around 190 GW, including large hydro projects. India needs to add 310 GW in the next six years or at an average of 50 GW per annum.

-: You should also know :-

Agrivoltaics

Agrivoltaics pair solar with agriculture, creating energy and providing space for crops, grazing, and native habitats under and between panels. Thus, farmers can grow crops while also being 'prosumers' (Producers and Consumers) of energy.

Challenges in renewable Sector:

- **Poses competition:** The development of renewable infrastructure requires essential natural resources which might jeopardize with other productive activities like agriculture and other related livelihoods.
- **Employment shifts:** Large-scale renewable energy projects can boost employment locally, but they can also lead to major national-level shifts in employment sectors. To protect unskilled and poorer populations, it's essential to implement targeted skilling and training programs.
- **Impact on biodiversity:** Open natural systems, like deserts, play a crucial role in providing essential ecosystem services. Disturbances to these systems can lead to ecological damage and potentially contribute to climate change. Example: States such as Gujarat and Rajasthan offer ideal conditions for the development of renewable energy infrastructure. However, this poses a threat to the ecosystem of the Great Indian Bustard, a critically endangered species.

Conclusion:

The world stands at the cusp of a second green revolution, this time focused on energy. There is a unique opportunity to anticipate and address the unintended consequences of this revolution by aligning technological, economic, and institutional structures to maximize synergies between sustainability, climate change mitigation, and development goals. Involving local governance units in the planning and siting processes of renewable energy projects, such as solar parks, can align local developmental objectives with the goals of sustainable energy development.

India's Soil Health

Why in News:

Study named 'Geospatial modeling and mapping of soil erosion in India', has for the first time, classified soil erosion on a pan-India basis and has revealed a worrying trend for India's soil health.

Key findings of the study:

- Study has classified soil erosion into six levels, ranging from "minor" to "catastrophic," which is based on the amount of soil lost per hectare annually.
- A region would be classified as "catastrophic" if it experiences erosion exceeding 100 tonnes of soil per hectare in a year.
- As per the study approximately 30% of the country's landmass is experiencing "minor" soil erosion, while a significant 3% is facing "catastrophic" topsoil loss.
- **The Brahmaputra Valley in Assam:** The study pointed out that the biggest hotspot for soil erosion in the country is the Brahmaputra Valley in Assam. The northeastern state Assam lost close to 300

square kilometres or 31 per cent of its surface soil to "catastrophic" erosion.

- **The lower reaches of the Himalaya:** These regions too are characterized by moraine or loose soil and highly unstable slopes. Spanning from the Kashmir Valley to the southern regions of Himachal Pradesh and Uttarakhand, this region extends across the border into Nepal.
- It is one of the most prominent erosion hotspots in the country, exacerbated by its susceptibility to seismic activity or earthquakes.
- **Odisha:** It is also a significant hotspot for "catastrophic" erosion. Erosion here extends from the southern reaches of the Mahanadi River, traversing along the western borders of Odisha's lush green cover and natural forests, all the way to the northern parts of Andhra Pradesh. This underscores the significant soil degradation experienced by the forest cover in the region.
- District-wise, the study highlighted that nine out of the 20 most susceptible districts to soil erosion in the country are located in Assam.
- The national mean for soil in the country stood at 21 tonnes per hectare per year.

-: Prelims Insights :-

The RUSLE Equation: Known as Revised Universal Soil Loss Equation or the R-factor, the equation takes into account various factors like predicted crop loss, rainfall and runoffs, soil erodibility, steepness and length of a slope of a mountain, crop management and support practices like strip cropping, etc., to estimate soil loss at 250 metre spatial resolution.

Conclusion:

According to the Food and Agriculture Organization of the United Nations, it could take up to 1,000 years to produce 2 to 3 centimeters of topsoil, which has a depth of 6 cm. Topsoil, the uppermost layer of soil, is vital for agriculture as it holds nutrients and moisture essential for plant growth. Erosion significantly reduces fertility and can lead to decreased crop yields.

Global Forest Watch data on Indian Forests

Why in News:

The Global Forest Watch, which tracks forest changes in near real-time using satellite data and other sources, has recently disclosed concerning trends about Indian Forests covers.

Key highlights of the report:

Global statistics:

- The loss of primary forests those untouched by people and sometimes known as old-growth forests in the tropics declined 9% last year compared to 2022.
- The world last year lost about 37,000 square kilometers (14,000 square miles) of tropical primary forest, an area nearly as big as Switzerland.
- Brazil, the Democratic Republic of Congo and Bolivia ranked highest among tropical countries for primary forest losses. Globally, deforestation increased by 3.2% in 2023.

Statistics with respect to India:

- India has lost 2.33 million hectares of tree cover since 2000, equivalent to a six per cent decrease in tree cover during this period.
- Further India has lost 4,14,000 hectares of humid primary forest (4.1 per cent) from 2002 to 2023, making up 18 per cent of its total tree cover loss in the same period.
- The data showed that 95 percent of the tree cover loss in India from 2013 to 2023 occurred within natural forests.
- The GFW data showed that five states accounted for 60 percent of all tree cover losses between 2001 and 2023.
- Assam had the maximum tree cover loss at 324,000 hectares, compared to an average of 66,600 hectares. Mizoram lost 312,000 hectares of tree cover, Arunachal Pradesh 262,000 hectares, Nagaland 259,000 hectares, and Manipur 240,000 hectares.

Carbon dioxide emissions:

- Between 2001 and 2022, forests in India emitted 51 million tons of carbon dioxide equivalents annually, while removing 141 million tons of carbon dioxide equivalent per year. This resulted in a net carbon sink of 89.9 million tons of carbon dioxide equivalent annually.
- Additionally, an average of 51.0 million tons of carbon dioxide equivalent per year was released into the atmosphere due to tree cover loss in India.

Conclusion:

The tree cover loss data provided by Global Forest Watch offers the most comprehensive spatial information on global forest changes. However, the data has evolved over time due to algorithm enhancements and improved satellite data. Global Forest Watch uses tree cover as a metric for assessing forest extent, loss, and gain because it can be easily observed from space using medium-resolution satellite imagery. However, tree cover loss does not always indicate forest loss, and tree cover gain does not always mean forest gain, due to the complexities of defining a forest based on both tree cover and land use.

Acidification of Soil

Why in News:

According to a study published in journal science, due to acidification, soil losses inorganic carbon. Inorganic carbon is a stable carbon pool in soil which regulates nutrient level in the soil. The study noted that depletion could hurt the health of soil. Further in India, soil acidification might lead to loss of 3.3 billion tonnes of soil inorganic carbon from the top 0.3 metres of soil over next 30 years.

About soil acidification:

- It is a process by which soil becomes more acidic, typically due to natural factors like rainfall and biological processes, as well as human activities such as industrial emissions and the extensive use of nitrogen-based fertilizers. This process leads to a decrease in soil pH, which can adversely affect plant growth, nutrient availability and soil biology.
- Soil acidification is already a concern in the country, affecting about 48 million hectares (mha) out of 142 mha of arable land. Acidic soils in India are widespread in the humid southwestern, northeastern and Himalayan regions. The northeastern region, in particular has recorded acidity in approximately 95% of the soils.

Reason behind soil acidification:

- **Intensive use of nitrogenous fertilizers:** Excessive application of nitrogen fertilizers like urea, ammonium sulfate and ammonium nitrate leads to soil acidification. These fertilizers release hydrogen ions, which accumulate in the soil, decreasing its pH.
- **Overuse of acid-forming fertilizers:** Fertilizers like ammonium sulfate and ammonium nitrate are acid-forming and their prolonged use contributes to soil acidification.
- **Crop residue burning:** Burning crop residues releases nitrogen oxides, which react with water to form nitric acid, contributing to soil acidification.
- **Industrial and vehicular pollution:** Atmospheric deposition of sulfur and nitrogen compounds from industrial and vehicular emissions can lead to soil acidification.
- **Soil erosion and nutrient depletion:** Soil erosion and nutrient depletion due to intensive farming practices and deforestation can lead to soil acidification.
- **Natural processes:** India's geology, with vast areas of acidic parent rocks like granite and basalt, can naturally lead to acidic soils.
- **Climate change:** Increased temperature and altered precipitation patterns can enhance soil acidification processes.

Impact soil acidification:

- **Soil inorganic carbon (SIC) loss:** Soil acidification can result in the loss of SIC, which is important for soil health and ecosystem services.
- **Reduced crop growth and productivity:** Acidic soils can limit the availability of essential nutrients for plants, affecting crop growth and productivity.
- **Depletion of nutrients:** Soil acidification can lead to the depletion of nutrients in the soil, affecting its ability to regulate nutrient levels, foster plant growth and store carbon.
- **Economic implications:** Soil acidification can have significant economic implications, particularly in a heavily populated and agrarian country like India.
- **Food security concerns:** Soil acidification can affect agricultural productivity, leading to food security concerns.

Way Forward:

The following steps may help in curbing the acidification of soil:

- **Liming:** Apply lime or dolomite to neutralize acidity and raise soil pH.
- **Balanced fertilization:** Use a balanced mix of fertilizers, including lime or dolomite, to maintain soil pH.
- **Organic amendments:** Add organic matter like compost, manure, or green manure to improve soil structure and fertility.
- **Crop rotation:** Rotate crops to break disease and pest cycles, and include legumes to fix nitrogen.
- **Integrated nutrient management:** Optimize fertilizer use, considering soil type, crop requirements, and nutrient cycling.

Plankton Crash

Why in News:

The panel formed by the National Green Tribunal (NGT) to probe the cause of the sea turning red in Puducherry in October and November 2023 has attributed the phenomenon to plankton crash.

More about the News:

- The panel dismissed the earlier possibility of algal bloom and contamination from a nearby paper manufacturing unit's effluents flowing into a canal that leads to the sea, citing that the unit's soaking and beating processes in October-November 2023 did not coincide with the discoloration at Promenade Beach.
- Instead, they attributed the phenomenon to a plankton crash, pointing to a high iron concentration that may have favored plankton bloom.
- According to a study by Annamalai University, a majority of a particular unicellular species of phytoplankton, Noctiluca scintillans, in the sea were found ruptured, leading to the release of red pigment into the sea.
- Environmental parameters such as sea surface temperature (31°C), salinity (41 psu), pH (6.5), and dissolved oxygen (5.8 ppm) were assessed and found to be conducive to the development of this species.

-: Prelims Insights :-

Plankton: Planktons are the organisms that cannot swim against currents, instead they rely on water movements for their mobility. Example: protozoans, bacteria, algae, mollusks, and coelenterates. Larger organisms like jellyfish are also considered plankton due to their inability to swim against currents.

Algal bloom: It is excessive multiplying of algae or phytoplankton due to favorable environmental conditions.

What is plankton crash?

- A plankton crash occurs when a significant bloom of plankton in a pond is replaced by a small number of viable plankton. This can result from a deficiency in either nutrients or CO2.
- Dead plankton can generate substantial quantities of persistent foam on the pond's surface.

About National Green Tribunal:

- NGT was established in 2010 under the NGT Act, 2010 for effective and expeditious disposal of environmental protection and conservation cases.
- The Tribunal is guided by principles of natural justice and not bound by the procedure laid down under the Code of Civil Procedure, 1908.
- **Composition:** The act allows for up to 40 members (20 expert members and 20 judicial members).
- The administrative head of the tribunal is the Chairman who also serves as a judicial member. The chairman is required to be a serving or retired Chief Justice of a High Court or a judge of the Supreme Court of India.

Conclusion:

The panel has suggested close monitoring of the quality of sewage flowing in the canal that converges near Kuruchikuppam area in Puducherry and implementing long-term measures to address the issue of untreated sewage being discharged into the sea.

Financing for Sustainable Development Report

Why in News:

Financing for Sustainable Development Report 2024: Financing for Development at a Crossroads was launched on April 9 by United Nations Conference on Trade and Development.

Key Highlights of the Report:

- **Progress on SDGs:** Countries are off track on the 2030 Agenda for Sustainable Development, with around half of the 140 Sustainable Development Goal (SDG) targets for which sufficient data is available deviating from the required path.
- **Development Financing Gap:** According to the report, $4.2 trillion are needed in investments to close the development financing gap. This number was previously $2.5 trillion before the COVID-19 pandemic began.
- **Impact on Developing Countries:** Developing countries bear the brunt of exorbitant debt burdens and soaring borrowing costs, hindering their ability to respond to multifaceted crises effectively.
- The report reveals that developing countries pay

around twice as much on average in interest on their total sovereign debt stock as developed countries.

- According to the report debt service will be $40 billion annually between 2023 and 2025 in the least developed countries (LDC), which is more than 50 per cent from $26 billion in 2022.
- Stronger and more frequent disasters, caused by the ongoing climate crisis, account for more than half of the debt upsurge in vulnerable countries.
- **Global Tax Trends:** As per the report, corporate income tax rates are falling, with global average tax rates down from 28.2 per cent in 2000 to 21.1 per cent in 2023, due to globalization and tax competition.
- **Need for Reform:** The report points out that international financial system, set up at the 1944 Bretton Woods Conference, is no longer fit for purpose. A new coherent system that is better equipped to respond to crises, scales up investment in the SDGs especially through stronger multilateral development banks, and improves the global safety net for all countries, is the need of the hour.

Recommendations by the report:

The report lists four actions that are needed:

- Close financing gaps for SDG/climate investments (both public and private) at scale and with urgency.
- Close policy and architecture gaps, and reform international institutions.
- Close credibility gaps and trust deficits both international and domestically.
- Formulate and finance new development pathways.

Conclusion:

With only six years remaining to achieve the SDGs and hard-won development gains being reversed, particularly in the poorest countries. If current trends continue, the UN estimates that almost 600 million people will continue to live in extreme poverty in 2030 and beyond.

Earth's Polar Vortex Reversed

Why in News:

The polar vortex, an air current that encircles the polar region, unexpectedly reversed its direction for a period of 21 days. Atmospheric scientists observed this phenomenon in March and described it as one of the most significant events of its kind in the last four decades.

About the Polar Vortex:

- The polar vortex is a prominent feature of Earth's atmosphere that describes the high-altitude winds that blow around the pole every winter in a region called the stratosphere.
- While most of the weather we experience is a feature of the troposphere below it, extreme stratospheric winds of up to 250 km/hr keep a pocket of cold air trapped over the North Pole.
- It appears during winter in the hemisphere when the Earth's pole is facing away from the sun. During this time, the polar stratosphere experiences darkness and becomes cooler compared to the tropical stratosphere.
- During certain weather conditions, atmospheric waves called Rossby waves push up and weaken the polar vortex, causing some of that cold air to spill out. This is known as a Sudden Stratospheric Warming event. This sends frigid Arctic air southward into regions that don't normally experience such cold temperatures.
- This results in extreme cold snaps, snowstorms, and other winter weather events in areas like North America, Europe, and Asia.

About the vortex reversal:

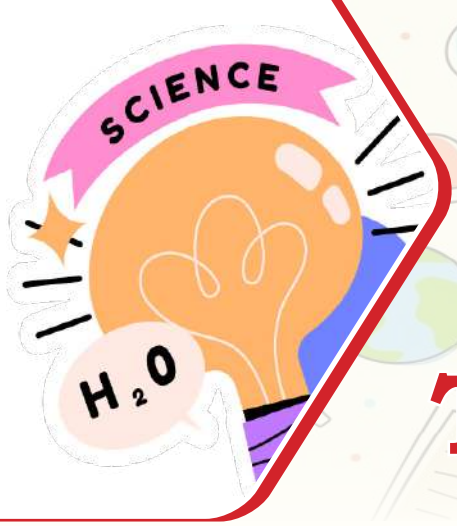
- The vortex changed direction around March 4th. It was a substantial reversal, reaching -20.5 m/s a few days ago, which puts it in the top 6 strongest such events since 1979
- This led to a significant and sustained disruption of the polar vortex. By late March, the winds returned to above 0 m/s, with forecasts indicating this trend lasting for more than 10 days, categorising the recent sudden warming as a major event rather than the final warming.
- Experts further said that the final warming is anticipated to occur later than usual this year

Impact of such reversal:

- The polar vortex disruption may cause a noticeable change in weather patterns, leading to an unusually long period of warmer temperatures in the lower stratosphere, lasting more than five weeks.
- Regions like northern Europe and Asia, typically experiencing cold following major warmings, saw milder temperatures than expected.

Conclusion:

The impact of this latest polar vortex reversal is not yet conclusive as the effects will be gradual; however there is a spike in ozone levels above the Arctic. This happens because a weaker polar vortex causes more ozone to flow to the poles and remain there. The impact of climate change is not yet clear; however, close monitoring will be crucial.



Science & Technology

Origin of the Universe: Current status of Global Research

Recently, Nobel Prize winning scientist Peter Higgs passed away. He is known for the discovery of the God particle, which helped to explain how the universe was created after the Big Bang. He was jointly awarded the Nobel Prize in Physics for the Higgs-Boson theory. With his death, an era of science and technology came to an end. Peter Higgs is considered a great teacher, guide and a personality who inspired generations of young scientists. Britain's Peter Higgs and Belgium's François Englert won the 2013 Nobel Prize in Physics. Both scientists had made a theoretical discovery of the process to explain the mass of particles smaller than the atom.

Higgs had suggested a process regarding the structure of fundamental matter in the universe in 1960. He had predicted a particle Higgs boson in this process and had made a theoretical discovery of the process to explain the mass of particles smaller than the atom. His 1964 theory of the particle of mass is known as the Higgs boson or "God particle".

Peter Higgs worked extensively on solving the big puzzle of how there is mass in the universe, which is one of the biggest puzzles of physics. After this achievement, Higgs got a place in the books along with Albert Einstein and Max Planck. Experiments at the Large Hadron Collider at the European Council for Nuclear Research (CERN) also confirmed the Higgs boson or God particle theory. Peter Higgs was a member and Companion of Honor of the Royal Society. He founded the Higgs Center for Theoretical Physics in 2012.

What is Higgs Boson?

- Higgs boson is an electron sub-atomic particle that provides mass to other particles. Its interactions determine the mass of particles like electrons, protons, and neutrons. Electrons have a certain mass, protons have a bit more, and neutrons have slightly more than protons, based on their interactions with the Higgs boson. The Higgs boson can also interact with another Higgs boson, indicating its mass is greater than that of a proton or neutron.
- Here it is also necessary to know what God Particle is, scientifically called Higgs Boson. This is a particle crucial in understanding why particles have weight. Researchers working at project called Large Hadron Collider have discovered indications about the presence of this particle which gives particles their respective mass.
- This may sound very normal, but without mass, stars, galaxies, and atoms wouldn't exist, shaping the universe in a fundamentally different way. Mass allows objects to contain something within themselves; without it, atoms would remain in constant motion without forming stable structures. According to theory, there is a field in every empty space which is named Higgs field. This field contains particles which are called Higgs boson.

How the universe originated:

- Scientists have been continuously discussing the issue that how this universe was created? Who is behind the amazing engineering of this universe? Is there a creator of this world or did this universe randomly become

everything from nothing? These questions are still mysteries.

- According to the Big Bang Theory, 13.8 billion years ago, our universe was confined in a small point as big as an atom. This world came into existence after a sudden big explosion. After the Big Bang, there was only pure energy in the entire Universe. With time, this energy suddenly started turning into matter. Due to this, stars, planets, nebulae, galaxies were formed. After the Big Bang, when the universe started to cool down slowly and the Higgs field suddenly came into existence.
- It was as if nature had pulled a lever of a big mechanism, due to which the Higgs field started working in our Universe. After the Higgs field came, some particles that were massless i.e. moving at the speed of light started interacting with this field. Due to which, they started having mass. At the same time, some particles like photons were still not interacting with the Higgs field. They were still bundles of energy.

Higgs field helps in understanding the evolution of the universe:

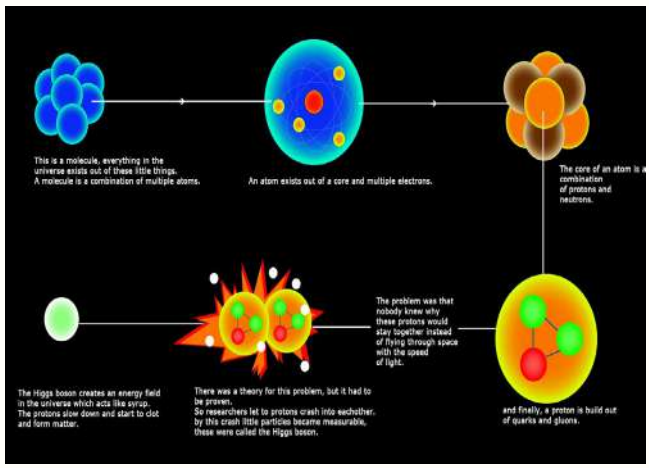
- Interaction with the Higgs field led to the formation of matter on a large scale in the universe. Later, planets, stars, nebulae, etc. were formed from these substances.
- If the Higgs field had not come into existence at that time, then no particle in this universe would have had weight. Due to lack of weight, all of them would have been moving at the speed of light. In such a situation, neither matter would have been formed nor stars or galaxies would have existed. Let us say that the Higgs field has a very big hand behind our existence today.

Difference between Higgs boson and Higgs field:

- There are four fundamental forces in our universe. These include electromagnetism, strong nuclear, weak nuclear and gravity forces. All these forces have carriers, such as photon of electromagnetism, W and Z bosons of weak nuclear, gluon of strong nuclear, graviton of gravity. In the same way, the carrier of the Higgs field is the Higgs boson.

Research related to Large Hadron Collider and the origin of the universe:

- Research has been done by scientists at CERN in Geneva to discover the God Particle. At the time when the universe cooled down after the Big Bang, some energy particles were gaining weight (mass) after interacting with the Higgs field. To solve a puzzle, scientists built a special machine called The Large Hadron Collider. Scientists believed that if charged particles like protons are collided with heavy energy, then their collision will create a stir in the Higgs field. Higgs boson (God Particle) will be born in this stir.
- In the year 2012, proton particles were collided with 99.99 percent of the speed of light in the 27-kilometer-long machine, called the Large Hadron Collider, at CERN in Geneva. A tremendous amount of energy was released in this collision. During this time, scientists came to know about the Higgs boson for the first time. This experiment proved the theory of Higgs field which was given by Peter Higgs in the year 1964. After this theory was proved to be true, in the year 2013 Peter Higgs was awarded the Nobel Prize in Physics.



Why Higgs Boson was called The God Particle:

- The name "God Particle" for the Higgs boson has an interesting origin dating back to the early 1990s. Physicist Leon Lederman intended to title his book on the subject of the Higgs boson and Higgs field as "The God Damn Particle." However, his publisher found the name unusual and decided to change it to "The God Particle," removing the word "Damn."
- The Higgs boson, known as the "God Particle," is a particle whose internal structure remains unknown. It is often referred to as the DNA of the universe. In particle physics, fundamental particles include quarks, leptons, and gauge bosons. The Higgs boson has a mass of 125 billion electron volts, which is 130 times greater than a proton. The name "boson" in Higgs boson is derived from the Indian physicist Satyendra Nath Bose. However, there is international controversy among scientists regarding this naming convention.

Other researches to find out the origin of the universe:

- Japan's X-ray rocket with a telescope has left for the

moon to find out the origin of the universe. JAXA has said that the information obtained from this will help in knowing how celestial bodies are formed and it is hoped that we will also be able to uncover the secret of how the universe originated.

- In collaboration with NASA, JAXA will find out the power of light at different wavelengths, the temperature of things in space and their size and brightness. According to the space agency, 'Smart Lander for Investigating Moon' or SLIM has also been sent in the new Japanese rocket. It can also be called a light lander to land on the moon. An attempt will probably be made to land the smart lander on the surface of the moon early next year.
- At the beginning of the creation, there was nothing but zero. The entire universe was contained in the zero which expanded to the sun, moon, stars and this earth, on which life exists today. Modern science calls this concept the Big Bang.
- However, many mysteries related to the Big Bang are yet to be solved as to why the universe is continuously expanding after the Big Bang. However, the Big Bang is not the only mystery, the world of science is also constantly grappling with puzzles like black holes and dark matter.
- One meaning of understanding black holes is that we will be able to understand the principles of the universe and in the near future we will be able to know the rules of birth and death of stars, gravity and balance between the moon and stars.

Short Issues

White Rabbit Technology

Why in News:

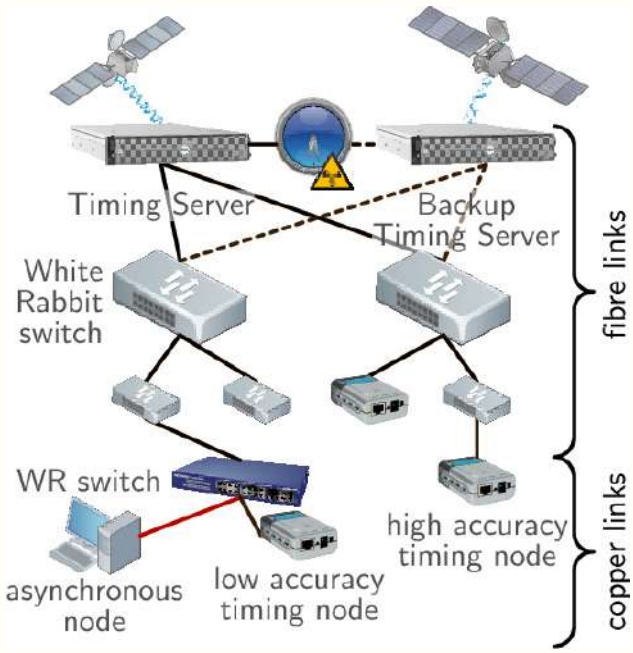
Recently, CERN in collaboration with institutes and companies has developed white rabbit network under white rabbit collaboration. The technology synchronizes devices in the accelerators down to sub-nanoseconds. The high accuracy of synchronization in White Rabbit is achieved by extending the Precision Time Protocol. This technology allows easy deployments of scalable and reliable networks with high accuracy synchronization requirements.

About Whiter Rabbit technology:

- White Rabbit Switches provides sub-nanosecond synchronization accuracy.
- It achieves sub-nanosecond accuracy in Ethernet based networks.
- A key feature of White Rabbit is that it is open source and based on standards. Companies and institutes can therefore adapt it to their needs and incorporate it in their products and systems.

Main features of the White Rabbit Network:

- Sub-nanosecond accuracy and picoseconds precision of synchronization.
- Connecting thousands of nodes.
- Typical distances of 10 km between network elements.
- Gigabit rate of data transfer.
- Fully open hardware, firmware and software.
- Commercial availability from many vendors.



About White Rabbit Collaboration:

- Collaboration is a membership-based global community whose objective is to maintain a high-performance open-source technology that meets the

needs of users and to facilitate its uptake by industry.
- It will provide dedicated support and training, facilitate R&D projects between entities with common interests and complementary expertise, and establish a testing ecosystem that fosters trust in products that incorporate the open-source technology.

Conclusion:
White Rabbit is used in the finance sector as well as in many research infrastructures, and it is currently being evaluated for application in the quantum internet. The technology could also play a key role in the future landscape of global time dissemination technologies, which currently rely heavily on satellites.

Ozone on Jupiter's Moon Callisto

Why in News:
An international team of scientists, including from Physical Research Laboratory, Ahmedabad, has discovered strong evidence of the presence of ozone on Jupiter's moon Callisto. The presence of ozone on icy Callisto sheds light on the complex processes taking place.

The importance of ozone:
- Published in the March 2024, the study explores the chemical changes in "SO_2 astrochemical ice," mainly made of sulfur dioxide (SO_2) under ultraviolet light.
- Earth has life because it had the resources to thrive, evolve, and diversify. These resources include sunlight with the right radiation, water, a stable atmosphere with the right gases at the right temperature, and compounds needed for biochemical processes.
- While sunlight is essential for life, not all of its emissions are beneficial. Ultraviolet (UV) radiation, particularly UV-B and UV-C, can harm organisms.
- These wavelengths can damage DNA, cause mutations, and increase the risk of skin cancer and cataracts in humans. UV light can also inhibit plant growth and harm other organisms. The ozone layer plays a crucial role in protecting life on Earth by absorbing UV-B and UV-C radiation.
- The ozone layer, made of ozone molecules (three oxygen atoms bonded together), acts as a shield, absorbing much of the ultraviolet radiation from the sun.
- Scientists are studying certain celestial bodies in our Solar System that have ozone, indicating stable atmospheric conditions. This suggests these bodies could potentially support life.

Callisto and its environment:
- After Saturn, Jupiter has the most moons in the Solar System. Callisto is one of Jupiter's largest moons and the third-largest moon in the Solar System after Ganymede and Titan.
- Callisto is distinguished by its composition. Despite being as big as the planet Mercury, it has less than half as much mass. It is primarily composed of water ice, rocky materials, sulphur dioxide and some organic compounds.
- These substances make the moon a potential candidate for supporting life in the Solar System beyond the earth. Callisto's surface is heavily cratered, indicating a long history of being struck by asteroids and comets.
- It also lacks the extensive seismic activity seen on some of Jupiter's other moons, such as Io and Europa.

Conclusion:
The discovery of ozone on Callisto indicates the presence of oxygen, a key ingredient for forming complex life-sustaining molecules like amino acids. This finding raises questions about the habitability of Callisto and other icy moons in our Solar System. Understanding these moons could expand the knowledge of habitable conditions beyond Earth.

Artificial Sun

Why in News:
Scientists from Seoul National University and the Korea Institute of Fusion Energy have made a major breakthrough in their pursuit of clean nuclear energy by creating an 'artificial sun' at the Korea Superconducting Tokamak Advanced Research (KSTAR) reactor.

Key facts:
- Reportedly, the reactor reached temperatures above 100 million degrees Celsius for 30 seconds.
- By comparison, the Sun's core temperature reaches about 15 million degrees.

Previous attempts:
- Chinese scientists have been working on developing smaller versions of nuclear fusion reactors since 2006.
- Experimental Advanced Superconducting Tokamak (EAST) fusion energy reactor of China created an artificial sun, reaching temperatures of 70 million degrees Celsius for 1,056 seconds, which is five times hotter than the sun.

Importance of artificial sun

Energy security:

- By mimicking the Sun's natural response, scientists are hoping the technology can help humanity harness vast amounts of energy and fight the energy crisis.

Clean energy:

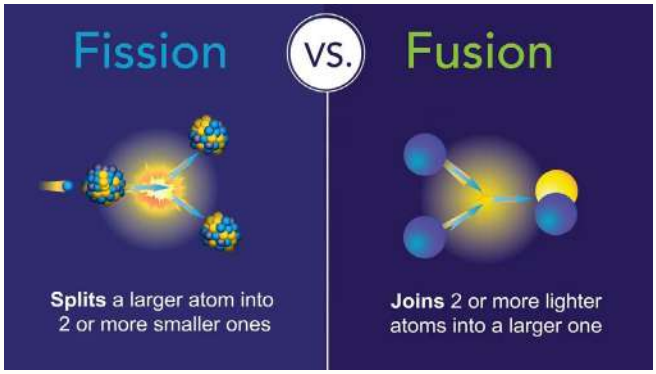
- It is pertinent to note that nuclear fusion is considered the holy grail of energy and it powers our Sun.
- It fuses atomic nuclei to create huge amounts of energy, unlike the fission process used in nuclear weapons and nuclear power plants, which splits them into pieces.
- The process requires no fossil fuels and produces no hazardous waste, unlike the nuclear fission process that powers commercial nuclear power generation.
- Unlike fission, fusion emits no greenhouse gases.

Less Disaster:

- Physicists also claim that the risk of environmental disaster is very low.

Challenges:

- Maintaining temperatures over 100 million degrees is very critical.
- Operating at a stable level for a long time is so difficult.
- Despite decades of research into the technology, nuclear fusion has still taken a long time to be realized outside the laboratory.



About Nuclear fission and Nuclear fusion:

Nuclear fission:

- Nuclear fission is a reaction in which the nucleus of an atom splits into two or more smaller nuclei. The fission process often produces gamma photons, and releases a very large amount of energy even by the energetic standards of radioactive decay.

Nuclear fusion:

- In a fusion reaction, two light nuclei merge to form a single heavier nucleus. The process releases energy because the total mass of the resulting single nucleus is less than the mass of the two original nuclei. The leftover mass becomes energy.

Conclusion:

Although these are important developments, there is still much work to be done before the world will be able to see a fully functioning artificial sun.

Genetic Profiling of Elephants in Kerala

Why in News:

The Wildlife Institute of India (WII) has provided forensic kits to Kerala Forest department to initiate genetic profiling of the 400 odd captive elephants in Kerala. This initiative, aimed at incorporating the details of these elephants into a national database, signifies a pioneering effort in the conservation and management of captive elephants.

Significance of the Initiative:

- The initiative is in line with the aim of Ministry of Environment, Forest and Climate Change, to manage the transfer of elephants and safeguard their well-being. This is underscored by the recent enforcement of the Captive Elephant (Transfer or Transport) Rules, 2024.
- Earlier in 2019, the Kerala Forest Department collaborated with the Rajiv Gandhi Centre for Biotechnology, Thiruvananthapuram, to conduct DNA profiling of elephants. This was marked as an initial stride towards the scientific management of captive elephants.
- Kerala, once known for having the largest population of captive elephants, now reports approximately 25 elephant deaths annually, leading to a decrease in the captive population to 407.
- With an estimated 3,000 captive elephants across India, several states have completed similar profiling. The data will be accessible through "Gaja Suchana," a mobile application developed by the Wildlife Institute of India (WII), aiding in the monitoring of elephant transfers and welfare.

About the Initiative:

- The initiative aims to develop a comprehensive database containing photographs, physical details (like height), and genetic characteristics of every captive elephant in Kerala.
- The Kerala Forest Department, with the support of forensic kits provided by the WII, will lead this initiative. Assistant conservators in each district have been assigned the responsibility of collecting blood and

dung samples.

Conclusion:

- The genetic profiling of captive elephants in Kerala by the WII represents a significant advancement in elephant conservation efforts. This profiling would aid in enhancing the welfare of captive elephants and combating illegal transfers, offering a methodical approach to monitoring and management.
- Furthermore, through integrating contemporary scientific methods with age-old practices, the initiative will guarantee the well-being, welfare and sustainable stewardship of these magnificent creatures, reflecting Kerala's cultural legacy.
- The data generated will provide valuable insights into the genetic diversity and health of captive elephants, informing future conservation strategies and policies.

CAR-T Cell Therapy

Why in News:

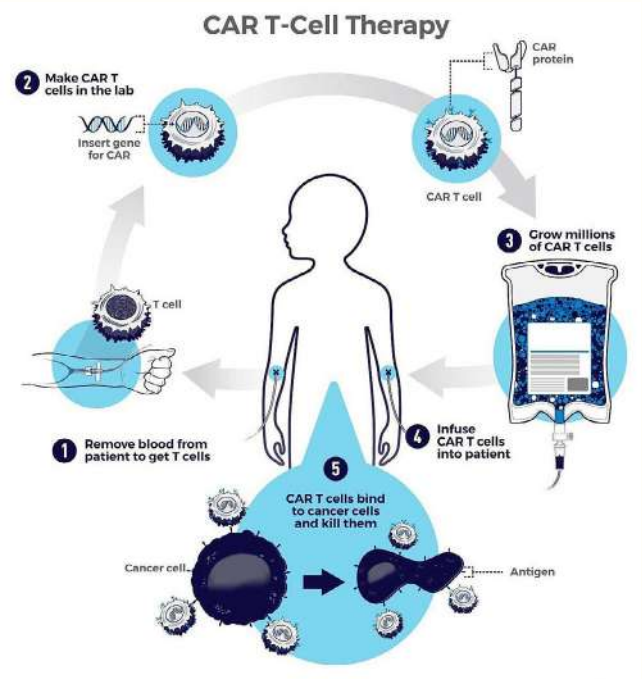
The President of India Smt. Droupadi Murmu recently launched India's first home-grown anti-Cancer CAR-T cell therapy NexCAR19 and dedicated it to the Nation in the presence of the Governor of Maharashtra, Shri Ramesh Bais at the Indian Institute of Technology, (IIT) Bombay in Mumbai.

What is CAR-T Cell Therapy?

- CAR-T cell therapy stands for Chimeric Antigen Receptor T cell therapy. The process entails removing T cells from the patient, which play a key role in the body's immune response.
- These cells are then cultured in the lab, genetically modified to target cancer and reintroduced into the patient's body. Essentially, the patient receives a living drug that continuously combats cancer.
- T cells are white blood cells that identify and fight illness. They have receptors that recognize antigens, which are proteins or molecules the immune system targets. Cancer cells may have antigens that the immune system does not recognize as abnormal, allowing cancer to evade the immune response.
- CAR-T cells are genetically engineered in the lab to express a new receptor that can bind to cancer cells and effectively kill them.

Processes involved in therapy:

- **T Cell Collection:** Blood is taken from the patient's arm and T cells are extracted using an apheresis machine.
- **T Cell Modification:** In a lab, T cells are engineered by inserting a synthetic CAR, and they are cultured to increase in number.
- **CAR-T Cell Infusion:** Once a sufficient amount of modified T cells is ready, they are reintroduced into the patient's arm.
- Chemotherapy might be advised prior to CAR-T cell infusion to improve treatment outcomes.



Car-T Cell therapy in India:

- India's first CAR-T cell therapy is developed through collaboration between the Indian Institute of Technology, Bombay and Tata Memorial Hospital in association with industry partner ImmunoACT.
- NexCAR19 is designed to target cancer cells carrying the CD19 protein, a marker on cancer cells, enhancing precision in treatment.

Conclusion:

According to an ICMR study, one in nine Indians will develop cancer in their lifetime. Cancer is a leading cause of adult illness and death in India. In India, where around 8 lakh people die from the disease annually, treatment is prohibitively expensive for many. Also, while chemotherapy and immunotherapy can extend a cancer patient's life by a few months or years, cell-and-gene therapy aims to cure and provide lifelong benefits. Furthermore, the indigenous therapy costs about a tenth of the price of treatment in the US. This approach also simplifies treatment by offering a

one-time therapy.

PRATUSH

Why in News:

Astronomers are looking forward to opening a new window on the universe by posting high-resolution telescopes on the moon, and in orbit around it. India is also proposing to put a new telescope in the atmoshphre of moon named PRATUSH.

About PRATUSH Telescope:

- PRATUSH (Probing ReionizATion of the Universe using Signal from Hydrogen) is a radio telescope that will be installed on the far side of the Moon.
- It is being built by the Raman Research Institute (RRI) in Bengaluru with active collaboration with the Indian Space Research Organization (ISRO).
- Initially, ISRO will place PRATUSH in Earth orbit. After some calibration, the space agency will launch it towards the moon.
- It will have a wideband frequency-independent antenna, a self-calibrating analog receiver, and a digital correlator to capture radio noise in all the important signals of the Dark Age.
- The target instrument sensitivity is at the level of a few millikelvins without being limited by any systematic features.

Challenges for Earth-based telescopes:

- Earth-based telescopes, optical telescopes (which collect visible light at longer wavelengths) and radio telescopes (which collect radio waves with the shortest wavelengths) face obstacles due to interference from the atmosphere.
- Optical telescopes struggle with pollution, while radio telescopes struggle with electromagnetic interference from a variety of sources, including communications signals.
- It also doesn't help that Earth's ionosphere blocks radio waves coming from outer space.

Benefits of placing a telescope on the Moon:

- Scientists are considering placing optical and radio telescopes on the far side of the Moon, which always faces away from Earth.
- **Clear visibility:** The Moon's pristine, airless desolation provides crystal-clear viewing conditions for optical telescopes during the long lunar night.
- **Protection:** Radio telescopes located on the far side of the Moon will also be protected by the Moon (its diameter is 3,476 km) – which blocks radio transmissions from Earth and electrically charged plasma winds from the Sun.
- It promises to be the most radio-quiet place in the solar system.

Conclusion:

There are many question related to universe that are yet to be solved. PRATUSH will aim to detect signals from the first stars and galaxies, reveal the cosmic dawn of the universe, answer questions about when the first stars formed, the nature of the first stars and what the light from the first stars etc.

Russia's War Affecting Climate Change Monitoring

Why in News:

The Russian War with Ukraine has been hindering the foreign scientist's access to data from Russian field stations and therefore their ability to monitor climate change in Arctic.

Why this is a cause of concern?

- Arctic is warming nearly four-times faster than the rest of the world. The consequences of this go way beyond just the Arctic. The melting permafrost and rising sea-levels can have devastating effects on local ecosystems as well as the climate
- Many research stations in the Arctic are part of the INTERACT. They continuously monitor environmental conditions in the different countries in the region.
- Researchers utilized earth-system models (ESMs) to study Arctic ecosystem conditions, focusing on eight key variables such as temperature, vegetation, precipitation, and snow depth.
- Excluding Russian data from Arctic climate studies, particularly from Siberia, have significantly increased biases in understanding the Arctic's ecosystem changes.
- INTERACT stations, generally located in regions not fully representative of the Arctic's diversity, miss crucial data from colder, drier, and carbon-rich areas of Siberia.
- This exclusion has led to predictions that underestimate the ecosystem variables' changes, equating to an 80-year advance in climate change impacts.

About International Network for Terrestrial Research and Monitoring in the Arctic (INTERACT):

- INTERACT is an infrastructure project within SCANNET, an arctic network comprising 74 terrestrial field bases (with an additional 21 research stations in Russia on hold) in northern Europe, the US, Canada, Greenland, Iceland, the Faroe Islands, Scotland, and northern alpine areas.
- The project, backed by EU funding, aims to enhance research and monitoring capabilities across the Arctic through the Transnational Access Program.
- Its primary objective is to improve the identification, understanding, prediction, and response to environmental changes in the Arctic, a region with limited observing capacity due to its vastness and sparse population.
- INTERACT is a multidisciplinary initiative that supports numerous scientists globally in fields such as glaciology, permafrost, climate, ecology, biodiversity, and biogeochemical cycling.
- In addition to research, INTERACT stations facilitate international networks in individual disciplines and contribute to education by hosting summer schools.

Conclusion:

Modern warfare's impact the environment in various ways, including sky-high fuel consumption and a massive carbon footprint. The fighting also leads to the degradation of thriving ecosystems. As India has insisted earlier, 'todays era is not of war' as it is impacted the earth at the levels that may have several future repercussions. The war has resulted in the deaths of thousands, displacement of many more, and left many with debilitating injuries.

