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PIONEER ACADEMY's
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CURRENT AFFAIRS FOR CIVIL SERVICES

Topic 1. WANT TO CATCH A SUPERNOVA? THERE'S A NEW APP FOR THAT

Important for the subject: Science and technology

The compass and gyroscope sensors of a smartphone can precisely align the telescope, or binoculars, with the focus of one's observation in the sky.

- The apps can further extend their **low-light capabilities** so that, once paired with a telescope, the phone turns into a veritable looking glass to the heavens.

Space-based Apps:

- The **Google Sky Map** is described as **"a hand-held planetarium for your Android device"** and can locate and identify stars, planets, and nebulae (enormous clouds of gas and dust in interstellar space) in seconds.
- **NASA's free smartphone app** helps in finding the way around the sky, providing images, videos, and exclusive updates on current and scheduled space missions.

A new App- ZARTH:

- A team of researchers led by **Ashish Mahabal**, an astronomer and the lead computational and data scientist at the **Center for Data Driven Discovery,**
- **California Institute of Technology,** has developed an app that **allows anyone with a smartphone to 'hunt' for transients (Space related phenomenon and events typically lasting fractions of a second to days or even years)**.
- The app uses the **open-source Sky Map** and adds data daily from the **Zwicky Transient Facility (ZTF)'s robotic telescope** at the **Palomar Observatory in California**.
- **Palomar** is also home to one of the oldest, largest, and most powerful telescopes in the world: the **200-inch Hale reflector.**
- The **ZTF** scans the entire northern sky every two days and uses the data to make large area sky maps that have important applications in tracking near-earth asteroids and studying supernovae.
- The new app, called **ZARTH**, short for **'ZTF Augmented Reality Transient Hunter'**, is built along the lines of the **augmented reality mobile game Pokemon Go**.
- Its USP is that it allows the user to do serious science while playing a game. Students from the **Indian Institutes of Technology at Mandi** and **Gandhinagar** were also involved in developing **ZARTH**.
- This new app is inspired by the game **Pokemon Go**.
- In the **ZARTH app,** users have to 'catch' a transient, and once they catch it, the app shows more details about it.
- ZARTH ranks transients by their rarity and importance.

Significance:

- The game (or App) can be introduced in the classroom courses Encouraging students to pursue STEM (Science, Technology, Engineering and Maths) studies.

- Detection of rare and new astronomical events.

Terms:

- **Supernovae:** A supernova is the explosion of a star. It is the largest explosion that takes place in space.
- A supernova occurs during the last evolutionary stages of a massive star or when a white dwarf is triggered into runaway nuclear fusion.
- **Black Hole:** A black hole is a region of spacetime where gravity is so strong that nothing, including light or other electromagnetic waves, has enough energy to escape it. Black hole is the incredibly dense debris of dead stars.
- **Hale Telescope:** The Hale Telescope is a **200-inch (5.1 m), f/3.3 reflecting telescope** at the **Palomar Observatory** in **San Diego County, California, US,** named after astronomer **George Ellery Hale.**
- The **Hale** was groundbreaking for its time, with **double the diameter of the second-largest telescope,** and pioneered many new technologies in telescope mount design and in the design and fabrication of its large aluminum coated **"honeycomb" low thermal expansion Pyrex mirror**. It was completed in **1949** and is **still in active use**.

Topic 2. TO LIVE WITH ALS AND TO CARE FOR PATIENTS EXTRACTS A TOLL

Important for the subject: Science and technology

Introduction

Amyotrophic Lateral Sclerosis (ALS) is a rare **neurodegenerative** disease. The **gap** between symptom onset and diagnosis significantly impacts the experience.

Understanding ALS

- ALS targets **Motor Neurons in the brain and spinal cord. Motor Neurons** control voluntary functions like **walking, talking, and more.**
- **Gradual deterioration** of these neurons leads to muscle weakness and **atrophy**. **Impaired respiratory muscles** due to neuron loss affect breathing.

Survival and Progression

- On average, ALS patients survive for around **three years after diagnosis.** Research by Chio et al. (2009) reveals a range of **20 to 48 months** for survival.
- The disease's **progression rate varies** from person to person based on factors like **genetics and overall health**.