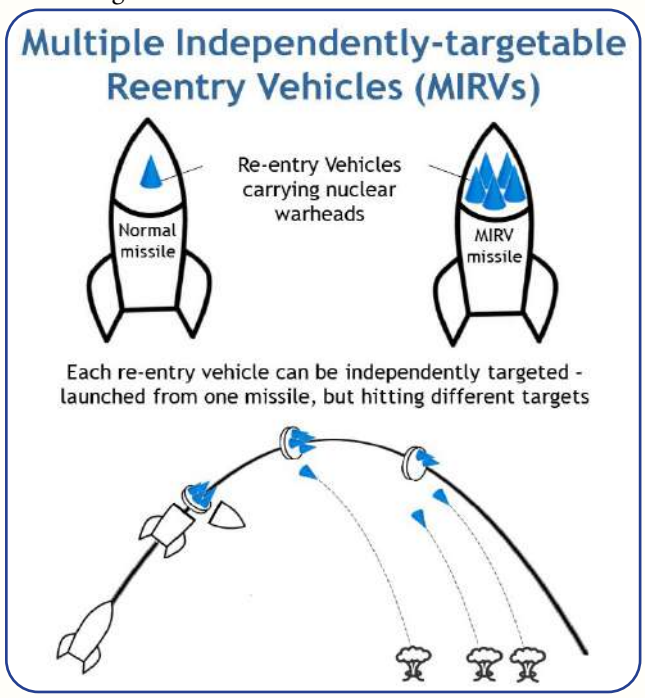
Agni-Prime Ballistic Missile

Why in News:

India has successfully tested the new-generation nuclear-capable Agni-Prime ballistic missile, from the Abdul Kalam Island off the coast of Odisha. This is the second pre-induction night launch of Agni Prime, with the first test fire was on June 7, 2023.

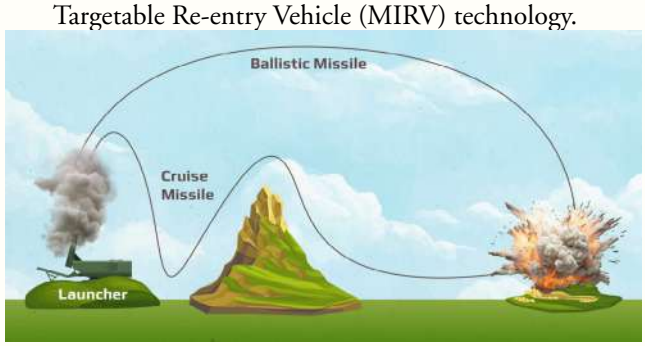
More about the news:

- The launch is in line with India's strategic objectives under the 'Mission Divyastra' enhancing its status among nations with strong strategic capabilities. This nighttime launch is one in a series of tests involving different versions of the Agni missile.
- In the previous month, India conducted a successful initial flight test of the Agni-5 missile, which is capable of carrying nuclear warheads and features multiple independently targetable re-entry vehicles (MIRVs). The Agni-5 is a new generation advanced variant of the Agni missile series.



About Agni Prime:

- It is a two-stage canister missile with a maximum range of 1,000 to 2,000 km. It is lighter than all the earlier Agni series of missiles. It weighs at least 50 per cent less than the Agni 3 missile and has new guidance and propulsion systems.
- It can be transported by road and rail and stored for longer periods, significantly reducing the time required for preparation and launch. The missile uses a cold launch mechanism and can be fired in salvo mode.
- It is equipped with the Multiple Independently Targetable Re-entry Vehicle (MIRV) technology.



Ballistic vs Cruise missiles:

- Ballistic missiles are launched directly into the Earth's upper atmosphere and can travel beyond it, after which the warhead separates from the missile and descends

toward a predetermined target.

- These self-guided weapons are propelled by rockets and have the capacity to carry either conventional or nuclear payloads. They are deployable from aircraft, ships, submarines, and land.
- A cruise missile is a guided missile designed to target terrestrial or naval objectives. Unlike ballistic missiles, cruise missiles operate within the atmosphere and maintain a relatively constant speed for most of their flight path until they reach their target.

-: Prelims Insights :-

Multiple Independently Targetable Re-entry Vehicle (MIRV) technology:
MIRV technology was first introduced by the United States when it deployed an Intercontinental Ballistic Missile (ICBM) with MIRV capability in 1970. This technology enables a single missile to carry multiple warheads (typically 4-6), each capable of targeting different locations independently.
By allowing a single missile to engage multiple targets, MIRV technology significantly enhances the missile's effectiveness. These missiles can be launched from both land-based platforms and sea-based platforms, such as submarines

Conclusion:

The Agni-Prime will gradually replace the Agni-I (700-km) missiles in the arsenal of SFC, which also has the Prithvi-2 (350-km), Agni-2 (2,000-km), Agni-3 (3,000-km), and Agni-5 ballistic missiles. Further, recent flight-test of the three-stage Agni-5 with MIRVs, consequently, represents a big leap forward in strategic deterrence for India. Successful development and induction of the missile will be an excellent force multiplier for the armed forces.

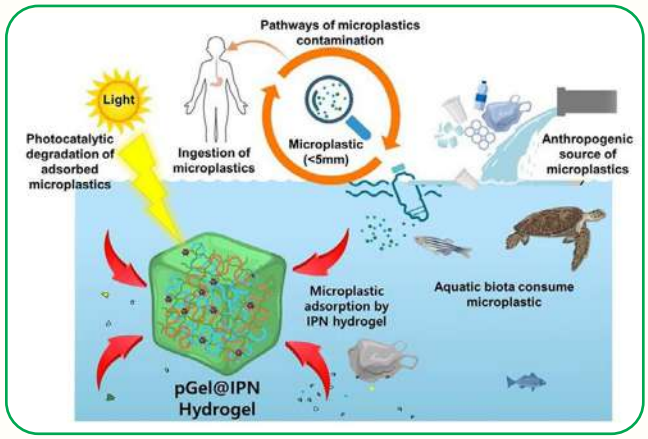
Hydrogel to Remove Microplastics

Why in News:

Researchers at the Indian Institute of Science (IISc) have recently designed a sustainable hydrogel to remove microplastics from water.

About the three polymer hydrogel:

- Scientists have previously made several attempts to use filtering membranes to eliminate microplastics. However, these membranes often become blocked by the particles, making them ineffective in the long run.
- The sustainable hydrogel designed by the researchers has a unique intertwined polymer network that can bind the contaminants and degrade them using UV light irradiation.



- The novel hydrogel developed by the team comprises three different polymer layers chitosan, polyvinyl alcohol and polyaniline intertwined together, making an interpenetrating polymer network (IPN) architecture
- The researchers conducted numerous experiments to assess the durability and strength of the material. They discovered that the blend of the three polymers provided stability across a range of temperatures.
- In addition to addressing the issue of treating or removing microplastics, another significant challenge is detecting them. Due to their small size, these particles are not visible to the naked eye.
- To overcome this challenge, the researchers incorporated a fluorescent dye into the microplastics. This allowed them to monitor the adsorption and degradation of the microplastics by the hydrogel under various conditions.
- The hydrogel was found to be highly efficient it could remove about 95% and 93% of two different types of microplastics in water at near-neutral pH (6.5).

What are Microplastics?

- Microplastics result from the degradation and fragmentation of larger plastics. These particles are increasingly recognized as pervasive contaminants with

potential implications for the environment, wildlife, and human health.

- They are categorized into two main types: microplastics, which range from 0.1 to 5,000 µm in size, and nanoplastics, which are even smaller, ranging from 0.001 to 0.1 µm.
- They represent an environmental peril and are present even in isolated regions like polar ice caps and deep ocean trenches, posing a threat to both aquatic and terrestrial organisms.

Conclusion:

As plastics disperse in the environment, they undergo aging, weathering, and deterioration, leading to mechanical abrasion, breakage, fragmentation, and photo-oxidation, which involves chemical release or adsorption. Over time, plastics break down into various sizes and shapes, undergoing changes through interactions with microorganisms and other substances in their surroundings. Research indicates that microplastics, discovered in water bottles and food items like sugar, honey, sea salt, and tea, have been eventually deposited in human lung tissue, placenta, stool, blood, and meconium. Therefore, this finding can prove crucial in mitigating the impacts of microplastics.

World Quantum Day

Why in News:

World Quantum Day was observed on 14 April across the world. The 2024 event aimed to spark interest and generate enthusiasm for quantum mechanics.

Highlights:

- **Celebrations and events:** More than 65 countries marked the occasion, with various events and initiatives promoting public awareness and understanding of quantum science and technology.
- **India's aspirations:** India celebrated World Quantum Day 2024, aspiring to become a global leader in quantum science and technology, with a focus on developing quantum computing, quantum communication, and quantum sensing applications.
- **National Quantum Mission:** India's National Quantum Mission (NQM) was launched, aiming to seed, nurture, and scale up scientific and industrial R&D in quantum technology, with a total outlay of Rs 6003.65 Crore for eight years.
- **Research advancements:** Researchers made progress in developing new quantum bits (qubits), advancing quantum computing, and exploring applications in fields like medicine, materials science and secure communication.
- **Global impact:** Quantum technology is expected to have a significant impact on the global economy, with potential applications in areas like computing, communication and sensing, implications for national security and prosperity.

Importance of world quantum day:

- **Celebrates the history of quantum mechanics:** World quantum day marks a significant milestone in the journey of quantum mechanics, which began in the early 20th century with physicists like Max Planck, Albert Einstein, Niels Bohr and Erwin Schrödinger.
- **Recent breakthroughs in quantum technology:** Over the past couple of years, quantum mechanics (quantum computing in particular) has witnessed a surge in interest and innovation, including the development of quantum computers, quantum encryption and quantum sensing technologies.
- **Significance of quantum technology:** Quantum technology has the power to reshape industries, accelerate scientific research and drive economic growth. It can improve drug discovery, develop sustainable energy solutions, revolutionize cybersecurity and advance AI.
- **Celebrates the collective efforts:** World quantum day is a reminder of the collaborative and interdisciplinary nature of quantum science. It celebrates the collective efforts of physicists, engineers, mathematicians and computer scientists from across the globe who are pushing the boundaries of knowledge and innovation.

History of world quantum day:

- World quantum day started on 14 April 2021 as an initiative by an international group of scientists. The initiative was joined by engineers, educators, science communicators, organizations and others to celebrate the first world quantum day on 14 April 2022. April 14 was chosen because "4.14" represents the rounded first 3 digits of Planck's constant: 4.14×10−15 eVs.

Conclusion:

By concluding world quantum day, world reinforce the significance of quantum science and technology in shaping our future and inspiring continued innovation and discovery.

New Gene CYB561A3

Why in News:

A study published in Nature Genetics has identified a new gene, CYB561A3, that regulates skin pigmentation. The study used genome editing and chromosomal conformational capture to identify the regulators of a number of genes involved in skin pigmentation. Researchers identified the mechanisms by which mutations in the regulatory regions of four genes could affect pigmentation and its variability. This work expanded the repertoire of genes known to be involved in the processes driving pigmentation diversity.

More information:

- Researchers used genome-wide association studies of skin color from more than 1,500 eastern and southern African individuals. They scanned the entire genome to locate genetic variants that were highly differentiated between the lightly pigmented San population and other darkly pigmented African populations.
- Using CRISPR/Cas-9 genome editing, the team found mutations in an enhancer of OCA2, a gene associated with albinism, could result in a 75% reduction in melanin relative to control cells.
- The study not only identified the role of the OCA2 gene enhancer in regulating melanin production but also uncovered the history of regulatory variants within the OCA2 gene. The two regulatory variants, estimated to be 1.2 million and 57 thousand years old, provide valuable insights into human evolution and migration.
- The older variant, dating back 1.2 million years, may have played a role in adapting to different environmental conditions, such as UV radiation, during early human evolution. The younger variant, estimated to be 57 thousand years old, coincides with the migration of humans from Africa to other parts of the world. This suggests that this variant may have evolved as an adaptation to new environments with different UV radiation levels, potentially influencing skin pigmentation and melanin production.

About skin colour:

- Skin color is an inherited trait that's connected to biology and genetics.
- The evolution of skin color is connected to the intensity of ultraviolet radiation in different parts of the world. Skin color is an adaptive trait that evolved based on environmental pressure. For example, darker skin evolved to shield humans from the sun's intense ultraviolet radiation, while lighter skin tones are an adaptation to maximize vitamin D production.

Conclusion:

Findings underscore the complexity of genetic factors influencing skin color and the benefits of including ethnically diverse and underrepresented populations in genetic studies. This study has broader implications for understanding human evolution, adaptation and diversity. It can inform research on the genetics of complex traits and diseases.

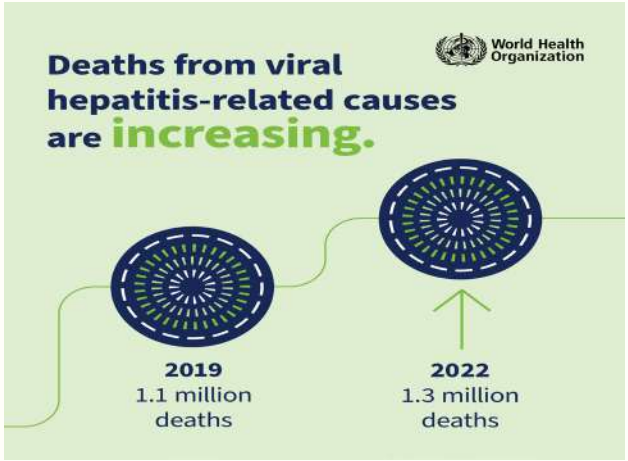
WHO Report : Warning Against Hepatitis

Why in News:

Viral hepatitis deaths are on the rise. As per the Global Hepatitis Report 2024, released by the World Health Organization (WHO), as many as 1.3 million or 13 lakh people died of viral hepatitis in 2022. The same number of deaths were cause by tuberculosis as well. These two were the second leading causes of death among communicable diseases in 2022, after COVID-19.

Key Points of the Report:

- Despite progress globally in preventing hepatitis infections, deaths are rising because far too few people with hepatitis are being diagnosed and treated.
- Accordint to WHO Director-General Dr Tedros Adhanom Ghebreyesus, "WHO is committed to supporting countries to use all the tools at their disposal - at access prices - to save lives and turn this trend around."



- Data from 187 countries were taken into account to compile the report. As per the recent data, the total number of deaths increased from 1.1 million (11 lakhs) in 2019 to 1.3 million in 2022.
- Hepatitis B is the leading cause of these 1.3 million deaths, accounting for 83 percent of the mortalities. The remaining 17 percent is caused by hepatitis C.

"The increase in estimated mortality since 2019 suggests that the number of hepatitis-related cancer cases and deaths are increasing," the report read.

- However, cases of new infections by viral hepatitis declined from 2.5 million in 2019 to 2.2 million in 2022. Of the 2.2 million new infections, 1.2 million were caused by hepatitis B and nearly 1.0 million by hepatitis C.
- Further delving into the data showed that an estimated 304 million (30.4 crore) people were living with viral hepatitis B and C in 2022. Among these, an estimated 254 million were living with hepatitis B and about 50 million were living with hepatitis C.
- The data showed that half of those living with the infection are aged between 30 and 54; and men account for 58 percent of all cases. An estimated 12 percent of the cases are prevalent among children, in particular for hepatitis B.

Who are at risk?

Hepatitis B and C affect the general population in many regions. But also those with the following are at greater risk of contracting the disease than others. They are:

- Those with a history of exposure through unsafe blood supplies, medical injections and other health procedures.
- Newborns and children are at risk through vertical (mother-to-child) transmission of hepatitis B, notably in settings with high hepatitis B prevalence.
- Indigenous populations and mobile and migrant populations from countries with higher prevalence.
- Key populations, including people who inject drugs, people in prisons and other closed settings, sex workers and gay men and other men who have sex with men, who may be disproportionately affected in different contexts.

Diagnosis and therapy rate remain poor:

- The global target for eliminating viral hepatitis by 2030 looks distant at the moment, as diagnosis and therapy rate across the world remain less than satisfactory.
- The new report showed that only 13 percent of the people living with chronic hepatitis B infection had been diagnosed in 2022. Among these about 3 percent patients had received antiviral therapy during the aforementioned time period.
- Patients with hepatitis C recorded better numbers, with 36 percent of people living with the disease getting diagnosed between 2015 and 2022, and 20 percent receiving curative treatment.
- Overall, approximately seven million people received hepatitis B treatment at the end of 2022 and 12.5 million people have received hepatitis C curative treatment during the same time.
- In 2022, an estimated 45 percent of infants received a dose of the hepatitis B vaccine within 24 hours of birth. The coverage, however, varied by region. In the African Region, where the highest prevalence of hepatitis B cases are witnessed, only 18 percent of newborns received the dose, as compared to 80 percent in the Western Pacific Region.
- The report also designated the Covid-19 pandemic as one of the biggest factors in the slowdown of viral hepatitis prevention across the world. "The COVID-19 pandemic severely affected hepatitis services. Getting back on track to achieve the Sustainable Development Goals requires treating an estimated 40 million people with hepatitis B and curing an estimated 30 million people with hepatitis C by the end of 2026," it stated.

How well is India managing?

- Unfortunately, India has one of the highest burdens of viral hepatitis in the world. The world's most populous country has 29 million (2.9 crore) people living with hepatitis B and about 5.5 million (0.55 crore) with Hepatitis C infections.
- India registered 50,000 new hepatitis B cases and another 140,000 new hepatitis C cases in 2022. As per the WHO report, a total of 123,000 people succumb to the infection in 2022.
- Stating a preventing method, Dr SK Sarin, vice-chancellor of the Delhi-based Institute of Liver and Biliary Sciences, told the Indian Express: "In order to reduce the burden of Hepatitis B in India, there is a need to ensure that all newborns receive complete vaccination. It should also be offered to adults who were born before the vaccine was included in the national programme."

Conclusion:

Currently, hepatitis B vaccine is offered to children in India under the Universal Immunisation Programme, which was launched by the Government of India in 1985. The vaccine is also administered to adults working in high-risk sectors, such as healthcare, by the Indian government's viral hepatitis control programme. Treatment for both viral hepatitis B and C is can be availed under the programme.

Center and State Rights on Industrial Companies in India: Supreme Court Action

India has a federal system of governance, and it distributes powers between the Center and the States through Article 246 of the Constitution's Seventh Schedule. One such power relates to the production and distribution of liquor and industrial alcohol, a topic which has been frequent in the recent news. Disputes have emerged from time to time between the Center and the State over the rights to the sources of revenue, as both have to take initiative to manage their financial structure. With present state of development, States, aiming for rapid development, are reluctant to compromise on revenue collection, aligning with anti-federalism principles.

According to the RBI's 2021 report, many state governments derive 10 to 15 percent of their income from liquor taxes. Recent issues highlight challenges in revenue collection. The Supreme Court is now deliberating on the rights of states in a special case. According to the RBI report of 2021, many state governments derive 10 to 15 percent of their income from liquor taxes. Recent challenges in revenue collection have brought to light some issues. The Supreme Court has begun considering the rights of states in a special case, indicating a shift in perspective.

The 9th Constitution Bench of the Supreme Court is hearing the matter of regulating industrial alcohol, prompting a debate on who has the rights over industrial alcohol. The Court has also taken up the issue of suffering caused by poisonous liquor and has initiated hearings on two related questions:

- **First:** Does the state government or the central government have the power to make, sell and fix the price of industrial alcohol?
- **Second:** Was there any flaw in the decision given by the Supreme Court on this matter in 1989?

Supreme Court's latest Observation:

- During the hearing of the industrial alcohol case in the Supreme Court's Constitution Bench, amidst reports of suffering caused by poisonous liquor, the Court also discussed about jurisdiction over this subject. Chief Justice DY Chandrachud had opined, "We all know about the tragedy of poisonous liquor and in this regard the states are also concerned about the health of their citizens, then why should the states not have the power to regulate it? If the states can make regulations to stop the misuse, then they can also impose a fine."
- In this context, the Constitution Bench of nine judges is reviewing the powers of the Center and the states in the production, manufacturing, supply and health of industrial alcohol. Earlier, a Constitution Bench of seven judges had ruled against the states and made its decision in favour of the Center in 1997. In this decision, it was said that the Center will have regulatory power over industrial products. After the states challenged this decision, the matter was sent to the nine-judge bench in 2010.

Status of rights related to liquor and industrial alcohol between the Center and the State:

- The right of imposing tax on alcohol is already with the state, however situation related to industrial alcohol is not very clear. "Liquor" is one of the subjects listed under the State List in the Seventh Schedule of the Constitution. The state has the right to completely control and regulate the production, purchase and sale of liquor. At the same time, in the Union List and

Concurrent List, concerning 'Industry,' it is stated that products related to public interest manufactured by industries are under the control of the Centre and Parliament of the country.

-: Prelims Insights :-

Potable alcohol is produced through fermentation, with their potency boosted through distillation. The alcohol content in these beverages ranges from 0.5% to 9.5%, contingent on the method of extraction. Fermentation is the process in which the yeast acts on sugar and converts it to ethanol and gives off carbon dioxide. The fermented liquid has 3-14% alcohol and it can be concentrated up to 95% by a series of distillations. Distillation is the process of separating elements in a liquid by vaporization and condensation. In the distillation process, the alcohol which is present in the fermented liquid (alcoholic wash) is separated from water.

Industrial ethanol is high-purity alcohol that can be made from different raw materials such as sugarcane, grain, and wheat. Usually denatured, it is made unfit for human consumption by mixing it with other chemicals like isopropyl alcohol.

Next to its ABV and denaturants, the use of ethanol determines if it is industrial grade or not: industrial applications are usually in the construction, fuel, and pharmaceutical industry.

- A bench of 9 judges of the Supreme Court will decide whether industrial alcohol comes under the jurisdiction of the state government or not? The bench also has to decide whether the state government can legally control industrial alcohol or not? Apart from this, it also has to be decided whether the Center has made any law to regulate industrial alcohol under Section 18G of the 1951 law or not? Both industrial alcohol and liquor are made from rectified spirit. The rectified spirit is then sent to the 'denaturation' process, which produces industrial alcohol. This alcohol cannot be consumed due to the de-intoxication process.

Central government's stand on the right to industrial alcohol:

- The Central Government has claimed its right to regulate industrial alcohol before the Supreme Court, saying that the legislative power to impose excise duty on alcohol for industrial use lies exclusively with the Parliament. The matter of alcohol suitable for human use falls under the jurisdiction of the state legislature while the matter of alcohol unsuitable for human use is a matter of Parliament's jurisdiction.
- Attorney General of India R Venkataramani has told a 9-judge Constitution Bench headed by Supreme Court Chief Justice DY Chandrachud that the decision to consider alcohol suitable for human use and alcohol unsuitable for human use separately was taken very thoughtfully. The matter of alcohol suitable for human use (Potable alcohol) falls under the jurisdiction of the state legislature, while the matter of alcohol unsuitable for human use (not drinkable - Industrial alcohol) is a matter of Parliament's jurisdiction.

Role of Industrial Development and Regulation Act, 1951:

- In 1951, the Government of India came up with a law called Industries Development and Regulation Act (IRDA). This law was meant for regulation and control of industrial alcohol and through this the Central Government has been exercising control over industrial alcohol. The problem arose when the State Governments enacted laws on it and they considered it a subject of the State List just like liquor.

Court decisions on rights over liquor and industrial alcohol:

- In 1989, a 7-judge bench of the Supreme Court heard the case on industrial alcohol in detail and found that only the Central Government can levy tax on industrial alcohol (which is not potable). This was confirmed in Synthetics and Chemicals Ltd. v. Uttar Pradesh, 1989.
- The Supreme Court has to decide whether there is really some fundamental difference between the 1956 and 1989 decisions. Should industrial alcohol be considered a state subject under the provisions of the State and Concurrent Lists or should the claim, made under the provision of 18G of the Central law, IRDA Act, be considered more effective?
- Synthetics & Chemicals Ltd vs State of UP, which came up before a nine-judge Constitution bench of the Supreme Court in 2007, deals with the interpretation

of Section 18G of the Industrial (Development and Regulation) Act, 1951.

- Section 18G empowers the central government to distribute certain products belonging to scheduled industries fairly so that it is available at a reasonable price. The central government can do so by issuing an official notification. However, according to Entry 33 of the Seventh Schedule of the Constitution, the state legislature has the power to regulate trade and the products of industries under Union control and imported goods.
- The question now is whether industrial alcohol can be treated as an intoxicating beverage? The controversy has arisen from the Industrial (Development and Regulation) Act 1951 and the 2016 amendment. It empowers the Central Government to regulate industries engaged in production, supply, distribution and trade of industrial alcohol. Under Entry 52 of Schedule I, Parliament can make laws to regulate any industry in public interest.

Status of constitutional dispute regarding industrial alcohol:

- Under the 7th Schedule of the Constitution, the rights related to alcohol have been mentioned in the Union List, State List, Concurrent List. Under this, Entry 8 of the State List deals with the power of the State Governments to make laws relating to production, manufacture, possession, transport, purchase and sale of liquor.
- At the same time, Entry 52 of the Union List empowers the Parliament or the Central Government to make laws on industries considered necessary in public interest, while Entry 33 of the Seventh Schedule allows both the States and the Centre to make laws on industries, with the condition that the State laws cannot contradict the Central laws.
- With this, the Central Government has recognised industrial alcohol as a subject falling under the industries (Development and Regulation) Act, 1951 (IDRA), which lists it as an object of regulation. This Act of Parliament empowers the Central Government to regulate industrial alcohol.

Short Issues

T+0 Settlement

Why in News:

BSE and NSE have introduced trading in the T+0 rolling settlement cycle in the equity segment on an optional basis. The beta version of the optional T+0 settlement cycle, or same-day settlement, with a limited set of brokers. This came after the Securities and Exchange Board of India (SEBI) issued operational guidelines for the launch of the shorter tenure settlement cycle.

About T+0 Trading Settlement Cycle:

- In December 2023, SEBI proposed to introduce a facility for clearing and settlement of funds and securities on T+0 (same day) on an optional basis, in addition to the existing T+1 settlement cycle.
- Under the T+0 trading cycle, trades will be settled on the same day as the T+0 market closes.
- This means that if investors sell a share, they will get the money credited to their account on the same day, and the buyer will get the shares in their demat account on the same day of the transaction.
- The current T+1 system involve a delay of one business day between the trade execution date and the settlement date. In this system, sellers receive only 80% of the cash on the day of sale, with the remaining 20% is available on the next day.

Benefits of the system:

- A shorter settlement cycle will bring cost and time efficiency to investors, transparency in fees and strengthen risk management across clearing corporations and the overall securities market ecosystem.
- The T+0 business cycle is expected to provide flexibility in terms of faster payment of funds against securities to sellers and faster payment of securities against funds to buyers.
- For the securities market ecosystem, a shorter settlement cycle will further free up capital in the securities market,

thereby enhancing overall market efficiency.

Conclusion:

This initiative corresponds to the changing Indian securities market, marked by surging volumes, values, and participants. With real-time settlement, Indian exchanges show their commitment to staying up to date with innovation and boosting market competition.

Indian Gaming Industry

Why in News:

India gaming report, 2024 was published by Interactive Entertainment and Innovation Council and winzo.

Key findings of the Report:

- India is the fastest growing mobile gaming market and annual revenue of overall Indian gaming industry is expected to almost double to 6 billion dollar by 2028 from 3.1 billion dollar in 2023.
- Accordint to the report, paid user will reach 240 million by 2028 from 144 million in 2023.
- The report said that the number of professional player in India will grow by 2.5 times over next five years.
- The report noted that India's share of global games download is 16 percent followed by Brazil and U.S.
- The report estimates, India has consumer base of around 568 million gamer and is home to approximately 15000 game developers and programmers.
- The report projects that India's online gaming industry will add 2.5 lakh more jobs in the next 10 years, which currently employs 1 lakh skilled gaming professionals directly and indirectly.
- About 40 percent of gaming population in India is comprised of women.
- The number of Indian gaming companies has grown from 25 in 2015 to over 900 gaming development companies in 2023 indicating continued stronger potential in the sector.
- The report noted that market is set to witness as many as 10 unicorns and 5 decacorns by 2028.

Issues with online gaming:

- Excessive gaming can lead to addiction, causing individuals to neglect other aspects of their lives such as work, school, and social relationships.
- Prolonged gaming sessions can lead to physical health problems such as eyestrain, headaches and sleep disturbances.
- Excessive gaming can lead to social isolation as individuals may prefer spending time in the virtual world rather than engaging with people in real life.
- Online gaming communities sometimes experience cyberbullying, where players harass, threaten, or intimidate others.
- Online gaming platforms may collect personal data, and there's a risk of privacy breaches or unauthorized access to sensitive information.

Conclusion:

The World Health Organization recognizes gaming disorder as a mental health condition. It involves impaired control over gaming, increasing priority given to gaming over other activities, and continuation of gaming despite negative consequences. Thus it is need of the hour to make sound rule related to online gaming so that it may not negatively affect demographic dividend of India.

India Employment Report 2024

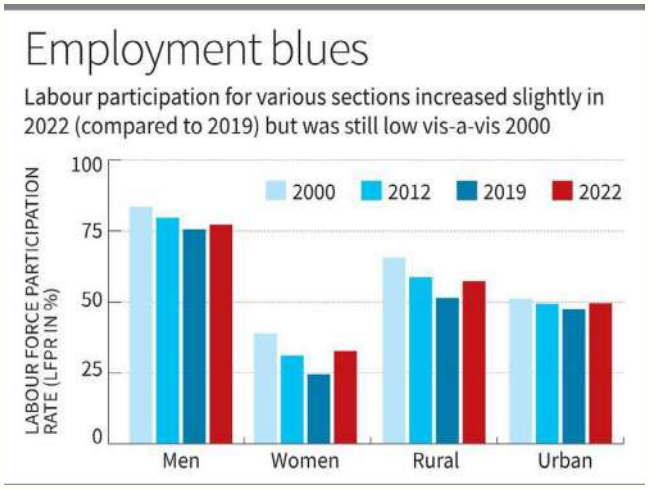
Why in News:

India Employment Report 2024 was published by the Institute for Human Development and the International Labour Organisation (ILO). It has revealed a troubling picture of rising unemployment among young, educated Indians.

Key findings of the report:

- Gross value added (GVA) grew at an annual average rate of 6.7% between 2012 and 2019, where as the employment growth rate was at 0.01%. This was even worse than in the period between 2000 and 2012 when the GVA grew at 6.2% and employment at 1.6%.
- Youth unemployment in India increased nearly threefold, from 5.7% in 2000 to 17.5% in 2019, but declined since to 12.1% in 2022
- The unemployment was much higher among young people in urban areas than in rural areas.
- The report further mentioned that the unemployment in youths has increased with the level of education, with the highest rates among those with a graduate degree or higher.
- India's youth account for almost 83% of the unemployed workforce and the share of youngsters with secondary or higher education in the total unemployed youth has almost doubled from 35.2% in 2000 to 65.7% in 2022.
- Women saw a rise in self-employment and unpaid family work.
- Labour productivity increased consistently alongside technological progress.

- There's a gradual shift from agriculture to non-farm sectors in the workforce, however, the transition slowed due to the COVID-19 pandemic.
- Employment is dominated by the informal sector (about 82%). Self-employment and casual employment are predominant.
- Wages have remained low and stagnant or decreased. Modest wage rises for casual labourers were observed, while real wages for regular workers stagnated or declined.
- Despite India's youthful workforce being a demographic asset, many lack essential skills, with 75% unable to send emails with attachments, 60% unable to copy and paste files, and 90% unable to use spreadsheets for mathematical formulas.
- While overall educational levels have risen, gaps remain across social groups, economic backgrounds, and regions.
- Only a small percentage of youths have formal vocational training.



About the Report:

- The India Employment Report 2024 is published by the Institute for Human Development and the International Labour Organisation (ILO) on labour and employment issues. This report on Youth Employment, Education and Skills examines the challenge of youth employment in the context of the emerging economic, labour market, educational and skills scenario in India and changes over the past two decades.

Key Recommendation:

- Government should integrate an employment creation agenda into macroeconomic policies.
- Government should emphasising productive non-farm employment, notably in manufacturing.
- Government should prioritise labour-intensive manufacturing to absorb unskilled labour and complement with selected services.
- Concentrate efforts on supporting micro, small, and medium-sized enterprises through a decentralised approach.

Global Trade Update

Why in News:

Recently, UNCTAD released global trade update report.

Key findings of the report:

- Report said that international trade is expected to rebound in 2024 amid lingering geopolitical uncertainties.
- Rising demand for environmental goods should boost trade in 2024.
- In 2023, global trade saw a 3 percent contraction due to supply chain disruption.
- In India, merchandise exports grew by 5 percent in the last quarter of 2023 as compared to same period a year ago.
- The service sector witnessed 8 percent growth while trade in goods experienced a 5 percent declined compared to 2022.
- Overall, the value of global trade fell by 3% in 2023.
- Most regions saw negative trade growth in 2023. The exception was a significant increase in intra-regional trade in Africa.
- IN 2023, Developing countries experienced a sharper decline in trade, with their imports and exports falling by 5% and 7%, respectively, compared to a 4% drop in imports and 3% in exports for developed nations.

About UNCTAD:

- The United Nations Conference on Trade and Development (UNCTAD) is the UN's leading institution dealing with trade and development.
- It is a permanent intergovernmental body established by the United Nations General Assembly in 1964.
- UNCTAD supports developing countries to access the benefits of a globalized economy more fairly and effectively.
- It provides economic and trade analysis, facilitates consensus-building and offer technical assistance to help developing countries use trade, investment, finance and technology for inclusive and sustainable

development.

Conclusion:

The forecast for 2024 is broadly positive, with GDP growth expected to continue at around 3%. The demand for environmental goods, especially electric cars, is set to play a crucial role in driving trade growth. However, the logistical challenges such as shipping disruptions in the Red Sea, Black Sea and Panama Canal cast shadows over the optimistic outlook, threatening to raise costs and disrupt supply chains. Ongoing geopolitical tensions and regional conflicts could also renew volatility in energy and agricultural markets. Additionally, the growing need to secure access to minerals critical for the energy transition could affect prices and add to market volatility for these commodities.

Minimum Wage vs Living Wage

Why in News:

India is set to replace its minimum wage system with a living wage by 2025, with the government seeking technical assistance from the International Labour Organization (ILO) to develop a framework for estimating and implementing it, according to reports.

What is Living wage?

- The living wage is defined by the ILO as "the wage level necessary to afford a decent standard of living for workers and their families, taking into account the country's circumstances and calculated for the work performed during normal hours."
- The minimum wage is the lowest amount of remuneration required by law to be paid by employers to employees for work performed during a given period.
- While the minimum wage aims to protect workers from low pay, the living wage goes further by providing enough income to cover basic needs such as food, clothing, shelter, and more.

Impact of such step:

- India has over 500 million workers among which 90% are employed in the unorganized sector. The transition from minimum to living wages aims to expedite lifting millions out of poverty and ensuring their well-being.
- While many earn a daily minimum wage of Rs 176 or more, the national wage floor, stagnant since 2017, lacks enforceability across states, leading to wage payment discrepancies. This lack of upward movement in wages has resulted in disparities in wage payments across different states.
- India's strong economic growth, at 8.4%, shows its capacity to support higher wages. Workers' concerns about the current minimum wage being too low to cover basic needs, especially with inflation, are also driving the shift.

Challenges:

- **Financial Strain:** Implementing a national living wage framework across states with varying costs of living will require careful planning. Some businesses, especially small and medium enterprises, may face financial strain due to increased labor costs.
- **The diversity of living costs:** The cost of living varies significantly between cities, states, and even districts, making it challenging to establish a uniform living wage rate.
- **Automation and the Gig Economy:** The rise of automation and the gig economy poses distinct challenges in ensuring fair compensation for workers. Technological advancements may render certain jobs obsolete or subject them to significant transformations.
- **Lack of Awareness:** There is a notable lack of awareness among workers regarding minimum wage provisions and their entitlements under labour laws, especially in remote and non-unionized areas. Consequently, their wages have not kept pace with increasing costs, leading to a decline in real value over time.

Conclusion:

India remains committed to achieving the Sustainable Development Goals (SDGs) by 2030, including promoting decent work and economic growth, despite challenges. The transition from minimum to living wages is viewed as a strategic step to expedite lifting millions out of poverty while safeguarding their well-being. However, balancing business affordability with worker welfare will be crucial in realizing this objective.

Monetary Policy Committee

Why in News:

The Monetary Policy Committee (MPC) of the Reserve Bank of India (RBI), recently met from April 3 to 5, and has decided to keep the repo rate, unchanged at 6.5 per cent and maintain the policy stance of 'withdrawal of accommodation' in the monetary policy.

Major highlights of the Meeting:

Monetary Outcomes:

- Benchmark interest rate or repo rate kept unchanged

at 6.5%.
- GDP growth for 2024-25 retained at 7%, lower than 7.6% last fiscal.
- Retail inflation to average 4.5% this fiscal, lower than 5.4% in FY24.
- Food price uncertainties to continue to weigh on inflation outlook.

Economic Perspectives:
- Outlook for agriculture, rural activity appears bright, with good rabi wheat crop and improved prospects of kharif crops, due to expected normal monsoon. With rural demand catching up, consumption is expected to support economic growth in FY25.
- Strong rural demand, moderating inflationary pressures, and sustained momentum in manufacturing and services sector to boost private consumption.
- The headwinds from protracted geopolitical tensions and increasing disruptions in trade routes, however, pose risks to the outlook.
- Strong growth momentum, along with GDP projections for 2024-25, gives RBI the policy space to unwaveringly focus on price stability.

Financial Market Developments:
- The central bank permits non-bank payment system operators to offer CBDC (Central Bank Digital Currency) wallets. Further, trading of Sovereign Green Bonds permitted in International Financial Services Centre (IFSC).
- RBI to launch a mobile app to facilitate retail participation in G-secs . The Bank will now allow cash deposits in banks through UPI and UPI payments from PPI wallets via third-party apps.
- Net inflows by foreign portfolio investors (FPI) stood at $41.6 billion during 2023-24, the second highest level of FPI inflow after 2014-15. India continues to be the largest recipient of remittances in the world.
- Current Account Deficit in 2024-25 to remain at a level that is both viable and eminently manageable.
- The Indian rupee remained largely range-bound as compared to its emerging market peers as well as a few advanced economies during 2023-24. However, it was most stable among major currencies in FY24.
- RBI to modify LCR framework to facilitate better management of liquidity risk by banks.

About the monetary Policy Committee:
- Under Section 45ZB of the amended RBI Act, 1934, the central government is empowered to constitute a six-member Monetary Policy Committee (MPC). This committee will determine the policy interest rate required to achieve the inflation target. The first such MPC was constituted in September 2016.

Members of MPC:
As per the amended RBI act, the MPC shall consist of:
- The RBI Governor as its ex officio chairperson,
- The Deputy Governor in charge of monetary policy,
- An officer of the Bank to be nominated by the Central Board, and
- Three persons to be appointed by the central government.

Finance Ministry's New Rules for Space Sector

Why in News:
The Finance Ministry has taken a significant step by notifying amended rules under the Foreign Exchange Management Act. This move is aimed at operationalizing its earlier decision to permit up to 100% foreign direct investment (FDI) in the space sector. The FDI is allowed through three categories of liberalized entry routes, marking a major development in opening up the sector to foreign investment.

Key Points:
- India's space program, once recognized for its communication and weather satellites, has garnered global attention following the launch of Chandrayaan and the establishment of a solar laboratory.
- ISRO's upcoming missions, including sending astronauts into space, underscore its expanding capabilities. However, the entry of private companies into the space sector has also made a significant impact.
- In 2022, Skyroot Aerospace, a Hyderabad-based startup, launched India's first privately built and designed rocket from ISRO's Satish Dhawan Space Centre. This shift indicates a move towards collaboration in a field traditionally focused on self-reliance.
- India currently holds a 2-3% share of the global space economy, a figure the government aims to increase to over 10% by 2030. To achieve this, an investment of $22 billion in the next decade is estimated by the Indian National Space Promotion and Authorisation Centre (IN-SPACe).
- The Space Policy, introduced in April last year, redefined ISRO's role to focus on research and development, while also recognizing the private sector as a key player.
- Relaxing FDI entry barriers aligns with the goal of expanding India's presence in the global space economy

and provides regulatory clarity, especially evident in the provision for spaceports where 49% FDI is now permitted.

About the New Rules:

- As per the Finance Ministry notification, 100% FDI has been allowed for the space sector under the category of manufacturing and operation of satellites, satellite data products and ground segment and user segment.
- Out of which, up to 74% would be through the automatic route and government nod would be required for investment beyond 74%. Under the earlier policy, any foreign investment in manufacturing and operating satellites is allowed only with government approval.
- Automatic FDI has also been permitted up to 49% for launch vehicles and associated systems or subsystems, and creation of spaceports for launching and receiving spacecraft. Government approval would be required for investments beyond 49%.
- Manufacturing of components and systems or sub-systems for satellites, ground segment and user segment will be fully under the 100% automatic route.
- The investee entity shall be subject to sectoral guidelines as issued by the Department of Space from time to time, it added. The new rules came into effect from April 16.

-: Prelims Insights :-

India gets FDI through two routes:

- ***Automatic route: Under this route, the non-resident or Indian company does not require a prior nod from the Reserve Bank of India (RBI) or the government of India for FDI.***
- ***Government route: Under this route, the government's approval is mandatory.***

Space Sector and changing Dynamics:

- There are over 200 start-ups in the sector now as compared to just around 40 or 50 three years ago. There has also been an expansion in the infrastructure set up by private companies such as Ananth, Dhruva, Skyroot, Pixxel and Bellatrix.
- The companies are already generating some revenue, but a significant increase can be expected soon. For instance, launch companies like Skyroot and Agnikul are likely to start commercial launches next year onwards. Further there have been talks regarding process of transferring SSLV to the private sector.
- 24 commercial launches are expected a year from the new spaceport Kulasekharapatnam. With every launch costing around Rs 35 to 40 crore, the launches alone will bring in nearly Rs 1,000 crore.
- Further revenue will also be generated from the data coming in from the satellites that have been launched as well as the manufacturing of the satellites.
- Major companies like L&T and Godrej, previously contractors for ISRO, are also planning to enter the space sector independently.
- Tata and Reliance have also shown interest, and there is significant international interest as well, with firms like OneWeb and Starlink already applying to provide broadband services in India.
- Space technology plays a vital role in achieving government welfare objectives, such as those related to agriculture and global warming mitigation, as well as national security goals.
- The ISRO-dominated ecosystem is evolving, requiring a balance between regulatory oversight and market freedom. A liberal FDI regime is seen as the first step towards achieving this balance.
- The Indian space policy and the FDI policy have been transformative, opening up all space activities to the private sector. Previously, private companies were mainly vendors to ISRO or involved in telecommunications.

Conclusion:

Recognizing the need for skill development in the sector, short-term courses are also being organised for industry professionals and collaborating with universities to offer a degree in space technology. Additionally, efforts are underway to create opportunities for retired ISRO scientists to work with the private sector, with four experts already hired and a list of consultants being compiled. IN-SPACe is also facilitating access to ISRO infrastructures for private companies, exemplified by the recently inaugurated technical center in Ahmedabad. Furthermore, MoUs with Gujarat and Tamil Nadu for manufacturing plants reflect the government's commitment to supporting satellite and launch vehicle manufacturing, respectively.

Agriculture & Allied Sector

Why in News:

NITI Aayog member, Ramesh Chandra said that the agriculture and allied sector may register more than 6 percent growth in financial year 2024- 2025 due to favourable monsoon and low base of previous year. He also favoured allowing increased exports in the case of surplus production of certain crops during the kharif season. Currently, the government has restricted the export of non-Basmati rice, wheat, sugar and onion.

Role of monsoon in Indian agriculture:

- Monsoon plays a crucial role in Indian agriculture, as it provides water for crops during the prime agricultural season. The monsoon season brings about 70% of the annual rainfall, which is essential for the 263 million farmers in India.

Positive impacts:

- **Increased crop production:** Monsoon rains support the growth of crops, resulting in higher agricultural output.
- **Economic boost:** A successful monsoon season contributes to rural prosperity by providing income to farmers and labourers.
- Recharge of groundwater: The monsoon helps recharge groundwater resources, which is crucial for sustainable agricultural practices.

Negative impacts:

- **Erratic monsoon patterns:** The monsoon's timing, intensity and distribution are unpredictable, leading to uncertainties in agricultural planning and crop management.
- **Droughts and floods:** Monsoon failure or excess rainfall can lead to droughts or floods, respectively.
- **Crop losses:** Prolonged and excessive monsoon rains can cause crop diseases, reducing crop quality and yield.

What is low base effect of previous year?

- The low base effect is an economic phenomenon in which a small absolute change from a low initial amount is translated into a large percentage change. An example of the base effect is if the growth rate was too low in the corresponding period of the previous year, even a relatively smaller rise in the growth rate will arithmetically give a high rate of current growth. Agriculture growth in 2023-24 was 0.67%, which means the base (for 2024-25) is low.

Challenges for agriculture sector:

While the sector has made significant progress in recent years, it still faces various challenges such as:

- Dependence on monsoon.
- Limited access to technology and markets.
- Inefficient supply chains.
- Climate change.

Remedies:

To address these challenges, the government and other stakeholders must work together to:

- Invest in research and development.
- Improve irrigation facilities.
- Enhance access to credit and insurance.
- Promote sustainable agriculture practices.
- Support small and marginal farmers.
- Encourage private sector investment.

Conclusion:

The agriculture and allied sector in India is a vital part of the country's economy, providing employment to a significant portion of the population and contributing substantially to the country's GDP. By addressing the challenges, India can unlock the full potential of its agriculture and allied sector, ensuring food security, improving rural livelihoods and driving economic growth.

Coal and Lignite Production in India

Why in News:

Union Coal and Mines Minister Pralhad Joshi said that the country has for the first time crossed the milestone of 1 billion tonnes of coal and lignite production in the financial year 2023-24.

Why coal is necessary for India:

- In the preceding fiscal year 2022-23, India achieved a historic milestone with its total coal and lignite output reaching 937 million tonnes (MT), as per official figures. This record-breaking production marks a significant step towards ensuring the nation's energy security.
- The majority of extracted coal is used for electricity production. The remaining coal is used for cement, steel and other industries. The government had earlier said the peak electricity demand between April and June is likely to reach 260 GW as compared with 243 GW this year in September 2023.
  - The India Meteorological Department (IMD) predicts higher-than-normal temperatures in most

parts of the country during the hot weather season of March to May. However, preparations are on to meet the upcoming summer demand can aid in dealing with increased power consumption.

- Furthermore, India currently relies significantly on fossil fuels, with only 22% of its energy coming from renewables while coal supplies 75% of power, despite its aim to boost renewable energy.
  - The shift toward coal also addresses the essential need for baseload capacity, ensuring a minimum level of demand fulfilment over 24 hours.
- The coal sector directly creates around 7.25 lakh jobs, underscoring its significance within India's energy landscape.

-: Prelims Insights :-

- **Coking Coal:** Coking coal, when heated in the absence of air, form coherent beads, free from volatiles, with strong and porous mass, called coke. Coking coal has coking properties and is mainly used in steel making and metallurgical industries
- **Semi Coking Coal:** Semi coking coal, when heated in the absence of air, form coherent beads not strong enough to be directly fed into the blast furnace. Such coal is blended with coking coal in adequate proportion to make coke.
- **Non-Coking Coal:** Non-Coking Coal does not have coking properties and is mainly used for power generation. It is also used for cement, fertilizer, glass, ceramic, paper, chemical and brick manufacturing, and for other heating purposes
- **Washed Coal:** Processing of coal through water separation mechanism to improve the quality of coal by removing denser material (rocks) and high ash produces washed coal which has less ash, higher moisture, better sizing, better consistency, less abrasive, etc.

Coal and future Implications:

- The Coal Ministry plans to triple underground coal output by 2028, to meet the escalating energy demand in the world's most populous country and fastest-growing large economy.
- Also, India faces challenges in ensuring a steady energy supply through renewable sources due to the variable nature of sources like solar and wind, which are not always in sync with demand. To ensure a steady supply, India has to heavily invest in battery storage which is expensive due to supply chain disruptions.
- Along with this, India's plans for nuclear energy have not taken off that well. In 2021-22, nuclear plants only contributed 3.15% of India's total electricity generation.
- State-owned distribution companies (discoms) rely on thermal or nuclear generation to meet base load demand despite renewable sources. Urgent energy storage is crucial to counter renewable variability. These companies may struggle more if burdened with solar and wind-based generation.

Conclusion:

India is actively improving coal efficiency through measures such as mandating supercritical technology for Ultra Mega Power Projects, promoting coal gasification, modernizing old thermal power plants, and installing electrostatic precipitators. The expansion of renewables is a gradual process and highlights need for storage to bridge capacity gaps. While thermal energy, especially coal and nuclear, remains crucial until renewable capacity grows, coal serves as an essential base load due to constraints in expanding nuclear capacity.

Private Investment Trends in India

Why in News:

According to the latest data, fresh investment plans in India have fell to 15.3% in 2023-24 while foreign investors have reduced new outlays by almost a third.

Private Investment in India:

- Private investment in India began to significantly pick up after the economic reforms of the late-1980s and early-1990s, which improved private sector confidence. The growth in private investment lasted until the global financial crisis of 2007-08.
- It rose from around 10% of GDP in the 1980s to around 27% in 2007-08. However, from 2011-12 onwards, private investment began to drop and hit a low of 19.6% of GDP in 2020-21.

Current trend in new Investments:

Overall Investment Trends:

- Value of new investment announcements dropped almost 5% from the all-time high of almost 37 lakh

crore recorded in 2022-23.
- Manufacturing sector's proposed outlays slid by 40% from 19.85 lakh crore in 2022-23 to under 11.9 lakh crore in 2023-24. Its share in new investments declined from almost 54% in 2022-23 to 33.8% of the 35.22 lakh crore outlays announced last year.
- Irrigation and mining investments' value tanked 48.7% and 19.25%, respectively.
- Electricity and infrastructure sectors clocked upticks of 96% and 22%, respectively.

-: Prelims Insights :-

Gross Fixed Capital formation:
- GFCF, represents the growth in the size of fixed capital in an economy. Fixed capital includes assets like buildings and machinery that require investment to be created.
- Private GFCF can indicate how much the private sector is willing to invest. Overall GFCF also includes capital formation from government investment.
- Developed economies like the U.S. have more fixed capital per capita than developing economies like India.

State-wise Analysis Trends:
- State governments led the way on capex growth, ramping up spends on new investment projects by 27% to almost Rs. 7.69 lakh crore, while value of the Centre's fresh projects rose 8.4% to Rs. 6.09 lakh crore.
- Maharashtra attracted the maximum new projects with proposed outlays of almost 8 lakh crore.
- Gujarat retained its second position with its share of investments almost unchanged at about 12%.
- Karnataka slid from third to the fourth rank over the past year.
- Odisha jumped from fifth rank to third in 2023-24, despite an 11.4% decline in investment value (Rs. 3.23 lakh crore).
- Tamil Nadu's rank among states surged from eighth to fifth, with commitments of Rs. 2.71 lakh crore in 2023-24.

Conclusion:

The potential slowdown in new investment announcements in the first quarter of the year can be attributed to the extended general election period. However, with the new government assuming office in June, the flow of fresh investment is expected to gain traction. The government should not only usher in further reforms but also ensure the timely execution of the 72.22 lakh crore of investments announced in the last two years. Any delays in the implementation of projects, especially in critical sectors like green hydrogen, semiconductors, electric vehicles, transport infrastructure, hydel, and solar power, could potentially impede the growth trajectory of the Indian economy in the coming years.

CDP-SURAKSHA

Why in News:

The government has come up with a new platform called CDP-SURAKSHA, to disburse subsidies to horticulture farmers under the Cluster Development Programme (CDP).

About the CDP-SURAKSHA:

- SURAKSHA stands for "System for Unified Resource Allocation, Knowledge, and Secure Horticulture Assistance".
- It is essentially a digital platform will allow an instant disbursal of subsidies to farmers in their bank account by utilising the e-RUPI voucher from the National Payments Corporation of India (NPCI).
- It has features such as database integration with PM-KISAN, cloud-based server space from NIC, UIDAI validation, eRUPI integration, local government directory (LGD), content management system, geotagging, and geo-fencing.
- It uses e-RUPI vouchers from the NPCI. The voucher is a one-time payment mechanism that can be redeemed without a card, digital payments app or internet banking access, at the merchants accepting e-RUPI.

How it will work?

- The platform seeks to push the growth of India's horticulture sector, which contributes nearly one-third to the agriculture gross value addition (GVA), making a substantial contribution to the Indian economy.
- It allows access to farmers, vendors, implementing agencies (IA) and cluster development agencies (CDAs) and officials of the National Horticulture Board (NHB).
- Under the previous system, farmers had to purchase planting materials themselves and then seek subsidy approval from officials.
- The new CDP-SURAKSHA platform changes this by offering subsidies to farmers upfront when they buy

planting material. Vendors supplying the materials will only receive payment after farmers confirm the delivery of their orders.

About Cluster Development Program (CDP):

- The CDP is a component of the central sector scheme of NHB, which is aimed at leveraging "the geographical specialisation of horticulture clusters and promoting integrated and market-led development of pre-production, production, post-harvest, logistics, branding, and marketing activities
- In a pilot phase, the programme will be implemented in 12 horticulture clusters, out of the total 55 clusters selected for the programme.
- These clusters will be implemented through Cluster Development Agencies (CDAs) which are appointed on the recommendations of the respective State/UT Government.
- The 55 clusters will cover 9 lakh hectares of land across 55 clusters, benefiting around 10 lakh farmers. It is expected to attract private investment of Rs 8,250 crore, in addition to government assistance.
- The government's support varies based on the cluster size: up to Rs 25 crore for mini clusters (up to 5,000 ha), up to Rs 50 crore for medium clusters (5,000 to 15,000 ha), and up to Rs 100 crore for mega clusters (more than 15,000 ha).

Conclusion:

The production of horticulture crops has significantly increased in recent years. In 2010-11, it was 240.53 million tonnes, and by 2020-21, it had risen to 334.60 million tonnes. Timely and efficient subsidy disbursal is crucial to further boost productivity in this sector and improve farmers' livelihoods. There is a vast opportunity to enhance the productivity of Indian horticulture to meet the country's estimated demand of 650 million metric tonnes of fruits and vegetables by 2050.

All India Household Consumption Expenditure Survey 2022-23

Why in News:

Ministry of Statistics and Program Implementation has released the data of the All India Household Consumption Expenditure Survey 2022-23. This data is based on the results of the survey conducted between August 2022 and July 2023. All India Household Consumption Expenditure Survey (HCES), is a survey conducted by the NSSO every five years, to ascertain the household spending habits.

Key findings of the survey:

- The average monthly per capita consumption expenditure (MPCE) in Indian households rose by 33.5% since 2011-12 in urban households to Rs.3,510.
- Rural India's MPCE saw a 40.42% increase over the same period to hit Rs. 2,008.
- In 2022-23, 46% of rural household expenditure and 39% of urban household expenditure were on food items.
- The bottom 5% of India's rural population, ranked by MPCE, has an average MPCE of Rs. 1,373 while it is Rs. 2,001 for the same category of population in the urban areas.
- The top 5% of India's rural and urban population, ranked by MPCE, has an average MPCE of Rs. 10,501 and Rs. 20,824, respectively.

New methodology of the Household Consumption Expenditure Survey:

- Segregation of the consumption basket into three broad categories: food items, consumables and services and durable goods. Splitting of the single questionnaire into three parts covering the above categories.
- Three questionnaires used at random in a selected household during three separate monthly visits.
- Inclusion of questions seeking inputs on free items and subsidies under welfare schemes.

Methodology issues of the Household Consumption Expenditure Survey:

- Non-comparability of current estimates with those of the past due to the splitting of the questionnaire and visiting a sample household thrice.
- The splitting of the single questionnaire into three parts covering food items, consumables and services items, and durable goods.
- The new HCES considers a State/UT as the basic stratum, whereas every district was considered as a basic stratum for rural and urban areas in HCES 2011-12.
- Stratification of households based on possession of land in rural areas and possession of four-wheeler cars for non-commercial use in urban areas.

Conclusion:

The Household Consumption Expenditure Survey in India is essential for understanding the dynamics of consumption across the country's diverse populace. As India continues to evolve, the significance of accurate, transparent and comprehensive consumption data cannot be overstated for shaping a more inclusive and equitable society.

Central Bureau of Investigation in India: Role and Authority

The role of the central investigation agencies in any country is crucial for maintaining law and order, serving as a cornerstone for the rule of law. However, recent times have seen a reevaluation of the roles of CBI and other agencies like the National Investigation Agency (NIA) and the Enforcement Directorate (ED) role, particularly regarding their authority and powers. There is an ongoing debate about how to improve coordination between central investigation agencies and state police forces, especially in a federal country like India. In West Bengal, there has been a notable increase in investigations by the NIA, ED, and CBI, sparking further discussions on this issue.

Recently, NIA officials visited Medinipur in West Bengal to investigate a terrorist bomb blast case, but encountered challenges. They were attacked and faced allegations of working against human rights and misbehaving with women. Additionally, the state government and Chief Minister were perceived as uncooperative towards the NIA during the investigation.

In such instances, the contentious nature of Centre-State relations regarding investigations and the role of security forces comes into question. There are concerns whether the Central Government is utilising investigations as a political tool, or if the West Bengal State Government is offering any form of clandestine support to terrorists, criminals, or scamsters. Such controversial questions indeed cast a shadow over India's federal character, highlighting the shared responsibility of both the Central and State Governments to address them. The attacks on Central Investigation Officers in West Bengal are also providing opportunities for people and organisations of foreign origin to question India, irrespective whether focus is on the Central or State Government.

- The attack on the Enforcement Directorate team which conducted raids on the allegations related to the ration scam exemplifies this situation. When the Enforcement Directorate officers reached the house in a case related to the ration scam in West Bengal, they found the house locked, due to which they tried to break the lock of the house. Then suddenly a large number of villagers gathered and attacked the investigation team. The Central Force personnel who accompanied them were attacked and their vehicles were also vandalized. A similar incident has happened with the CBI investigation as well. For all these cases, it becomes necessary to evaluate the role of central investigation agencies.

Structure and role of NIA:

- NIA is a federal investigation agency established by the Government of India to deal with terrorism in India. It came into existence with the enactment of the National Investigation Agency Act on December 31, 2008 and started functioning as the central counter terrorism law enforcement agency in this country. Apart from its headquarters in New Delhi, NIA has expanded its geographical reach through a network of branch offices located in Lucknow, Hyderabad, Kochi, Guwahati, Mumbai, Kolkata, Raipur and Jammu. The first case was registered with NIA in June 2009.
- NIA has so far conducted more than 1000 raids against terrorist networks and arrested 625 terrorists

from across the country. The conviction rate of NIA is currently 94.70 percent. At the same time, 74 accused have been convicted by NIA in various cases. NIA has also investigated terrorist cases in the Consulate General of Canada in Ottawa, London and San Francisco.

- With the objective of breaking the links of various forms of terrorism and its organised crime, the National Investigation Agency has been empowered last year in the NIA Amendment Act, 2019 to deal with terror cases as well as cyber security related cases, crimes related to counterfeit currency, crimes related to explosive materials, human trafficking, extending the jurisdiction of investigation to foreign countries and keeping under investigation such persons who commit crimes against Indian citizens outside India or that affect the interests of India.
- The importance of such legislation is understood when the country finds professional policemen and terrorist organisations like ISIS indulging in cyber crime in India and inciting violence online for religious extremism in the country. Ever since the NIA has got the right to take action against organised crime networks, the role of the NIA has also started being seen with the powers of the Central Government.

Role of Enforcement Directorate:

- The role of Enforcement Directorate is considered important for preventing money laundering in the country, taking action against suspicious financial transactions, breaking the black money network, targeting the hawala business and it is known for strict legal action against corruption in the country. Whether it is illegal liquor trade, paper leak cases, drug smuggling cases linked to money laundering, ED takes action against all these.
- Enforcement Directorate was established in the year 1956 and comes under the Revenue Department of the Ministry of Finance. It is responsible for fighting economic crimes and enforcing the Foreign Exchange Management Act, 1999 and (Prevention of Money Laundering Act, 2002). It also includes IAS, IPS and IRS officers and officers promoted from ED's own cadre.
- The ED Director is appointed as per the provisions of the Central Vigilance Commission Act, 2003. The Center appoints the Director on the recommendation of a committee, which is headed by the Central Vigilance Commissioner. The other members of the committee are secretaries in the ministries of Finance (Revenue), Home and Personnel and Training. In India, ED or Enforcement Directorate is responsible for enforcing economic laws and regulations, investigating financial crimes and seizing illegal assets.
- The major functions of ED include investigating cases related to violations of FEMA, 1999, "hawala" transactions and foreign exchange racketeering.

Powers of Enforcement Directorate:

- The main objectives of setting up the Enforcement Directorate include taking legal action against money launderers in the country including confiscation of their property.
- The ED conducts search (property) and seizure (money/documents) under Section 16 (power of survey) and Section 17 (search and seizure) of the PMLA after deciding that money has been laundered. Based on that, the officers decide whether arrest is required as per Section 19 (power of arrest). Under Section 50 of the PMLA, the ED can conduct search and seizure directly without even calling a person for interrogation.
- It is not necessary to first summon the person and then initiate search and seizure. If the person is arrested, the ED gets 60 days to file a prosecution complaint (charge sheet) as the punishment under PMLA does not exceed seven years.

Role of Central Bureau of Investigation CBI:

- The Central Bureau of Investigation (CBI) is the premier central investigating agency of India which mainly handles high profile cases. The main job of this investigating agency is to ensure the events and evidence of partial cases. It mainly investigates cases of corruption, murder and scams and can investigate in any corner of the country on the order of the Government of India.
- CBI was established in the year 1963. It works under the Ministry of Personnel Public Grievances and Pensions, Government of India. It comes under the Prime Minister's Office.
- This investigating agency is also considered a nodal police agency. All immediate recruitment in it is done through SSC (Staff Selection Commission). The authority of CBI is considered to be the most favorable agency which lies under the authority of the Central Government for the discovery of corruption related to crime through public servants, but CBI does not investigate corruption level as the police force of the state.
- The Central Bureau of Investigation is the important investigating body for serious crimes ranging from murder to warmongering. It is worth mentioning that the power with CBI is derived from the Delhi Special Police Establishment Act, 1946. The main role of this investigating agency is to prevent corruption and

maintain integrity in the administration. It is also considered responsible for investigating cases related to violation of economic and fiscal laws i.e. violation of laws related to customs and central excise, export and import control, income tax, foreign exchange rules etc. On the order of the state government, CBI can take cognisance of any matter of public importance and can also investigate it. Apart from this, CBI represents India for correspondence with Interpol.

Short Issues

ASI to Delist 18 Centrally Protected Monuments

Why in News:

The Archaeological Survey of India (ASI) has decided to delist 18 "centrally protected monuments" from its list because it has assessed that they do not have national. These monuments were previously categorized as untraceable. The gazette notification for the 18 monuments was issued on March 8. There is a two-month window for the public to send in "objections or suggestions"

What is Delisting of monuments?

- The ASI, under the Union Ministry of Culture, safeguards and maintains specific monuments and archaeological sites of national importance as per, The Ancient Monuments Preservation Act, 1904 and The Ancient Monuments and Archaeological Sites and Remains Act, 1958 (AMASR Act).
- According to the Section 35 of the AMASR Act, "If the Central Government is of opinion that any ancient and historical monument or archaeological site and remains declared to be of national importance…has ceased to be of national importance, it may, by notification in the Official Gazette, declare that the ancient and historical monument or archaeological site and remains, as the case may be, has ceased to be of national importance for the purposes of [the AMASR] Act".
- Therefore, delisting of a monument effectively means it will no longer be conserved, protected, and maintained by the ASI.

National monument: reasons behind their deterioration:

- ASI currently has 3,693 monuments under its purview, which will fall to 3,675 once the current delisting exercise is completed in the next few weeks. This is the first such large-scale delisting exercise in several decades
- **Infrastructure development:** 50 of India's 3,693 centrally protected monuments were missing. Fourteen of these monuments had been lost to rapid urbanization, 12 were submerged by reservoirs/ dams, and the remaining 24 were untraceable.
- **Lack of adequate personnel:** Out of the total requirement of 7,000 personnel for the protection of monuments, the government could provide only 2,578 security personnel at 248 locations due to budgetary constraints. Further, security guards were posted at only 248 of the 3,693 protected monuments.
- **Other challenges:** ASI faces challenges due to limited funding and resources, hindering its conservation efforts. Maintaining and securing thousands of heritage sites against vandalism and encroachment is difficult.
- Environmental threats like climate change pollution and balancing public access with conservation to preserve historical integrity is an also an ongoing challenge.

Conclusion:

India should rationalize the list of centrally protected monuments (CPM) based on national significance, architectural value, and heritage content. India spends relatively little on monument protection and there is a need to acquire more human resources and increase funding for conservation. Integrating sustainable practices into conservation and restoration projects is also crucial.

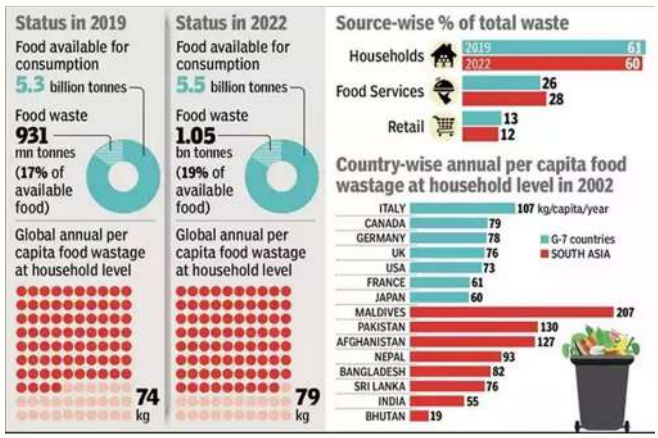
Food Waste Index Report 2024

Why in News:

The Food Waste Index Report, 2024, a joint study jointly authored by the United Nations Environment Programme (UNEP) and WRAP (Waste and Resources Action Programme was released ahead of International Day of Zero Waste (30 March).

Major findings of the Index:

- **Food Waste Statistics (2022):** The report noted that in 2022, there were 1.05 billion tonnes of food waste generated (including inedible parts), amounting to 132 kilograms per capita and almost one-fifth of all food available to consumer.
  - 60% of total food waste at the household level, 28% at food services, and 12% at retail.
  - Over one billion meals were wasted daily in 2022, despite 783 million people facing hunger and a third of humanity experiencing food insecurity.
- **Environmental Impact:** Food loss and waste contribute 8-10% of annual global greenhouse gas emissions, nearly 5 times that of the aviation sector.
  - Food loss also caused significant biodiversity loss, taking up almost a third of the world's agricultural land.
- **Rural vs. Urban Food Waste:** The report notes that rural areas generally waste less food due to greater diversion of food scraps to pets, livestock, and home composting.
- The report highlights that numerous low- and middle-income countries lack sufficient systems to track progress toward achieving SDG 12.3.
  - Only four G-20 countries (Australia, Japan, U.K., U.S.) and the European Union have suitable food waste estimates for tracking progress to 2030.



About the Food Waste Index Report:

- The Food Waste Index tracks global and national generation of food and inedible parts wasted at retail and consumer (households and food service) levels. It supports achievement of one of the two indicators of SDG 12.3.
- The report defines "food waste" as "food and the associated inedible parts removed from the human food supply chain".
- Further, Food loss is defined as "all the crop and livestock human-edible commodity quantities that, directly or indirectly, completely exit the post-harvest/slaughter production/supply chain, etc., excluding, the retail level.

-: Prelims Insight :-

SDG 12.3: By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses:

- **SDG 12.3.1 (a):** The Food Loss Index (FLI) measures losses along the food supply chain starting from post-harvest losses on the farm up to but not including retail stage. FAO is the custodian of FLI.
- **SDG 12.3.1 (b):** FWI halve per capita global food waste at retail and consumer levels. UNEP is the custodian.

Conclusion:

The report estimated the toll of both food loss and waste on the global economy at $1 trillion. It emphasized the importance of expanding and strengthening data infrastructure to enable the tracking and monitoring of food waste.

India's Birth Crisis

Why in News:

India's total fertility rate (TFR) or births per woman will reduce to 1.29 in 2050, a new study published in Lancet has warned.

Declining birth rate in India:

- Researchers predict that by 2050, 155 out of 204 countries (76% of the world) will have fertility rates below replacement level. This number is expected to rise to 198 countries (97%) by 2100.
- According to the Global Burden of Disease, Injuries, and Risk Factors Study (GBD) in 2021, the total fertility rate (TFR) has decreased globally over the past 70 years, from approximately five children per woman

in 1950 to 2.2 children in 2021. In India, the TFR was 6.18 in 1950, dropped to 4.60 in 1980, and further declined to 1.91 in 2021.

Reasons behind such dip:

- **Declining fertility rate:** Various factors, including obesity, stress, smoking, and environmental pollution, contribute to the declining fertility rates in India.
- **Rising cost for raising a child:** Most of the parents feel that they now do not receive much benefit from their children the way they used to. This has influenced their decision to have an additional child that would involve a substantial cost of bringing them up.
- **Rise of female literacy and women's participation in the workforce:** Career consciousness, financial returns and economic independence have meant that women are reconsidering their options of having a second child.
- **Increased Infant Mortality:** Infant mortality has declined substantially (because of various maternal and child health-related programmes and successful immunisation). This means that more children are surviving, and families are choosing to have fewer children.
- In fact in the urban space, many couples do not consider child-rearing as a must-do task, are instead choosing not to have babies at all and even considering options like adoption. This pattern is percolating to rural India too.

Implications:

- The rising demand for In Vitro Fertilization (IVF) treatments underscores the growing prevalence of infertility issues, with the IVF market projected to reach $3.7 billion by 2030, up from $793 million in 2020.
- By 2050 the share of senior citizens in India will be more than 20 per cent, that is one five people in India will be old and there will less young people to take care of them.

Conclusion:

As India braces for a surge in its senior citizen population policymakers will challenges in managing social security and healthcare. Scandinavian countries like Sweden and Denmark are tackling similar issues by supporting new families with affordable childcare and healthcare. These countries are also promoting gender equity by engaging men in household and care work, which helps women balance careers and motherhood. To address declining fertility rates, economic policies supporting growth and job creation, along with social security and pension reforms, will be crucial.

Cybercrime in India

Why in News:

A report by the Indian Cybercrime Coordination Centre (I4C) revealed that digital financial frauds accounted for a staggering Rs. 1.25 lakh crore over the last three years. According to the National Cybercrime Reporting Portal (NCRP), in 2023, at least Rs. 10,319 crore was reported to be lost by victims of digital financial fraud.

How digital frauds work:

- Convincing the victim to send money, either by impersonation (fake social media profiles) or by giving them a false promise of greater return (investment, crypto, held up custom package etc)
- By taking credentials such as Unified Payments Interface ID (UPI), Personal Identification Number (PIN), One-Time Password (OTP) or Internet banking ID or password from the victim and then using the same on other apps/websites and transferring money without the knowledge of the victim.
- For this the customer will either be given a fake link which looks exactly like a UPI app screen or banking website or the victim will be conned into installing a screen sharing app.

What after the scam:

- After a fraudster empties a victim's bank account, the money undergoes a series of circulations in broadly three stages.
- The first stage is a temporary account into which the fraudsters transfer victims' money. This account will be used to receive money from various other victims as well. From here, the money is then transferred into a second stage account.
- The second category of accounts is a group of accounts among which money is circulated. There are a lot of middlemen who are money circulators. Their task is only to receive money from first level bank accounts for a nominal cut.
- After sufficient churning, the money is then transferred into a third stage account which is a sink account. This can be a bank account, an e-wallet etc.

Challenges before law enforcement agencies:

- The siphoned off money hops across bank accounts and wallets within minutes but supervised entities are not able to give the required details to agencies with the same speed.

- Most of the crime is reported after 24 hours of the commission.
- Due to stress and trauma most victims end up deleting much of the evidence from their phones.
- By the time a money trail is established the money is already withdrawn from the system and there is no way to either identify the person or recover the money.

The action that need to be taken:

- As a first, just as how Google accounts do not allow logging in from a new device unless permission is granted by the former, financial institutions must be mandated to replicate this feature in their apps.
- As soon as a UPI ID, password or OTP is entered in a different device, an alert must be generated in a previous device with no further action being allowed until it is approved by the person.
- Banking and financial apps must disable screen-sharing to run on top of them.
- In the bank statement, all banks and NBFCs must be mandated to provide comprehensible data.

Conclusion:

The Bharatiya Nagarik Suraksha Sanhita 2023 which is set to replace the Indian Penal Code of 1861, recognises 'organised crime' as a continuous unlawful activity. Digital financial frauds are very much covered in this definition. Law enforcement agencies face a lot of difficulties in conducting interstate raids and arrests. It requires a large team and coordinated effort. Interstate digital financial fraud networks must be recognised as a serious crime and bail may be restricted by the Courts.

Cyber Slavery

Why in News:

Recently, minister of external affair said that Indian government is collaborating with Cambodian authority for rescuing India people who trapped in Cambodia as a cyber-slaves. Over 5,000 Indians are reported to be trapped in Cambodia, where they are allegedly being coerced into carrying out cyber frauds.

About cyber slavery:

- Cyber slavery, also known as a digital slavery, is an organised crime which refers to exploitation of people through digital means.
- Individuals are lured under false pretenses, often promised data entry jobs. However, upon arrival, they are forced to engage in cyber fraud activities, including posing as law enforcement officials or using fake social media profiles to scam people.
- The scams involve various tactics, including posing as women on dating apps to convince targets to invest in cryptocurrency trading or fake stock investments etc.

What are the key challenges in cyber slavery?

- Cyber slavery operates in the digital shadows, thus making it difficult to track down perpetrators, their anonymity allows them to hide behind pseudonyms, encrypted communication channels, and virtual private networks (VPNs).
- The internet transcends national borders, complicating legal jurisdiction. Perpetrators can operate from one country while victimizing individuals in another country.
- Perpetrators often use fake identities, making it challenging to identify and trace them.
- Law enforcement agencies face resource limitations, both in terms of personnel and technology.

About India Cambodia relationship:

- India and Cambodia established diplomatic relations in 1952 after Cambodia's independence from French colonial rule.
- India is among the top 10 foreign investors in Cambodia and the fourth largest trading partner in ASEAN with bilateral trade in 2019-20 worth US $86.9 billion.
- Cambodia is also in plans to establish a bilateral Free Trade Agreement (FTA) with India .
- Cambodia also appreciates India's role in supplying COVID-19 vaccines, most recently under the QUAD vaccine initiative.
- With respect to physical connectivity, the completion of the India- Thailand- Myanmar trilateral highway that is to be connected to Cambodia, Laos, and Vietnam will give India and Cambodia an opportunity to enhance multimodal connectivity.

About Cambodia:

- Cambodia is a country in Southeast Asia, bordered by Thailand, Laos, Vietnam, and the Gulf of Thailand.
- The capital of Cambodia is Phnom Penh.
- The Mekong delta is situated in Cambodia and southern Vietnam.

Conclusion:

Cyber slavery is a serious and widespread form of organized crime, with tens of thousands of people trapped in scams. It's hard to stop because the criminals can easily move their operations between countries. Governments and NGOs need to work together to tackle this problem effectively.

Mohiniyattam

Why in News:

Kalamandalam, Kerala's top arts institution has defied tradition by allowing male students in Mohiniyattam courses, marking a significant shift in gender norms and embracing inclusivity in classical dance forms.

About Mohiniyattam:

- Mohiniyattam literally interpreted as the dance of 'Mohini', the celestial enchantress of the Hindu mythology, is the classical solo dance form of Kerala. The delicate body movements and subtle facial expressions are more feminine in nature and therefore are ideally suited for performance by women.
- According to a Puranic story, Lord Vishnu took on the guise of a 'Mohini' to seduce the Asuras, both in connection with churning of the ocean and episode of the slaying of Bhasmasura.
- Mohiniyattam's exact origin is unclear, but historical evidence suggests a community of female temple dancers who added expressive gestures to the mantras chanted by temple priests during rituals.
- References of Mohiniyattam can be found in the texts Vyavaharamala written in 1709 by Mazhamagalam Narayanan Namputiri and in Ghoshayatra, written later by great poet Kunjan Nambiar.
- This dance form of Kerala was structured into the present day classical format by the Travancore Kings, Maharaja KartikaTirunal and his successor Maharaja Swati Tirunal (18th -19th century C.E.).

Major characteristics of Mohiniyattam:

- Mohiniyattam, a lasya style dance, is characterized by graceful, swaying body movements with no abrupt jerks or sudden leaps.
- Movements in Mohiniyattam are inspired by the swaying of the sea, coconut trees, and paddy fields, emphasizing gliding and toe movements. Some movements are borrowed from dances like Nangiar Koothu, Kaikottikali, and Tiruvatirakali.
- Mohiniyattam uses 24 hand gestures, mainly from Hastalakshana Deepika (used in Kathakali), with some from NatyaShastra, Abhinaya Darpana, and Balarambharatam.
- The gestures and facial expressions are closer to the natural (gramya) and the realistic (lokadharmi) than to the dramatic or rigidly conventional (natyadharmi).
- Mohiniyattam focuses on acting, with dancers immersing themselves in the characters and emotions of the compositions like Padams and Pada Varnams, allowing for expressive facial expressions.

Conclusion:

Unlike other classical dance forms, like Bharatnatyam or Kuchipudi, Mohiniyattam, said to have originated in courtesan performances, has had very few male exponents. Male inclusion would aid in preventing the taboo against males performing the dance form.

WADA Anti-Doping Report

Why in News:

According to the 2022 testing figures released by the World Anti-Doping Agency (WADA), India has emerged as the country with the highest percentage of doping offenders.

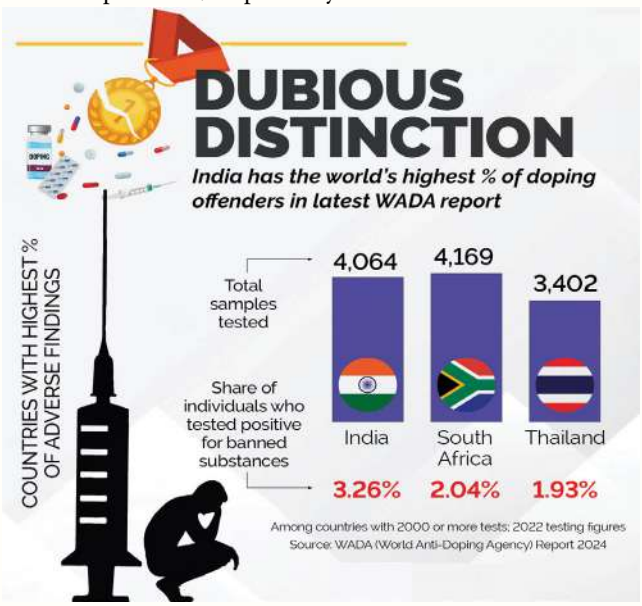
Highlights of the Report:.

- The report revealed that out of 4,064 samples collected from Indian athletes (including urine, blood, and athlete biological passports), 127 individuals tested positive for banned substances, accounting for 3.26% of the sample size.
- There was 6.4 per cent increase in the total number of samples analysed and reported in its Anti-Doping Administration and Management System (ADAMS) in 2022, compared to the previous year.
- The percentage of (Adverse Analytical Findings) AAF also increased to 0.77 per cent in 2022, from 0.65 per cent in 2021.
- Samples in India were tested at the National Anti-Doping Laboratory (NDTL) at the JLN stadium. The analysis was based on failed drug tests among nations, with more than 2000 samples being tested by their respective testing laboratories.

Country-wise data:

- India's doping violations outnumber those of major sporting nations such as Russia (85), the United States (84), Italy (73), and France (72). China conducted the highest number of samples testing - 17,357 during the counting period - with an adverse findings percentage of 0.25 per cent.
- India also topped the list for the highest percentage of failed EPO-Receptor Agonists (ERA) tests conducted per laboratory (blood), with 11 cases or 1.8 per cent of adverse analytical findings (AAFs).
- Following India, South Africa ranked second with 80 doping failures (2.04 per cent from 4,169 samples tested), followed by Bangkok's testing laboratory in third place, reporting 1.93 per cent of its testing pool (3,402 samples), returning 65 cases of AAFs.

- The United States and Qatar secured the fourth and fifth positions, respectively.



-: Prelims Insights :-

WADA is a Swiss private law, not-for-profit foundation, with its seat in Lausanne, Switzerland, and its headquarter is in Montreal, Canada.

The International Olympic Committee (IOC) convened the First World Conference on Doping in Sport, in Lausanne, Switzerland, on February 2-4, 1999, which resulted in the Lausanne Declaration on Doping in Sport. Lausanne Declaration called for the establishment of an independent international anti-doping agency, to be operational for the Games of the XXVII Olympiad in Sydney in 2000.

As per the Declaration, the World Anti-Doping Agency (WADA) was founded on November 10, 1999, in Lausanne

Conclusion:

The statistics reveal a significant lack of fundamental understanding about banned supplements and medications among Indian coaches, doctors, and physiotherapists involved with teams in various sports. The report's findings also underscore the prevalent problem of doping in Indian sports and the immediate necessity to address it. It emphasizes the requirement for a strong scientific and research setup in the nation.

World Heritage Day

Why in News:

World Heritage Day, also known as the International Monuments and Sites Day, was observed on 18 April, 2024. The theme for World Heritage Day 2024 was "Discover and Experience Diversity". The day is dedicated to raising awareness about the incredible cultural and natural treasures recognized by UNESCO's World Heritage List.

History of the day:

- World Heritage Day was first celebrated in 1983 by UNESCO (United Nations Educational, Scientific and Cultural Organization). The idea of celebrating World Heritage Day on April 18 every year was proposed in 1982 by the International Council on Monuments and Sites (ICOMOS). The proposal was approved the following year at UNESCO's General Conference.

UNESCO World Heritage sites in India:

Cultural sites:

- Agra Fort (1983)
- Ajanta Caves (1983)
- Archaeological Site of Nalanda Mahavihara at Nalanda, Bihar (2016)
- Buddhist Monuments at Sanchi (1989)
- Champaner-Pavagadh Archaeological Park (2004)
- Chhatrapati Shivaji Terminus (formerly Victoria Terminus) (2004)
- Churches and Convents of Goa (1986)
- Dholavira: a Harappan City (2021)
- Elephanta Caves (1987)
- Ellora Caves (1983)
- Fatehpur Sikri (1986)
- Great Living Chola Temples (1987, 2004)
- Group of Monuments at Hampi (1986)
- Group of Monuments at Mahabalipuram (1984)
- Group of Monuments at Pattadakal (1987)
- Hill Forts of Rajasthan (2013)
- Historic City of Ahmadabad (2017)
- Humayun's Tomb, Delhi (1993)
- Jaipur City, Rajasthan (2019)
- Kakatiya Rudreshwara (Ramappa) Temple, Telangana (2021)
- Khajuraho Group of Monuments (1986)
- Mahabodhi Temple Complex at Bodh Gaya (2002)

- Mountain Railways of India (1999, 2005, 2008)
- Qutb Minar and its Monuments, Delhi (1993)
- Rani-ki-Vav (the Queen's Stepwell) at Patan, Gujarat (2014)
- Red Fort Complex (2007)
- Rock Shelters of Bhimbetka (2003)
- Sacred Ensembles of the Hoysalas (2023)
- Santiniketan (2023)
- Sun Temple, Konârak (1984)
- Taj Mahal (1983)
- The Architectural Work of Le Corbusier, an Outstanding Contribution to the Modern Movement (2016)
- The Jantar Mantar, Jaipur (2010)
- Victorian Gothic and Art Deco Ensembles of Mumbai (2018)

Natural sites:

- Great Himalayan National Park Conservation Area (2014)
- Kaziranga National Park (1985)
- Keoladeo National Park (1985)
- Manas Wildlife Sanctuary (1985)
- Nanda Devi and Valley of Flowers National Parks (1988, 2005)
- Sundarbans National Park (1987)
- Western Ghats (2012)

Mixed sites:

- Khangchendzonga National Park (2016)

About UNESCO:

- UNESCO, the United Nations Educational, Scientific and Cultural Organization, is a specialized agency of the United Nations that was established on 16, 1945.
- The organization's purpose is to promote world peace and security through international cooperation in education, arts, sciences and culture.
- UNESCO's activities include supporting literacy and education, protecting independent media and press freedom, preserving regional and cultural history and promoting cultural diversity.