Diagnosis Challenges

- The diagnostic journey for ALS takes **8 to 15 months** from the emergence of symptoms.
- **Definitive biomarkers** for ALS remain undiscovered, complicating diagnosis. Diagnosis

requires **motor cell failure in multiple body regions**. Isolated symptoms, such as limb weakness, are insufficient for a confirmed ALS diagnosis.

Rare Disease Policy and ALS

- India **lacks a comprehensive national policy** focused on rare diseases like ALS.
- The Union Government's **National Policy for Rare Diseases (NPRD) 2021** offers financial assistance **up to Rs. 50 lakh**for patients with rare diseases.
- **WHO defines rare diseases** as disorders with a prevalence of 1 or less per 1000 population.
- The **NPRD includes a prevalence threshold of 1 to 6 in 10,000 people**. **ALS affects six out of one lakh people,** meeting the criteria for rare diseases in India.

Rare Diseases: An Overview

Definition and Scope

- Rare diseases are a group of disorders with **low prevalence** in the population. **WHO defines rare diseases** as disorders with a prevalence of 1 or less per 1000 population.
- There are 6,000-8,000 classified rare diseases. Less than 5% of these diseases have available therapies.

Examples of Rare Diseases

- Lysosomal Storage Disorders (LSD), Pompe disease, cystic fibrosis, muscular dystrophy, spina bifida, hemophilia, etc. These diseases often have severe and chronic impacts on patients' lives.

National Rare Disease Policy 2021: Overview

- Emphasize **local research and production** of medicines.
- **Reduce treatment costs** for rare diseases.
- Facilitate **early detection and prevention** of rare diseases.

Key Provisions of the Policy

Categorization

- **Group 1**: Disorders treatable with **one-time curative** interventions.
- **Group 2**: Diseases necessitating **long-term or lifelong** treatment.
- **Group 3**: Diseases with available treatment but facing challenges in patient selection, high costs, and lifelong therapy.

Financial Support

- Up to Rs. **50 lakhs financial aid for patients** with any category of rare diseases, treated at the **Centre of Excellence (CoE)** specified in NPRD-2021, **outside the**

RashtriyaArogaya Nidhi umbrella scheme.

- Up to **Rs. 20 lakhs assistance under Rashtriya Arogya Nidhi for Group 1 rare diseases.**
- Rashtriya Arogya Nidhi extends support to patients with critical diseases irrespective of their financial status. Utilization of **digital crowdfunding platform** for individual and corporate contributions.

Centres of Excellence

- Designation of **eight health institutions** as 'Centres of Excellence'. Allocation of **one-time financial aid of up to Rs. 5 crore** for enhancing diagnostic facilities.

National Registry

- Establishment of a nationwide **hospital-based registry** for rare diseases. Ensuring **comprehensive data and standardized definitions** to support research and development initiatives.

Topic 3. PRESIDENT MURMU LAUNCHES STEALTH FRIGATE INS VINDHYAGIRI

Important for the subject: Science and technology

President Droupadi Murmu on Thursday launched ***INS Vindhyagiri,*** the last in the series of three ***Project 17A (Alpha) frigates*** built by the Indian Navy at Kolkata-based **Garden**

Reach Shipbuilders and Engineers (GRSE).

INS Vindhyagiri and Project 17A Details

- INS **Vindhyagiri**will join sister ships INS **Himgiri**and INS **Dunagiri**at the Outfitting Jetty at GRSE for remaining activities and equipment trials.
- The Nilgiri-class frigates have a **length of 149 meters and a displacement of over 6,670 tonnes.** The propulsion system allows speeds of **over 28 knots.**
- Project 17A Frigates represent advancements over the **Project 17 (Shivalik Class) Frigates**, with improved stealth features, advanced weapons, sensors, and platform management systems.
- **Seven Project 17A Frigates** are under construction at Mazagon Dock Shipbuilders Limited (MDL) and GRSE.
- INS **Nilgiri** (MDL)
- INS **Taragiri** (MDL)
- INS **Mahendragiri** (MDL)
- INS **Udaygiri**(MDL)
- INS **Himgiri**(GRSE)
- INS **Dunagiri**(GRSE)
- INS **Vindhyagiri**(GRSE)
- Over 75% of the orders for Project 17A were placed on indigenous firms, in line with the vision of **'Aatma Nirbhar Bharat'.**

Topic 4. CHANDRAYAAN-3 LANDER SEPARATES FROM PROPULSION MODULE

Important for the subject: Science and technology

After 34 days on board the Chandrayaan-3 spacecraft, the propulsion module and the lander module parted ways on August 17, and have now embarked on their respective journeys.

Separation of Modules and Soft Landing Plans

- Propulsion module and lander module separation on August 17, 2023. Complex braking maneuvers for a **soft landing in the south polar region** of the moon. Lander is expected to touch down on the moon's surface at 5.47 p.m. on August 23, 2023.

Chandrayaan-3 Components

- The Lander module, propulsion module, and rover constitute Chandrayaan-3.
- **Propulsion module's role**: Transport lander to 100-km moon orbit after launch.
- **Lander's capabilities**: Soft landing, rover deployment, in-situ chemical analysis.

Scientific Missions on the Lunar Surface:

Scientific Payloads and Mission Duration

- **Rover payloads**: Study **lunar surface composition, and elements analysis.**
- **Lander payloads**: Study **lunar quakes, thermal properties, plasma changes, and Earth-moon distance.**
- **The propulsion** module carries a **SHAPE** payload for Earth's atmospheric study. **Lander and rover mission life**: One lunar day (14 Earth days).
- The **propulsion module payload** will be operational for **3-6 months. SHAPE Payload: Spectro-polarimetry of Habitable Planet Earth** Developed by **U.R. Rao Satellite Centre, ISRO, Bengaluru**.
- Part of Chandrayaan-3's **propulsion module**. Studies **Earth's atmosphere** from the moon's viewpoint.
- Analyzes **spectral signatures and polarization patterns**. Identifies potential life markers for exoplanets. Gathers data for **exoplanet habitability.**

Topic 5. ARE TURMERIC SUPPLEMENTS ADVISABLE?

Important for the subject: Science and technology

Australia's Therapeutic Goods Administration (TGA), the country's regulator of medicines, medical devices and biologicals, issued a **medical advisory** last week warning **Australians** of the **risk of liver injury** from using **medicines and herbal supplements containing turmeric** or its **active ingredient, curcumin**.

Why was this advisory issued?

- There are over 600 listed medicines, legally available in Australia, that contain these curcuma species and/or curcumin.
- **TGA** had received **18 reports of liver problems** experienced by consumers taking products containing **curcuma longa (turmeric) and/or curcumin**.
- The prolonged investigation and the evidence from **nine of these reports** had enough information to suggest that **a liver injury may have been caused by curcuma longa or a curcumin product.**

Does turmeric have health benefits?

- The **TGA warning** says that the **risk of liver injury did not appear to relate to curcuma longa consumed in "typical" dietary amounts as a food**.
- As a staple ingredient in **South and South East Asian cuisine, turmeric** is also used in **Ayurvedic** and **Chinese-medicine concoctions**.

Several studies indicate that curcumine has:

- Anti-oxidant properties that can help with inflammation. Can potentially help in arthritis and infections. Curcumin used along with the drug Artemisinin was **effective in treating**

malaria when tested on mice.

- There have also been studies investigating the drug as an adjuvant in chemotherapy based on results in mice and animal studies. But their studies on human trials are inconclusive.

Bioavailability of curcumine:

- Very little of curcumine is absorbed, or made 'bioavailable', by the body. A popular approach is to use **piperine,** the **major active component of black pepper,** which **improves bioavailability by 2000%.**

Challenges with curcumine consumption:

- The **ANSES report (French Agency for Food, Environmental and Occupational Health & Safety)** underlines that **turmeric** has **"choleretic" properties.**
- It means it **stimulates** the **secretion of bile to improve digestion**, and therefore, it is advisable that those with **bile duct disease should avoid turmeric**.
- **Curcumin** could also **interact with medications** such as **anticoagulants, cancer drugs** and **immunosuppressants**, reducing their safety and effectiveness.

Is there a 'safe limit' on the amount of turmeric that can be consumed?

- The **European Food Safety Authority** has set an **acceptable daily intake of 180 mg of curcumin per day** for a **60 kg adult** as the safe level of consumption.
- The average consumption in **France** remains low, with **27 mg** for heavy consumers of foods containing turmeric.
- A **World Health Organization/Food and Agricultural Organisation advisory recommends 3 mg/kg of body weight.** A 75 kg person can have about 200 mg a day.
- **India's Food Safety and Standards Authority of India** has standards that packaged turmeric must comply with but **nothing on the recommended dietary allowance**.