About ICOMOS:

- The International Council on Monuments and Sites (ICOMOS) is a professional organization dedicated to the conservation and protection of cultural heritage sites across the globe.
- Founded in 1965 in Warsaw as a result of the Venice Charter of 1964, ICOMOS is headquartered in Charenton-le-Pont, France, and offers advice to UNESCO on World Heritage Sites.

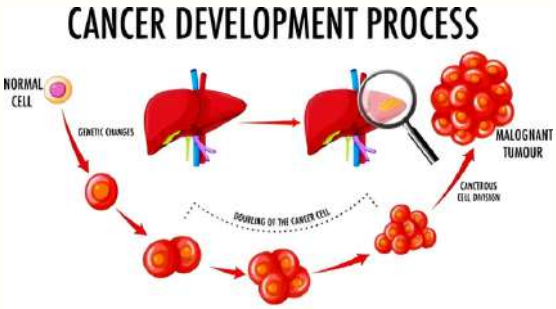
India Cancer Capital of the World

Why in News:

The 4th edition of Apollo Hospitals' flagship Health of Nation Report was recently released on World Health Day 2024 (7th April). The report indicated a significant growth in non-communicable diseases (NCDs) across the nation and said the country was witnessing fastest rise in cancer cases.

Major highlights of the report:

- **Rising NCDs in India:** The report highlights a concerning increase in Non-Communicable Diseases (NCDs) in India, including cancer, diabetes, hypertension, cardiovascular diseases, and mental health issues, significantly impacting the nation's health.
- **Projected Increase in Cancer Cases:** The number of cancer cases in India is expected to rise above global averages, from 1.39 million in 2020 to 1.57 million by 2025.
- **Most Common Cancers by Gender:** Among women, the most common cancers are breast cancer, cervix cancer, and ovarian cancer, while among men, they are lung cancer, mouth cancer, and prostate cancer. Unlike the global trend, more women are diagnosed with cancer in India.



- **Early Onset of Certain Cancers:** Certain cancers are affecting younger people in India sooner than in the U.S., U.K., and China, with lung cancer's median age at 59 in India, compared to 70 in the U.S., 68 in China, and 75 in the U.K.
- **Comparison with Global Rates:** India's cancer rate, though reporting more than a million new cases annually, has not surpassed countries like Denmark, Ireland, and Belgium, nor the U.S., with 100 cases per 100,000 people compared to 300 in the U.S.
- **Other Key Findings:**
  - Obesity incidence has risen from 9% in 2016 to

20% in 2023.
  - Hypertension incidence has increased from 9% in 2016 to 13% in 2023.
  - A high proportion of Indians are at risk for Obstructive Sleep Apnea.
- **Future Burden:** The report predicts a potential surge in healthcare burdens due to conditions like pre-diabetes, pre-hypertension, and mental health disorders manifesting at increasingly younger ages..

Reasons and Challenges:

- **Environmental factors:** Pollution from vehicles and industries exposes a large part of the population to carcinogenic substances, raising the risk of various cancers.
- **Lifestyle Changes:** Shift towards processed foods and declining physical activity levels contribute to rising obesity rates, linked to breast, colorectal, and endometrial cancers.
  - Rampant use of tobacco, both smoking and smokeless varieties, significantly increases the risk of lung, oral, and throat cancers.
- **Limited Awareness and Screening:** Lack of awareness about cancer symptoms and the absence of widespread screening programs lead to late-stage diagnoses, reducing treatment success rates.
- **Socioeconomic Inequalities:** Economic disparities hinder access to quality healthcare, especially for marginalized communities, contributing to delayed diagnosis and treatment.
  - Stigma surrounding cancer also plays a role in delayed diagnosis and treatment, further complicating the issue.

Potential Solutions:

- **Regular Health Screenings:** Regular screenings play a crucial role in reducing blood pressure (BP) and body mass index (BMI) levels, thereby lowering the risk of cardiac-related ailments.
- **Nationwide Awareness Campaigns and Screening Programs:** There is need to educate people about tobacco dangers and healthy lifestyles. Along with this promoting regular screenings, especially in rural areas, can enhance early detection and improved treatment outcomes.
- **Stricter Tobacco Control Policies:** This can be done implementing higher taxes and bans on public smoking to reduce cancer risk factors. Further, public education campaigns can be conducted on balanced diets and regular exercise for prevention.
- **Enhancing Healthcare Infrastructure:** Through increasing cancer specialists, diagnostic facilities, treatment centers, and affordable medications, especially in underserved areas.
- **Research and Innovation:** Emphasizing the importance of research and innovation in cancer prevention, diagnosis, and treatment for better outcomes.

Major initiatives for cancer treatment:

- **CAR-T cell therapy:** India's first home-grown gene therapy launched for cancer at IIT Bombay. It is the world's most affordable CAR-T cell therapy.
- **Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (PMJAY):** It offers health insurance up to INR 5 lakhs per family per year for secondary and tertiary care hospitalisation, covering many cancer-related treatments.
- **Rashtriya Arogya Nidhi (RAN):** It provides financial assistance to patients living below the poverty line who suffer from life-threatening diseases, including cancer, allowing them to receive medical treatment at government hospitals.
- **Tertiary Care Cancer Centres (TCCC) scheme:** To establish state cancer institutes and tertiary care cancer centers nationwide, enhancing facilities for cancer treatment.
- **Pradhan Mantri Swasthya Suraksha Yojana (PMSSY):** includes the establishment and upgrading of government medical colleges and institutions, improving resources for cancer care, and bolstering the National Cancer Grid (NCG).
- **First Cancer Care (FCC) initiative:** Introduced in 2022, it utilizes advanced technology to transform cancer prevention and treatment, focusing on quality, timeliness, precision, and fairness. It offers a holistic framework covering prevention, early detection, curative care, and governance.

Conclusion:

Combatting cancer in India demands a multifaceted strategy. Addressing root causes like tobacco use and sedentary lifestyles, along with improving healthcare infrastructure and research, can significantly reduce the cancer burden and promote a healthier population. Further there is need to address India's rising burden of non-communicable diseases (NCDs) which requires a unified approach and cohesive strategy across the healthcare ecosystem and the nation.

Voluntary Code of Ethics

Why in News:

The Election Commission of India made a takedown request for four twitter posts of different political parties, acting upon which X withheld them.

More about the News:

- Although the social media platform complied with the Election Commission's (EC) request to withhold the posts during the Lok Sabha elections, it stated that it disagreed with the orders.
- Therefore, to maintain transparency, X decided to make public the emails sent by the EC to the platform.
- These emails mentioned that the posts in question violated the Model Code of Conduct (MCC), and reminded X of its responsibility to remove such posts as per the 'Voluntary Code of Ethics' for social media platforms.

Umesh Sinha Committee:

- As political parties increasingly took to social media, EC, in January 2019, set up a committee under Deputy Election Commissioner Umesh Sinha to ideate on the matter.
- After multiple meetings, the committee suggested changes to the Representation of People Act, 1951 which deals with the conduct of Lok Sabha and state assembly elections, to cover social media posts in the 48 hour period before polling, when conventional campaigning is banned.
- The Internet and Mobile Association of India, (IAMAI) and social media platforms Facebook, Whatsapp, Twitter, Google, Sharechat and TikTok had presented and observed this "Voluntary Code of Ethics" during the General Election to 17thLok Sabha 2019. IAMAI has assured the Commission that the platforms will cooperate in ensuring the conduct of free and fair elections.

Features of the Voluntary Code of Ethics:

- Social Media platforms will voluntarily undertake information, education and communication campaigns to build awareness including electoral laws and other related instructions.
- Social Media platforms have created a high priority dedicated grievance redressal channel for taking expeditious action on the cases reported by the ECI.
- Social Media Platforms and ECI have developed a notification mechanism by which ECI can notify the relevant platforms of potential violations of Section 126 of the R.P. Act, 1951 and other electoral laws.
- Platforms will ensure that all political advertisements on their platforms are pre-certified by the Media Certification and Monitoring Committees as per the directions of Hon'ble Supreme Court.
- Participating platforms are committed to facilitate transparency in paid political advertisements, including utilising their pre-existing labels/disclosure technology for such advertisements.

Conclusion:

The voluntary code's implementation seeks to improve the integrity of elections, combat misinformation and inappropriate content and promote a fair and transparent digital campaigning environment. It highlights the joint responsibility of social media platforms, election authorities and stakeholders in upholding democratic principles and electoral integrity in the digital realm.

MRP of Essential Medicines Increased

Why in News:

The National Pharmaceutical Pricing Authority implemented a increase of 0.00551% in the Maximum Retail Price for scheduled formulations (drugs) at the start of the fiscal year 2024–25. An increase in the prices of essential medicines came into force on April 1.

Issue with such decision:

- Manufacturers can raise the Maximum Retail Price (MRP) of scheduled formulations based on the Wholesale Price Index (WPI) without needing prior government approval. However, pharmaceutical companies argue that a reasonable price increase is necessary for quality control.
- Despite the recent hike, the government believes it will only have a minimal impact on the prices of essential drugs like antibiotics and painkillers.
- The National Pharmaceutical Pricing Authority (NPPA) adheres to the Drug Price Control Order (DPCO) of 2013, which allows price adjustments in accordance with changes in the WPI index.
- Medicine prices increased by 12% last year and 10% in 2022.

What are essential medicines?

- WHO defines Essential medicines as the medicines that satisfy the priority healthcare needs of any population.
- Ministry of Health and Family Welfare hence prepared and released the first National List of Essential Medicines of India in 1996 consisting of 279 medicines.
- Currently, India's National List of Essential Medicines covers approximately 400 molecules and 960

formulations.

About National Pharmaceutical Pricing Authority:

- NPPA was constituted by the government of India in 1997 under the Ministry of Chemicals and Fertilizers (Department of Pharmaceuticals since 2008).
- It regulates drug pricing while ensuring the availability and accessibility of medicines at affordable prices.
- The authority is allowed to direct a price hike of over 10% for the drugs and devices listed on the National List of Essential Medicines (NLEM). All medicines under the NLEM are subject to price regulation.

Conclusion:

India's pharmaceutical industry is highly advanced among developing nations, ranking third globally in volume and 13th in value. The United States is the largest export destination for bulk drugs from India, despite its strict regulatory standards. Other significant export destinations include Brazil, Bangladesh, Turkey, China, the Netherlands, Nigeria, Vietnam, and Egypt. India is also a key supplier of bulk drugs to several developing countries, ranking among the top five suppliers to Bangladesh, Nigeria, Vietnam, Egypt, Iran, and Pakistan. Despite China's dominance as a larger supplier, India remains a substantial exporter in this regard. However, a major challenge is India's heavy reliance on China for the supply of bulk drugs and drug intermediates, with approximately two-thirds of its total imports in this category originating from China.

India Employment Report, 2024: Women's Participation

Why in News:

The India Employment Report, 2024 was released recently by the Institute for Human Development and the International Labour Organization. The report has showcased a concerning picture for Women employment in India.

Major Highlights of the Report:

- The Labour Force Participation Rate (LFPR), the Workforce Participation Rate (WPR) and the Unemployment Rate (UR) have showed long-term deterioration between 2000 and 2019 however improved thereafter.
- The improvement coincides with periods of economic distress, both before and during the COVID-19 pandemic, with the exception of two peak pandemic quarters.

Women's participation:

- The female labor force participation rate (LFPR) in India is notably lower than that of males. In 2023, the male LFPR stood at 78.5, while the female LFPR was only 37. (The global female LFPR rate is 49, as per World Bank data.)
- The female LFPR has been on a decline since 2000, reaching a low of 24.5 in 2019 before slightly rising, especially in rural areas. Despite these improvements, the overall employment conditions remain challenging.
- The India Employment Report, 2024, indicates that women largely account for the incremental in self-employment and unpaid family work.
- Nearly two thirds of the incremental employment after 2019 comprised self-employed workers, among whom unpaid (women) family workers predominate.
- The share of regular work, which steadily increased after 2000, started declining after 2018.

The reasons for women's low participation in the labour force:

- The proportion of youths globally who are not in education, employment or training has been consistently highest in South Asia, at an average of 29.2 per cent between 2010 and 2019 (ILO 2022a). India also has a large share of youth not in employment, education or training, and the rate is higher among young women than men.
- There are several reasons for higher unemployment rate among women. For instance women being made responsible for all care-giving duties at home plus cooking and cleaning to low wages, patriarchal mindsets and safety issues.
- Additionally, India's growth pattern has not been particularly job-intensive, especially on the labour demand side. This has led to a situation where women are being squeezed out of employment due to a scarcity of paid work opportunities.

Conclusion:

In addition to the scarcity of paid work, social norms that limit women's mobility and assign them primary caregiving roles at home restrict their ability to pursue available opportunities. Safety concerns and inadequate transportation options further constrain women to seek work close to home, limiting their choices. To address these challenges, policies supporting labour-intensive sectors in both manufacturing and higher productivity services are essential. Public investments in safety and transportation are critical, as is investment in affordable child and elderly care services.

Degraded Forest Land for Green Credits

Why in Broadcast

After the Ministry of Environment, Forest & Climate Change announced the rules for its Green Credit Programme (GCP), ten States have identified parcels of degraded forest land, amounting to about 3,853 hectares, that will be available for individuals, groups, public and private sector units to earn and potentially trade green credits.

1. What is Degraded Land?

- Degraded land is land that has lost some degree of its natural productivity due to human-caused processes. However, there is no single internationally-approved definition of "degraded land".
- In the context of developing policies to reduce emissions from deforestation and forest degradation (REDD+), degraded land refers to areas with low carbon stocks.
- These areas typically have minimal tree cover and an absence of peat, so they do not contain or sequester as much carbon as natural forests do.
- General terms that have been used interchangeably with "degraded land" include:
  - **Degraded Forest:** Secondary or selectively logged forests that provide reduced levels of ecosystem services, including but not limited to carbon storage. Ecologists and environmental NGOs are concerned that allowing the conversion of these forests could result in significant carbon emissions as well as lost "co-benefits" such as biodiversity preservation.
  - **Marginal/Waste Land:** Areas with low agricultural productivity and economic potential.
  - **Idle/Unused/Abandoned Land:** Areas that are devoid of human activity or not being used productively, often from a legal standpoint. These terms are controversial because legal designations do not always consider existing local or traditional rights, claims, or uses.

2. Causes of Forest Degradation

Multiple factors contribute to forest degradation. Discussed below are some of the significant causes:

- **Illegal Logging and Overexploitation:** Uncontrolled logging for timber, firewood and charcoal are major contributors.
- **Agricultural Expansion:** The clearing of forests for the cultivation of cash crops like soy, palm oil, coffee and cocoa or for cattle rearing contributes significantly to forest degradation.
- **Mining and Infrastructure Development:** Mining activities and infrastructure development lead to the felling of trees, causing degradation.
- **Climate Change:** Warmer temperatures, altered rainfall patterns and increased frequency of extreme weather events are contributing to forest degradation around the globe.

3. About Carbon Credit

- A carbon credit represents a reduction of 1 metric ton in greenhouse gas emissions to compensate for 1 metric ton of emissions made somewhere else.
- A credit can be bought, sold or traded before it is "retired," meaning it cannot be traded again, assuring that only the buyer can claim emissions cuts associated with that credit.

4. Green Credit Program (GCP)

- Green Credit Program (GCP) notified on 13th October, 2023 is an innovative market-based mechanism designed to incentivize voluntary environmental actions across diverse sectors, by various stakeholders like individuals, communities, private sector industries, and companies.
- This program is part of the broader 'LiFE' campaign (Lifestyle for Environment).
- The GCP's governance framework is supported by an inter-ministerial Steering Committee and The Indian Council of Forestry Research and Education (ICFRE) serves as the GCP Administrator, responsible for program implementation, management, monitoring, and operation.

5. Green Credits

Any person or entity may take any measure specified for the purposes of protection, preservation, or conservation of the environment. The measures referred may include the following activities:

- **Tree Plantation:** To promote activities for increasing the green cover across the country.
- **Water Management:** To promote water conservation, water harvesting and water use efficiency or water savings, including treatment and reuse of wastewater.
- **Sustainable Agriculture:** To promote natural and regenerative agricultural practices and land restoration to improve productivity, soil health and nutritional value of food produced.
- **Waste Management:** To promote circularity, sustainable and improved practices for waste management, including collection, segregation, and environmentally sound management.
- **Air Pollution Reduction:** To promote measures for reducing air pollution and other pollution abatement activities.
- **Mangrove Conservation and Restoration:** To promote measures for conservation and restoration of mangroves.
- **Ecomark Label Development:** To encourage manufacturers to obtain ecomark label for their goods and services.
- **Sustainable Building and Infrastructure:** To encourage the construction of sustainable buildings and other infrastructure using environment friendly technologies and materials.

6. Challenges Faced in Green Credits Program

Lack of standards

- With so many policies and procedures in place, it can be difficult for businesses to determine which credit to pursue and how to measure their impact.

Limited access to high-quality credits

- Another challenge facing the green loan policy scenario is access to high-quality credit.

Lack of transparency and accountability

- The program lacks the necessary mechanisms for transparency and accountability, creating mistrust and uncertainty among stakeholders.

Limited market demand

- Despite the growing interest in sustainability and green practices, there may be less demand for green credit in some industries or areas.

Ensuring the long-term sustainability of green credit

- As demand for green credit increases, it is important to ensure that policies remain effective in reducing carbon emissions and promoting sustainable practices.

Impact is difficult to verify

- Monitoring the true impact of green credit schemes can be challenging, raising concerns about the validity of the environmental benefits claimed.

Fluctuating regulatory frameworks

- The regulatory landscape for green credit can be dynamic and policy and regulatory changes will affect the sustainability and attractiveness of these programs for businesses.

Semiconductor Chips

Why in Broadcast

PM Modi laid the foundation stone of the chip fabrication unit of Tata-Powerchip Semiconductor Manufacturing Corp at Dholera on March 13. He also inauguated the CG Power-Renesas outsourced assembly and test (OSAT) facility at Sanand (Gujarat) and the Tata OSAT unit at Morigaon (Assam). Dholera will be India's first commercial semiconductor fabrication facility. The three projects had received Cabinet nod on February 29, 2024. Combined, the three projects are worth over Rs 1.25 lakh crore.

1. About Semiconductor Chip

- A semiconductor has properties between a conductor and an insulator.
- In its purest form a semiconductor is a very weak conductor of electricity.
- However, its electrical properties can be changed by adding small amounts of certain substances called 'dopants'.
- By taking a pure semiconductor and carefully injecting certain parts with specific dopants, complex circuits can be 'printed' on the semiconductor.

2. How are semiconductor Designed?

- The process to design a semiconductor can be broken down into 5 steps.
- **Architectural Design:** In this phase the parameters of the chip are determined including its size, desired function, level of power consumption, and preferred cost.
- **Logic & Circuit Design:** After the parameters are outlined, engineers begin translating the required functions into circuit logic. Today, this process is done on automated logic simulators to verify that everything is in order before production.
- **Physical Design:** Here, the circuit logic is mapped onto a silicon wafer. Essentially, this is a plan of where each transistor, diode, or other component will sit on the chip.
- **Verification & Sign-Off Phases:** These are used to verify whether the designed chip is manufacturable and whether it can withstand the physical stresses of its assigned function.

3. Semiconductor Device Fabrication

- Semiconductor device fabrication is the process used to manufacture semiconductor devices, that are present in everyday electronic devices.
- It is a multiple-step photolithographic and physio-chemical process during which electronic circuits are gradually created on a wafer, typically made of pure single-crystal semiconducting material.

4. What is a transistor?

- A transistor is a semiconductor that amplifies or switches electronic signals. Transistors serve as the basic building blocks of modern electronics.
- Transistors are made of materials like silicon or germanium that are capable of allowing electrical current to flow through them in a controlled manner.
- The materials of transistors are doped, or "treated," with impurities to create a structure called a p-n junction. In this case, "p" stands for positive and the "n" stands for negative.
- These notations refer to the type of dopant atoms (impurities) that have been added to the semiconductor material.
- The most common type of transistor is the metal-oxide-semiconductor field-effect transistor (MOSFET), which is widely used in electronic devices.

Brain Boosters

5. Types of Transistors

- Transistors are classified into two types:
  - Bipolar junction transistor (BJT)
  - Field-effect transistor (FET)

6. Why Are Transistors Important?

- Transistors form the basic building blocks of modern electronics.
- They are versatile devices that can act as switches, amplifiers and signal regulators, thereby enabling the processing and storage of digital information.
- The widespread use of transistors in electronic devices has greatly impacted our daily lives by enabling modern communication, entertainment, transportation and healthcare technologies.

7. Revolution in the Tech World by Transistors

- Invented at Bell Laboratories in 1947, the transistor rapidly replaced the bulky vacuum tube as an electronic signal regulator.
- Considered one of the most significant developments in the history of the PC, the invention of the transistor fueled the trend toward miniaturization in electronics.
- As these solid-state devices were significantly smaller, lighter and consumed significantly less power than vacuum tubes, so electronic systems made with transistors were also much smaller, lighter, faster and more efficient.
- As the size of transistors has exponentially decreased, their cost has fallen, creating many more opportunities to use them.
- Integrating transistors with resistors and other diodes or electronics components has made ICs smaller.
- The phenomenon regarding miniaturization relates to Moore's Law, which states that the number of transistors in a small IC would double every two years.

8. What is a Semiconductor Wafer?

- A semiconductor wafer is a thin slice of material, typically made of silicon, that is used in the manufacturing of electronic components such as integrated circuits (ICs), microchips, and other semiconductor devices.
- The wafers are circular in shape and range in size from a few millimeters to several inches in diameter.
- The wafer serves as the substrate for the electronic components, and it undergoes a series of complex manufacturing processes, including photolithography, etching, and doping, to create the necessary structures and electrical properties required for the specific application.
- The patterned layers of materials on the wafer form the integrated circuit, which can contain millions or even billions of transistors and other components.

9. Effect of Temperature on a Semiconductors

- A semiconductor changes its electrical conductivity according to the temperature.
- As the temperature increases, the kinetic energy of electrons in the crystalline solid also increases.
- The increase in temperature decreases the resistivity of the semiconductor.
- As the temperature increases, the electrons lose their covalent bonds, and the semiconductor becomes an insulator.
- The increase in electrical conductivity is the effect of thermal energy, which sets free electrons in the conduction band.
- The temperature also affects mobility. When an electrical conductor is heated, the charge carrier mobility decreases.
- The temperature increases the electrical conductivity of a semiconductor.
- In a semiconductor, an electrical field decreases the intrinsic mobility.

National Civil Services Day

Why in Broadcast

To acknowledge and honour the work of civil servants engaged in public service, the backbone of the nation's administration, the National Civil Services Day is celebrated on April 21 every year. This day commemorates the address given by Sardar Vallabhbhai Patel, the first Home Minister of Independent India, to probationary officers in 1947, where he referred to civil servants as 'the steel frame of India.

1. Importance of the Day

- The observance of the day entails the following:
  - Recognition and motivation of civil service officers.
  - Evaluation of departmental performance.
  - Presentation of awards for excellence in public administration.
- Each year on this occasion, the PM confers the **Prime Minister's Awards for Excellence in Public Administration** upon districts and implementing units for their exemplary achievements in priority programme implementation and innovation categories.

2. About Prime Minister's Awards for Excellence in Public Administration

- Government of India had instituted The Prime Minister's Awards for Excellence in Public Administration in 2006 to acknowledge, recognize and reward the extraordinary and innovative work done by Districts/ Organizations of the Central and State Governments.
- The Scheme was restructured in 2014 for recognizing the performance of District Collectors in Priority Programs, Innovations and Aspirational Districts.
- The Scheme was restructured again in 2020, to recognize the performance of District Collectors towards economic development of the District.
- The Scheme was revamped with a new approach in 2021 with the objective to encourage Constructive Competition, Innovation, Replication and Institutionalisation of Best Practices.
- Under this approach, emphasis is on the following:
  - Good governance
  - Qualitative achievement
  - Last mile connectivity
  - Achievement of quantitative targets

3. Award Categories

Category - 1: Holistic Development Of Districts

- The schemes under this category seeks to encourage last mile delivery, saturation approach and citizen centricity.
- Ten best performing Districts on a cumulative aggregate criteria will be given awards under this Category.

Category 2 - Innovation:

- The Prime Minister s Awards for Excellence in Public Administration Scheme recognise innovations at Central, State and District level by officers from all Central Services, as well as from the State Service officers.
- There will be 6 Awards in this category; two awards each for Central level, State level and District level initiatives respectively for its demonstration of innovation which is sustainable and can be replicated.

Space Tourism

Why in Broadcast

Gopi Thotakura is set to become the first Indian to venture into space as a tourist on Blue Origin's NS-25 mission. Mr. Thotakura was selected as one of the six crew members for the mission, making him the first Indian space tourist and the second Indian to venture into space after the Indian Air Force's Wing Commander Rakesh Sharma in 1984.

1. What is Space Tourism?

- Space tourism is the term used to describe the commercial activity of transporting private individuals into space for leisure, adventure, or amusement.
- Space tourism concentrates on providing ordinary people with the chance to experience space flight and see the Earth from space, in contrast to conventionally-funded government space missions when astronauts carry out other activities or conduct scientific research.

2. Types of Space Tourism

Suborbital Tourism:

- Suborbital travel is similar to a brief trip up and down to the brink of space.
- People briefly become weightless and get to view the Earth from a great height.
- Suborbital flights are being developed by organizations like Virgin Galactic and Blue Origin.

Orbital Tourism:

- This is a lengthy journey that involves numerous orbits of the Earth.
- They can stay in space for days or even weeks, experiencing longer periods of weightlessness.
- This kind of tourism hasn't yet taken place and is currently in the planning stages.

Lunar Tourism:

- Some businesses have discussed taking travelers on a tour of the moon.
- This vacation would be extremely expensive and sophisticated, yet it is still in the future.

3. Advantages of Space Tourism

- **Education and Scientific Inspiration:** Space travel can pique people's interest in STEM areas, which include science, technology, engineering, and mathematics.
- **Technological Innovation:** The growth of space tourism necessitates technological advancements in a number of areas, including spaceship design, propulsion technology, life support technology, and more.
- **Economic Opportunities:** In areas where launch sites, training facilities and related infrastructure are created, the space tourism industry has the potential to provide jobs and foster economic growth.
- **Reduced Space Access Costs:** As the space tourism sector grows and develops, it may help to bring down the price of entering space.
- **Public-Private Partnership:** Space tourism can encourage government and commercial sector cooperation, resulting in more effective and creative space endeavors.
- **Construction of Space Infrastructure:** This could open the door to a range of future space activities, such as manufacturing, research, and resource utilization.
- **Funding for Additional Exploration:** Money made from space tourism might be used to finance more extensive space exploration endeavors, like trips to the Moon, Mars, and beyond.
- **Improved Safety Measures:** The emphasis on safety in space tourism may result in improvements in safety protocols, emergency procedures and technology that may be useful for other space missions.

4. Disadvantages of Space Tourism

- **Environmental Impact:** Launching rockets is a necessary part of space tourism, which uses a lot of fuel and releases greenhouse gases into the environment.
- **Resource Intensity:** Space travel necessitates a significant amount of energy, supplies, and infrastructure which may be applied to solving more pressing problems on Earth.
- **Accidental Potential:** Space flight is inherently dangerous, with the possibility of disastrous mishaps during launch, re-entry, and orbital activities.
- **High Costs:** At the moment, space travel is very pricey, which restricts access to only the wealthiest people.
- **Health Concerns:** Traveling to and from space exposes people to a number of health concerns, including radiation exposure, muscular atrophy, bone density loss, and possibly psychological difficulties.
- **Orbital Debris:** The problem of space debris in Earth's orbit is getting worse. These debris run the risk of colliding with other objects, producing more debris and endangering other spacecraft.
- **Ethical Considerations:** The funding of space tourism presents ethical difficulties, especially in light of the urgent global challenges that need attention and money.
- **Impact on Scientific Missions:** As space tourism grows, there may be tensions between the requirements of visitors and those of scientific missions. Conflicts may arise over shared resources, launch schedules, and orbital slots.

5. Space Tourism Companies

- Virgin Galactic
- SpaceX
- Blue Origin
- Orion Span
- Boeing
- Space Adventures
- Zero 2 Infinity

6. First Space Tourist

- In April 2001, history was made when Dennis Tito became the first-ever space tourist.
- Tito, an American engineer and entrepreneur, embarked on an eight-day journey to the International Space Station (ISS) aboard a Russian Soyuz spacecraft.

7. Innovations Originated from Space Technology

Satellite Television:

- Originally designed for space exploration, satellite technology evolved to revolutionize the television industry. This innovation has granted people access to a diverse array of channels and programming.

Water Purification Systems:

- Water purifiers used in spacecraft to recycle and purify water for astronauts have been adapted for terrestrial use.

Digital Cameras:

- The use of charge-coupled devices in early space missions for capturing high-quality images contributed to the development of digital camera technologies.

Smoke Detectors:

- Originally developed for the Skylab Space Station in the 1970s, NASA's smoke detectors have become a crucial safety feature in homes and commercial buildings, especially in high-rise structures.

Artificial Limbs and Prosthetics:

- It was designed for NASA astronauts in need of enhanced functionality during space missions.
- The materials and technologies developed for spacesuit gloves have been adopted for use in artificial limbs and prosthetics.

Global Positioning System (GPS):

- Initially developed by the US military to track military assets, GPS became publicly available in the 1980s. The decision to make this technology accessible for non-military purposes revolutionized navigation and location tracking for civilian use.

Forests: A National Asset

Why in Broadcast

The Supreme Court has asserted in a judgment that forests in India are a national asset and a major contributor to the nation's financial wealth. "It is the spirit of the forest that moves the earth," a Bench headed by Justice M.M. Sundresh observed in a judgment based on an appeal filed by the State of Telangana against a High Court decision "graciously gifting" forest land to a private person.

1. Forest Cover

- The Forest Cover includes all lands more than one hectare in area with tree canopy density of more than 10 percent.
- All the tree species along with bamboos, fruit bearing trees, coconut palm trees etc and all the areas including forest, private, community, government or institutional land, meeting the above defined criteria have been termed as Forest Cover.
- Forest Cover classified in terms of canopy density:

Class	Description
Very Dense Forest	All lands with tree canopy density of 70 percent and above.
Moderately Dense Forest	All lands with tree canopy density of 40 percent and more but less than 70 percent.
Open Forest	All lands with tree canopy density of 10 percent and more but less than 40 percent.
Scrub	Forest lands with canopy density less than 10 percent.
Non-forest	Lands not Included in any of the above classes (includes water).

2. Importance of the Judgement

- The judgment has come at a time when the Forest Conservation (Amendment) Act, 2023 has attracted widespread criticism.
- The Court observed that, depletion and disappearance of forests would ultimately lead to a massive extinction of organisms.
- The court observed that concepts of carbon credit and green accounting to evaluate a nation's wealth had become a reality.
- A country with excess forest cover would be able to sell its excess carbon credit to the one in deficit. This signifies the contribution of forests in the financial wealth of a country.

3. Importance of Forests for Nature

- Forests are home to over 80% of terrestrial biodiversity, including 80% of amphibians, 75% of birds and 68% of mammals.
- Deforestation of some tropical forests could lead to the loss of as many as 100 species a day.
- Forests provide habitats for plants and animals, including some of planet's most iconic species like the tiger, giant panda, gorilla and orangutan.
- Habitat loss is one of the main causes of biodiversity loss, as land that once was forest is cleared for other uses.
- Forest-dwelling wildlife populations (which include mammals, birds, reptiles and amphibians) have declined on average by 69% since 1970.

4. Importance of Forests for People

- Over 1.6 billion people depend on forests for food or fuel and some 70 million people worldwide including many Indigenous communities, call forests home.
- Forests provide us with oxygen, shelter, jobs, water, nourishment and fuel.
- Forests help prevent erosion and enrich and conserve soil and producing the rich topsoil needed to grow plants and crops.
- Forests also play an important role in the global water cycle, moving water across the earth by releasing water vapor and capturing rainfall.
- Deforestation has serious consequences on the health of people directly dependent on forests, as well as those living in cities and towns, as it increases the risk of diseases crossing over from animals to humans.
- Meanwhile, time spent in forests has been shown to have a positive benefit on conditions including cardiovascular disease, respiratory concerns, diabetes and mental health.

5. Importance of Forests for Climate

- Forests are the largest storehouses of carbon after the oceans.
- When forest are cut down or damaged, huge amounts of carbon emissions are released which contribute to the climate crisis.
- Forests help protect people and nature from the consequences of global warming.
- Extreme events caused by climate change, such as more frequent wildfires, limit the ability of our forests to regenerate.
- Deforestation contributes to climate change by increasing the risk of fires. Stopping deforestation and restoring forests is a crucial part of climate action.

6. Issues faced by forest

- **Inadequate and Dwindling Forest Cover:** The biggest problem of the Indian forests is the inadequate and fast dwindling forest cover.
- **Deforestation:** Deforestation occurs when forests are converted to non-forest uses, such as agriculture and road construction.
- **Forest degradation:** Forest degradation occurs when forest ecosystems lose their capacity to provide important goods and services to people and nature.
- **Low Productivity:** Productivity of Indian forests is very low as compared to some other countries.
- **Forest Fires:** Large tracts of vegetal cover are destroyed every year by forest fires.
- **Plant Diseases, Insects and Pests:** Large tracts of forest cover suffer from plant diseases, insects and pests which leads to considerable loss of forest wealth.
- **Obsolete Methods of Lumbering and Sawing:** In most of the Indian forests, obsolete methods of lumbering, sowing etc. are practised.
- **Lack of Scientific Techniques:** Scientific techniques of growing forests are also lacking in India.
- **Desertification:** The extension of dry areas and desertification is another big challenge that needs to be tackled with proper interventions.

7. Initiative by Government to Encourages Plantation

- Nagar Van Yojana
- School Nursery Yojana
- Compensatory Afforestation Fund Management and Planning Authority
- National Afforestation Programme
- National Mission for a Green India

Fourth Global Mass Coral Bleaching Triggered

Why in Broadcast

According to US National Oceanic and Atmospheric Administration (NOAA), the fourth global mass coral bleaching event has been triggered by extraordinary ocean temperatures. This could have serious consequences for ocean life and millions of people who rely on reefs for food, jobs and coastal defence.

1. More Info

- Since mid-March 2023, the average sea surface temperature (SST) has been abnormally high.
- According to the EU Copernicus Climate Change Service (C3S), in March, 2023, it reached a record monthly high of 21.07°C.
- The primary reason behind the soaring temperatures is the rising emissions of heat-trapping greenhouse gases (GHGs).
- Nearly 90% of the extra heat trapped by GHGs has been absorbed by the oceans that is why they have become so warm.

2. About Corals

- Corals are invertebrate animals belonging to a group called Cnidaria.
- Each individual coral animal is called a polyp, and most live in groups of hundreds to thousands of genetically identical polyps that form a 'colony'.
- The colony is formed by a process called budding.

3. About Coral Reefs

- Corals extract abundant calcium from surrounding seawater and use this to create a hardened structure for protection and growth.
- Coral reefs are created by millions of tiny polyps forming large carbonate structures.
- Coral reefs are the largest living structure on the planet and the only living structure to be visible from space.
- Coral polyps have developed the relationship of symbiosis with tiny single-celled plants, known as zooxanthellae.
- Inside the tissues of each coral polyp live these microscopic, single-celled algae, sharing space, gas exchange and nutrients to survive.
- This symbiosis between plant and animal also contributes to the brilliant colors of coral.

4. How Do Corals Eat?

- While most of a corals diet is obtained from zooxanthellae, they can also 'fish' for food too.
- During feeding a coral polyp will extend its tentacles out from its body and wave them in the water current where they encounter small fish, plankton or other food particles.

5. How Do Corals Reproduce?

- Most coral species spawn by releasing eggs and sperm into the water, but the period of spawning varies from one species to another.
- When an egg and a sperm meet they form a larva known as a planula.
- The baby coral floats around near the surface at first, and then in the water column until it finds a hard surface to attach to.

6. What Does A Coral Reef Look Like?

Charles Darwin classified coral reefs as to their structure and morphology. He described them as follows:

Fringing Reefs:

- Fringing reefs lie near emergent land.
- They are fairly shallow, narrow and recently formed.
- They can be separated from the coast by a navigable channel (which is sometimes incorrectly termed a "lagoon").

Barrier Reefs:

- Barrier reefs are broader and lie farther away from the coast.
- They are separated from the coast by a stretch of water which can be up to several miles wide and several tens of metres deep.
- Sandy islands covered with a characteristic pattern of vegetation have sometimes formed on top of a barrier reef.
- The coastline of these islands is broken by passes, which have occupied the beds of former rivers.

Atolls:

- Atolls are large, ring-shaped reefs lying off the coast, with a lagoon in their middle.
- The emergent part of the reef is often covered with accumulated sediments and the most characteristic vegetation growing on these reefs consists of coconut trees.
- Atolls develop near the sea surface on underwater islands or on islands that sink, or subside.

7. About Coral Bleaching

- Corals are very sensitive to light and temperature and even a small change in their living conditions can stress them.
- When stressed, they expel zooxanthellae and turn entirely white. This is called coral bleaching.
- Coral bleaching doesn't immediately lead to the death of corals. They rather go under more stress and are subject to mortality.
- Coral bleaching reduces the reproductivity of corals and makes them more vulnerable to fatal diseases. If the bleaching is not too severe, corals have been known to recover.

8. Where Are Corals Found?

- Coral reefs are found throughout the oceans, from deep, cold waters to shallow, tropical waters.
- Temperate and tropical reefs however are formed only in a zone extending at most from 30°N to 30°S of the equator; the reef-building corals prefers to grow at depths shallower than 30 m, or where the temperature range is between 16-32°C and light levels are high.
- Based on current estimates, shallow water coral reefs occupy somewhere between 284,000 and 512,000 km^2 of the planet (cold-water (deep) coral reefs occupy even more area).
- Coral reefs harbor more than one quarter of the ocean's biodiversity. No other ecosystem occupies such a limited area with more life forms.

9. Significance of Corals

- Coral reefs have a crucial role in marine ecosystems.
- Thousands of marine species can be found living on one reef.
- Research has shown that there could be millions of undiscovered species of organisms living in and around reefs.
- These massive structures also provide economic goods and services worth about $375 billion each year.
- More than 500 million people across the world depend on coral reefs for food, income and coastal protection from storms and floods.
- Coral reefs can absorb up to 97% of the energy from waves, storms, and floods, which prevents loss of life, property damage, and soil erosion.
- Therefore, the absence of coral reefs would not only result in severe ramifications for marine life but also for humans.

10. Global Mass Bleaching of Coral Reefs

- According to 'The Conversation', Global mass bleaching of coral reefs is, when significant coral bleaching is confirmed in the Atlantic, Indian and Pacific oceans.
- The first one took place in 1998 in which 20% of the world's reef areas suffered bleaching-level heat stress.
- The next two global bleaching events occurred in 2010 (35% of reefs affected) and between 2014 and 2017 (56% of reefs affected).

11. About Fourth Global Bleaching Event

- NOAA has confirmed that the fourth global bleaching event is currently underway.
- Nearly 54 countries, territories and local economies have confirmed bleaching.
- The Great Barrier Reef is witnessing its most severe bleaching event.
- Bleaching was also confirmed in the Western Indian Ocean, including Tanzania, Kenya, Mauritius, Seychelles, and off the western coast of Indonesia.
- According to reports, more than 54% of the world's coral area has experienced bleaching-level heat stress in the past year.
- The key driver behind the current event is higher ocean temperatures.
- The situation has been aggravated by El Niño.

12. What Can be the Impact of the Event?

- As the global mass bleaching event is still unfolding, its full impact will not be known for a while but scientists have said the event is the most severe yet.
- With global temperatures soaring, such events are expected to become more frequent and longer.
- According to a 2018 report by the Intergovernmental Panel on Climate Change (IPCC), the world may lose the vast majority of its coral reefs at 1.5°C of warming, and virtually all at 2°C.
- IPCC is a United Nations body which assesses the science related to climate change.
- Currently, the average global temperature of the Earth has increased by at least 1.1°C since 1850.
- According to the Paris Agreement, to curb global warming to no more than 1.5°C, countries need to bring GHG emissions to a net zero by 2050.
- The goal, however, is unlikely to be achieved as record levels of GHG emissions have continued to be emitted into the atmosphere.

13. How to Stop Coral Bleeching?

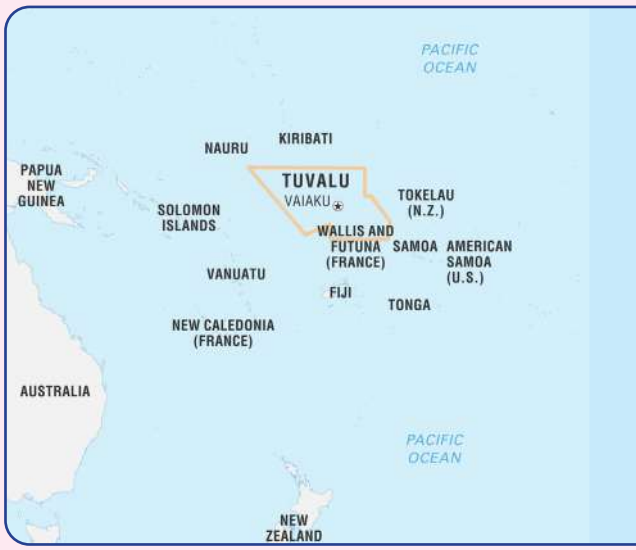
- **Reduce Carbon Emissions:** One of the most effective ways to prevent coral bleaching is to reduce global carbon emissions, which contribute to climate change and rising sea temperatures.
- **Protect & Establish Marine Protected Areas (MPAs):** MPAs provide a safe haven for corals to recover and thrive.
- **Improve Water Quality:** Reduce land-based pollution, sedimentation and nutrient runoff, which can stress corals and lead to bleaching.
- **Support Coral Reef Conservation Efforts:** Organizations and initiatives work to protect and restore coral reefs through research, monitoring and community engagement.
- **Promote Sustainable Tourism:** Encourage responsible snorkeling and diving practices, avoiding touching or standing on corals.
- **Advance Coral Reef Research & Monitoring:** Scientific studies help us understand coral bleaching causes and develop effective conservation strategies.
- **Engage in Policy & Advocacy Efforts:** Encourage governments to enact policies protecting coral reefs and addressing climate change.
- **Educate & Raise Awareness:** Inform others about coral bleaching causes and consequences, inspiring collective action.
- **Support Sustainable Fishing Practices:** Encourage eco-friendly fishing methods to reduce coral damage and promote healthy marine ecosystems.