India-USA patent dispute over turmeric:

- The **Indian government** challenges the **US** for **patenting turmeric and forces them to revoke it.**
- **American researchers of Indian origin, Suman K. Das** and **Hari Har P. Cohly**of the **University of Mississippi Medical Center** put a claim to the **US Patent and Trademark Office**, maintaining that they had **discovered haldi's healing properties**.
- In **March 1995**, they received a patent for the **Haldi medication.**
- **On March 6, 1997,** the **United States** filed its **first complaint** with the **World Trade Organization (WTO)** against **India's 'patent protection for pharmaceutical and agricultural chemical products.**
- The **Council of Scientific and Industrial Research** requested a r**eexamination** from the **US Patent Office.** The **patent,"use of turmeric in wound healing",** was **cancelled in 1998.** Evidence established that use of turmeric to promote wound healing had been known for generations in India, hence, it is not an invention.

Topic 6. BACTERIAL RESHAPING SPEEDS HYDROCARBON BREAKDOWN

Important for the subject: Science and technology

Specialized marine bacteria that bloom following oil spills form **unique biofilms** that reshape the **oil droplets, allowing more bacteria to feed at once**. The finding improves scientists' understanding of the processes that drive **biodegradation of spilled oil**.

- The **bacterium Alcanivorax borkumensis** consumes **hydrocarbons** as its **sole carbon and energy source**.
- The **marine bacteria** are known to form **biofilms around oil droplets,** but how exactly this process works hasn't previously been fully understood.
- A research team based in **Japan** and **France** has captured the **full dynamics of biofilm development** by using a **microfluidic device** that allows the **real-time imaging of bacteria-covered oil droplets.**
- This enabled the team to **observe the whole process from initial colonisation through to complete consumption of oil droplets**.
- The **speed** with which the **bacteria degrade the droplets** depends on the **bacteria's adaptation to oil consumption**.
- But rather than this being caused by an increase in individual metabolic throughput, this acceleration appears to be due to the **types of biofilms that the bacteria form.**
- **Bacteria** that were **exposed to the oil for longer formed thin biofilms with numerous branching dendrites.**
- These **dendritic biofilms decrease the oil–water interfacial tension** causing dimples to form on the droplets, which **speeds up the bacteria's consumption** by expanding the interface of the oil droplet **allowing more bacteria to feed simultaneously.**

Topic 7. INDIA'S FIRST 3D-PRINTED POST OFFICE INAUGURATED IN BENGALURU: HOW DOES 3D PRINTING WORK?

Important for the subject: Science and Technology

India's first 3D-printed post office was **virtually inaugurated** by Union Minister Ashwini Vaishnaw in **Bengaluru's Cambridge Layout** on Friday (August 18).

Multinational company **Larsen & Toubro Limited** built the post office with technological support from **IIT Madras** under the guidance of **Professor Manu Santhanam.**

Its construction was completed in just **43 days** — two days ahead of the deadline.

What exactly is 3D printing? And how do 3D printers work?

- Invented in the **1980s**, **3D printing** burst into the mainstream around the **2010s,** when many thought it would take over the world.
- The technology at the time was **expensive, slow and prone to making errors**. In recent years, some of these flaws have been done away with, making **3D printing** more

prevalent than ever before.

Concept of 3D printing:

- **3D printing**, also known as **additive manufacturing**, is a process that uses **computer-created design** to make **three-dimensional objects layer by layer.**
- It is an **additive process**, in which layers of a **material** like **plastic, composites or bio-materials** are built up to construct objects that range in shape, size, rigidity and colour.

Working mechanism:

- A personal computer is connected to a 3D printer.
- Design a 3D model of the required object on computer-aid design (CAD) software and press 'print'. The 3D printer does the rest of the job.
- **3D printers** construct the desired object by using a **layering method**, which is the complete opposite of the **subtractive manufacturing processes**.
- **Subtractive manufacturing process** involves carving out a desired product out of a large object. Example: Sculpture from a big piece of marble, monoliths out of a big rock etc.
- In the **layering method,** objects arebuilt from the bottom up by piling on layer after layer until the object looks exactly like it was envisioned.

What objects can be built using 3D printers?

- These machines are capable of printing anything from ordinary objects like a ball or a spoon to complex moving parts like hinges and wheels.
- One could print a whole bike – handlebars, saddle, frame, wheels, brakes, pedals and chain – ready assembled, without using any tools.

Use of 3D printing in Space sector:

- The **Agnilet engine (developed by Space Startup- Agnikul)** is an **entirely 3D printed,** single-piece, 6 kN semi-cryogenic engine.
- The engine, which uses a **mixture of liquid kerosene at room temperature** and **supercold liquid oxygen as propellant,** was tested last year at the **Vikram Sarabhai Space Centre in Thiruvananthapuram**.
- In **2021, Skyroot** had successfully demonstrated the **country's first privately developed cryogenic engine, Dhawan-1,** which too was **completely 3D printed**, using a superalloy, by a process that cut the manufacturing time by 95 per cent.

Are there any concerns about 3D printing?

- While it does allow engineers to reiterate designs faster than with conventional manufacturing techniques, **it is not as scalable.**
- With conventional techniques, once a design has been set, multiple copies can be made much faster.
- **3D printing is still slow** if you compare it to **injection moulding or planar-based**

manufacturing where you can manufacture millions of pieces every month. So**it is not meant for manufacturing in large volumes**.

Other challenges include:

- Equipment costs
- Limited materials available
- Post-processing requirements
- Manufacturing costs
- Lack of in-house additive manufacturing resources
- Lack of expertise and/or training among workforce/employees
- Limited repeatability (accuracy from build to build)
- Lack of formal standards
- Lack of proven documentation of additive manufacturing's capabilities
- Software development and capabilities
- Longer production timelines
- Limited recyclability
- Risk of litigation/legal implication
- Data storage requirements

Topic 8. OBSERVATIONS OF WOLF-RAYET STAR INDICATE POTENTIAL MAGNETAR FORMATION IN SUPERNOVA

Important for the subject: Science and Technology

Observations and stellar evolution models suggest a **connection between a Wolf Rayet star and magnetar production during a supernova.**

This study offers insights into the **formation process of magnetars**, which are characterized by **extremely powerful magnetic fields**.

Magnetars:

- **Magnetars** are a type of **neutron star with magnetic fields trillions of times stronger than the sun's.**
- Magnetars can induce **starquakes**, analogous to earthquakes on stars, releasing massive amounts of energy and radiation.

Wolf-Rayet Star and Supernova:

- Wolf-Rayet stars are **advanced-stage massive stars** that have **expelled their outer hydrogen layers** and exposed their **helium core**.
- Neutron stars, including magnetars, are born from the remnants of massive stars that have undergone **supernova explosions.**
- The exact origin of magnetars remains a Important for the subject of scientific inquiry.
- **One hypothesis** posits that **amplification of the magnetic field within the parent star's**

core during a supernova event could lead to the formation of a magnetar.

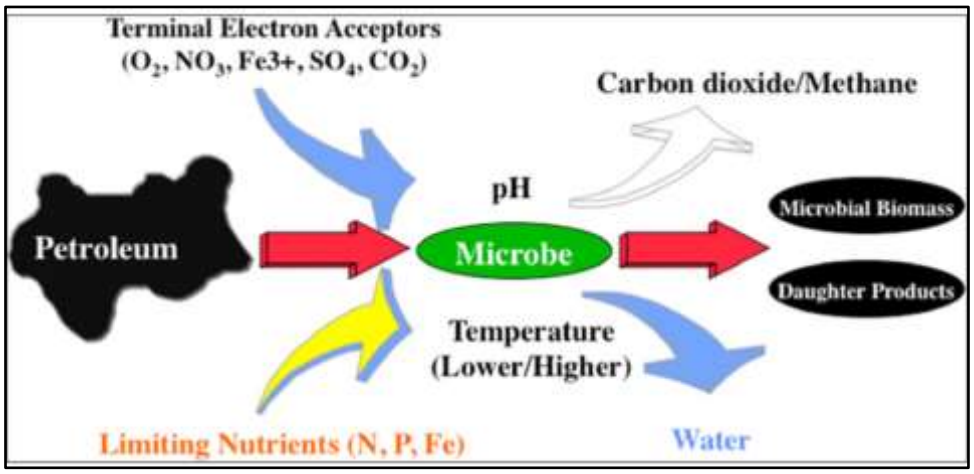
- However, such strong magnetic fields have not been observed in massive, evolving stars that eventually become neutron stars.