Places in News

Tuvalu

A study has revealed that Tuvalu is facing the threat of submergence and has raised its concerns at international climate conferences. Tuvalu, an island nation in the west-central Pacific Ocean located between Hawaii and Australia and part of the region called Oceania.

- **Capital:** Funafuti.
- **Geographical boundaries:** Tuvalu is bordered by Tokelau to the east, the Santa Cruz Islands of the Solomon Islands to the west, Kiribati to the north, Nauru to the northwest, Fiji to the south, Samoa and Wallis and Futuna to the southeast, and Vanuatu to the southwest.



Features:

- The islands consist of three reef islands (Nanumanga, Niutao and Niulakita) and six true atolls (Funafuti, Nanumea, Nui, Nukafetau, Nukulaelae and Vaitupu). Funafuti is the largest atoll and consists of several islets around a central lagoon. Tuvalu experiences a tropical oceanic climate characterized by consistently warm temperatures, high humidity and relatively stable weather patterns throughout the year.

Aral Sea

A recent study from the Leibniz Institute for Tropospheric Research (TROPOS) and Freie Universität, Berlin shows that the drying of the Aral Sea has increased dust amounts in Central Asia by 7% over the past three decades.

About Aral Sea:

- The Aral Sea is located on the border between Kazakhstan in the north and Uzbekistan in the south, in the middle of Central Asia, east of the Caspian Sea. The Aral Sea was once known as the world's fourth largest inland body of water. It had an important place as a salt water lake in Central Asia.
- It is located in Soviet Central Asia and was fed by the Amu Darya and Syr Darya rivers originating from the Pamir and Tien Shan mountain ranges.
- In the 1960s, extensive Soviet irrigation projects diverted water from these rivers for agriculture, resulting in reduced water flow into the Aral Sea.
- The reduced water flow caused a sharp reduction in the size of the lake, leading to severe environmental degradation and the emergence of the Aralkum Desert.
- The drying of the Aral Sea has increased salinity levels, reduced biodiversity and adversely affected the local climate and ecosystem.
- Environmental degradation of the Aral Sea basin has raised international concerns, leading to collaborative efforts to address water management challenges and mitigate the impacts of desertification on local communities and ecosystems.

Burkina Faso

- Burkina Faso expelled three French diplomats for alleged "subversive activities", declaring them "persona non grata".
- **Capital:** Ouagadougou
- **Location:** Burkina Faso is a landlocked country located in West Africa.
- Political boundaries: Burkina Faso shares borders with Niger (northeast), Mali (northwest), Togo and Ghana (south), Benin (southeast), and Ivory Coast (southwest).

Features:

- The highest point in Burkina Faso is Tenakourou, also known as Mount Tenakourou.
- Burkina Faso is traversed by several rivers, including the Volta, the Black Volta (Mouhoun), the White Volta (Nakambe) and the Red Volta (Nazinon).
- Burkina Faso is rich in various minerals including gold, manganese, limestone, phosphate, salt and zinc.
- Burkina Faso experiences a tropical climate.
- International relations: Burkina Faso maintains diplomatic relations with various countries and is a member of regional organizations such as the Economic Community of West African States (ECOWAS) and the African Union (AU).

Kosovo

- Four towns in the Serb-majority region of North Kosovo held local election on whether to oust their ethnic Albanian mayors in a territory riddled with deadly tensions.
- **Capital:** Pristina.
- **Location:** Kosovo is a landlocked country in the Balkan region of Southeastern Europe.
- **Geographical boundaries:** Kosovo borders Serbia (east
- and north), Montenegro (west), North Macedonia (southeast) and Albania (southwest).

Features:

- The highest point in Kosovo is Mount Geravica (part of the Prokletije mountain range), located in the south-western part of Kosovo.
- Major rivers of Kosovo include the Ibar, Sitnica, White Drin and Lepenac.
- Kosovo experiences a continental climate.
- Ethnic composition: The ethnic composition of Kosovo is predominantly Albanian, with the majority of the population consisting of ethnic Albanians, while there are also significant communities of other ethnic groups such as Serbs and Bosniaks, Gorani, Turks and Roma.

Current Affairs: Uttar Pradesh

GST and VAT collection exceeds Rs 1 lakh crore for the first time in UP

Uttar Pradesh's GST and VAT collection has exceeded Rs 1 lakh crore for the first time, setting a new record.

Key points:

- ❖ According to Suresh Khanna, Finance Minister, UP Government, there has been an increase of Rs 18,660 crore in the revenue of the government, out of which the maximum increase is attributed to GST.
- ❖ Around Rs 75000 crore was collected from GST, while Rs 31000 crore were collected from VAT.
- ❖ In the fiscal year 2022-23, the target for GST and VAT collection in UP was set at Rs 1 lakh crore, but only Rs 96000 crore was collected.
- ❖ Subsequently, for the fiscal year 2023-24, the state tax department raised its target by 70% to Rs 1.5 lakh crore. However, during the same period, the central government ceased GST compensation payments.
- ❖ Achieving this target, without the Rs 50,000 crore compensation from the Central Government, was challenging. However, the State Tax Department managed to increase tax collection due to a 16% growth in business activity in the state.

Name of 8 stations changed in Uttar Pradesh

On the initiative of Union Minister Smriti Irani, the Home Ministry has approved for changing the names of 8 railway stations in Amethi, Uttar Pradesh. The new names are linked to the cultural heritage of the region, reflecting a significant change in their identities.

Names of railway stations changed:

- » Fursatganj Railway Station: Tapeshwarnath Dham.
- » Jais railway station: Guru Gorakhnath Dham.
- » Bani Railway Station: Swami Paramhans
- » Misrauli Railway Statio: Maa Kalika Dham.
- » Nihalgarh Railway Station: Maharaja Bijli Pasi
- » Akbarganj Railway Station: Maa Ahorva Bhavani Dham
- » Warisganj Halt: Amar Shaheed Bhale Sultan
- » Kasimpur Railway Station Halt: Jais City.

Process of changing the name:

- ❖ Whenever the name of a station has to be changed, the state government sends its proposal to the nodal ministry and the home ministry to get its approval. After this, the Home Ministry also keeps the Railway Ministry in the loop before giving its approval on this proposal. Along with this, care is also taken that no other railway station with the name being approved should be present in the country.

Trinetra App 2.0 launched

Uttar Pradesh Police launched Trinetra App 2.0 which is equipped with advanced digital technology to prevent criminal activities.

About Trinetra App 2.0:

- ❖ The application is equipped with digital technology to digitize over 9.32 lakh criminal records in its database. Police personnel of Inspector rank or higher can access it as needed.
- ❖ This system allows police to gather comprehensive crime-related information, including crime history, FIR details, inquiry reports, audio recordings, photographs, and seizure records.
- ❖ It also aids in searching for fugitive criminals using photo linking and facial recognition technology.

What was Trinetra App 1.0?

- ❖ Launched by the then DGP OP Singh in December 2018 to address rising crime rates in Uttar Pradesh, the application initially could store records of 5 lakh individuals.
- ❖ It featured technical capabilities such as artificial intelligence, face recognition and a host of other features.
- ❖ This system enables on-duty constables and officials to easily access the criminal records of suspects. It also stores fingerprints and voice samples of criminals, facilitating easy data searches.

Masaan Holi of Varanasi

Just as Braj's Holi is celebrated across the country, similarly, the Holi of Masaan in Kashi is also of great importance. Masaan Holi is observed annually in Kashi on the day following Ekadashi of Shukla Paksha in the month of Phalgun.

Key points:

- Masaan Holi is played with pyre ashes and gulal at Manikarnika Ghat in Kashi.
- The use of pyre ashes in Masan Holi of Varanasi symbolizes the shortness of life and the cyclical nature of one's existence in this materialistic world.
- This ash has purifying properties that cleanse the impurities of body, mind and soul.
- Through this, during Holi, people wish for spiritual rejuvenation and internal purification by applying ashes to each other.

UP & Maharashtra leading the India's progress after Covid-19

According to recently published SBI Research data, Maharashtra and Uttar Pradesh have emerged as the leading states in contributing to India's GDP growth. Maharashtra contributed 56 basis points, while Uttar Pradesh contributed 40 basis points out of the total 235 basis points growth.

Key findings of the report:

- The Indian economy has demonstrated resilience after the Covid-19 pandemic, with average real GDP growth reaching 8.1%.
- This acceleration in growth rate is much higher than the GDP growth of 5.7% in the pre-pandemic period.
- Among the states' Gross Domestic Product, Gujarat has significantly doubled its economic output during this period. States like Karnataka, Assam, Andhra Pradesh, Odisha, Telangana, Sikkim and Madhya Pradesh also registered significant progress.
- Karnataka, Andhra Pradesh, Telangana and Assam have also seen significant progress in per capita income. Gujarat, Karnataka and Telangana have performed better than other states in terms of per capita income.
- There has not been any significant increase in per capita income in states like Uttar Pradesh, Chhattisgarh, Bihar and Madhya Pradesh.
- The report also stressed the need for collaborative efforts between the Central and State Governments to address regional disparities and promote inclusive growth strategies.

Purchase of electricity for increasing the electricity supply in Uttar Pradesh

The Uttar Pradesh government has stated that the state's energy demand is projected to surpass 31,000 MW in 2024. To meet this demand, the Uttar Pradesh Power Corporation Limited (UPPCL) has already transacted 5,500 million units (MU) of electricity from 11 states through power banks.

Key points:

- About 4,000 MU will be supplied during the high energy demand period (April-October). The state had experienced a peak demand of 28,284 megawatts (MW) in the year 2023.
- The power corporation had arranged for 3,000 MU of energy from five states to bridge the demand-supply gap.
- The state power consumer forum said UPPCL will have to look for more energy amid rising demand, which has crossed 20,000 MW.
- During this period UPPCL also faces a difficult task in arranging optimum coal supply for 660 MW Obra C Thermal Power Plant and 660 MW Jawaharpur Thermal Power Plant to ensure uninterrupted operations during the summer period.
- It is noteworthy that the maximum energy demand is expected to increase to 53,000 MW by the year 2028. However, the state government hopes to substantially increase renewable energy production and the state has set a target of producing 22,000 MW of solar power in 4-5 years.

Uttar Pradesh Madrasa Education Board unconstitutional: Allahabad High Court

After the Allahabad High Court declared the Madrasa Education Board unconstitutional, Uttar Pradesh has canceled the recognition of more than 16 thousand madrasas in the state. Now only those madrassas that meet the standards will get recognition, for which madrassas can apply for recognition from UP Board, CBSE or ICSE Board. However, the Supreme Court has put a stay on the decision.

Key points:

- In the new system, any madrasas which do not meet the standards, will not be recognized and their operations will be stopped.
- CM Yogi Adityanath has formed a five-member committee under the chairmanship of the District Magistrate to enroll children studying in such madrassas in government basic or intermediate schools.
- Earlier, the government had conducted a survey of madrassas running in the state in which 16,513 recognized madrassas and 8,500 unrecognized madrassas were mentioned.
- It was feared that unrecognized madrassas were getting foreign funding, which they were misusing.
- These madrassas are accused of neither providing secular education nor focusing on modern subjects like

mathematics, science etc.

- The UP Board of Madrasa Education Act 2004 is a law passed by the Government of Uttar Pradesh that was created to improve the education system of Madrasas in the state.
- Under this law, madrassas are required to meet certain minimum standards to obtain recognition from the board which includes providing curriculum, teaching materials and guidelines for training of teachers.

Current Affairs: Uttarakhand

Helicopter service to Adi Kailash and Om Parvat Peak in Uttarakhand

Helicopter service to Adi Kailash and Om Parvat peak was started from Naini Saini Airport in Pithoragarh district of Uttarakhand.

Key Points:

- Under the Heli Darshan scheme of the Uttarakhand government, a Mi-19 helicopter will fly pilgrims to and from the airport to Adi Kailash and Om Parvat in the Vyas Valley region.
- This service was inaugurated by Joint Magistrate Ashish Mishra.

Adi Kailash:

- Also known as Shiv Kailash, Chhota Kailash, Baba Kailash or Jonglingkong Peak, it is a mountain located in the Himalayan mountain range in Pithoragarh district of Uttarakhand.

Uttarakhand assesses GLOF risks in Himalayas

The State Government of Uttarakhand has initiated proactive measures to assess and mitigate the risks associated with Glacial Lake Outburst Floods (GLOFs). Two expert panels have been setup to conduct risk assessments and monitor five high-risk glacial lakes in the region. These lakes have been identified as immediate danger, requiring immediate attention and intervention.

GLOF:

- GLOFs occur when water levels in glacial lakes suddenly rise due to various glacial activities, posing a significant threat to surrounding areas. GLOFs are formed primarily by glacial melting and subsequent eruptions, which can cause devastating floods downstream.

Luminous invests in solar module facility in Uttarakhand

Luminous Power Technologies inaugurated a 250 MW solar module manufacturing facility in Rudrapur, Uttarakhand. Luminous also launched an immersive experience center at the plant to showcase its solar ecosystem approach that integrates connected energy solutions.

Key Points:

- Built with an initial investment of Rs 1.2 billion, the fully automated 10-acre plant is expandable to 1 GW capacity.
- The launch marks a strategic shift for Luminous from being just a solar inverter and battery maker to a solar module maker.
- The facility will produce polycrystalline, monocrystalline, N-type and TOPCon solar panels with adaptability from 5BB (busbars) to 16BB configurations for residential, commercial and agricultural requirements.
- The company has partnered with the University of New South Wales, Australia for solar module technology development.
- The launch is in line with the government's 'Make in India' mission and the recently announced 'PM Surya Ghar: Free Electricity Scheme'.
- According to the "State of Solar PV Manufacturing in India 2024" report by Mercom India Research, India added 20.8 GW of solar modules and 3.2 GW of solar cell capacity in calendar year 2023.

Current Affairs: Bihar

Financial assistance by NABARD for Bihar

National Bank for Agriculture and Rural Development (NABARD) provided financial assistance of Rs 10372.86 crore to Bihar in the form of refinance, direct finance and grants-in-aid during the financial year 2023-24.

About National Bank for Agriculture and Rural Development:

- NABARD is a development bank that primarily focuses

on rural areas of the country. It is the apex banking institution for providing finance for agriculture and rural development.
- ❖ Headquarter: Mumbai.
- ❖ Apart from agriculture, it is responsible for the development of small industries, cottage industries and rural projects.
- ❖ It is a statutory body which was established in the year 1982 under the National Bank for Agriculture and Rural Development Act, 1981.

Developed Nation by the year 2047

Vice President Jagdeep Dhankhar urged young professionals to be part of the effort to make India a developed nation by the year 2047.
- ❖ He was addressing the sixth convocation of IIM Bodhgaya in Bihar.
- ❖ He emphasized that young minds and students are the torchbearers of India's future and appealed to the young students to utilize their skills and talents to write a new chapter in India's growth story.
- ❖ The Vice President awarded degrees to MBA students at the convocation ceremony.
- ❖ He also visited the world famous Mahabodhi Temple in Bodh Gaya and offered prayers.

Mahabodhi Temple:
- ❖ It is one of the four sacred sites related to the life of Lord Buddha and especially his attainment of enlightenment (Bodhi).
- ❖ The other three are: Lumbini in Nepal (birth), Sarnath in Uttar Pradesh (Dharma-chakra-pravartana – first sermon) and Kushinagar (Mahaparinirvana – death).
- ❖ The first temple of this complex was built by Emperor Ashoka in the 3rd century BC. However, it was completely rebuilt with bricks in the late Gupta period. The present temple is estimated to be built in the 5th or 6th century.
- ❖ It was recognized as a UNESCO World Heritage Site in the year 2002.

Saffron Stupa

People from all over the country and abroad are visiting the Kesariya Stupa, which is the largest Buddhist stupa globally. Located in Kesariya, about 110 kilometers from Patna, in the East Champaran district of Bihar, the stupa attracts visitors with its historical and cultural significance.

Key points:
- ❖ The first construction of the stupa is believed to be from the 3rd century BC. The original Kesariya Stupa probably dates back to the time of Ashoka (about 250 BC), as the remains of a capital of a pillar of Ashoka were discovered there.
- ❖ The present stupa dates back to the Gupta dynasty between 200 AD and 750 AD and is probably associated with the 4th century ruler King Chakravarti.
- ❖ The stupa mound may also have been inaugurated during the time of the Buddha as it matches in many ways the description of the stupa built by the Licchavis of Vaishali to house the alms bowl given by the Buddha.
- ❖ In ancient times, Kesariya was under the rule of Maurya and Licchavis.
- ❖ In ancient times, two great foreign travelers, Faxian (Fahien) and Xuan Zang (Hiuen Tsang), visited this place and wrote interesting and informative accounts of their visits.
- ❖ The discovery of gold coins bearing the seal of the famous emperor Kanishka of the Kushan dynasty (30 AD to 375 AD) further establishes the ancient heritage of Kesariya.
- ❖ Its exploration began in the early 19th century after its discovery under the leadership of Colonel Mackenzie in the year 1814.
- ❖ Later, it was excavated by General Cunningham in the year 1861-62 and in the year 1998, an ASI team led by archaeologist K.K. Muhammad carried out proper excavation of the site.

Current Affairs: Jharkhand

Rights of Persons with Disabilities Act, 2016

Supreme Court expressed displeasure over Jharkhand's failure to frame the rules required for implementation of the Rights of Persons with Disabilities Act, 2016.

Key points:
- ❖ The top court found that Jharkhand has not yet fulfilled its obligations.
- ❖ Jharkhand has not yet appointed state commissioners.

About Rights of Persons with Disabilities Act, 2016:
- ❖ According to the Act, the rule-making powers of the State include constitution of a committee for research

on disability, constitution of district level committees and determination of pay, allowances and other conditions of services of the State Commissioner and creation of funds for persons with disabilities.

- This Act was passed by the Parliament of India to give effect to the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD), which India had ratified in the year 2007.
- The Act replaces the earlier Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act, 1995, which was considered inadequate and outdated in addressing the needs and challenges of persons with disabilities in India.
- The Act recognizes 21 types of disabilities, whereas under the previous law there were 7 types of disabilities.

Bird flu

The Jharkhand government issued an alert recently after several cases of bird flu, also known as avian flu, were reported at a government poultry farm in Ranchi.

Key points:

- Nearly 4,000 birds, including chickens, were culled and hundreds of eggs destroyed after cases were confirmed at the regional poultry farm in Hotwar, Ranchi.
- An order detailing the standard operating procedures issued by the government said culling of the remaining chickens at the regional poultry farms will be carried out in the coming days and they will be disposed of through scientific methods.
- Officials have been directed to conduct a survey within a radius of 1 kilometer from the incident center to trace and eliminate the infection. They have also been asked to make a map of a 10 kilometer area and mark it as a surveillance area.
- The Union Ministry of Fisheries, Animal Husbandry and Dairying have asked the state to take all measures to prevent its spread.

Avian influenza:

- Avian influenza, also commonly known as 'bird flu', is a highly contagious viral infection that primarily affects birds, especially wild birds and domestic poultry.
- In 1996, the highly pathogenic avian influenza H5N1 virus was first detected in domestic waterfowl in southern China.

Transmission and associated symptoms in humans:

- Human cases of H5N1 avian influenza occur occasionally, but the infection is difficult to spread from person to person. According to the World Health Organization, the mortality rate when people are infected is around 60%.

Manda Festival of Jharkhand

On the last day of the week-long 'Manda' festival in Jharkhand, a large number of devotees gathered on the streets to participate in the festivities. Celebrated all over Jharkhand, Manda festival is celebrated to commemorate the sacrifice of Sati, the first wife of Lord Bhole Shankar. The devotees perform a hard task of devotion by walking barefoot on burning embers to please Lord Bhole Shankar.

Key points:

- The tribal celebrated Manda Puja, an age-old annual ritual to appease the gods for good rains and bountiful harvests.
- It usually occurs during the spring season and marks the end of the agricultural cycle.
- In Chutiya area of Ranchi, Manda Puja Committee organized the Mahotsav at Shiv Temple.
- During the festival, devotees fast for seven to nine days and participate in walking over fire and hanging themselves upside down from a bamboo structure attached to their back.
- A distinctive aspect of the Manda Mahotsav is the role of the 'Bhokta', usually a male devotee who observes a strict fast throughout the Mahotsav.

Tribes of Jharkhand

- According to the 2001 census, the Scheduled Tribe (ST) population of Jharkhand state is 7,087,068, which is 26.3% of the total population of the state (26,945,829).
- Scheduled Tribes are predominantly rural as 91.7% of them live in villages.
- The district-wise distribution of ST population shows that Gumla district has the highest proportion of STs (68.4%).
- STs constitute more than half of the total population in Lohardaga and West Singhbhum districts, while STs constitute 41.8-44.6% of the tribal population in Ranchi and Pakur districts.
- Koderma district (0.8%) has the lowest ST population before Chatra (3.8%).

Major tribes:

- Munda
- Santhal
- Oraon
- Khariya
- Gond
- Kol

- Kanwar
- Savar
- Asur
- Baiga
- Banjara
- Bathudi
- Bediya
- Binjhiya
- Birhor
- Ho
- Karmali
- Kharwar
- Khonda
- Kora

Current Affairs: Madhya Pradesh

'Chalo booth ki ore' Campaign

In Madhya Pradesh, Chief Electoral Officer Anupam Rajan has initiated the Chalo Booth campaign to boost voter turnout. The campaign focuses on conducting extensive voter awareness activities at every polling station, aiming to increase voter participation significantly.

- The Chalo Booth campaign aims to ensure that the message reaches every household in settlements connected to each polling station, urging everyone to exercise their franchise on May 7.
- To achieve this, District Election Officers have established local teams for each polling station. These teams will conduct door-to-door campaigns to encourage voters to cast their ballots.

Madhya Pradesh leads Centre's Green Credit Program

Madhya Pradesh is leading the Centre's Green Credit Program (GCP) by approving over 500 land plots for plantation across 10 states in the last two months. A total of 10,000 hectares of land has been identified for the program by these states. The program focuses on nurturing ecosystem services and encourages non-carbon environmentally positive actions to benefit local soils, water and ecosystems.

- The degraded forest land sanctioned for plantation/ greening practice is reported to be highest in Madhya Pradesh (954 hectares), followed by Telangana, Chhattisgarh, Gujarat and Assam.
- Other states where land parcels have been approved include Bihar, Rajasthan, Tamil Nadu, Maharashtra and Odisha.
- Many public sector undertakings and institutions have been registered to plant trees on degraded forest land and earn green credits.

About the Green Credit Program:

- The Green Credit Program (GCP) is a market-based initiative that encourages voluntary environmental actions from individuals, companies, communities and private sector industries.
- The Ministry of Environment, Forest and Climate Change announced the program on October 13, 2023, to encourage companies to participate in environment-friendly activities like waste management, water management and tree planting.

Green Credit Rules, 2023 :

- It was notified on 12 October 2023 under the Environment Protection Act 1986.
- This program allows individuals and companies to earn and trade green credits for reforestation on degraded forest land.

Cruise Tourism in Madhya Pradesh

Madhya Pradesh Tourism Board has signed a Memorandum of Understanding (MoU) with the Inland Waterways Authority of India (IWAI) and the Government of Gujarat to increase cruise tourism in Madhya Pradesh.

Key points:

- The proposed cruise route is scheduled to start from Ekatm Dham (Statue of Oneness) at Omkareshwar in Madhya Pradesh and travel to the Statue of Unity at Kevadiya in Gujarat.
- As per the terms mentioned in the MoU, IWAI is committed to provide two floating jetties to both Madhya Pradesh and Gujarat.
- The State Government will develop additional infrastructure and facilities for cruise tourism, which will boost economic development in the area and benefit the local population.
- Cruise tourism not only promises to enrich the tourism landscape but also provide tourists with an immersive experience of the local culture, traditions, lifestyle and cuisine amid the scenic views of the Narmada River.

Cows of specific breed in Madhya Pradesh

Chief Minister of Madhya Pradesh welcomed a pair of Punganur cows that were brought in the state from Andhra Pradesh.

Key points:

- Punganur cow is a dwarf cattle breed native to Chittoor district of Andhra Pradesh. It is one of the smallest breeds of humped cattle in the world.
- This breed is highly resistant to drought and can adapt to low quality fodder.
- The milk of cows of this breed have high fat content which makes it ideal for the production of ghee.
- A Punganur cow can give about 1 to 3 liters of milk per day and the fat content of the milk is 8%, whereas in other native breeds it is 3 to 4%.
- Their milk is also rich in nutrients like omega fatty acids, calcium, potassium and magnesium.
- Punganur cows are considered eco-friendly, requiring less water, feed and space than cross breeds.

Current Affairs: Chhattisgarh

NTPC Nava Raipur received Gold Medal for Best Branding

- NTPC Nava Raipur has received the Gold Medal for the Best Branding Initiative in the thirty-second Corporate Communication Meet held in Lucknow. Director Human Resources Dilip Kumar Patel presented the award to Sachdev Sethi, Senior Manager, NTPC Nava Raipur.
- This award is given for the efforts made by NTPC Nava Raipur with the aim of promoting brand identity. NTPC Nava Raipur attempted to do excellent branding of the company through outdoor displays and exhibitions at places like Raipur Airport Complex and on occasions like Naya Raipur, New India Festival etc.

Shubha Mishra sets World Record

- Shubha Mishra of Raipur, Chhattisgarh has registered her name in the Golden Book of World Records by making fourteen thousand eight hundred and fifty pieces of jewelry using jute fabric.
- For this achievement, 'Mera Sathi Janseva Sanstha' honored Shubha Mishra in a program organized in Raipur.
- On this occasion, retired All India Radio announcer Paresh Rao, police officer and Pandwani singer Taruna Sahu, Shikha Vikas Choubey and Payal Vishal were also honoured.
- Shubha Mishra is also a Chhattisgarhi news reader at Akashvani Kendra Raipur.

Bhoramdev Mahotsav

- Bhoramdev Mahotsav organized in Kabirdham district of Chhattisgarh has concluded. Collector Janmejay Mahobe, Superintendent of Police Dr. Abhishek Pallav and District Judge Satyabhama Dubey also attended the closing ceremony.
- To increase the fame of Bhoramdev Temple, a place of historical, archaeological, religious and tourist importance for Chhattisgarh. Bhoramdev Mahotsav is organized every year during Krishna Paksha Teras of Chaitra month.
- This festival is organized with the help of Culture and Tourism Department of Chhattisgarh Government, Bhoramdev Mahotsav Organizing Committee, District Administration, Bhoramdev Teerth Management Committee and public cooperation.

Naxalite encounter

A total of 29 Naxals were killed and three security personnel sustained injuries in an encounter that broke out in Chhattisgarh's Kanker, which lies in the Bastar region. the operation had been launched after receiving information about the presence of North Bastar and Abujhmad Committee division committee members such as Shankar, Lalita, Raju and others.

About Naxalism:

- Naxalism or Left Wing Extremism (LWE) is one of the major challenges to India's internal security. The Maoists' motto, "Power flows from the barrel of the gun", is their driving force. Naxalites want to overthrow the state through violent means. They have declared their lack of faith in the democratic means of the ballot and adhere to violence as a means to achieve their goals. Naxal affected areas in India are known as 'Red Corridor'.
- The Naxalite movement began in 1967 with a tribal-peasant rebellion against landlords in Naxalbari village in the Darjeeling district of West Bengal. This rebellion was led by leaders like Charu Majumdar, Kanu Sanyal. Later, this militant movement spread throughout West Bengal and was carried on by a large number of other

groups in different states.

- Naxalite groups control large areas in several states of India notably Andhra Pradesh, Bihar, Chhattisgarh, Jharkhand, Orissa and West Bengal and their influence extends far beyond those regions. National and state governments in India have consistently outlawed Naxalite groups.

Mahanadi Boat Accident

Recently seven people died in a boat accident in the Mahanadi River. The Chief Minister has announced an ex-gratia amount of Rs 4 lakh for the families of the deceased.

About Mahanadi:

- The Mahanadi River system is the third largest river in peninsular India after the Godavari and Krishna rivers and the largest river in the state of Odisha.
- The catchment area of the river extends to Chhattisgarh, Madhya Pradesh, Odisha, Jharkhand and Maharashtra.
- Its basin is bounded by the hills of Central India in the north, the Eastern Ghats in the south and east and the Maikal mountain range in the west.
- **Origin:** Mahanadi originates from Sihawa, south of Amarkantak near Raipur in the state of Chhattisgarh.

Major tributaries:

- Seonath, Hasdeo, Mand and Ib join the Mahanadi from the left while Ong, Tel and Jonk join from the right.
- **Dispute Redressal:** The Central Government constituted the Mahanadi Water Disputes Tribunal in the year 2018.

Major Dams/Projects on Mahanadi:

- **Hirakud Dam:** It is the longest dam in India.
- Pandit Ravi Shankar Sagar, Dudhawa Reservoir, Sondur Reservoir, Hasdev Bango dam and Tandula dam are other major projects.
- **Urban Centre:** The three important urban centers in the basin are Raipur, Durg and Cuttack.

Current Affairs: Rajasthan

Vegetation potential of Thar Desert

According to a theory based on rainfall and climate data, scientists focusing on the 'Indian Ocean Warm Pool' (IOWP) have speculated that vegetation in the Thar Desert may change due to global warming.

Key points:

- The Indian Ocean warming pool (IOWP) has long been acknowledged for its influence on the Indian monsoon. Global warming has caused the IOWP to shift westwards.
- At the western edge of the IOWP, water evaporates and is then drawn towards India by the Earth's rotation. This movement contributes to a 150-day rainy season in the northeast and a 70-day rainy season in the northwest.
- As the IOWP expands westward, the duration of the rainy season is expected to increase, leading to a 50-100% rise in average summer rainfall over the semi-arid northwest of India. This increase in rainfall could potentially lead to greening of the Thar Desert over time, according to scientists.

Rajasthan Day 2024

Rajasthan Day was celebrated on 30 March remembering the foundation day of the state.

Key points:

- The Union of Rajasthan was established on 25 March 1948 when ten states from southern and south-eastern Rajputana, including Kushalgarh, Banswara, Kota, Bundi, Jhalawar, Tonk, Shahpura, Pratapgarh, Dungarpur, and Kishangarh, united to form Eastern Rajasthan. Later, on 18 April 1948, Udaipur State (Mewar) also joined the union, resulting in its renaming as United Rajasthan, comprising a total of 15 states.
- Following this, on 30 March 1949, Jodhpur, Jaipur, Bikaner, and Jaisalmer, along with the princely states of Neemra and Lava, merged to establish Greater Rajasthan, a significant event commemorated as Rajasthan Day.
- The integration continued, and on 15 May 1949, Matsya Union joined Greater Rajasthan, leading to the federation being named the United State of Greater Rajasthan. The last state to become part of the federation was Sirohi, which joined on 26 January 1950.
- Finally, on 1 November 1956, the Ajmer-Merwar region, previously under British rule, was amalgamated into Rajasthan following the recommendation of the States Reorganization Commission, resulting in the formation of Reorganized Rajasthan.

Abel Prize

The Abel Prize, 2024 has been awarded to French mathematician Michel Talagrand for his outstanding work in probability theory and functional analysis which has important applications in mathematical physics and statistics.

About the Abel Prize:

- The Abel Prize is a prestigious award in mathematics awarded for groundbreaking scientific achievements.
- It is awarded annually by the King of Norway to one or more mathematicians.
- It is named after the Norwegian mathematician Niels Henrik Abel (1802–1829).
- It was established in 2003 by the Government of Norway and was created on the basis of the Nobel Prize, in honor of the famous Norwegian mathematician Niels Henrik Abel.
- Recipients of the award receive a cash prize of 9 million Norwegian krone (approximately Rs 7 crore), making it one of the most prestigious awards in the field of mathematics.
- The award covers a variety of mathematical disciplines, including probability theory, function analysis, mathematical physics and statistics.

Staghorn Coral

Staghorn corals have been observed in the waters of Ko Man Nai Island, Rayong Province, Thailand.

About Staghorn Coral:

- Staghorn coral (Acropora cervicornis) is a branching coral with horn-like branches that can grow up to 6.5 feet (2 m) long.
- It is found in warm, clear, oxygen-rich waters in the Indo-Pacific and Atlantic ocean, usually between 25° North and 25° South.
- Staghorn coral colonies are light brown or golden brown with a white tip.
- It is found in clear, shallow waters on coral reefs in the Bahamas, Florida, and the Caribbean.
- It is nocturnal and uses stinging tentacles to feed on small aquatic animals called zooplankton.
- The IUCN considers the staghorn coral to be near threatened.

Kalam-250

Skyroot Aerospace has successfully tested its Phase-2 (Kalam-250) of Vikram I Launch Vehicle at ISRO's Propulsion Testbed in Sriharikota, Andhra Pradesh.

About Kalam-250:

- Kalam-250 is the second stage rocket motor of Skyroot Aerospace's Vikram-1 launch vehicle.
- It plays an important role at the time of launch, in taking the launch vehicle from the Earth's atmosphere towards the vacuum of space.
- This stage uses a high power carbon composite rocket motor with solid fuel and a sophisticated ethylene-propylene-diene terpolymer thermal protection system.
- Notable features of the Kalam-250 include carbon ablative flex nozzles and precision electro-mechanical actuators that facilitate thrust vector control of the launch vehicle.
- The solid propellant used in Kalam-250 was processed at Solar Industries' facility in Nagpur.

GI Tag

More than 60 products from across India, including Banaras Thandai, have been granted the Geographical Indication (GI) tag.

About the products:

- Six traditional crafts of Assam, including Bihu Dhol, Asharikandi terracotta craft, Jaapi (bamboo headgear) and Mishing handloom product have received the Geographical Indication (GI) tag.

- Thirteen other products from Assam have also received the GI tag, such as Bodo Dokhona and Bodo Eri silk etc.
- The famous Banarasi Thandai, a traditional drink made by blending milk with a nutritious mix of nuts, seeds and spices, also got the tag. This reflects its cultural and historical importance as initially it was offered to the Shri Kashi Vishwanath deity on the occasion of Mahashivaratri, Rangbhari Ekadasi, and Holi.
- Banarasi Thandai along with other products like Banaras Tabla and Banaras Shehnai have also been awarded the Geographical Indication (GI) tag. Tripura's attire - Pachra-Rignai and sweets Matabari Peda, as well as 'Meghalaya Garo Textile' and 'Meghalaya Lyrnai Pottery' have also received the GI tag.

Geographical Indication Tag:

- A Geographical Indication tag indicates that a product's specific qualities or reputation are linked to a specific geographical origin.
- Geographical Indication tag is used for agricultural products, food items, alcoholic beverages, handicrafts and industrial products.
- The Geographical Indications of Goods (Registration and Protection) Act, 1999 regulates the registration and protection of Geographical Indications (GI).

Dornier 228 Aircraft

Hindustan Aeronautics Limited has handed over two Dornier 228 aircraft/airplanes to the Guyana Defense Force.

About Dornier 228 Aircraft:

- The Dornier 228 is a twin-engine turboprop aircraft that can perform multiple maritime missions.
- It is lightweight, has a wide range of operating speeds and is fuel efficient.
- Its wingspan is 55 feet 8 inches, length is 54 feet 4 inches and height is 15 feet 11 inches.
- The aircraft is designed for quick role change, with maritime patrol, surveillance, marine pollution contingency, search and rescue and medical evacuation capabilities.
- Hindustan Aeronautics Limited (HAL) purchased the production license for the Dornier 228 in 1983 and set up a manufacturing unit in Kanpur.

Tholu bommalata

Sangeet Natak Akademi has taken up the revival of Tholu Bommalata, an ancient style of puppetry which is facing the threat of extinction.

About Tholu bommalata:

- Tholu Bommalata, also known as "Bommalatam" or "Tolpava Koothu", is a shadow puppetry art that originated in the Godavari region of Andhra Pradesh, India around the 3rd century BCE.
- The word "Tholu" means leather in Tamil, and "Bommalatam" means puppet.
- The puppets are made of translucent, colored leather and are projected on small screens like colored photographic transparencies.
- The puppeteer wields two sticks from behind and the puppets narrate mythological and folk tales from the epics through a mix of music, dance and live action.
- Puppets often depict animals, birds, gods and demons.
- The Government of India designated Tholu Bommalata as Geographical Indication (GI) in 2008.
- It is recognized by the Government of India as a part of its 'One District One Product (ODOP)' initiative.

Paira Cropping System

Odisha has been actively promoting climate-resilient agriculture through its rice fallow initiative using paira cropping system.

About Paira Cropping System:

- Paira cropping system is a traditional farming method mainly followed in coastal areas, especially in the state of Odisha.
- In this farming system, seeds of crops like lentils, lathyrus, kidney beans or moong are sown in the standing rice crop about 2 weeks before it is harvested.
- Para crop requires minimal intervention and cost as it uses the existing infrastructure of paddy fields and depends on natural moisture.
- It reduces soil erosion and optimizes fertilizer application, thereby contributing to sustainable agricultural practices.
- This system has been important in the agricultural landscape of Odisha, contributing to crop diversification and increasing farm income.

Parivartan Chintan

Defense Ministry organized the first Tri-Services Conference named 'Parivartan Chintan' in New Delhi, which was chaired by Chief of Defense Staff General Anil Chauhan.

About Parivartan Chintan:

- Parivartan Chintan is a Tri-Services Conference of all Tri-Service Institutions, Department of Military Affairs, Headquarters Integrated Defense Staff and Chiefs of the three Services.
- The translation of the word "Parivartan Chintan" into English is "Transformational Deliberation".
- The objective of this conference is to promote a joint culture within the Indian Armed Forces and integrate capabilities across the three services to enhance war fighting capability, interoperability and jointness.
- It provided a platform to brainstorm and formulate new ideas, initiatives and reforms to advance jointness and integration efforts that are essential for the transformational journey of the Indian Armed Forces towards future readiness and effective multi-domain operations.
- Officers from different service sections, through their diverse understanding and experience, recommended measures to rapidly achieve the desired "joint and integrated" final state.

TSAT-1A

Tata Advanced Systems Ltd., a wholly owned subsidiary of Tata Sons, recently announced successful launch of its sub-meter optical satellite, TSAT, by SpaceX's Falcon 9 rocket from the Kennedy Space Center, Florida, US.

About TSAT-1A:

- TSAT-1A is an Earth observation satellite which has been launched as part of Bandwagon-1 mission.
- It provides high-resolution optical satellite images with increased collection capacity, dynamic range and low-latency delivery through its multispectral and hyperspectral capabilities.
- The satellite was assembled and tested in India by Tata Advanced Systems Limited (TASL) at its Vemagal facility in Karnataka.
- TASL partnered with SatelliteLogic, utilizing its expertise in satellite development, while also contributing its capabilities in complex systems integration.
- The successful assembly and testing of TSAT-1A in India is a milestone for TASL and symbolizes India's growing capabilities in the space sector.
- TSAT-1A's high-resolution optical satellite images will be used for a variety of applications including environmental monitoring, agriculture, urban planning and national security, contributing to better decision-making processes.

Garudan Thookkam

Devotees participated in 'Garudna Thookkam' at the Sarkara Devi Temple in Thiruvananthapuram, Kerala.

About Garudan Thookkam:

- Garudan Thookkam, also known as Garuda Parva, is a ritual art form that is performed in some Kali temples in Kerala, India.

- This art is known for its vibrant costumes, headgear and makeup, which transforms common people into majestic artists.
- The performers dress like Garuda, an eagle, and dance to the beat of the drum.
- After this, hooks are pierced in the back of the artists and they are taken around the temple to seek the blessings of the goddess.
- The ritual involves 18 Thalavattam (rhythmic patterns) and the performers are taken in procession in bullock carts, boats or hand-pulled carts.
- This practice is prevalent in the Bhadrakali temples of Kottayam, Alappuzha, Ernakulam and Idukki districts.

EA-Earth Action

EA Earth Action published a report estimating that approximately 220 million tons of plastic waste will be generated worldwide in 2024.

About EA-Earth Action:

- EA-Earth Action is a Swiss-based research consultancy that provides solutions and initiatives to tackle the plastic pollution crisis.
- The organization publishes the Plastic Overshoot Day report which builds critical understanding into the global plastic pollution crisis.
- The organization employs data driven methods to assess plastic consumption patterns, waste management capabilities and environmental impacts.
- It classifies countries based on the Mismanaged Waste Index (MWI) which measures the imbalance between plastic production and waste management capacity.
- According to EA, India ranks fourth in MWI where 98.55% of the waste generated is mismanaged.
- India is one of the 12 countries. The other countries include China, Brazil, Indonesia, Thailand, Russia, Mexico, United States of America, Saudi Arabia, Democratic Republic of Congo, Iran and Kazakhstan which are responsible for 52 percent of the world's mismanaged plastic waste.

Angara-A5

Russia achieved a significant milestone with the test launch of its first post-Soviet space rocket, Angara-A.5, from the Vostochny Cosmodrome located in the far eastern Amur region.

About Angara-A5:

- Angara-A5 is a key space rocket developed by Russia to replace the Proton-M as its heavy-lift launch vehicle.
- It is a three-stage rocket which weighs approximately 773 tonnes and can carry a payload of up to 24.5 tonnes into space.
- It has been designed to be more environmentally friendly, using less harmful fuel and Russian-made components.
- The Angara project is of utmost importance for Russia as it ensures independent access to space without relying on foreign launch sites such as the Baikonur Cosmodrome in Kazakhstan.

Exercise-DUSTLIK

Indian Army contingent participated in the fifth edition of India-Uzbekistan joint military exercise Dustlik at Termez, Uzbekistan. The exercise continued till 28 April 2024.

About Exercise Dustlik:

- Dustlik is an annual joint military exercise between Uzbekistan and Indian army.
- The Indian contingent included 60 soldiers while the Uzbekistan contingent comprised 100 soldiers.
- It aims to promote military cooperation between India and Uzbekistan and enhance joint capabilities to conduct joint operations, especially in mountainous and semi-urban areas.

- The key areas of focus during the exercise include high physical fitness, joint planning, tactical exercises and basics of special weapon skills.
- It enhances sharing of best practices and interoperability between the armed forces of India and Uzbekistan for future joint operations.
- The exercise is alternated between India and Uzbekistan, with the previous edition being held in Pithoragarh, Uttarakhand, India in February last year.