Observation and Study Details:

- The study conducted by Tomar Shenar and colleagues focuses on the **binary system HD 45166.**
- This system comprises a **main sequence star and a companion hot Wolf-Rayet star.**

Topic 9. "OIL-EATING" MICROBES AND HYDROCARBON BIODEGRADATION

Important for the subject: Science and Technology



Introduction:

Alcanivorax borkumensis bacteria have specialized **biofilm formation Reshaping oil droplets** increases the consumption rate. The study investigates the optimization of **oil biodegradation** and consumption mechanisms

- **Obligate Hydrocarbonoclastic Bacteria (OHCB) and Bioremediation**
- OHCB uniquely consumes hydrocarbons as its sole carbon and energy source Crucial role in bioremediation of spilled petroleum globally

borkumensis (Alca): OHBC with aerobic and rod-shaped characteristics. Alca **exploits organic acids and alkanes**; prominent during oil spills. Alca forms **biofilms** around oil droplets during consumption

- **Biofilm morphology changes** tied to adaptations in oil consumption
- Initial oil exposure leads to **a thick spherical biofilm growing outward;** oil droplet mostly retains its shape
- Prolonged oil exposure results in thin biofilm with **dendritic finger-like protrusions**
- Dendritic biofilms **modify oil-water interfacial tension**

Bacterial proliferation leads to the buckling and reshaping of oil droplets

- The increased surface area of droplets enhances consumption by the growing bacteria population
- Alca oil consumption efficiency is amplified by expanding interfacial properties

Collaborative Microbial Degradation

- **Alca** lacks the capability to degrade the entire range of hydrocarbons in crude oil Comprehensive degradation requires a **diverse microbial community**
- Microbes **interact and sometimes compete** to perform degradation **Commonly Used Bacterial Species for Hydrocarbon Degradation and Bioremediation**

Bacterial Species Description

- Alcanivorax borkumensis
- Well-known for its ability to degrade long-chain alkanes found in marine oil spills.
- Pseudomonas putida is Widely used due to its versatility in degrading various pollutants, including hydrocarbons.

Rhodococcus spp.

- Commonly employed for their effective degradation of a wide range of hydrocarbon compounds.
- Bacillus subtilis
- Certain strains are utilized for their hydrocarbon-degrading capabilities in bioremediation.

Acinetobacter spp.

- Frequently chosen for their adaptability and effectiveness in degrading hydrocarbons in diverse environments.

Sphingobium spp.

- Recognized for their capacity to efficiently degrade both simple and complex hydrocarbons.

Topic 10. CSIR'S NEW LOTUS VARIETY 'NAMOH 108': A GRAND GIFT TO PM MODI

Important for the subject: Science and Technology

Union Science Minister Jitendra Singh unveils **the 'Namoh 108'** lotus variety at **CSIR-National Botanical Research Institute, Lucknow**. The variety is described as a grand gift to **PM** Narendra Modi, recognizing his relentless zeal and tenure.

Key Features of Namoh 108 Lotus

- Lotus with **precisely 108 petals**, a unique trait. Initially discovered in **Manipur** and

incorporated into **CSIR-NBRI's plant collection**.

- Initially appeared **ordinary** compared to other lotus types. Subsequent **genome sequencing** revealed unique characteristics. **Sole lotus variety in India with its genome sequenced.**
- Genome research led to **improved germplasm and characteristics**. Modified to enable **easier cultivation outside Manipur.**
- Plan to establish an **industrial and entrepreneurial ecosystem** around the variety.

Name and Significance

- The name **'Namoh 108'** is derived from "***Om Namaha Vasudeva***". 'Namoh' translates to **'salutations' in Sanskrit.Lotus Mission** The launch of 'Lotus Mission' follows the success of **the Aroma Mission.**
- **CSIR-NBRI** initiates the **'Lotus Mission'** to promote the wider cultivation of 108 Namo flowers.
- An integral part of a **larger horticultural mission.** Aims to spread cultivation across **various regions** of India.