Parkinson's Disease

Researchers discovered that genetic susceptibility to non-familial Parkinson's disease varies, making it possible to identify specific cellular disorders through genetic data analysis.

About Parkinson's disease:

- Parkinson's disease is a progressive neurodegenerative disorder that affects movement and often leads to immobility and dementia.
- More than one million people in the United States are affected by Parkinson's disease with the number increasing globally.
- Symptoms of Parkinson's disease include tremors, stiffness, bradykinesia (slowness of movement), and postural instability.
- Parkinson's disease has both genetic and environmental components.
- Recent research has identified a new genetic variant, RAB32 Ser71Arg, associated with Parkinson's disease. This variant affects dopamine levels and cellular functions providing insight into the pathology of the disease.

International Monetary Fund Estimates

International Monetary Fund (IMF) has raised India's Gross Domestic Product (GDP) growth forecast to 6.8 percent for the financial year (FY) 2024-25.

About International Monetary Fund:

- The International Monetary Fund (IMF) is an international organization established at the Bretton Woods Conference in 1944.
- It has 190 member countries.
- It provides financial assistance to member countries facing balance of payments crises, particularly with conditions for economic recovery.
- It played a key role in the resolution of various global economic crises, including the Asian financial crisis of 1997 and the global economic crisis of 2008.
- Headquarter: Washington, D.C.
- India is a founding member of the International Monetary Fund.

Durga-2

DRDO has started testing a prototype for its DURGA-2 (Directionally Unobstructed Ray Gun Array) system.

About Durga-2:

- Durga-2 is a laser weapon developed by India's Defense Research and Development Organization (DRDO).
- It is a 100 kW directed energy weapon (DEW) that can be used from land, sea, and air platforms.
- It can neutralize drone attacks, deflect ballistic missiles and destroy fighter aircraft at the speed of light.
- It uses laser, microwave or particle beams to damage or destroy a target using concentrated energy.
- This system offers advantages over conventional weapons, delivering lethal force at the speed of light and being unaffected by gravity or atmospheric drag.

Electric Air Taxi

Stellantis and Boeing have revealed plans to begin trials for electric air taxi in India next year, aiming for a commercial launch by 2026.

About Electric Air Taxi:

- Electric air taxis represent an innovative mode of transportation that aims to address urban congestion and provide efficient, time-saving travel options in densely populated cities.
- They are powered by electric propulsion systems, making them an environment friendly alternative to traditional fossil fuel-powered aircraft.
- They contribute to reducing carbon emissions and reducing the effects of air pollution.
- They take advantage of cutting-edge technology in electric propulsion, battery storage and autonomous flight systems to enable safe, quiet and efficient air transportation in urban areas.
- Electric air taxi operations require integration with existing urban infrastructure, including helipads and vertiports, to facilitate take-off, landing and passenger boarding in urban areas.
- Many companies, including startups and established aerospace manufacturers, are investing in the development of electric air taxi technology.

Vasuki indicus

Paleontologists in India discovered the fossil remains of Vasuki indicus in the Panamro lignite mine, Kutch, Gujarat.

About Vasuki indicus:

- Vasuki indicus is an ancient giant snake discovered in India, estimated to be between 36 to 50 feet (11 to 15 m) long.
- Named after the mythological snake king associated with the Hindu god Shiva, Vasuki lived in the swampy evergreen forests of western India about 47 million years ago.
- It was a slow ambush predator, possibly capturing prey through contractions.
- It is an extinct species of giant snake discovered in India, believed to be one of the largest snakes ever known.
- Vasuki shares similarities with Titanoboa, another giant snake found in Colombia, with both living during unusually hot temperatures.
- Fossils of Madatsoidae snakes, including Vasuki indicus, have previously been found in India, with late Oligocene specimens discovered in the Ladakh Himalaya in 2022.

Shompen Tribe

Shompen tribe of the rain forests of Great Nicobar Island voted for the first time in the Andaman and Nicobar Lok Sabha constituency, a historic democratic success.

About Shompen Tribe:

- The Shompen tribe is classified as a Particularly Vulnerable Tribal Group (PVTG) by the Government of India, reflecting their weak socio-economic status and cultural distinctiveness.
- They live primarily in the dense tropical rainforests of Great Nicobar Island, which is part of the Andaman and Nicobar Islands region.
- They are semi-nomadic hunter-gatherers who live in small groups.
- Their main sources of livelihood are hunting, gathering, fishing, and a little bit of horticultural activities in a rudimentary form.
- Historically, the Shompen tribe has maintained a solitary and isolated lifestyle, with limited contact with the outside world.
- According to 2011 census data, the Shompen tribe had an estimated population of 229.

IRDAI

Insurance Regulatory and Development Authority of India (IRDAI) has abolished the age limit for purchasing a health insurance policy from April 1.

About IRDAI:

- The Insurance Regulatory and Development Authority of India is a government agency that regulates and promotes the insurance business in India.
- IRDAI is a statutory body established by the Insurance Regulatory and Development Authority Act, 1999 (IRDA Act, 1999).
- Its primary objective is to protect the interests of policyholders and to regulate, promote and ensure the orderly growth of the insurance industry in India.
- It consists of a 10-member body, consisting of a Chairman, five full-time members and four part-time members appointed by the Government of India.
- It operates under the Ministry of Finance, Government of India.
- **Headquarter:** Hyderabad.

Exercise : Poorvi Lehar

Indian Navy conducted Exercise 'Poorvi Lehar' off the eastern coast of India to strengthen its preparedness for maritime security challenges.

About 'Poorvi Lehar':

- Poorvi Lehar is an exercise conducted by the Indian Navy off the east coast of India.
- The primary objective of exercise was to assess and verify the preparedness of the Indian Navy to deal with maritime security challenges in the region.
- The exercise was conducted under the operational control of the Flag Officer Commanding-in-Chief, Eastern Naval Command.
- The exercise saw participation of various assets including ships, submarines, aircraft and special naval forces.
- The objective of 'Poorvi Lehar' is to assess the readiness of the Indian Navy to effectively deal with maritime security challenges.
- The exercise demonstrates the Indian Navy's commitment to maintaining strong defense capabilities and ensuring security along the eastern coast, which is critical to national security.

Mpox

In a recent study, scientists have identified specific genomic regions in the Mpox virus family where the virus changes to adapt through gene duplication, mutation accumulation, deletion or inactivation.

About MPOX:

- Mpox, formerly known as monkeypox, is a rare viral infection caused by the monkeypox virus.
- It can spread from person to person and through the environment.
- It is a zoonosis, meaning it can spread from infected animals to humans.
- It is endemic to densely forested areas of West, Central and East Africa.
- Symptoms of mpox include fever, headache, muscle aches, back pain, tiredness, swollen lymph nodes, a rash that appears and spreads on the face, and chills.
- Mpox genomes can be classified into two broad classes: I and II, each of which contains subclades or lineages.
- Clade IIb was implicated in the 2022 outbreak and demonstrated high human-to-human transmission, indicating adaptability.
- The virus experienced a global outbreak in 2022–2023, leading to the declaration of a public health emergency by the WHO.
- The outbreak affected more than 118 countries and infected approximately 100,000 people, with a case fatality rate

between 1–10%.

Lightest Bullet Proof Jacket

Defense Research and Development Organization (DRDO) has successfully developed the lightest bullet proof jacket in India.

About the Lightest Bullet Proof Jacket:

- The Bullet Proof Jacket is a protective garment providing lightweight protection against ballistic threats.
- It is designed to provide protection against the highest threat level 6 of BIS (Bureau of Indian Standards) ammunition while ensuring the comfort and mobility of the wearer.
- The bulletproof jacket was successfully tested at Terminal Ballistic Research Laboratory (TBRL), Chandigarh, confirming its effectiveness.
- It uses a new design approach incorporating innovative materials and processes for improved performance.
- It is specially designed to withstand multiple impacts, ensuring maximum protection for the wearer.

Properties:

- It is ergonomically designed Front Hard Armor Panel (HAP) for superior protection and wearer's comfort.
- The HAP consists of a monolithic ceramic plate with a polymer backing, which increases its efficiency during operation.

Schengen Visa

European Commission has introduced a new visa system "Cascade" for Indian citizens to obtain a Schengen visa, which provides multiple-entry access with extended validity periods.

About Schengen Visa:

- A Schengen visa is an entry permit that allows travelers to enter the countries of the Schengen area.
- The visa can be used for short stays of up to 90 days within any 180-day period for tourism, business, visiting family, medical treatment, study, training placements and volunteer activities.
- The visa also allows transit through the territory and airports of the Schengen states.
- A Schengen visa can be obtained as a single-entry visa, which allows the holder to enter the Schengen area once or a multiple-entry visa, which is granted for multiple visits to the Schengen area as long as it is legal.
- The Schengen Area includes 23 of the 27 EU member states, Iceland, Liechtenstein, Norway and Switzerland, Bulgaria, Cyprus and Romania, and Ireland.

Jagjit Pavadia

- India's Jagjit Pavadia has been re-elected to the International Narcotics Control Board (INCB) for the term 2025-2030.
- The International Narcotics Control Board is an autonomous body that oversees the implementation of United Nations drug control treaties.
- The International Narcotics Control Board was established in 1968 under the Single Convention on Narcotic Drugs and consists of 13 members elected by the United Nations Economic and Social Council every five years.
- INCB's mandate includes enforcing various drug control conventions while ensuring global compliance.
- INCB is the independent and quasi-judicial monitoring body for the implementation of United Nations international drug control conventions.
- It was established in 1968 in accordance with the Single Convention on Narcotic Drugs, 1961.

Hydrogel to Rremove Microplastics

- Indian Institute of Science (IISc) Bangalore has developed a new hydrogel to remove microplastics from water.

- This hydrogel, with a unique polymer network, binds to microplastics using UV light and destroys it.
- It consists of three polymer layers: chitosan, polyvinyl alcohol and polyaniline, which together with copper substituted polyoxomaleate nanoclusters act as catalysts.
- Microplastics are tiny pieces of plastic less than five millimeters long that can be harmful to our oceans and aquatic life.
- The Indian Institute of Science is India's leading educational institution for scientific research and higher education. It is located in Bangalore.

Kankesanthurai Port

The Sri Lankan Cabinet has approved the refurbishment of the Kankesanthurai Port in the Northern Province, with India agreeing to fund the entire project at a cost of USD 61.5 million.

About Kankesanthurai Port:

- The Kankesanthurai Port, also known as the KKS Port, is situated in the northern region of Sri Lanka. It covers an area of around 16 acres and is located 104 kilometers (56 nautical miles) from Karaikal Port in Pondicherry.
- The direct passenger ship service connecting Nagapattinam in Tamil Nadu to Kankesanthurai port near Jaffna covers a distance of 111 kilometres (60 nautical miles) in approximately three and a half hours.
- The project faced delays because the estimated cost was higher than the loan amount. Discussions with India are ongoing for a possible Public Private Partnership approach.
- The project was initially approved on May 2, 2017, with approval for Project Management Consultant Services granted on December 18, 2019. The full cost of the project was announced as USD 61.5 million in March this year.

Kristalina Georgieva

- The International Monetary Fund (IMF) has again appointed Kristalina Georgieva as the Managing Director (MD) of the IMF for a new term of 5 years. The new term of Kristalina Georgieva will start from 1 October 2024.
- The Managing Director of the IMF is appointed by the IMF's Executive Board, which selects the Managing Director by voting or consensus. Since 2004, the IMF has adopted a policy of appointing a Managing Director through consensus. This year, Kristalina Georgieva was the only candidate nominated for the post.
- Kristalina Georgieva is a citizen of Bulgaria and was first appointed as the MD of the IMF in 2019 for a five-year tenure.
- She has also previously been the Chief Executive Officer of the World Bank. She has also served as the interim President of the World Bank Group.
- She has also served as Commissioner for International Cooperation, Humanitarian Aid and Crisis Response of the European Commission.

C-C nozzle

- ISRO's Vikram Sarabhai Space Center (VSCC) has developed a lightweight carbon-carbon (C-C) nozzle for rocket engines.
- Carbon–carbon composites are advanced materials made by combining carbon fibers with a carbon matrix.
- The nozzle has been developed using sophisticated processes like green composite carbonization, carbon vapor infiltration, high temperature treatment.
- The payload capacity of the rocket can be increased with this rocket engine prepared by the space agency's Vikram Sarabhai Space Center (VSSC).

One Liners

1. Kamal Kishore has been appointed Special Representative for Disaster Risk Reduction by the United Nations Secretary General.
2. Matabari Pera and Pachra of Tripura get the coveted GI tag.
3. A Digital India Trust Agency will be set up by RBI to keep an eye on illegal lending apps.
4. Government e-Marketplace (GeM) doubled its gross merchandise value to Rs. 4 lakh crore.
5. Congo has appointed Judith Suminwa Tuluka as its first female Prime Minister.
6. Vineet Jain received ENBA Lifetime Achievement Award 2023.
7. Defense exports from India have reached Rs 21,083 crore in FY 2023-24.
8. REC Limited has been awarded the Skoch ESG Award 2024 in the Renewable Energy Financing category.
9. Hardik Singh and Salima Tete were respectively named the men's and women's players of the year at the Hockey India Awards 2024.
10. Mirabai Chanu has become the only Indian weightlifter to qualify for the Paris Olympics 2024.
11. World Bank has estimated India's economic growth at 6.6% for FY25.
12. Adani Green has become the first Indian company to have 10,000 MW renewable energy capacities.
13. A new 'OptiDrop' platform has been developed by C-CAMP to study single cells.
14. Dr. Karthik Kommuri received the prestigious National Fame Award 2024.
15. India plans to create its first privately managed Strategic Petroleum Reserve (SPR) by 2029-30.
16. Sorin Investment Fund Chairman Sanjay Nair takes over as President of ASSOCHAM for 2024-25.
17. Bindyarani Devi won bronze medal in Weightlifting World Cup.
18. Rice Fallow Initiative launched by Odisha to promote climate-resilient agriculture.
19. India's first domestic gene therapy for cancer treatment launched by the President Smt. Droupadi Murmu .
20. On 03 April 2024, the Army Medical Corps celebrated its 260th Raising Day.
21. In 2021, COVID-19 became the second leading cause of death globally, according to a Lancet study. The leading cause of death worldwide in 2021 continues to be ischaemic heart disease.
22. 'Voice Engine', a voice cloning tool, was unveiled by OpenAI.
23. SJVN Limited has won two awards at the 15th CIDC Vishwakarma Awards 2024.
24. Ninety-nine change-makers have been added to the Young Global Leaders Community Class of 2024 by the World Economic Forum (WEF).
25. Rakesh Mohan has been made a member of the World Bank Economic Advisory Panel.
26. The Extreme Light Infrastructure - Nuclear Physics Center (ELI-NP) in Magurele, Romania, houses the world's most powerful laser.
27. INS Sharda has been awarded the 'On the Spot Unit Citation' by Admiral R Hari Kumar, Chief of the Naval Staff during his visit to the Southern Naval Command, Kochi.
28. Bilquis Mir known as the aqua woman of Kashmir Valley, has become the first woman from India to be a jury member at the forthcoming Summer Olympics in Paris.
29. National Cooperative Dairy Federation of India Ltd (NCDFI) elected Meenesh Shah as its president.
30. Parivartan Chintan, a tri-service conference was organized in New Delhi on 8 April 2024.
31. Peter Pellegrini was elected President of Slovakia.
32. Cochin Shipyard signs ship repair agreement with US Navy.
33. The seventh round of trade treaty talks between India and Peru began in New Delhi.
34. A new gold-backed currency called ZiG has been launched by Zimbabwe.
35. Igla-S Man Portable Air Defence Systems (MANPADS) was received by the Indian Army.
36. Manoj Panda has been named as the member of new Finance Commission.
37. The Supreme Court of India, for the first time, recognised the right against the adverse impacts of climate change, saying it is intertwined with the right to life and equality that are embedded in the Indian constitution.

38. India and the European Union (EU) have launched an initiative for electric vehicle startups.
39. Clean Economy Investor Forum was organized by the Indo-Pacific Economic Framework for Prosperity (IPEF) in Singapore.
40. Peter Higgs, who discovered the 'God Particle', died at the age of 94.
41. India's Chandrayaan-3 mission team has been awarded the US Space Exploration Award.
42. Max Verstappen won the F1 Japanese Grand Prix 2024.
43. Simon Harris became the new Prime Minister of Ireland.
44. GAIL (India) Limited has been given the 15th "CIDC Vishwakarma Award" in the "Achievement Award for Best Construction Projects" category.
45. India's Udit won silver and Abhimanyu and Vicky won bronze at the Asian Wrestling Championships 2024.
46. Indigenous Man Portable Anti-Tank Guided Missile weapon system successfully tested by DRDO and Indian Army.
47. Bjarni Benediktsson has been appointed Prime Minister of Iceland.
48. Dr. Gagandeep Kang has been selected for the prestigious John Dirks Gairdner Award in Global Health.
49. Russia successfully launches first Angara-A5 space rocket.
50. Sanjay Shukla will be the new Managing Director (MD) of National Housing Bank (NHB).
51. State-run aerospace major Hindustan Aeronautics Limited has received a tender from the Defence Ministry to produce 97 light combat aircraft (LCA Mk-1A) Tejas for the Indian Air Force.
52. Sachidananda Mohanty has been appointed as a member of the UGC.
53. India has been ranked 10th in cybercrime, the list is topped by Russia and followed by Ukraine.
54. Adani Group is building the world's largest renewable energy park in Khavda region, Gujarat.
55. The US-India Tax Forum has appointed Tarun Bajaj as its new chief.
56. Rashmi Kumari won the National Women's Carrom title for the twelfth time.
57. Madhya Pradesh leads in tree plantation under the 'Green Credit' scheme with 954 hectares.
58. Bayer Leverkusen wins the Bundesliga title for the first time.
59. According to Global Forest Watch, 2.33 million hectares of tree cover was lost in India since 2000.
60. IMF re-appointed Kristalina Georgieva as Managing Director for the next five-year term.
61. India's Jain spiritual leader Lokesh Muni has been presented with the US President's Gold Volunteer Service award in recognition of his contribution to the public good and humanity. He is founder of Ahimsa Vishwa Bharati and World Peace Center in India.
62. British-American writer Salman Rushdie has released his memoir "Knife".
63. ISRO has developed carbon-carbon (C-C) nozzle for rocket engines.
64. DRDO organized the first international workshop on 'Emerging Technologies and Challenges for Exoskeletons' in Bengaluru.
65. Kannada poetess Mamta Sagar Ji was awarded the International Literary Award.
66. India's growth forecast for 2024 was raised by the International Monetary Fund (IMF) to 6.8% from 6.5%.
67. Nalin Negi has been appointed as the whole-time CEO of BharatPe.
68. Sheikh Ahmed Abdullah Al-Ahmad Al-Sabah has been appointed as the new Prime Minister of Kuwait by the Emir of Kuwait.
69. In FY24, CBDT signed a record number of 125 advance pricing agreements.
70. Amitabh Bachchan was honoured with the Lata Deenanath Mangeshkar Puraskar.
71. According to UNCTAD report, India's economy will grow at the rate of 6.5% in 2024.
72. A state-of-the-art Submersible Platform (SPACE) for underwater characterization and evaluation has been inaugurated in Kerala.
73. World Economic Forum has named Nykaa's Adwaita Nair as a 2024 Young Global Leader.

74. Nigeria has become the first country in the world to roll out the "revolutionary" new Men5CV vaccine against meningitis.
75. Vice Admiral Dinesh Kumar Tripathi has been appointed as the Chief of the Indian Navy.
76. Malcolm Adisesia Award 2023 will be presented to Utsa Patnaik.
77. The World Future Energy Summit 2024 held at the Abu Dhabi National Exhibition Center (ADNEC).
78. The Himachal Pradesh Cricket Association (HPCA) stadium at Dharamshala has become the first BCCI-accredited venue to install a state of the art 'hybrid pitch'.
79. Indian team won four medals at the 13th European Girls' Mathematical Olympiad (EGMO) 2024.
80. Deepika Soreng received the Asunta Lakra Award.
81. Three new archaeological sites have been discovered in Ooragutta near Bandala village in SS Tadvai mandal of Mulugu district, Telangana.
82. The Higher School of Economics, Russia, and the University of Delhi signed an agreement on strategic cooperation and joint actions, and a large research hub will begin operating at the partner university here.
83. Indigenous flight control modules handed over to HAL for LCA Tejas MK-1A variant by DRDO.
84. An MoU was signed between AFMS and IIT Kanpur in development of technologies.
85. Sweden has become the 38th country to join the Artemis Accord.
86. Vedanta group firm Hindustan Zinc has become the third largest silver producer globally.
87. A new species of tiger has been discovered in dense rainforests of Brazil named clouded tiger cat (Leopardus pardinoides).
88. For fiscal year 2023-2024, India's net direct tax collections increased by 17.7% to Rs 19.58 lakh crore.
89. Indian Navy conducted Exercise Poorvi Lehar off the east coast.
90. National Fertilizers Limited has received the "Navratna" status.
91. IRDAI removes age limit for individuals purchasing health insurance policy.
92. CRPF ADG Nalin Prabhat has been appointed NSG chief.
93. The first Rainbow International Tourism Conference was held in Kathmandu, Nepal.
94. Seven members of the Shompen tribe in Andaman and Nicobar Islands voted for the first time.
95. Mohammed Salem wins the 2024 World Press Photo of the Year award.
96. NABARD has released its Climate Strategy 2030 document.
97. Novak Djokovic won the Laureus World Sportsman of the Year honour for a record 5th time, while Spain's World Cup-winning football star Aitana Bonmati won the World Sportswoman of the Year award in Madrid.
98. Papua New Guinea has appointed the first defense advisor to India.
99. Bangladeshi singer Rezwana Choudhury received the Padma Shri award.
100. Ratan Tata has received the Kalinga Institute of Social Sciences Humanitarian Award 2021.
101. Reliance Jio became the world's largest mobile operator in terms of data traffic.
102. On April 24, the 10th round of India-Japan consultations on disarmament, non-proliferation and export controls was held in Tokyo.
103. Hindustan Aeronautics Limited (HAL) has been awarded the Outstanding Public Sector Undertaking (PSU) of the Year award.
104. The sixth edition of the International Conference on Disaster Resilient Infrastructure held in New Delhi.
105. Indian Navy participated with UK Littoral Response Group in Maritime Partnership Exercise.
106. 'One Earth, One Family, One Future' has been endorsed at the SCO Defense Ministers meeting in Kazakhstan.
107. National Bank for Agriculture and Rural Development (NABARD) has partnered with RBI's RBI Innovation Hub (RBIH).
108. FEMA rules for direct listing on international exchanges have been issued by RBI.
109. FSIB has recommended the name of Rana Ashutosh Kumar Singh for the post of MD of State Bank of India.

Ecology

- Ecology is the study of interaction among living organisms (plants, animals, microbes) as well as interaction with its abiotic environment (temperature, water, air, soil, light, etc.). According to Odum, the Father of Modern Ecology, "Ecology is the study of structure and function of ecosystems".

Ecological Hierarchy

- Ecological hierarchy refers to the synergy of organisms with their environment and leads to the formation of a grouping of organisms. It is grouped into four levels: individual, population, community and ecosystem level.

Habitat & Ecological Niche

- A habitat is the place where an organism lives while a niche is that organism's role within that environment.

Ecological Community

- An ecological community is defined as a group of species that are commonly found together.

Ecotone

- An ecotone is a transition area between two biological communities, where two communities meet and integrate. It may be narrow or wide, and it may be local (the zone between a field and forest) or regional (the transition between forest and grassland ecosystems).

Ecological Succession

- Ecological succession is the process by which the mix of species and habitat in an area changes over time. Gradually, these communities replace one another until a "climax community" like a mature forest is reached, or until a disturbance, like a fire, occurs.
- Types and Process of Succession:
  - » Two different types of succession primary and secondary have been distinguished. Primary succession occurs in essentially lifeless areas where as secondary succession occurs pre existing habitat.

Ecology, Environment and Ecosystem

- **Ecology** is the scientific study of the interactions between organisms and their environment. It encompasses the relationships between living organisms and their physical surroundings.
- **Environment** refers to the surroundings or conditions in which a person, animal, or plant lives or operates. It includes both biotic (living) and abiotic (non-living) factors.
- **Ecosystem** is a community of living organisms (biotic factors) interacting with one another and their physical environment (abiotic factors). It includes all the organisms in a given area, as well as the physical environment with which they interact.

Functions of Ecosystem

- The primary function is to regulate and promote the essential ecological processes to support life on Earth and provide stability to the ongoing process.
- There are different trophic levels of ecosystems and the work of an ecosystem is to maintain a balance between all such tropic labels.
  - » It also provides a way to cycle the minerals.
  - » It maintains the interaction of abiotic components with the biotic components.
  - » It maintains energy flow through the food chain.
  - » It ensures nutrient cycling (biogeochemical cycles).
  - » It ensures ecological succession or ecosystem development.
  - » It involves Homeostasis (or cybernetic) or feedback control mechanisms.

Flow of Energy in Ecosystem

- A trophic level is the representation of energy flow in an ecosystem.
- The trophic level of an organism is the position it occupies in a food chain.
- Trophic level interaction deals with how the members of an ecosystem are connected based on nutritional needs.

Trophic levels

Autotrophs	Green plants (Producers)
Heterotrophs	Herbivore (Primary consumers)
Heterotrophs	Carnivores (Secondary consumers)
Heterotrophs	Carnivore (Tertiary consumers)
Heterotrophs	Top carnivores (Quaternary consumers)

- Energy flows through the trophic levels from producers to subsequent trophic levels is unidirectional.
- Energy level decreases from the first trophic level upwards due to loss of energy in the form of heat at each trophic level.
- This energy loss at each trophic level is quite significant. Hence there are usually not more than four-five trophic levels (beyond this the energy available is negligible to support an organism).

Food Chain

- Transfer of food energy from green plants (producers) through a series of organisms with repeated eating and being eaten link is called a food chain. E.g. Grasses->Grasshopper->Frog->Snake->Hawk/Eagle.
- Each step in the food chain is called trophic level.
- A food chain starts with producers and ends with top carnivores.
- The trophic level of an organism is the position it occupies in a food chain.
- Types of Food Chains:
  - » Grazing food chain
  - » Detritus food chain

Food Web

- Multiple interlinked food chains make a food web.
- Food web represents all the possible paths of energy flow in an ecosystem.
- If any of the intermediate food chains is removed, the succeeding links of the chain will be affected largely.
- The food web provides more than one alternative for food to most of the organisms in an ecosystem and therefore increases their chance of survival.

Ecological Pyramid

- An ecological pyramid is a graphical representation designed to show the biomass and bio productivity at each trophic level in an ecosystem.
- The three types of ecological pyramids include:
  - » **Pyramid of Number:** In this type of ecological pyramid, the number of organisms in each trophic level is considered as a level in the pyramid. The pyramid may either be upright or inverted.
  - » **Pyramid of Biomass:** A biomass pyramid is the representation of total living biomass or organic matter present at different trophic levels in an ecosystem. The pyramid may either be upright or inverted.
  - » **Pyramid of Energy:** Pyramid of energy is an upright pyramid that illustrates the flow of energy from producers to consumers. It indicates the actual role played by various organisms in energy transfer. Energy pyramids indicate how much energy is required in the next trophic level as it flows upwards.

Biomagnifications

- Biomagnification, also known as bioamplification or biological magnification, is the increase in concentration of a substance, e.g a pesticide, in the tissues of organisms at successively higher levels in a food chain.

Species Interactions

There are six types of interactions between different species.

Competition

- Competition is a rivalry where two or more parties strive for a common goal which cannot be shared: where one's gain is the other's loss. Competition examples include trees growing taller to compete for sunlight and two birds fighting over a worm.

Predation

- In ecology, the act of preying on other animals is termed predation. The animal which hunts and kills other animals for food, is called the predator and the attacked animal is called the prey. Both predator and prey are evolved in the same ecosystem. For example: Lion hunting the deer or zebras.

Commensalism

- Commensalism is a long-term biological interaction in which members of one species gain benefits while those of the other species neither benefit nor are harmed. Examples:
  - » Orchids Growing On Branches
  - » Sharks and Remora/Sucker Fish
  - » Whales and Barnacles
  - » Tree frog on plants
  - » Burdock Seeds on Animals

Parasitism

- Parasitism is generally defined as a relationship between the two living species in which one organism is benefitted at the expense of the other. The organism that is benefitted is called the parasite, while the one that is harmed is called the host.
- A well-known example of parasitism occurs when ticks latches on to a dog or cat and feeds off of its blood. The protozoan plasmodium is a common parasite of humans, which causes the disease malaria.

Mutualism

- Mutualism is one type of these relationships where both species involved benefit to some extent with neither species being harmed. There are several different examples of mutualistic relationships, including flowers and insects for pollination, as well as ants and aphids or Acacia for protection and food.

Amensalism

- Amensalism, association between organisms of two different species in which one is inhibited or destroyed

and the other is unaffected.

Adaptation

- The plant does not have a central nervous system like animals, so they cannot respond to the environment in the same way as animals do. However, plants make behavioural and physical adaptations. In comparison with animals, plants have more permanent adaptations.

Examples of adaptation in plants

- Spines or hairs shade plants and break up drying winds across the leaf/stem surface. The roots of desert plants are also adapted to help them survive. Some plants have shallow, widespread roots to absorb a maximum of rainfall moisture. Others have deep taproots to get water that is deep underground.

Examples of Adaptations in animals

- The shape of a bird's beak, the color of a mammal's fur, the thickness or thinness of the fur, the shape of the nose or ears are all examples of physical adaptations which help different animals survive.

Homeostasis

- Homeostasis is defined as a self-regulating process by which a living organism can maintain internal stability while adjusting to changing external conditions.

Different Types of Species

Endemic Species

- Endemism is the state of a species only being found in a single defined geographic location, such as an island, state, nation, country or other defined zone; organisms that are indigenous to a place are not endemic to it if they are also found elsewhere.
- Asiatic Lion in Gir Forest, Lion-tailed Macaque in Western Ghats of India, Nilgiri Tahr, Malabar large spotted civet, Nilgiri Blue Robin, Jerdon's Corser, Nilgai, Nicobar megapode are some of the species of animals endemic to India.

Keystone Species

- Keystone species are those that provide vital ecosystem services which are essential for the survival of other species in the ecosystem.

Indicator Species

- Indicator species, organism often a microorganism or a plant that serves as a measure of the environmental conditions that exist in a given locale. For example, greasewood indicates saline soil; mosses often indicate acidic soil. Tubifex worms indicate oxygen-poor and stagnant water unfit to drink.

Invasive Species

- Invasive species are animals or plants from another region of the world that don't belong in their new environment. They can be introduced to an area by ship ballast water, accidental release and most often, by people. Introduction of water hyacinth into India, the introduction of Nile perch into Lake Victoria in East Africa, and the introduction of African catfish into Indian Rivers are all examples of alien species.

Ecosystem

Terrestrial Ecosystems

- A terrestrial ecosystem is a land-based community of organisms and the interactions of biotic and abiotic components in a given area. Examples of terrestrial ecosystems include the tundra, taigas, temperate deciduous forests, tropical rainforests, grasslands, and deserts.

Aquatic Ecosystem

- Aquatic ecosystems include oceans, lakes, rivers, streams, estuaries, and wetlands. Within these aquatic ecosystems are living things that depend on the water for survival, such as fish, plants, and microorganisms.

Plankton

- There are two main types of plankton: phytoplankton, which are plants, and zooplankton, which are animals.
- Zooplankton and other small marine creatures eat phytoplankton and then become food for fish, crustaceans and other larger species.

Importance of phytoplankton

- Phytoplanktons are the foundation of the aquatic food web, the primary producers, feeding everything from microscopic, animal-like zooplankton to multi-ton whales. Small fish and invertebrates also graze on the plant-like organisms and then those smaller animals are eaten by bigger ones.

Sea-grass

- Seagrasses are the only flowering plants which grow in marine environments. There are about 60 species of fully marine seagrasses which belong to four families, all in the order Alismatales.
- Seagrass flora of India is represented by 6 genera and 13 species, out of which the Gulf of Mannar and Palk Bay harbour the maximum number of species followed by Andaman and Nicobar and Lakshadweep islands.

Seaweeds
- Seaweed, or macroalgae, refers to thousands of species of macroscopic, multicellular, marine algae. The term includes some types of Rhodophyta, Phaeophyta and Chlorophyta macroalgae.
- Seaweeds have become a source of food, feed, medicine, cosmetics, energy, and fertiliser and are used in the industrial production of agar and alginates.

Human Modified Ecosystems
- Human-modified ecosystems are shaped by our activities and their side effects.
- Characteristics of human modified ecosystems:
  - » Highly simplified.
  - » Species diversity is very low.
  - » Food chains are simple and small.
  - » Depend on human (anthropogenic) support for survival; need for fossil fuel energy, fertilizers, irrigation etc.
  - » Attract large number of weeds.

Nutrient Cycling
- A nutrient cycle is the movement and exchange of inorganic and organic matter back into the production of matter. Energy flow is a unidirectional and noncyclic pathway, whereas the movement of mineral nutrients is cyclic.
- There are five main nutrient cycles:
  - » Carbon cycle.
  - » Oxygen cycle.
  - » Water cycle/Hydrological Cycle.
  - » Phosphorus cycle.
  - » Sulfur cycle.

Carbon Cycle
- The carbon cycle is the process that moves carbon between plants, animals, and microbes; minerals in the earth; and the atmosphere. Carbon is the fourth most abundant element in the universe. With its ability to form complex molecules such as DNA and proteins, carbon makes life on Earth possible.

Hydrological Cycle
- The water cycle, also known as the hydrologic cycle or the hydrological cycle, is a biogeochemical cycle that involves the continuous movement of water on, above and below the surface of the Earth.
- Different Steps of the Hydrologic Cycle:
  - » Evaporation.
  - » Condensation.
  - » Precipitation.
  - » Interception.
  - » Infiltration.
  - » Percolation.
  - » Transpiration.

Nitrogen Cycle
- Nitrogen Cycle is a biogeochemical process which transforms the inert nitrogen present in the atmosphere to a more usable form for living organisms. Furthermore, nitrogen is a key nutrient element for plants. However, the abundant nitrogen in the atmosphere cannot be used directly by plants or animals.
- Animals secure their nitrogen (and all other) compounds from plants (or animals that have fed on plants). Four processes participate in the cycling of nitrogen through the biosphere: (1) nitrogen fixation, (2) decay, (3) nitrification, and (4) denitrification. Microorganisms play major roles in all four of these.
- Impact of Human on the Nitrogen Cycle:
  - » Human activities, such as making fertilizers and burning fossil fuels, have significantly altered the amount of fixed nitrogen in the Earth's ecosystems.

Oxygen Cycle
- Oxygen cycle refers to the movement of oxygen through the atmosphere (air), biosphere (plants and animals) and the lithosphere (the Earth's crust). The oxygen cycle demonstrates how free oxygen is made available in each of these regions, as well as how it is used.

Sulphur Cycle
- The sulfur cycle describes the movement of sulfur through the geosphere and biosphere. Sulfur is released from rocks through weathering, and then assimilated by microbes and plants. It is then passed up the food chain and assimilated by plants and animals, and released when they decompose.
- Mineralization, oxidation, reduction, and incorporation are the four stages that make up the sulphur cycle. Mineralization occurs first. One of the most important components of proteins, vitamins, and hormones is sulphur.
- Impact of Human on the Sulphur Cycle:
  - » Human activities such as mining and fossil fuels burning have altered the balance of this cycle, wherein inputs of sulfur compounds in surface waters and atmosphere have increased extensively.

Phosphorus Cycle
- The phosphorus cycle is the biogeochemical cycle that involves the movement of phosphorus through the lithosphere, hydrosphere, and biosphere.
- Impact of Human on the Phosphorus Cycle:

» Humans greatly influence the phosphorus cycle through the release of mined phosphates into ecosystems, especially in the form of fertilizers, but also from detergents and sewage waste.

Different Types of Creatures

Neuston

- Neuston, group of organisms found on top of or attached to the underside of the surface film of water. The neuston includes insects such as whirligig beetles and water striders, some spiders and protozoans, and occasional worms, snails, insect larvae, and hydras.

Periphyton

- Periphyton is a complex mixture of algae, cyanobacteria, heterotrophic microbes, and detritus that is attached to submerged surfaces in most aquatic ecosystems.

Nekton

- Nekton (or swimmers) are living organisms that are able to swim and move independently of currents. Nekton are heterotrophic and have a large size range, with familiar examples such as fish, squid, octopus, sharks, and marine mammals.

Benthos

- Animals that live on the sea floor are called benthos. Most of these animals lack a backbone and are called invertebrates. Typical benthic invertebrates include sea anemones, sponges, corals, sea stars, sea urchins, worms, bivalves, crabs etc.

Lake Ecosystems

- A lake is a body of standing water that is generally large enough in area and depth, regardless of its hydrology, ecology, or other qualities.
- Lake ecosystem can be divided commonly into three zones. The first is the littoral zone which is the shallow zone close to the shore. This is where the rooted wetland plants are noticed. The open water zone (or photic zone) and the deep water zone (or aphotic zone) are the two zones that make up the offshore.

Aging of Lakes

- Lake aging is the natural process by which a lake fills in over geologic time with erosional materials carried in by tributary streams, with materials deposited directly from the atmosphere, and with materials produced within the lake itself.

Eutrophication

- Eutrophication is the process in which a water body becomes overly enriched with nutrients, leading to the plentiful growth of simple plant life. The excessive growth (or bloom) of algae and plankton in a water body are indicators of this process.

Effects of Eutrophication:

- The known consequences of eutrophication include blooms of blue-green algae (i.e., cyanobacteria, tainted drinking water supplies, degradation of recreational opportunities, and hypoxia.

Wetlands

- A wetland is a distinct ecosystem that is flooded or saturated by water, either permanently for years or decades or seasonally for a shorter periods. It supports both terrestrial and aquatic species. They vary widely depending on the climate, soil, vegetation, hydrology, chemistry, and human disturbance.

Functions of Wetlands

- Wetlands are considered valuable because they clean the water, recharge water supplies, reduce flood risks and provide fish and wildlife habitat. In addition, wetlands provide recreational opportunities, aesthetic benefits, sites for research and education and commercial fishery benefits.

Comparison Between Lake and Wetlands:

- Wetlands are shallow water bodies whereas lakes can be deep or shallow. National Lake Conservation Programme (NLCP) considers lakes as standing water bodies which have a minimum water depth of 3 m, generally cover a water spread of more than ten hectares and have no or very little aquatic vegetation.

Wetlands in India

- In India, there are several wetland areas but the most notable ones include the Sundarbans in West Bengal, the Chilika Lake in Odisha, the Vembanad wetland in Kerala, Keoladeo National Park in Rajasthan, Loktak in Manipur, Deepor Beel in Assam and Sultanpur in Haryana.

National Wetlands Conservation Programme

- The National Wetlands Conservation Programme (NWCP) is a Centrally Sponsored Scheme (CSS) by the Ministry of Environment, Forests & Climate Change implemented since 1986 for the purpose of preventing the nation's wetlands from further deterioration.
- It was initiated to protect wetlands considering the benefits provided by them such as freshwater supply,

resource pool, biodiversity, flood control, groundwater recharge and climate change mitigation.

Estuary Ecosystem

- An estuary ecosystem is a unique and dynamic environment where freshwater rivers meet the ocean. It's a vital habitat for a diverse range of plants and animals, providing a transition zone between riverine and marine ecosystems. Estuaries are characterized by:
- **Mixing of fresh and saltwater:** Creating a brackish environment with varying salinity levels.
- **Sediment deposition:** Rivers carry sediment, nutrients, and organic matter, which accumulate in the estuary.
- **Tidal influences:** The ocean's tides affect the water level, circulation, and salinity of the estuary.
- **High productivity:** Estuaries are rich in nutrients, supporting a diverse array of plants and animals.

Key components of an estuary ecosystem:

- **Vegetation:** Mangroves, salt marshes, seagrasses, and tidal flats provide habitat and food for various species.
- **Phytoplankton and zooplankton:** Microscopic plants and animals form the base of the estuarine food web.
- **Fish and invertebrates:** Juvenile fish, shellfish, and other invertebrates thrive in the estuary's nursery grounds.
- **Birds and mammals:** Estuaries are crucial habitats for migratory birds, shorebirds, and marine mammals like dolphins and seals.
- **Microorganisms:** Bacteria, archaea, and other microorganisms play a vital role in decomposing organic matter and cycling nutrients.
- **Estuaries provide essential ecosystem services, including:**
  - » Water filtration and purification
  - » Shoreline stabilization and protection
  - » Carbon sequestration
  - » Nursery grounds for commercial fisheries
  - » Habitat for diverse and threatened species
- Overall, estuary ecosystems are vital components of coastal ecosystems, supporting a wide range of biodiversity and ecosystem services.

Mangroves Ecosystem

The mangrove ecosystem is a unique and fascinating environment found in tropical and subtropical coastal areas around the world. Here are some key aspects of mangrove ecosystems:

- **Location:** Mangroves are found in shallow, coastal waters, including estuaries, lagoons, and marine shorelines.
- **Vegetation:** Mangrove forests are dominated by mangrove trees, which are adapted to survive in saline, waterlogged conditions. There are over 80 species of mangrove trees, with the most common being the red mangrove, black mangrove, and white mangrove.
- **Biodiversity:** Mangrove ecosystems are home to a wide variety of plants and animals, including fish, crustaceans, mollusks, birds, and monkeys. Many species rely on mangroves for food, shelter, and breeding grounds.
- **Ecological role:** Mangroves provide important ecological services, such as:
- Shoreline stabilization and protection from erosion and storms.

Water filtration and purification:

- Carbon sequestration and storage.
- Nursery grounds for juvenile fish and other marine species.
- **Threats:** Mangrove ecosystems face various threats, including:
- Deforestation and habitat destruction for aquaculture, agriculture, and urbanization.
- Climate change, sea-level rise, and increased storm intensity.

Pollution and sedimentation:

- Overfishing and destructive fishing practices.
- **Conservation**: Efforts are being made to protect and restore mangrove ecosystems, including the establishment of protected areas, sustainable fishing practices, and community-based conservation initiatives.
- **Ecological connectivity:** Mangroves are connected to other ecosystems, such as coral reefs, seagrass beds, and salt marshes, through marine species migrations and nutrient exchange.
- **Cultural significance:** Mangroves have cultural and spiritual significance for many coastal communities, providing livelihoods, food, and medicinal resources.

Coral Reefs

Coral reef ecosystems are one of the most diverse and complex ecosystems on the planet, found in tropical and subtropical waters around the world. Here are some key aspects of coral reef ecosystems:

- **Location:** Coral reefs are found in shallow, sunlit waters, typically between 10-50 meters deep, in tropical and subtropical regions.

- **Coral structure:** Coral reefs are formed by coral polyps, tiny animals that secrete a hard calcium carbonate exoskeleton. The coral structure provides a habitat for a vast array of species.
- **Biodiversity:** Coral reefs are home to an incredible array of species, including:
  - » **Fish:** over 4,000 species, including parrotfish, butterflyfish, and angelfish.
  - » Invertebrates: sea fans, sea whips, sea slugs, and many more.
  - » **Algae:** coral reefs are dominated by coral, but other algae like seaweeds and sea grasses are also present.
- **Ecological role:** Coral reefs play a crucial role in the ocean ecosystem:
  - » Provide habitat for a vast array of species.
  - » Protect shorelines from erosion and storm damage.
  - » Support commercial fisheries and tourism industries.
  - » Help maintain water quality by filtering out sediments and nutrients.
- **Threats:** Coral reefs face numerous threats, including:
  - » **Climate change:** Rising sea temperatures and ocean acidification.
  - » Overfishing and destructive fishing practices.
  - » Pollution and sedimentation.
  - » Coastal development and tourism impacts.
- **Conservation:** Efforts are being made to protect and conserve coral reefs, including:
  - » Establishment of marine protected areas.
  - » Coral reef restoration and rehabilitation.
  - » Sustainable fishing practices and marine management.
  - » Education and awareness campaigns.

Environmental Pollution

- Environment pollution is a serious issue that affects the health and well-being of humans, animals, and plants. It occurs when harmful substances are released into the environment, contaminating the air, water, soil, and noise.

Types of Environmental Pollution:

- **Air Pollution:** The release of harmful gases and particles into the atmosphere, such as carbon monoxide, nitrogen oxides, and particulate matter.
- **Water Pollution:** The contamination of water sources, such as rivers, lakes, and oceans, with harmful substances like industrial waste, sewage, and pesticides.
- **Soil Pollution:** The presence of toxic substances in the soil, such as heavy metals, pesticides, and industrial waste.
- **Noise Pollution:** The excessive and disruptive sound levels that can harm humans and animals.

Causes of Environmental Pollution:

- **Industrial Activities:** The release of harmful substances from factories, power plants, and other industrial processes.
- **Vehicle Emissions:** The exhaust fumes from cars, trucks, and other vehicles.
- **Agricultural Activities:** The use of pesticides, fertilizers, and other harmful substances in farming.
- **Waste Disposal:** The improper disposal of waste, such as littering, illegal dumping, and inadequate waste management.

Effects of Environmental Pollution:

- **Respiratory Problems:** Air pollution can cause respiratory issues, such as asthma, bronchitis, and lung cancer.
- **Waterborne Diseases:** Water pollution can lead to waterborne diseases, such as cholera, typhoid, and diarrhea.
- **Cancer:** Exposure to harmful substances in the environment can increase the risk of cancer.
- **Climate Change:** The release of greenhouse gases, such as carbon dioxide and methane, contributes to climate change.

Solutions to Environmental Pollution:

- **Reduce, Reuse, Recycle:** Minimize waste, reuse materials when possible, and recycle.
- **Use Clean Energy:** Transition to renewable energy sources, such as solar and wind power.
- **Implement Regulations:** Enforce strict regulations on industrial activities, vehicle emissions, and waste disposal.
- **Educate and Raise Awareness:** Promote environmental education and raise awareness about the importance of protecting the environment.

Classification of Pollutant

Air Pollutants:

- Gaseous pollutants (e.g., CO, NO_x, SO_2, VOCs).
- Particulate pollutants (e.g., PM10, PM2.5, soot).

Water Pollutants:

- Organic pollutants (e.g., pesticides, herbicides, industrial waste).
- Inorganic pollutants (e.g., heavy metals, nutrients, sediment).

- Microbiological pollutants (e.g., bacteria, viruses, protozoa).

Soil Pollutants:
- Heavy metals (e.g. lead, mercury, arsenic).
- Organic pollutants (e.g. pesticides, industrial waste).
- Inorganic pollutants (e.g. salt, acid mine drainage).

Noise Pollutants:
- Continuous noise (e.g. traffic, industry).

The major air pollutants
- **Carbon Monoxide (CO):** Released through automobile emissions, industrial processes, and fires, posing health risks for people with pre-existing heart conditions.
- **Nitrogen Oxides (NO and NO_2):** Emitted from industrial processes, power generation, and vehicle emissions, contributing to smog and acid rain.
- **Sulfur Dioxide (SO_2):** Released through fossil fuel combustion, industrial processes, and electricity generation, causing haze and acid rain.
- **Ozone (O_3):** Created through reactions between nitrogen oxides and volatile organic compounds, leading to respiratory issues.

Smog
- Smog is a type of air pollution that reduces visibility and is caused by the release of pollutants from various sources, such as industrial activities, vehicle emissions and natural sources. There are different types of smog, including:
  - » **Sulfurous smog:** high concentration of sulfur oxides in the air, caused by the use of sulfur-bearing fossil fuels, particularly coal.
  - » **Photochemical smog:** nitrogen oxides and hydrocarbon vapors emitted by automobiles and other sources undergo photochemical reactions in the lower atmosphere.
- Smog can have harmful effects on human health, such as respiratory issues, cardiovascular disease, and even premature death. It also contributes to climate change by trapping heat in the atmosphere.

Smog can have harmful effects on human health, the environment, and the economy. Some of the effects include:

Effects on Health:
- **Respiratory problems:** Smog can irritate the lungs, exacerbate conditions like asthma, and increase the risk of respiratory infections.
- **Cardiovascular issues:** Exposure to smog has been linked to an increased risk of heart attacks, strokes, and other cardiovascular problems.
- **Cancer:** Long-term exposure to smog has been classified as a carcinogen, increasing the risk of lung cancer and other types of cancer.

Effects on Environment:
- **Visibility impairment:** Smog can reduce visibility, obscuring natural beauty and posing a hazard for transportation.
- **Eutrophication:** Smog can contribute to eutrophication, a process where excess nutrients in the air and water lead to harmful algal blooms and dead zones.
- **Climate change:** Smog-forming pollutants like ozone and methane are also greenhouse gases, contributing to climate change.

Effects on Economy:
- **Healthcare costs:** Smog-related health issues can result in increased healthcare costs and lost productivity.
- **Tourism and recreation impacts:** Smog can deter tourists and outdoor enthusiasts, affecting local economies.
- **Agricultural losses:** Smog can damage crops and reduce yields, leading to economic losses for farmers.
- It's important to note that the effects of smog can vary depending on the specific composition and concentration of pollutants, as well as individual susceptibility and exposure levels.

Urban air pollution
- Urban air pollution is a major environmental health risk in many parts of the world, causing approximately seven million premature deaths every year.
- The main sources of urban air pollution are transport, industry, energy, waste, agriculture and household activities . The most common air pollutants from urban air pollution are particulate matter, ozone, nitrogen dioxide and carbon monoxide .

Fly Ash
- Fly ash is a byproduct of coal combustion that is made up of fine particles that are driven out of coal-fired boilers along with flue gases . The uses of fly ash include:
  - » Improving the durability and workability of concrete mixes.
  - » Acting as a filler in paints, adhesives and metal and plastic composites.
  - » Serving as structural fill for road construction.
  - » Making bricks, ceramic tiles, plaster, Portland cement and ready-mix cement.
  - » Being used in hot mix asphalt, grout fill, wallboard, concrete pipes and concrete bricks.

Water Pollution

- Water pollution occurs when harmful substances often chemicals or microorganisms contaminate a stream, river, lake, ocean, aquifer, or other body of water, degrading water quality and rendering it toxic to humans or the environment.

Point Sources of Water Pollution

- Factories and sewage treatment plants are two common types of point sources.

Nonpoint Sources of Water Pollution

- Excess fertilizers, herbicides and insecticides from agricultural lands and residential areas are common source of nonpoint water pollution.

Biological Oxygen Demand

- Biochemical oxygen demand (BOD) represents the amount of oxygen consumed by bacteria and other microorganisms while they decompose organic matter under aerobic (oxygen is present) conditions at a specified temperature.

Chemical Oxygen Demand

- Chemical oxygen demand (COD) is a critical parameter of determining water quality which represents the degree of organic contamination in water bodies. Fundamentally, it is the amount of oxidant consumed during oxidation of organic substances present in water samples.

Soil Pollution

- Soil contamination, soil pollution, or land pollution as a part of land degradation is caused by the presence of xenobiotic chemicals or other alteration in the natural soil environment. It is typically caused by industrial activity, agricultural chemicals or improper disposal of waste.
- Soil pollution can be classified into different types based on the source and nature of the pollutants. Some of the main types of soil pollution are:
  - **Chemical pollution:** This occurs when chemicals such as pesticides, heavy metals, and industrial waste contaminate the soil.
  - **Industrial pollution:** This type of pollution occurs when industrial activities such as mining, smelting, and manufacturing release harmful chemicals into the soil.
  - **Agricultural pollution:** This type of pollution occurs when agricultural activities such as excessive use of fertilizers, pesticides, and irrigation lead to soil contamination.
  - **Urban pollution:** This type of pollution occurs when urban activities such as construction, transportation, and waste disposal contaminate the soil.
  - **Radioactive pollution:** This occurs when radioactive materials such as uranium and thorium contaminate the soil.
  - **Biological pollution:** This occurs when biological agents such as bacteria, viruses, and other microorganisms contaminate the soil.
  - **Physical pollution:** This occurs when physical changes such as compaction, erosion, and sedimentation alter the soil's structure and fertility.
  - **Thermal pollution:** This occurs when soil is exposed to high temperatures, causing damage to soil structure and fertility.
  - **Noise pollution:** This occurs when noise from human activities such as construction and transportation affects soil organisms and ecosystems.
  - **Plastic pollution:** This occurs when plastic waste enters the soil and contaminates it.

Radioactive Pollution

- Radioactive pollution, also known as radiological pollution, occurs when radioactive materials contaminate the environment, posing a threat to human health and the ecosystem. Sources of radioactive pollution include:
  - Nuclear power plants and accidents (e.g., Chernobyl, Fukushima).
  - Nuclear weapons testing and production.
  - Radioactive waste disposal.
  - Uranium mining and milling.
  - Medical and industrial uses of radioactive materials.
  - Radioactive contamination from consumer products (e.g., glow-in-the-dark paints, radiation therapy equipment).

Effects of radioactive pollution:

- Ionizing radiation exposure.
- Genetic mutations and cancer.
- Radiation sickness (acute radiation syndrome).
- Contamination of soil, water, and air.
- Long-term ecosystem damage.
- Increased risk of leukemia and other cancers.

Examples of radioactive pollution incidents:
- Chernobyl nuclear disaster (1986)
- Fukushima Daiichi nuclear disaster (2011)
- Three Mile Island nuclear accident (1979)
- Windscale nuclear fire (1957)
- Radioactive contamination of the Techa River (Russia)

Prevention and mitigation measures:
- Proper disposal of radioactive waste.
- Safety measures at nuclear facilities.
- Regulation and monitoring of radioactive materials.
- Public education and awareness.
- Remediation of contaminated sites.
- Development of alternative energy sources.

E–Waste

- E-waste, also known as electronic waste, refers to discarded electronic devices and components, such as:
  - » Computers, smartphones, and other electronic devices.
  - » Televisions, refrigerators, and other household appliances.
  - » Printers, scanners, and other peripherals.
  - » Batteries, circuits, and other electronic components.
- The rapid technological advancements and obsolescence of electronic devices have led to a significant increase in e-waste generation, posing environmental and health concerns.

Environmental impacts:
- **Toxic chemicals:** E-waste contains hazardous materials like lead, mercury, and cadmium, which can contaminate soil and water if not disposed of properly.
- **Air pollution:** Burning e-waste releases toxic fumes, contributing to air pollution.
- **Resource depletion:** E-waste can lead to the loss of valuable resources like copper, gold, and silver.

Health impacts:
- **Toxic exposure:** Improper e-waste disposal can lead to human exposure to toxic chemicals, causing health problems.
- **Cancer and reproductive issues:** Exposure to hazardous materials in e-waste has been linked to increased cancer risk and reproductive problems.

Solutions:
- **Recycling:** Responsible e-waste recycling can recover valuable materials and minimize environmental impacts.
- **Proper disposal:** Designated e-waste collection and disposal facilities can ensure safe handling and processing.
- **Extended producer responsibility:** Manufacturers can be held accountable for the waste generated by their products.
- **Sustainable consumption:** Encouraging sustainable consumption practices, such as buying second-hand or energy-efficient devices, can reduce e-waste generation.

Solid Waste

- Solid waste refers to non-liquid waste materials that are discarded or rejected as useless or unwanted. It can come from various sources, including:
  - Household waste (food waste, paper, plastic, glass, metal).
  - Industrial waste (packaging materials, hazardous waste, construction materials).
  - Commercial waste (paper, cardboard, plastic, food waste).
  - Institutional waste (hospitals, schools, government buildings).
  - Construction and demolition waste (building materials, debris).
  - Agricultural waste (crop residues, animal waste).

Types of solid waste:
- Organic waste (food waste, yard trimmings, paper).
- Inorganic waste (glass, metal, plastic, ceramic).
- Recyclable waste (paper, plastic, glass, metal).
- Non-recyclable waste (textiles, leather, wood, hazardous waste).
- Hazardous waste (batteries, electronics, chemicals, pharmaceuticals).

Effects of solid waste:
- Environmental pollution (air, water, soil).
- Health problems (disease transmission, respiratory issues).
- Aesthetic issues (unsightly waste, odors).
- Economic impacts (cost of disposal, lost resources).

Management strategies:
- Reduce (minimize waste generation).
- Reuse (extend product life).
- Recycle (convert waste into new products).
- Compost (organic waste decomposition).
- Dispose (landfill, incineration, waste-to-energy) .

Thermal Pollution

- Thermal pollution refers to the degradation of water

quality by changing its temperature, which can harm aquatic life and ecosystems. It is usually caused by human activities, such as:

- Industrial processes (cooling systems, manufacturing).
- Power plants (cooling systems, water discharges).
- Agricultural runoff (irrigation, fertilizers).
- Urban runoff (stormwater, sewage).

Effects of thermal pollution:

- Changes in aquatic habitat and ecosystem balance.
- Increased metabolism and stress in aquatic organisms.
- Decreased oxygen levels and water quality.
- Altered species distribution and abundance.
- Increased susceptibility to disease and parasites.

Consequences:

- Impacts on aquatic food chains and human consumption.
- Economic losses in fisheries and tourism.
- Decreased biodiversity and ecosystem resilience.
- Human health risks (waterborne pathogens, toxic substances).

Prevention and mitigation measures:

- Implement cooling systems that minimize water temperature changes.
- Use alternative cooling methods (air cooling, dry cooling).
- Monitor and regulate water discharges and temperatures.
- Implement best management practices in agriculture and urban planning.
- Protect and restore natural habitats and ecosystems.

Plastic Pollution

- Plastic pollution refers to the accumulation of plastic waste in the environment, harming marine life, human health, and the economy.

Key facts and impacts:

- 8 million tons of plastic enter the oceans annually.
- 50% of sea turtles and 90% of seabirds ingest plastic.
- Microplastics contaminate drinking water and food chains.
- Plastic debris causes entanglement, suffocation, and drowning.
- Economic losses: $13 billion annually in marine ecosystem damage.

Types of plastic pollution:

- Single-use plastics (bags, straws, water bottles).
- Microplastics (cosmetics, clothing, industrial processes).
- Macroplastics (fishing gear, packaging materials).
- Plastic pellets (raw materials for plastic production).

Impacts:

- Marine life entanglement and ingestion.
- Human health risks (microplastics in drinking water and food).
- Economic losses (tourism, fisheries, and marine industries).
- Aesthetic pollution (littered beaches and landscapes).

Solutions:

- Reduce plastic consumption and production.
- Increase recycling and waste management.
- Implement extended producer responsibility.
- Promote sustainable alternatives (bioplastics, reusable products).
- Support plastic-free initiatives and policies .

Bioremediation

- Bioremediation uses microorganisms to degrade organic contaminants in soil, groundwater, sludge, and solids. The microorganisms break down contaminants by using them as an energy source or cometabolizing them with an energy source.

In situ Bioremediation Techniques

- **Bioaugmentation:** Adding microorganisms to the site to speed up the degradation of pollutants.
- **Biostimulation:** Adding nutrients to the site to stimulate microorganisms.
- **Bio-slurping:** Removing free product from the water table.
- **Bio-sparging:** Injecting a gas and nutrients into the site to promote aerobic biodegradation.
- **Bioventing:** Supplying air and nutrients through wells to stimulate microorganisms.
- **Phytoremediation:** Using plants to decontaminate or stabilize contaminants and metals in the soil.

Ex situ Bioremediation Techniques

Ex situ bioremediation techniques involve removing the contaminated soil or groundwater from the site and treating it in a controlled environment. Some common ex situ bioremediation techniques include:

- **Bioreactors:** Treating contaminated soil or water in a controlled reactor vessel.
- **Landfarming:** Spreading contaminated soil on a controlled surface and stimulating microbial growth.
- **Composting:** Mixing contaminated soil with organic amendments and microorganisms to break down pollutants.
- **Biopiles:** Creating a pile of contaminated soil and stimulating microbial growth with aeration and

nutrients.
- **Slurry reactors:** Treating contaminated soil or water in a liquid suspension.
- **Solid-phase treatment:** Treating contaminated soil in a controlled environment using microorganisms.
- **Thermal treatment:** Using heat to enhance microbial growth and degradation of pollutants.
- **Chemical treatment:** Using chemicals to enhance microbial growth and degradation of pollutants.

Acid Rain

- Acid rain, or acid deposition, is a broad term that includes any form of precipitation with acidic components, such as sulfuric or nitric acid that fall to the ground from the atmosphere in wet or dry forms. This can include rain, snow, fog, hail or even dust that is acidic.

Renewable Energy

- Renewable energy refers to the energy generated from natural resources that can be replenished over time, such as:
  - » Solar energy (from sunlight).
  - » Wind energy (from wind).
  - » Hydro energy (from water).
  - » Geothermal energy (from heat from the Earth's core).
  - » Biomass energy (from organic matter).
  - » Hydrogen energy (from water and renewable energy sources).
- Renewable energy is a sustainable and clean way to power our homes, businesses, and transportation, reducing our reliance on finite fossil fuels and mitigating climate change.

Benefits of renewable energy:
- Sustainable and abundant.
- Reduces greenhouse gas emissions and air pollution.
- Lowers energy costs and enhances energy security.
- Creates jobs and stimulates local economies.
- Improves public health and well-being.

Challenges and solutions:
- **Intermittency:** Energy storage solutions like batteries and grid management systems.
- **Infrastructure:** Investing in grid upgrades, transmission lines, and distribution networks.
- **Cost:** Decreasing costs through technology advancements, economies of scale, and policy incentives.
- **Policy and regulation:** Encouraging supportive policies, tax credits, and research funding.

Installed Power Generation Capacity in India
- India's installed non-fossil fuel capacity has increased 396% in the last 8.5 years and stands at more than 190.97 GW (including large Hydro and nuclear), about 44% of the country's total capacity as of February 2024 .
- The total installed capacity of grid interactive renewable power was 109,885 MW in 2022.

International Renewable Energy Agency

- The International Renewable Energy Agency (IRENA) is an intergovernmental organization that was founded in 2009 to support the widespread adoption and sustainable use of all forms of renewable energy. IRENA is headquartered in Abu Dhabi and has almost 160 countries that are full members with an additional 24 states that are in various stages of accession.

Solar Energy

- Solar energy is a renewable source of energy, meaning it can be produced indefinitely without depleting resources.
- The process of generating solar energy involves the following steps:
  - » Sunlight hits the solar panels, which are made up of photovoltaic (PV) cells.
  - » The PV cells convert the sunlight into direct current (DC) electricity.
  - » The DC electricity is sent through an inverter, which converts it into alternating current (AC) electricity.
  - » The AC electricity is then fed into the electrical grid, where it can power electrical devices.
  - » If the solar panel system is connected to a battery, excess energy can be stored for later use.
  - » The electricity is then distributed to the power grid, and can be used to power homes, businesses, and other electrical devices.
- India ranks fourth in solar power capacity globally, with an installed capacity of 75.57 GW as of February 2024. India's solar power installed capacity was 81.813 GW as of March 31, 2024. India is a leading player in the use of solar energy, with installed solar energy capacity increasing 30 times over the last nine years. India's solar energy potential is estimated to be 748 GWp and India ranks 4th globally for solar power capacity.

International Solar Alliance

- The International Solar Alliance (ISA) is an intergovernmental organization that was launched in 2015, by the Prime Minister of India and the President of France, at the United Nations Climate Change Conference held in Paris.
- ISA is an action-oriented, member-driven, collaborative platform for increased deployment of solar energy technologies.
- The ISA is guided by its 'Towards 1000' strategy, which aims:
  - » To mobilize USD 1000 billion of investments in solar energy solutions by 2030.
  - » To deliver energy access to 1000 million people using clean energy solutions.
  - » To install 1000 GW of solar energy capacity.
  - » To mitigate global solar emissions to the tune of 1000 million tonnes of CO2 every year.
  - » Headquarter: National Institute of Solar Energy (NISE) in Gurugram, India.

Wind Energy

- Wind energy, also known as wind power, is created by harnessing the power of the wind to generate electricity.
- Wind power is considered a sustainable and renewable energy source and has a much smaller impact on the environment compared to burning fossil fuels.
- Wind energy is the second-fastest growing source of electricity worldwide, after solar power.
- The installed wind power capacity in India was 43.7 gigawatts as of June 30, 2023.
- India is ranked fourth globally in terms of wind power capacity.
- The Indian government aims to increase the installed wind energy capacity to 99.9 GW by 2029-2030.

Hydro Power

- Hydropower, also known as hydroelectric power, is the use of fast-moving or falling water to produce electricity or to power machines.
- Hydropower is a renewable source of energy and is the biggest source of renewable energy globally, with hydroelectric power plants located in over 150 countries.
- India's hydropower capacity is estimated to be around 148,701 MW, with an additional 6,780 MW from smaller hydroelectricity schemes.
- The country's hydropower capacity is expected to increase from 42 GW to 67 GW by 2031-32, with hydropower projects with an aggregate capacity of 15 GW currently under construction.
- India ranks fifth globally for installed hydroelectric power capacity.

Some details about hydroelectric power in India

- India ranks fifth globally for installed hydroelectric power capacity.
- As of March 31, 2020, India's installed utility-scale hydroelectric capacity was 46,000 MW, or 12.3% of its total utility power generation capacity.
- Hydroelectric power plants at Darjeeling and Shivanasamudra were established in 1898 and 1902, respectively.
- India imports surplus hydroelectric power from Bhutan.
- Small hydropower is defined to be generated at facilities with nameplate capacities up to 25 MW, comes under the ambit of the Ministry of New and Renewable energy (MNRE).
- Large hydro, defined as above 25 MW, comes under the ambit of the Ministry of Power.
- Koyna Hydroelectric Project is the largest completed hydroelectric power plant in India, with a power capacity of 1960 MW.
- India's hydroelectric power output dropped by 16.3% in the fiscal year ending March 31, 2024, the largest decline in 38 years, primarily due to low rainfall.
- This decrease led to hydroelectricity's share of India's total power generation falling to a historic low of 8.3%.
- As a result, the country's reliance on coal increased, with hydro generation reaching a five-year low of 146 billion kWh.

Ocean Thermal Energy

- Ocean Thermal Energy (OTE) is a form of renewable energy that harnesses the temperature difference between the warm surface waters and cold deep waters of the ocean to generate electricity.
- This technology is also known as Ocean Thermal Energy Conversion (OTEC).

How it works?

- Warm surface water (around 25°C) is pumped into a heat exchanger, where it heats a fluid with a low boiling point.
- The heated fluid turns into steam, which drives a turbine connected to a generator, producing electricity.
- The steam is then cooled by cold deep water (around

5°C) pumped from the ocean depths, causing the steam to condense back into a liquid.
- The cycle repeats, generating a continuous flow of electricity.

Benefits of OTE:
- Renewable and sustainable energy source.
- Zero greenhouse gas emissions.
- Can provide baseload power (24/7).
- Can also provide cooling and fresh water.

Challenges:
- High upfront costs.
- Technical difficulties in building and maintaining the infrastructure.
- Environmental concerns (e.g., impact on marine life).
- Despite these challenges, OTE has the potential to become a significant contributor to the global energy mix, particularly for tropical coastal regions.

Data about ocean thermal energy in India:
- The total theoretical potential of ocean thermal energy conversion (OTEC) in India is at 180,000 MW.
- The total identified potential of tidal energy is at 12,455 MW.
- The total theoretical potential of wave energy is at 40,000 MW.
- The National Institute of Ocean Technology is establishing an OTEC plant with a capacity of 65 kilowatts in Kavaratti, Lakshadweep.
- India is geographically well-placed to generate ocean thermal energy, with around 2000 kilometers of coast length along the South Indian coast, where a temperature difference of above 20°C is available throughout the year.

Biomass

- Biomass energy is a renewable energy source that has the potential to decarbonize not only the electricity sector but also the industrial, transport and aviation sectors. India has a large surplus of biomass and other waste that can be utilized for energy generation. Around 85% of renewable energy in India is from biomass.

Biomass energy is produced through various methods, including:
- **Combustion:** Burning biomass (e.g., wood, agricultural waste, municipal waste) to generate electricity or heat.
- **Anaerobic Digestion:** Breaking down biomass (e.g., food waste, animal manure) in the absence of oxygen to produce biogas (a mixture of methane and carbon dioxide).
- **Gasification:** Converting biomass into a synthesis gas (syngas) that can be used to produce electricity, heat, or biofuels.
- **Pyrolysis:** Heating biomass in the absence of oxygen to produce bio-oil, biochar, and syngas.
- **Fermentation:** Converting biomass into ethanol or other biofuels through microbial fermentation.
- **Biodiesel production**: Converting vegetable oils or animal fats into diesel fuel.
- **Biogas production:** Anaerobic digestion of biomass to produce biogas, which can be used as a fuel.

Benefits of biomass energy production:
- Renewable and sustainable.
- Reduces greenhouse gas emissions.
- Supports energy security and independence.
- Creates jobs and stimulates local economies.
- Can help mitigate waste management issues.

Challenges and limitations of biomass energy production:
- Feedstock availability and quality.
- Energy conversion efficiency.
- Cost competitiveness with fossil fuels.
- Potential environmental impacts (e.g., land use, water use, air pollution).

Geothermal Energy

- Geothermal energy is a renewable source of energy that is available in the form of heat from the Earth's interior.
- In India, there are around 340 geothermal springs, which are found in both orogenic (in the Himalayas) and non-orogenic (in the Peninsula) areas. The average temperature of these springs ranges from 35.0°C to the boiling point of water.

Environmental Issues

Environmental Issues in Indian Himalayan Region
- **Glacier Melting:** Rising temperatures are causing glaciers to melt at an alarming rate, leading to changes in river flow and affecting the water supply for millions of people.
- **Biodiversity Loss:** The Himalayas are home to a rich and diverse range of flora and fauna, but climate change, deforestation, and human activities are threatening the survival of many species.
- **Deforestation and Land Degradation:** The Himalayas

are experiencing widespread deforestation and land degradation due to human activities such as agriculture, urbanization, and infrastructure development.
- **Soil Erosion:** Soil erosion is a significant problem in the Himalayas, particularly in areas with heavy rainfall and deforestation, leading to landslides and sedimentation in rivers.
- **Water Scarcity:** The Himalayas are facing a severe water crisis, with many rivers and streams drying up due to climate change, deforestation, and over-extraction of water.
- **Landslides and Floods:** The Himalayas are prone to landslides and floods, which can be devastating for local communities and infrastructure.
- **Pollution:** The Himalayas are experiencing increasing levels of pollution, including air and water pollution, due to human activities such as industrialization, transportation, and agriculture.
- **Over-Tourism:** The Himalayas are facing the negative impacts of over-tourism, including degradation of natural habitats, pollution, and strain on local resources.
- **Accumulation of Black Carbon:** One of the biggest factors causing glaciers to melt is the emission of black carbon aerosols into the atmosphere.
- **Growth of Invasive Species:** As temperatures rise, new habitats become available for invasive species that can outcompete native flora and fauna of the Himalayan region.

Role of Indian Himalayan Region in Indian Climate

- **Prevents Cold Air:** The Himalayas prevent cold Central Asian katabatic winds from entering India, thereby keeping the Indian subcontinent warmer than other regions at similar latitudes.
- **Influences Monsoon Winds:** The Himalayas form a barrier for monsoon winds, preventing them from traveling northwards and causing heavy rainfall in the Terai region.
- **Contributes to Desert Formation:** The Himalayas are believed to play a significant role in the formation of Central Asian deserts such as the Taklamakan and Gobi.
- **Attracts Moisture-Laden Winds:** The Thar Desert attracts moisture-laden southwest summer monsoon winds, providing the majority of India's rainfall between June and October.
- **Regulates Temperature:** The Himalayas have a profound effect on the climate of the Indian subcontinent and the Tibetan Plateau, preventing frigid and dry Arctic winds from blowing south into the subcontinent.
- **Impacts Regional Climate:** The Indian Himalayan region's topography and geography significantly influence the regional climate, with varying temperatures and precipitation patterns across different regions.

Environmental Impacts of Palm Oil Production

- **Deforestation:** Palm oil production has led to widespread deforestation, especially in Indonesia and Malaysia, which are the world's largest producers of palm oil. This has resulted in the loss of biodiversity and the destruction of ecosystems.
- **Habitat destruction:** The expansion of palm oil plantations has led to the destruction of habitats of endangered species such as orangutans, elephants, and tigers.
- **Water pollution:** The use of pesticides and fertilizers in palm oil production has led to water pollution, which can harm aquatic life and human health.
- **Greenhouse gas emissions:** The production of palm oil contributes to greenhouse gas emissions, which contribute to climate change.
- **Land grabbing:** The expansion of palm oil plantations has led to land grabbing, which can result in the displacement of local communities and the loss of their livelihoods.
- **Loss of traditional livelihoods:** The expansion of palm oil plantations has led to the loss of traditional livelihoods, such as small-scale farming and forest-based livelihoods.
- **Increased risk of fires:** The expansion of palm oil plantations has led to an increased risk of fires, which can harm human health and the environment.
- **Impact on indigenous communities:** The expansion of palm oil plantations has had a negative impact on indigenous communities, who have lost their land, culture, and way of life.

Impact of Radiation from Mobile Phone Towers on Human Beings and Wildlife

Impact on Human:

- The effects of radiofrequency radiation on humans are still being studied, and there is ongoing debate about the potential risks.
- Some research suggests that long-term exposure to

radiofrequency radiation from mobile phone towers may increase the risk of certain health problems, such as cancer and neurological damage.

Impact on Wildlife:

- There is evidence that radiofrequency radiation from mobile phone towers can affect wildlife, particularly birds, bees, and other insects.
- The radiation can disrupt the natural navigation systems of these animals, leading to problems with migration, orientation, and communication.
- Some research suggests that radiofrequency radiation may also affect the reproduction and development of certain species.

Key Points:

- The effects of radiofrequency radiation on humans and wildlife are still being studied, and more research is needed to fully understand the potential risks.
- Some organizations, such as the International Commission on Non-Ionizing Radiation Protection (ICNIRP), have established guidelines for exposure to radiofrequency radiation, but these guidelines may not be adequate to protect all species.
- The impact of radiofrequency radiation on wildlife is a particular concern, as it can disrupt the natural behavior and ecology of certain species.

G.M crops in India

- Genetically modified (GM) crops are plants used in agriculture, the DNA of which has been modified using genetic engineering methods.

Key points about GM crops include :

- **Insertion of DNA:** GM is a technology that involves inserting DNA into the genome of an organism.
- **Genetic modification:** Plant genomes can be engineered by physical methods or by use of Agrobacterium T-DNA binary vectors.
- **New traits:** In most cases, the aim is to introduce a new trait to the plant which does not occur naturally in the species.
- **Examples of traits:** Examples in food crops include resistance to certain pests, diseases, environmental conditions, reduction of spoilage, resistance to chemical treatments (e.g. resistance to a herbicide), or improving the nutrient profile of the crop.
- **Examples in non-food crops:** Examples in non-food crops include production of pharmaceutical agents, biofuels, and other industrially useful goods, as well as for bioremediation.

Genetically modified (GM) crops in India:

- **Bt Cotton:** This is the only GM crop that is commercially cultivated in India, which started in 2002-2003. It is a pest-resistant cotton that has the Bt gene from the soil bacterium Bacillus thuringiensis.
- **Bt Brinjal:** This is a GM crop that was developed by Mahyco (Maharashtra Hybrid Seeds Company) in collaboration with the Dharward University of Agricultural Sciences and the Tamil Nadu Agricultural University. The commercial release of this crop was blocked in 2010.
- **GM Mustard:** This is a GM variety of mustard developed by the Delhi University's Centre for Genetic Manipulation of Crop Plants. The researchers at Delhi University have created a hybridized mustard DMH-11 using "barnase/barnstar" technology for genetic modification.

Sand Mining in India

- Sand mining in India refers to the removal of sand and gravel from rivers, beaches, and other sources for use in construction, manufacturing, and other industries .

Key points about sand mining in India.

- **Environmental concerns:** Sand mining has severe environmental consequences, including soil erosion, changes in river flow, and loss of biodiversity.
- **Illegal mining:** Illegal sand mining is a significant problem in India, with many cases of unregulated extraction and smuggling.
- **Government initiatives:** The government has introduced various initiatives to regulate sand mining, including the Mines and Minerals (Development and Regulation) Act and the Sustainable Sand Management Guidelines.
- **Demand and supply:** India requires 70 million tonnes of sand per year, with demand increasing by 7% annually, leading to a lucrative sand mining industry.
- **Sand mafias:** Illegal sand mining has given rise to sand mafias, who profit from the illegal extraction and sale of sand.
- **Social impacts:** Sand mining also has social impacts, including conflicts with local communities and displacement of people living near mining sites.
- **Economic impacts:** Unregulated sand mining can have severe economic consequences, including loss of revenue for the government and damage to infrastructure.

MCQs Based on Current Affairs

1. What is the purpose of the Krishi Integrated Command and Control Centre (ICCC)?

A. To monitor and control the spread of pests and diseases.
B. To provide real-time weather updates and forecasts.
C. To aid in making informed decisions using multiple IT applications and platforms.
D. To promote organic farming practices.

2. Consider the following statements about preventive detention:

1. The Supreme Court ruled that preventive detention cannot be used in a capricious manner as it goes against the fundamental right to life and liberty .
2. The court also stated that the inability of the police to tackle law and order situations should not be used as an excuse to invoke preventive detention.

Which of the statements given above is/are correct?

A. 1 Only
B. 2 Only
C. Both 1 and 2
D. Neither 1 nor 2

3. Consider the following statements:

1. Supreme Court has stated that the ED could call anybody for any information.
2. ED is a central agency responsible for enforcing economic laws and preventing money laundering.
3. ED has the power to summon any person for any information and the power to attach properties of people suspected of money laundering.

How many of the statements given above are correct?

A. Only one
B. Only two
C. All three
D. None

4. Consider the following statements:

1. Supreme Court of India ruled that the right against the adverse effects of climate change is part of the right to life and equality under the Indian Constitution .
2. The ruling came in the context of a plea to protect the Great Indian Bustard from losing its habitat due to power transmission lines.

Which of the statements given above is/are correct?

A. 1 Only
B. 2 Only
C. Both 1 and 2
D. Neither 1 nor 2

5. Consider the following statements about Electric Mobility Promotion Scheme (EMPS) 2024:

1. The Electric Mobility Promotion Scheme 2024 was introduced by the Ministry of Heavy Industries with the goal of accelerating the use of electric vehicles in India .
2. This scheme will run from April 1 to July 31, 2024, is part of the Indian government's effort to reduce carbon emissions and promote green mobility .
3. EMPS 2024 aims to support the adoption of electric two-wheelers and three-wheelers by providing demand incentives and encouraging the development of an electric vehicle (EV) manufacturing ecosystem in the country .

How many of the statements given above are correct?

A. Only one
B. Only two
C. All three
D. None

6. Consider the following statements:

1. India has applied to the International Seabed Authority for the right to explore two tracts in the Indian Ocean seabed .
2. The application to explore the cobalt-rich crust known as the Afanasy Nikitin Seamount is motivated by China's vessels conducting reconnaissance in the same region .
3. The Afanasy Nikitin Seamount is a 400 km-long and 150 km-wide structural feature in the Central Indian Basin, located about 3,000 km away from India's coast .

How many of the statements given above are correct?

A. Only one
B. Only two

C. All three
D. None

7. With reference to the Wildlife Institute of India, consider the following statements:
1. It is an internationally acclaimed institution, located at Dehradun in Uttarakhand.
2. Its aim is to encompass building scientific knowledge, training personnel, etc.
3. It is not actively engaged in research across the country.

How many of the statements given above are incorrect?
A. Only one
B. Only two
C. All three
D. None

8. Consider the following statements in respect of BrahMos missile:
1. It is a long-range supersonic cruise missile system.
2. It can be launched from land, sea and air platforms.
3. It is a joint venture between India and Russia.
4. BrahMos-II is the hypersonic version with speed of Mach 7.

How many of the statements given above are correct?
A.Only one
B.Only two
C. Only three
D. All four

9. Consider the following statements about electric air taxis:
1. They are electric-powered aircraft designed to reduce urban traffic congestion and offer faster travel times in crowded cities.
2. They utilize electric propulsion systems, making them more eco-friendly compared to traditional fossil fuel-powered airplanes.
3. They require dedicated infrastructure like helipads and vertiports for take-off, landing and passenger boarding within urban environments.

How many of the statements given above are correct?
A. Only one
B. Only two
C. All three
D. None

10. Consider the following statements about DURGA-2:
1. It is a laser weapon developed by DRDO that can be used on land, sea and air.
2. It uses sound waves to destroy targets.

Which of the statements given above is/are correct?
A.1 Only
B.2 Only
C. Both 1 and 2
D. Neither 1 nor 2

11. Consider the following statements about Group of Friends:
1. A high-level meeting of the Group of Friends was held to promote accountability for crimes against peacekeepers.
2. It is a United Nations initiative that brings together countries and organizations to address the issue of attacks on peacekeepers and ensure accountability for such crimes.
3. This meeting is an important forum for countries to reaffirm their commitment to the protection of peacekeepers and upholding international law.

How many of the statements given above are correct?
A. Only one
B. Only two
C. All three
D. None

12. Consider the following statements about BIMSTEC Charter:
1. Nepal Parliament has endorsed the BIMSTEC Charter.
2. The BIMSTEC Charter was formed in 1997 to enhance regional cooperation on issues like economic prosperity, social progress, scientific achievement, peace, stability and connectivity .

Which of the statements given above is/are correct?
A. 1 Only
B. 2 Only
C. Both 1 and 2
D. Neither 1 nor 2

13. Consider the following statements about GCC's Vision for Regional Security:
1. The GCC's Vision for Regional Security is a strategic framework that outlines the council's

priorities and goals for maintaining peace and stability in the region.

2. The GCC's Vision for Regional Security aims to create a stable and prosperous region, where member states can work together to address shared challenges and promote collective security.
3. The Gulf Cooperation Council is a political and economic alliance of six Middle Eastern countries: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates.

How many of the statements given above are correct?

A. Only one
B. Only two
C. All three
D. None

14. Consider the following statements about Vasuki indicus:

1. It was a giant, extinct snake discovered in India, possibly the largest ever found.
2. It lived alongside another giant snake, Titanoboa, during a time of warm climate.

Which of the statements given above is/are correct?

A. 1 Only
B. 2 Only
C. Both 1 and 2
D. Neither 1 nor 2

15. Consider the following statements about the Shompen Tribe:

1. They are classified as a Particularly Vulnerable Tribal Group by the Government of India.
2. They had an estimated population of 229 according to the 2011 Census.

Which of the statements given above is/are correct?

A.1 Only
B.2 Only
C. Both 1 and 2
D. Neither 1 nor 2

Answer- C

16. Consider the following statements about the Poorvi Leher exercise:

1. Statement-I: Poorvi Leher is an exercise conducted by the Indian Navy to assess its preparedness for maritime security challenges.
2. Statement-II: The exercise is crucial for maintaining strong defense capabilities along the east coast of India.

Which of the following is correct in respect to the above statements?

A. Both Statement-I and Statement-II are correct and Statement –II is the correct explanation of Statement-I.
B. Both Statement-I and Statement-II are correct and Statement –II is the correct explanation of Statement-I.
C. Statement-I is correct but Statement-II is incorrect.
D. Statement-I is incorrect but Statement-II is correct.

17. Consider the following statements with respect to Mpox (monkeypox):

1. It is a viral infection endemic in some parts of Africa.
2. It can be transmitted from infected animals to humans.
3. Mpox symptoms include fever, rash and swollen lymph nodes.
4. Mpox genomes are divided into two main clades: I and II, each with different sub-clades.

How many of the statements given above are correct?

A. Only one
B. Only two
C. Only three
D. All four

18. Consider the following statements:

1. Russia has withdrawn its peacekeeping forces from Nagorno-Karabakh, a disputed region between Armenia and Azerbaijan .
2. The withdrawal marks a significant shift in Russia's role in the region, as it had previously maintained a military presence there since the end of a war in 2020 .

Which of the statements given above is/are correct?

A. 1 Only
B. 2 Only
C. Both 1 and 2
D. Neither 1 nor 2

19. Consider the following statements about UNFPA State of World Population Report 2024:

1. The UNFPA State of World Population Report 2024 was launched by UNFPA Executive Director Dr. Natalia Kanem.
2. The report is titled "Interwoven Lives, Threads of Hope: Ending inequalities in sexual and reproductive health and rights".
3. It highlights the role that racism, sexism and other forms of discrimination continue to play in blocking broad gains in sexual and reproductive health for women and girls .

How many of the statements given above are correct?

A. Only one
B. Only two
C. All three
D. None

20. Consider the following statements:

1. The Rights of Persons with Disabilities Act, 2016 (RPwD Act) replaced an earlier legislation enacted in 1950.
2. The RPwD Act aims to provide equal opportunities and prevent discrimination against people with disabilities.
3. Under the RPwD Act, children with disabilities are entitled to free and accessible education from the age of 3.

How many of the statements given above are correct?

A. Only one
B. Only two
C. All three
D. None

21. Consider the following statements about the National Bank for Agriculture and Rural Development:

1. It is the apex development bank of India established in 1982 to promote sustainable agriculture and rural development.
2. It refinances agricultural activities, provides rural credit and offers technical assistance.
3. Its headquarter is in New Delhi.

How many of the statements given above are correct?

A. Only one
B. Only two
C. All three
D. None

22. With reference to the National Commission of Scheduled Tribes, consider the following statements:

1. It is a constitutional body established to safeguard the rights and interests of Scheduled Tribes in India.
2. It was established in 2004 through the 89th Amendment Act.

Which of the statements given above is/are correct?

A. 1 Only
B. 2 Only
C. Both 1 and 2
D. Neither 1 nor 2

23. Consider the following statements about India Employment Report 2024:

1. The "India Employment Report 2024" was released by the Institute for Human Development and the International Labour Organisation.
2. The report discusses the employment conditions in India, which remain poor despite improvements in overall labor force participation and employment rates.
3. The report also discusses the challenges faced by the youth in India in terms of employment and education.

How many of the statements given above are correct?

A. Only one
B. Only two
C. All three
D. None

24. Consider the following statements about global trade update report?

1. The Global Trade Update report was launched by the United Nations Conference on Trade and Development (UNCTAD).
2. The report highlights the state of global trade, including trends, challenges and projections.
3. Report notes that global trade is poised to rebound in 2024, following a 3% decline in 2023.

How many of the statements given above are correct?

A. Only one
B. Only two
C. All three
D. None

25. Consider the following statements about T+0 settlement cycle

1. The T+0 settlement cycle was introduced in India as a beta version.
2. This new settlement cycle will allow for shares to be settled on the same day of the trade, which will allow for greater liquidity and faster access to funds.
3. The T+0 settlement cycle is currently only available for 25 specific stocks and with select brokers.

How many of the statements given above are correct?

A. Only one
B. Only two
C. All three
D. None

26. Consider the following statements:

1. India Gaming Report 2024 released by Interactive Entertainment and Innovation Council and WinZO.
2. The report noted that India is largest gaming market globally, projected to hit $6 billion by 2028.

Which of the statements given above is/are correct?

A. 1 Only
B. 2 Only
C. Both 1 and 2
D. Neither 1 nor 2

27. Consider the following statements about the Lightest Bullet Proof Jacket:

1. It is designed to offer protection against the highest threat level of Bureau of Indian Standards ammunition and is comfortable for the wearer.
2. It uses traditional materials and methods for its ballistic protection.

Which of the statements given above is/are correct?

A. 1 Only
B. 2 Only
C. Both 1 and 2
D. Neither 1 nor 2

28. Consider the following statements regarding the World Meteorological Organization:

1. Statement-I: It is a specialized agency of the United Nations that focuses on weather forecasting.
2. Statement-II: It promotes international cooperation in a broader range of sciences like atmospheric science, climatology and hydrology.

Which of the following is correct in respect of the above statements?

A. Both Statement-I and Statement-II are correct and Statement –II is the correct explanation of Statement-I
B. Both Statement-I and Statement-II are correct and Statement-II is not the correct explanation for Statement-I
C. Statement-I is correct but Statement-II is incorrect
D. Statement-I is incorrect but Statement-II is correct

29. Consider the following statements about the Indigenous Technology Cruise Missile (ITCM):

1. It refers to a type of cruise missile developed entirely within a country's own research and development framework.
2. The missile features an indigenous propulsion system.
3. It is equipped with advanced avionics and software.

How many of the statements given above are correct?

A. Only one
B. Only two
C. Only three
D. All four

30. Consider the following statements:

1. India is planning to replace its minimum wage system with a living wage system by 2025 .
2. The shift to a living wage system will uplift millions of Indians from poverty and enhancing their quality of life .
3. The living wage is defined by the ILO as "the wage level necessary to afford a decent standard of living for workers and their families".

How many of the statements given above are correct?

A. Only one
B. Only two
C. All three
D. None

31. Consider the following statements about National Organ and Tissue Transplant Organisation:

1. It operates under the Directorate General of Health Services, Ministry of Health and Family Welfare.
2. It oversees organ procurement, allotment and distribution in India.

Which of the statements given above is/are correct?

A. 1 only
B. 2 only
C. Both 1 and 2
D. Neither 1 nor 2

32. With reference to the Aryabhata Satellite, consider the following statements:

1. It was India's first artificial satellite and built by the Indian Space Research Organisation.
2. It was launched from the Volgograd Launch Station by a Soviet Kosmos-3M rocket.
3. The area where Aryabhata was built was Peenya, on the outskirts of Bengaluru.

How many of the statements given above are correct?

A. Only one
B. Only two
C. Only three
D. None

33. Consider the following statements about Avian Influenza (Bird Flu):

1. Avian Influenza is a respiratory illness primarily affecting humans.
2. The most common way humans contract Avian Influenza is through close contact with infected birds or their droppings.

Which of the statements given above is/are correct?

A. 1 Only
B. 2 Only
C. Both 1 and 2
D. Neither 1 nor 2

34. Consider the following statements about the Liver-Gut Axis:

1. Statement I: Bile produced by the liver plays a role in fat digestion and gut health.
2. Statement II: Metabolites from gut bacteria can influence liver function and inflammation.

Which of the following is correct in respect of the above statements?

A. Both Statement-I and Statement-II are correct and Statement –II is the correct explanation of Statement-I.
B. Both Statement-I and Statement-II are correct and Statement-II is not the correct explanation for Statement-I.
C. Statement-I is correct but Statement-II is incorrect.
D. Statement-I is incorrect but Statement-II is correct.

35. Which of the following statements about the Pink bollworm is correct?

A. It is a type of fungus that affects cotton plants.
B. It is a beneficial insect that aids in pollination.
C. It primarily feeds on the seeds and bolls of cotton plants.
D. It is a marine organism found in oceans and seas.

36. Consider the following statements:

1. Space debris consists only of human-made objects.
2. Space debris is primarily found in the Earth's atmosphere.
3. Space debris poses no risk to operational satellites.
4. Space debris includes natural objects like meteoroids and asteroids.

How many of the above statements are correct?

A. Only one
B. Only three
C. All four
D. None

37. Consider the following statements:

1. Reserve Bank of India (RBI) has retained the GDP growth forecast at 7% for fiscal year 2024-25, which is lower than the 7.6% growth estimated for FY24.
2. The repo rate remains unchanged at 6.5% for the seventh consecutive time.
3. The RBI has also projected a retail inflation of 4.5% for FY25, with Q1 at 4.9%, Q2 at 3.8%, Q3 at 4.6% and Q4 at 4.5%.

How many of the statements given above are correct?

A. Only one
B. Only two
C. All three
D. None

38. Consider the following statements about CDP-SURAKSHA platform:

1. Indian government has launched CDP-SURAKSHA platform that disburse subsidies to horticulture farmers under the Cluster Development Program (CDP).
2. It allows instant disbursal of subsidies to farmers in their bank accounts using the e-RUPI voucher from the National Payments Corporation of India (NPCI).

Which of the statements given above is/are correct?

A. 1 Only
B. 2 Only
C. Both 1 and 2
D. Neither 1 nor 2

39. Consider the following statements about Global Hepatitis Report 2024:

1. Recently, World Health Organization (WHO) released Global Hepatitis Report 2024.
2. According to report an estimated 304 million people were living with hepatitis B and C in 2022.
3. India has the highest burden of viral hepatitis, with 2.9 crore people living with Hepatitis B infection and 0.55 crore living with Hepatitis C infection.

How many of the statements given above are correct?

A. Only one
B. Only two
C. All three
D. None

40. Consider the following statements about World Quantum Day:

1. World Quantum Day is an international event celebrated on April 14 every year .
2. It aims to promote public awareness and understanding of quantum science and quantum technology around the world .
3. It was first celebrated in 2022.

How many of the statements given above are correct?

A. Only one
B. Only two
C. All three
D. None

41. Consider the following statements:

1. Western Ghats in Gujarat have experienced a 119% increase in soil erosion over the past 30 years, according to an IIT-B study.
2. The study found a 94% increase in soil erosion rates across the Western Ghats Region.
3. Gujarat experiencing the second-highest increase after Tamil Nadu.

How many of the statements given above are correct?

A.Only one
B. Only two
C. All three
D. None

42. Consider the following statements about nuclear energy summit:

1. First nuclear energy summit was held in Brussels in March 2024.
2. The summit was co-hosted by Belgium and the International Atomic Energy Agency.
3. The summit was attended by 32 countries and the International Atomic Energy Agency .
4. Countries pledged their support for nuclear energy.

How many of the statements given above are correct?

A. Only one
B. Only two
C. Only three
D. All four

ANSWER

1.	(C)	12.	(C)	23.	(C)	34.	(B)
2.	(C)	13.	(C)	24.	(C)	35.	(C)
3.	(C)	14.	(C)	25.	(C)	36.	(A)
4.	(C)	15.	(C)	26.	(C)	37.	(C)
5.	(C)	16.	(A)	27.	(A)	38.	(C)
6.	(C)	17.	(D)	28.	(B)	39.	(C)
7.	(B)	18.	(C)	29.	(C)	40.	(C)
8.	(D)	19.	(C)	30.	(C)	41.	(C)
9.	(C)	20.	(A)	31.	(C)	42.	(D)
10.	(A)	21.	(B)	32.	(C)		
11.	(C)	22.	(C)	33.	(B)		

UPSC Prelims Mock Paper

1. Consider the following statements regarding Indian Stamp Act, 1899:
1. A stamp is an authorized mark, seal, or endorsement by the State Government for duty purposes.
2. Certain documents have specified charges outlined in Schedule I of the Act.
3. The Act includes provisions for digital signatures, adapting to the modern digital landscape.

How many of the statements given above are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

2. Consider the following pairs:

G.I. Tagged item	**State**
Sujini Embroidery	- Bihar
Kondapalli Toys	- Karnataka
Lakadong Turmeric	- Sikkim
Chamba Rumal	-Himachal Pradesh

How many of the given pairs above are correct?
(a) Only one
(b) Only two
(c) Only three
(d) All four

3. Nestled in the Kannan Devan Hills of the southern Western Ghats in India, this sanctuary, initially declared in 1975 for the preservation of the Nilgiri Tahr, achieved national park status in 1978. Encompassing the southern side of the park is the prominent Anamudi peak. Notably, this natural habitat is home to the rare Neelakurinji flower, which blooms only once every 12 years.
The above paragraph defines which of them best?
(a) Periyar National Park
(b) Dandeli Wildlife Sanctuary
(c) Kudremukh National Park
(d) Eravikulam National Park

4. Consider the following statements regarding Interim Budget, 2024:
1. India's Real GDP is projected to grow more than 8% in the fiscal year 2023-24.
2. A notable decrease was observed in the capital expenditure outlay.
3. In last 9 years FDI has tripled.

How many of the statements given above are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

5. Consider the following pairs:

UAVs	**- Countries**
1. Orion Helicopter E	- Belarus
2. Draganfly Tango	- Australia
3. Maraal	- Iran
4. Elbit Hermes 900	- USA

How many of the given pairs above are correct?
(a) Only one
(b) Only two
(c) Only three
(d) All four

6. Consider the following pairs:

	Ramsar Site-	**State**
1.	Magadi Kere Conservation Reserve	-Mizoram
2.	Karaivetti Bird Sanctuary	-Kerala
3.	Longwood Shola Reserve	-Tamil Nadu
4.	Ankasamudra Bird Conservation Reserve	-Karnataka
5.	Aghanashini Estuary	-Andhra Pradesh

How many of the above pairs are correctly matched?
(a) Only two
(b) Only three
(c) Only four
(d) All five

7. Consider the following statements regarding Payments Bank:
1. A payments bank is like any other bank but operates on a smaller scale without involving any credit risk.
2. It was set up based on the recommendations of the Nachiket Mor Committee.
3. It can take deposits up to Rs. 2,00,000, and it can accept demand deposits in the form of savings and current accounts.

How many of the above statements is/are correct?

(a) Only one
(b) Only two
(c) All three
(d) None

8. With reference to One Stop Centre scheme, consider the following statements:
1. It is a Central Sector Scheme formulated under the union Ministry of Women and Child Development (MWCD).
2. It's objective is to provide integrated support and assistance to women affected by violence, both in private and public spaces under one roof.

Which of the above statements is/are correct?
(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

9. Subika Paintings, recently seen in news belongs to which of the following states?
(a) Madhya Pradesh
(b) Bihar
(c) Assam
(d) Manipur

10. Consider the following statements regarding Multidimensional Poverty Index India:
1. Multidimensional poverty in India significantly dropped by less than 10% in last 9 years.
2. Uttar Pradesh, Bihar, and Madhya Pradesh emerged as frontrunners in poverty reduction during this period.
3. The MPI at global level is released by Oxford Poverty and Human Development Initiative (OPHI) and the UNDP's Human Development Report Office.

How many of the statements given above are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

11. Consider the following pairs:

Cancers	-	**Affected Organs**
1. Retinoblastoma	-	Eyes
2. Mesothelioma	-	Muscles
3. Sarcoma	-	Bones
4. Lymphoma	-	Blood cells

How many of the pairs given above are correct?
(a) Only one
(b) Only two
(c) Only three
(d) All four

12. Consider the following Articles of Indian Constitution:
1. Article 21
2. Article 24
3. Article 39

How many of the above statements imply for removal of bonded labour in India?
(a) Only one
(b) Only two
(c) All three
(d) None

13. The Dusted Apollo, a rare species found in the inner Himalayas at altitudes ranging from 3,500 to 4,800 meters, was initially identified in 1890. Its habitat spans from Ladakh to western Nepal.
The above passage explains which of the creatures best?
(a) Peacocks
(b) Cockroaches
(c) Beetles
(d) Butterflies

14. Consider the following statements regarding Annual Survey of Industries (ASI):
1. Industries showed higher GVA growth in 2020-21 than in 2021-22 on year-on-year basis.
2. Metals, Petroleum and Pharmaceuticals were the sectors driving growth.
3. Both the financial years 2020-21 and 2021-22 saw a decline in Y-o-Y fall in employment.

How many of the statements given above are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

15. Consider the following statements about Global Reporting Initiative Biodiversity Standard:

1. It is developed by Global Sustainability Standards Board (GSSB) with other stake holders.
2. It is to be implemented from April 1, 2024.

Which of the statements given above is/are correct?
(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

16. Pterosaur, recently seen in news is a:
(a) A newly found lizard species
(b) A Jurassic age reptile
(c) A Triassic age dinosaur
(d) A marine mammal of Pleistocene age

17. Consider the following statements about Food Processing Sectors:
1. Food processing sector permits 100% FDI through automatic route.
2. Processed food items need licensing under Industries (Development and Regulation) Act, 1951.
3. GVA in Food Processing sector has risen from 1.30 Lakh Crores in 2013-14 to 2.08 Lakh Crores in 2021-22.

How many of the statements given above are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

18. Consider the following statements with respect to World Governments Summit:
1. The summit explores and supports the next generation governments by leveraging innovation for global problem-solving.
2. It works under the aegis of the United Nations General Assembly.
3. The World Governments Summit, 2024 was recently held at New Delhi, India.

How many of the statements given above is/are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

19. Consider the following statements regarding Pradhan Mantri Matru Vandana Yojana:
1. The objective is to ensure sufficient rest for women during pregnancy, cash incentives are provided to partially compensate for any wage loss.
2. In the event of miscarriage or stillbirth, future eligibility for remaining instalments is forfeited.
3. Eligible beneficiaries are entitled to receive Rs 5000 in cash incentives distributed over three instalments.

How many of the statements given above are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

20. Consider the following statements about NexCAR19:
1. It is engineered to precisely target cancer cells expressing the CD19 protein.
2. Despite its efficacy in cancer therapy, the only drawback of this treatment is its potential to induce neurotoxicity.

Which of the statements given above is/are correct?
(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

21. Consider the following reports:
1. Living Planet Report
2. Forest Pathways Report
3. High Cost of Cheap Water Report

Which of the above reports are published by World Wildlife Fund?
(a) 1 only
(b) 1 and 2 only
(c) 2 and 3 only
(d) 1, 2 and 3

22. Consider the following description:
Nestled on South America's northern coast, this sovereign state stands as the smallest among its continental counterparts. Its borders are demarcated by French Guiana to the east, Guyana to the west, the Atlantic Ocean to the north, and Brazil to the south. Noteworthy geographical features include

Julianatop, the highest peak, and prominent rivers like the Maroni, and Courantyne. The climate here is characterized by intense heat and humidity, typical of tropical regions.
Which of the following countries is the paragraph describing?
(a) French Guyana
(b) Suriname
(c) Ecuador
(d) Guyana

23. Consider the following statements regarding selection of Election Commissioners in India:
1. Ministry of Parliamentary Affairs shortlist candidates and the Prime Minister finalize the appointment, which is formally ratified by the President.
2. Supreme Court has called for a consultative process for the selection of Election Commissioners of India.
3. Election Commission of India has always been a 3 member body since independence.

How many of the statements given above are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

24. Consider the following statements regarding Supplementary Demands for Grants:
1. Additional Grant caters to funding requirements for new services not originally budgeted for in the current fiscal year.
2. Vote of Credit facilitates the funding of new services through the reappropriation of existing funds.
3. Exceptional Grant for special purposes unrelated to the regular services of the fiscal year, address to unique or extraordinary circumstances.
4. Token Grant addresses unforeseen demands on India's resources and offer flexibility in funding urgent needs.

How many of the statements given above are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

25. Consider the following statements regarding National Green Hydrogen Mission:
1. The Ministry of Power serves as the nodal ministry for this endeavour.
2. The initiative targets investments exceeding Rs 8 lakh crore and is anticipated to create Six lakh jobs.

Which of the statements given above is/are correct?
(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

26. Consider the following Taxes:
1. Securities Transaction tax
2. Corporate Tax
3. Excise Tax
4. Capital Gains Tax

How many of the above are included in Direct Taxes?
(a) Only one
(b) Only two
(c) Only three
(d) All four

27. Consider the following statements regarding PM SVANidhi:
1. It is a centrally sponsored scheme.
2. The Scheme is available, by law, for beneficiaries belonging to all States/UTs.

Which of the statements given above is/are correct?
(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

28. Which of the following best explains Brumation?
(a) Reduced activity and metabolism during harsh conditions.
(b) Winter dormancy in reptiles and amphibians to conserve energy.
(c) Insect's growth pauses to sync with environmental changes.
(d) Summer dormancy to prevent dehydration, common in hot and dry conditions.

29. Rollapadu Wildlife Sanctuary, recently seen

in news is located in which of the following states?
(a) Telangana
(b) Karnataka
(c) Tamil Nadu
(d) Andhra Pradesh

30. With reference to Bochasanwasi Akshar Purushottam Swaminarayan Sanstha (BAPS), consider the following statements:
1. It is a socio-spiritual Hindu faith with its roots in the Vedas.
2. It is based on the Vedic teachings propagated by Bhagwan Swaminarayan.
3. Recently, Prime Minister inaugurated the Bochasanwasi Akshar Purushottam Swaminarayan Sanstha BAPS Mandir, the first Hindu temple in Abu Dhabi.

How many of the above statements is/are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

31. Consider the following statements regarding Retail Inflation:
1. Retail inflation, also known as Consumer Price Index (CPI) inflation, tracks the change in retail prices of goods and services which households purchase for their daily consumption.
2. CPI is calculated for a fixed basket of goods and services that may or may not be altered by the government from time to time.

Which of the above statements is/are correct?
(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

32. Consider the following statements regarding Great Backyard Bird Count (GBBC):
1. It is an annual, four-day event that engages bird enthusiasts of all ages around the world in counting birds to create a real-time snapshot of where the birds are.
2. It was launched in 1998 by the Cornell Lab of Ornithology and the National Audubon Society.
3. Indian birders have participated in the GBBC since 2013.

How many of the above statements is/are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

33. Consider the following statements about Steel slag :
1. It can be used as a construction material for roads and bridges.
2. It can be used to improve agricultural soil.
3. It can be used to produce cement.

How many of the above statements given is/are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

34. Consider the following statements.
1. The first-generation GM crops have improved traits like Herbicide-resistant crops and Pest resistant crops.
2. Second-generation GM crops involve enhanced quality traits, such as higher nutrient content.
3. Golden Rice is a GM crop that is biofortified to address vitamin A deficiency.

How many of the above statements given is/are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

35. With reference to the Forest (Conservation) Act 1980 consider the following statements:
1. It was enacted to ensure that India's forest land is not willingly usurped for non-forestry purposes.
2. The Act empowers the Centre to require that any forest land diverted for non-forestry purposes be duly compensated.
3. It broadens its purview to include territory that is not formally designated as "forest" in State or Central government records.

How many of the above statements given is/are correct?
(a) Only one
(b) Only two
(c) All three

(d) None

36. With reference to to India's Heat Index, consider the following pairs:

1. Green - Experimental Heat Index below 35°C
2. Yellow - Experimental Heat Index in the range of 36-45°C
3. Orange - Experimental Heat Index in the range of 46-55°C
4. Red - Experimental Heat Index above 55°C

How many of the above pairs are correctly matched?

(a) Only one
(b) Only two
(c) Only three
(d) All four

37. Consider the following statements about Ludwigia Peruviana:

1. It is popularly called primrose willow.
2. It is used in preparing a natural mosquito repellent.
3. Its overgrowth can affect elephant habitats and foraging areas.

How many of the above statements given is/ are correct?

(a) Only one
(b) Only two
(c) All three
(d) None

38. Consider the following statements regarding 'Drought Management in India'.

1. There is no single, legally accepted definition of drought in India.
2. Risk assessment and risk management of a drought falls within the purview of the Disaster Management Act, 2005.
3. The Central government is the final authority to declare a region as drought affected.

How many of the above statements given is/ are correct?

(a) Only one
(b) Only two
(c) All three
(d) None

39. Consider the following statements about United Nations Convention on Biological Diversity (UNCBD):

1. It is a legally binding treaty.
2. It comes under the United Nations Environment Programme (UNEP).
3. The CBD Secretariat is based in Montreal, Canada.

How many of the above statements given is/ are correct?

(a) Only one
(b) Only two
(c) All three
(d) None

40. Why does the Government of India promote the use of 'Urea Gold' in agriculture?

(a) Release of gold in the soil increases soil carbon level by the microorganisms.
(b) To address sulphur deficiencies in the soil.
(c) Nitrous oxide, which is a greenhouse gas, is not at all released into atmosphere by crop fields.
(d) It is a combination of a weedicide and a fertilizer for particular crops.

41. From the ecological point of view, which one of the following assumes importance in being a good link between the Eastern Ghats and the Western Ghats?

(a) Sathyamangalam Tiger Reserve
(b) Nallamala Forest
(c) Nagarhole National Park
(d) Seshachalam Biosphere Reserve

42. In the context of which of the following do some scientists suggest the use of **Cirrus Cloud Thinning Technique** and the injection of sulphate aerosol into the stratosphere?

(a) Creating the artificial rains in some regions.
(b) Reducing the frequency and intensity of tropical cyclone.
(c) Reducing the adverse effects of solar wind on the Earth.
(d) Reducing the global warming.

43. Solar light and Solar heaters both use the sun's energy, but they do so in different ways. Which of the following statements correctly describes the difference between solar light

and solar heater?
1. Solar light converts the sun's energy into electricity, while solar heaters convert the sun's energy into heat.
2. Solar light uses the sun's visible light, while solar heaters use the sun's infrared radiation.
3. Solar light is used to power devices, while solar heaters are used to heat water or air.

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

44. Consider the following statements.
1. Shallow earthquakes are generally less devastating compared to deeper earthquakes, because Shallow earthquakes carry less energy when they emerge on the surface.
2. The seismic waves of deeper earthquakes move radially upwards to the surface.
3. The earthquake magnitude scale gives a measure of the energy released by the seismic waves.

How many of the statements given above is/are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

45. Consider the following countries:
1. Norway
2. Finland
3. Denmark
4. Russia
5. Germany

How many of the above mentioned countries share a land border with Sweden?
(a) Only two
(b) Only three
(c) Only four
(d) All five

46. Which of the following statements about Shelf Clouds is/are true?
(a) Shelf clouds are formed by warm air rising rapidly and forming a wedge-shaped cloud.
(b) Shelf clouds are commonly associated with severe thunderstorms and can indicate the presence of a strong downdraft.
(c) Shelf clouds always precede a tornado and are a clear indication of an imminent twister.
(d) Shelf clouds are typically found at the leading edge of a thunderstorm and appear dark and ominous.

47. Consider the following statements:
1. The Moon was formed from a collision between Earth and a Mars-sized celestial body called Theia.
2. The Moon was formed before the Earth
3. The Moon's composition is identical to that of the Earth's mantle.
4. The Moon's gravitational pull affects Earth's tides.

How many of the statements given above is/are correct?
(a) Only one
(b) Only two
(c) Only three
(d) All four

48. Consider the following:
1. Nagaland
2. Assam
3. Mizoram
4. Tripura
5. Meghalaya

Which of the above states **does not** share a border with Manipur?
(a) 1, 2 and 3 only
(b) 4 and 5 only
(c) 5 only
(d) 3 and 4 only

49. The African Great Lakes are a series of lakes constituting the part of the Rift Valley lakes in and around the East African Rift. They include
1. Lake Victoria
2. Lake Malawi
3. Lake Baikal
4. Lake Tanganyika

Select the correct answer:
(a) 1, 2 and 3 only
(b) 1, 2 and 4 only
(c) 2, 3 and 4 only

(d) 1, 2, 3 and 4

50. Consider the following countries:
1. Syria
2. Lebanon
3. Jordan
4. Egypt

How many of the above nations share borders with Israel?
(a) Only one
(b) Only two
(c) Only three
(d) All four

51. With reference to Atlantic Meridional Overturning Circulation (AMOC), consider the following statements:
1. It is a large system of ocean currents.
2. It is the Atlantic branch of the ocean conveyor belt.
3. It carries warm surface waters from the tropics towards the Northern Hemisphere.

How many of the above statements given is/ are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

52. Which of the following statements about Data Scraping is true?
(a) Data Scraping is a technique used to retrieve information from a website or web page.
(b) Data Scraping is an illegal activity and is prohibited by law.
(c) Data Scraping can only be performed manually by copying and pasting data from websites.
(d) Data Scraping is a term used to describe the process of analyzing data to extract meaningful insights.

53. The 'Artemis Accords' was in news recently, is related to:
(a) Global cyber security
(b) Global food security
(c) Planetary exploration and research
(d) Climate change and disaster management

54. With reference to 'fuel cells' in which hydrogen-rich fuel and oxygen are used to generate electricity, consider the following statements :
1. If pure hydrogen is used as a fuel, the fuel cell emits heat and water as by-products.
2. Fuel cells can be used for powering buildings and not for small devices like laptop computers.
3. Fuel cells produce electricity in the form of Alternating Current (AC).

How many of the statements given above is/ are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

55. Consider the following statements:
1. Hydrazine Hydrate is a colorless liquid with a pungent odor.
2. Hydrazine Hydrate is commonly used as a rocket propellant.
3. Hydrazine Hydrate is highly toxic and can cause severe burns upon contact with skin.

How many of the statements given above is/ are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

56. Consider the following statements:
1. Bharat Interface for Money (BHIM) is a payments application and wallet, which allows users to make instant bank transfers.
2. National Payments Corporation of India (NPCI) charges users for transacting on BHIM.
3. BHIM features can be availed without the internet on any mobile phone.

How many of the statements given above is/ are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

57. Consider the following statements about National Payments Corporation of India (NPCI):

1. It is an initiative of the Reserve Bank of India (RBI) and Indian Banks Association (IBA) under the provisions of the Banking Regulation Act, 1949.
2. It has developed the National Electronic Toll Collection (NETC) program to meet the electronic tolling requirements of the Indian market.

Which of the given above statements is/are correct?
(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

58. Consider the following statements about Unified Payments Interface (UPI):
1. It is an instant real-time payment system jointly developed by National Informatics Centre (NIC) and Centre for Development of Advanced Computing (C-DAC).
2. It caters to the "Peer to Peer" collect request which can be paid as per requirement and convenience.

Which of the given above statements is/are correct?
(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

59. Consider the following statements about INDIAai:
1. INDIAai is a joint venture between the NITI and CERT-In.
2. It is a knowledge portal, research organization, and ecosystem-building initiative focused on preparing the nation for an AI-driven future.

Which of the statements given above is/are correct?
(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

60. Consider the following statements.
1. A semiconductor is a material which has an electrical conductivity value falling between that of a conductor and an insulator.
2. Quantum computing and enhanced wireless networks rely on semiconductors.
3. The Production-Linked Incentive (PLI) and Design Linked Incentive (DLI) schemes encourage building a semiconductor ecosystem in India.

How many of the above statements given is/are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

61. STAR-C Initiative is run by the :
(a) National Aeronautics and Space Administration
(b) International Solar Alliance
(c) Indian Space Research Organisation
(d) International Union for Conservation of Nature

62. Consider the following statements regarding Uniform Civil Code.
1. A Uniform Civil Code is one that would provide for one law for the entire country, applicable to all religious communities in their personal matters such as marriage, divorce, inheritance and adoption.
2. Article 44 of the Constitution lays down that it shall be the obligation of the state to secure a Uniform Civil Code for the citizens throughout the territory of India.

Which of the above statements is/are correct?
(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

63. Consider the following statements:
1. Article 356 is inspired by the Government of India Act, 1919.
2. A state government pursuing anti-secular politics is liable to action under Article 356.
3. The presidential proclamation imposing President's Rule is subject to judicial review.

How many of the statements given above is/are correct?
(a) Only one
(b) Only two

(c) All three
(d) None

64. Consider the following statements regarding Article 32 of the Indian Constitution:
1. Article 32 affirms the right to move the Supreme Court for the enforcement of the rights conferred in Part III of the Indian Constitution.
2. The right guaranteed under Article 32 is not absolute and can be suspended.
3. An individual filing petition in the High Court under Article 226 for the violation of fundamental rights is itself a fundamental right.

How many of the statements given above is/ are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

65. Consider the following statements.
1. Article 341 of the Constitution provides certain privileges and concessions to the members of Scheduled Castes.
2. Parliament alone is vested with the power to include or exclude any entry in the Scheduled Castes (SC) list.
3. There is provision for the reservation of Scheduled Castes both in the Lok Sabha and Rajya Sabha.

How many of the statements given above is/ are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

66. Consider the following statements:
1. The basic structure of the Constitution has been defined under article 368.
2. Principle of reasonableness and Welfare state are one of the elements of basic structure.
3. The famous Minerva Mills case was related to Evolution of the basic structure doctrine of the Constitution of India.

How many of the statements given above is/ are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

67. Consider the following statements:
1. The judges of the Supreme Court are appointed by the President.
2. The Collegium system was born through "Second judge's case".
3. A person appointed as a judge of the Supreme Court, subscribe to an oath before the Chief Justice of India.

How many of the statements given above is/ are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

68. Consider the following statements regarding Ad hoc Judge of supreme court:
1. The President can appoint a judge of a High Court as an ad hoc judge of the Supreme Court for a temporary period.
2. The judge so appointed should be qualified for appointment as a judge of the Supreme Court.

Which of the statements given above is/are correct?
(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

69. Consider the following statements:
1. The Collegium of the Supreme Court consists of 3 senior most Judges including the Chief Justice of India.
2. Article 222 of the Constitution provides for the transfer of a judge from one High Court to another.
3. The Collegium recommends the transfer of Chief Justices of High Courts and other judges.

How many of the statements given above is/ are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

70. Consider the following statements:
1. During elections, the Election Commission of India (ECI) mandates that Doordarshan and All India Radio allocate a certain amount of free airtime to recognized political parties for broadcasting their messages.
2. The ECI determines the time slots for political parties based on factors like their previous electoral performance and representation in the legislature.

Which of the statements given above is/are correct?
(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

71. Consider the following statements regarding Motion of Thanks.
1. It is addressed at the beginning of every session of the Parliament.
2. It is addressed by the Leader of the House.
3. The motion is put to vote in both the houses of the parliament.

How many of the above statements given are/ are incorrect?
(a) Only one
(b) Only two
(c) All three
(d) None

72. Which of the following committees does not have members from the Rajya Sabha?
(a) Committee on Public Undertakings.
(b) Public Accounts committee.
(c) Estimates Committee.
(d) Committee on the Welfare of Scheduled Castes and Scheduled Tribes.

73. Consider the following statements regarding Adjournment and Prorogation.
1. The Adjournment terminates both the sitting and session of the house, while the Prorogation only terminates the sitting of the house.
2. Both are done by the presiding officer of the house.
3. Both do not affect the bills or any other business pending before the house.

How many of the above statements given are/ are **incorrect**?
(a) Only one
(b) Only two
(c) All three
(d) None

74. Consider the following statements regarding Adjournment Motion.
1. Adjournment Motion draw the attention to a definite matter of urgent public importance.
2. It involves an element of censure against the government.
3. Rajya Sabha is not permitted to make use of Adjournment motion.

How many of the above statements given is/ are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

75. Consider the following:
1. Adjournment motion
2. Question hour
3. Supplementary questions

The Parliament of India exercises control over the functions of the Council of Ministers through which of the above:
(a) 1 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) 1, 2 and 3

76. Consider the following statements with respect to DigiReady Certification Portal:
1. It aims to assess and certify digital readiness of Micro, Small, and Medium Enterprises (MSMEs).
2. It is a joint initiative of Quality Council of India (QCI) and Open Network for Digital Commerce (ONDC).

Which of the above statements is/are correct?
(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

77. Consider the following statements about National Commission for Women:
1. It is a statutory body of the Government of

India.
2. It was founded in 1992, by the National Commission for Women Act, 1990.
3. It reviews the Constitutional and Legal safeguards for women.

How many of the above statements given is/ are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

78. There is a Parliamentary System of Government in India because:
(a) Lok Sabha is elected directly by the people.
(b) Parliament can amend the constitution.
(c) Rajya Sabha cannot be dissolved.
(d) Council of Ministers is responsible to the Lok Sabha.

79. Consider the following statements regarding the PESA Act.
1. The PESA Act was enacted in 1950 "to provide for the extension of the provisions of Part IX of the Constitution of India relating to the Panchayats to the Scheduled Areas".
2. It ensures self-governance through Gram Sabhas for people living in the Scheduled Areas.
3. It recognises the right of tribal communities, who are residents of the Scheduled Areas, to govern themselves through their own systems of self-government.

How many of the above statements given is/ are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

80. Consider the following statements.
1. Cooperatives are organisations formed at the grassroots level by people to harness the power of collective bargaining in the marketplace.
2. Since the areas of operation of Cooperatives are spread across more than one state, the Cooperatives are a concurrent subject under the Constitution of India.
3. Promotion of Cooperative societies is also a Directive Principles of State Policy under Part 4 of the Constitution of India.

How many of the above statements given is/ are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

81. Consider the following given ports of Ancient India:
1. Musiri
2. Tondi
3. Korkai
4. Poduke (Arikamedu)

How many of the above mentioned port(s) is/ are mentioned in the Sangam texts?
(a) Only one
(b) Only two
(c) Only three
(d) All four

82. Consider the following statements:
1. Sushruta was a contemporary of Charaka.
2. Sushruta was greatly influenced by Patanjali.

Which of the statements given above is/are correct?
(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

83. Consider the following statements regarding the Kakatiya dynasty.
1. The Kakatiya dynasty emerged during the 5th and 6th Century.
2. They ruled most of the eastern Deccan region comprising present day Telangana and Andhra Pradesh.
3. Under the Kakatiya rule, the caste system was not rigid and it was not given much significance socially.

How many of the above statements given is/ are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

84. Which of the following Act granted a monopoly

of the opium trade to the British East India Company, allowing the Company to control and regulate the opium business in India?
(a) Regulating Act of 1773
(b) Pitt's India Act of 1784
(c) Charter Act of 1813
(d) Charter Act of 1853

85. Which one of the following has become the first Indian city to join the World Cities Culture Forum (WCCF)?
(a) Hyderabad
(b) Varanashi
(c) Bangaluru
(d) Chennai

86. Consider the following statements about Light Combat Aircraft 'Tejas':
1. It is a single-engine multirole light combat aircraft.
2. It has the air-to-air refueling capability.
3. It was designed and developed by ISRO.

How many of the statements given above is/ are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

87. Consider the following statements about Permanent Court of Arbitration:
1. It is an international intergovernmental institute established in order to resolve disputes between states.
2. It has a three-part organizational structure.
3. It has a Financial Assistance Fund, which attempts to assist poor nations in meeting a portion of the expenses associated with international arbitration.

How many of the statements given above is/ are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

88. "Global Crisis Response Group"(GCRG) is an initiative established by:
(a) The Intergovernmental Panel on Climate Change.
(b) The UNEP Secretariat.
(c) The UN Secretary-General.
(d) The World Meteorological Organization.

89. Consider the following statements:
1. Gallium is a soft, silvery metal that is in a liquid state near room temperature.
2. Germanium is a semi-metal which makes it a good element for use as semiconductors.
3. Russia is the world's leading producer of both germanium and gallium.

How many of the statements given above is/ are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

90. Consider the following statements about SVAMITVA Scheme:
1. It is a new initiative of the Ministry of Panchayati Raj.
2. It aims to provide the 'Record of Rights' to village household owners possessing houses in inhabited areas.
3. Under the scheme, the land parcels in rural inhabited areas of all the villages are surveyed using drone technology.

How many of the above statements given is/ are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

91. Global Education Monitoring Report is released by :
(a) UNICEF
(b) UNDP
(c) WEF
(d) UNESCO

92. Consider the following statements with respect to Black-necked Crane:
1. It is endemic to Tibetan plateau and protected under the Schedule I of the Wild Life (Protection) Act, 1972.
2. The Tso Kar Wetlands Complex is an important foraging and breeding ground for it.

3. The assessment of the black-necked cranes was recently carried out by the Wildlife Institute of India and the Zoological Survey of India.

How many of the statements given above are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

93. Consider the following statements with respect to Hindu Kush Himalaya Region:
1. It stretches across all the bordering countries of India.
2. It has lost 75% of its original biodiversity over the last century.
3. The Hindu Kush Himalayan Monitoring and Assessment Programme (HIMAP) is an initiative of the Global Mountain Biodiversity Assessment (GMBA).

How many of the statements given above are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

94. Plankton, Aerosol, Cloud, ocean Ecosystem (PACE) Mission, recently seen in the news, is an initiative of which of the following?
(a) National Aeronautics and Space Administration
(b) Indian Space Research Organisation
(c) Japan Aerospace Exploration Agency
(d) Rocket Lab

95. Consider the following statements with respect to Global Mercury Partnership:
1. It was established in 2005 by the United Nations Environment Programme (UNEP).
2. It provides financial grant for Least Developed Countries (LDCs) to implement Minamata Convention.
3. Mercury is present in many household products like batteries, lightbulbs and even television.

How many of the statements given above are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

96. Consider the following statements with respect to Future Circular Collider (FCC):
1. It is a proton-proton collider that was instrumental in the discovery of the Higgs Boson.
2. It is an initiative of European Organization for Nuclear Research (CERN).

Which of the above statements is/are correct?
(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

97. Consider the following statements with respect to Public Examinations Bill, 2024:
1. The Bill aims to punish organised gangs and institutions that are involved in unfair means for monetary gains.
2. Any examination conducted by the Union Public Services Commission (UPSC) will be covered under this bill.
3. All offences under the Bill will be cognisable, non-bailable, and non-compoundable.

How many of the statements given above are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

98. Consider the following statements with respect to Asiatic Black Bear:
1. It is endemic only to Himalayan region.
2. It is protected under the appendix I of the CITES Convention.
3. Centre for Bear Rehabilitation and Conservation in Arunachal Pradesh is the only rehabilitation facility for Asiatic bears in India.

How many of the statements given above are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

99. Consider the following statements with respect to Election Commissioner:

1. He is appointed through a consultative process by a committee that include 'Leader of Opposition' as one of its members.
2. He can be removed by the President on the basis of a resolution passed by both the Houses of Parliament with special majority.
3. Dinesh Goswami committee recommended for appointments to be made solely at the discretion of the government.

How many of the statements given above are incorrect?
(a) Only one
(b) Only two
(c) All three
(d) None

100. Consider the following statements with respect to National Green Tribunal (NGT):
1. It is a statutory body that deals with environmental protection cases.
2. It is not bound by the procedure laid down under the Code of Civil Procedure, 1908.
3. The Tribunal is mandated to finalize all applications and appeals within 6 months of their date of submission.

How many of the statements given above are correct?
(a) Only one
(b) Only two
(c) All three
(d) None

ANSWER

1	b	21	d	41	a	61	b	81	b
2	b	22	b	42	d	62	a	82	d
3	d	23	a	43	d	63	b	83	b
4	d	24	b	44	b	64	a	84	c
5	a	25	b	45	b	65	b	85	c
6	a	26	c	46	b	66	b	86	b
7	c	27	d	47	b	67	b	87	c
8	b	28	b	48	b	68	b	88	c
9	d	29	d	49	b	69	b	89	b
10	b	30	c	50	d	70	c	90	c
11	b	31	c	51	c	71	a	91	d
12	c	32	c	52	a	72	c	92	c
13	d	33	c	53	c	73	c	93	b
14	a	34	c	54	a	74	c	94	a
15	a	35	c	55	c	75	d	95	b
16	b	36	d	56	a	76	c	96	b
17	b	37	b	57	b	77	c	97	c
18	a	38	b	58	b	78	d	98	b
19	b	39	c	59	b	79	b	99	b
20	c	40	b	60	c	80	b	100	c

ध्येय IAS

UDAAN
A journey to success
Affiliated by: ध्येय IAS

Unlock your potential of becoming **CIVIL SERVANT** without worrying about Financial Barriers.

REGISTER NOW *For*

IAS OLYMPIAD

ENTRANCE EXAM
16 - JUNE - 2024

ELIGIBILITY -12
AGE - 16
TO 19 YEARS

100%
SCHOLARSHIP

7800009800

Lucknow