Unveiling of **products derived from the variety:**

- **Apparel** made from **lotus fiber**. The perfume named **'Frotus'** is extracted from lotus flowers. **Perfume** developed under Lotus Research Programme in collaboration with **FFDC, Kannauj.**

Other Initiatives and Publications

- Launch of **new Aloe vera variety 'NBRI-Nihar'** with approximately **2.5 times higher gel yield.**
- Introduction of **herbal colors from temple flower offerings** for various applications, including dyeing silk and cotton cloths.
- Introduction of herbal products including **'Herbal Cold Drops'** and **'Herbal Anti Dandruff Hair Oil'**.
- Launch of a **Database** of **500 Raw Drug Repositories** adhering to **Indian Pharmacopoeia Standards.**
- Release of **a book on roses conserved at CSIR-NBRI Garden.** Collaboration with **M/s Nucleome Informatics, Hyderabad**, for research on **Cotton**.

CSIR-National Botanical Research Institute (NBRI):

- Originally established as the **National Botanic Gardens (NBG)** by the **State Government of Uttar Pradesh (U.P.).** Taken over by **CSIR in 1953.**
- Transitioned from classical botanical research to **applied and developmental research.** Renamed the **National Botanical Research Institute (NBRI) in 1978.**

Topic 11. INS VAGIR

Important for the subject: Science and Technology

For the first time, the Indian Navy's INS Vagir, a Scorpene-class submarine, has been deployed to Australia on an extended-range mission.

It is a **Kalvari-class submarine**, which includes vessels, such as the **INS Kalvari, INS Khanderi, INS Karanj, INS Vela and INS Vagsheer.**

It is the **fifth Scorpène-class submarine**.

- This class of submarines **have Diesel Electric transmission systems.**
- These are p**rimarily attack submarines** or 'hunter-killer' types which means they are designed to target and sink adversary naval vessels.
- It is built under **Project-75** by the **Mazgaon Docks Ltd,** under technology transfer from the **Naval Group of France**
- INS Vagir is **capable of undertaking diverse missions including anti-surface warfare, anti-submarine warfare, intelligence gathering, mine laying and surveillance missions.**
- It has **advanced stealth features** and is also equipped with **both long-range guided torpedoes and anti-ship missiles.**

What is Malabar naval exercise:

- It is an **annual exercise between the navies of India, Japan, and the U.S**. held alternately in the Indian and Pacific Oceans.
- It **began in 1992** as a **bilateral exercise between India and the U.S**.
- Then it got **permanently expanded into a trilateral format** with the **inclusion of Japan in 2015.**
- With the **addition of Australia, it has become a Quadilateral naval exercise** between India, USA, Japan and Australia.
- The **aim of the Malabar Exercise** of India, the US, Japan and Australia is to **coordinate for a free, open, and inclusive Indo-Pacific.**

What is Project 75:

- This project envisages the **indigenous construction of submarines equipped** with a **state-of-the-art Air Independent Propulsion system**
- **Project 75 (I), approved in 2007**, is part of the Indian **Navy's 30-year Plan for indigenous submarine construction.**
- Project-75(I) **envisages indigenous construction of six modern conventional submarines** including **associated shore support, Engineering Support Package, training and spares package with contemporary equipment, weapons & sensors including Fuel-Cell based AIP (Air Independent Propulsion Plant), advanced torpedoes, modern missiles and state of the art countermeasure systems**. .

Topic 12. GENE-EDITED MUSTARD

Important for the subject :Science and technology

Recently, Indian scientists developed the first ever Gene edited low-pungent mustard that is pest and disease-resistant.

Indian scientists have developed the first ever low-pungent mustard that is pest and disease-resistant. It is based on CRISPR/Cas9 gene editing, while being non-GM and transgene-free.

What are the issues with Mustard seeds:

- Mustard seeds are **rich in glucosinolates**, a class of compounds containing **sulphur and nitrogen**, which lend their **characteristic pungency** to both the **oil and meal derived from these seeds.**
- Rapeseed meal, a **byproduct of oil extraction**, is **unpalatable to poultry and pigs**. It must be **mixed with fodder grass and water** before being fed to cattle and buffaloes.
- The presence of **high levels of glucosinolates not only reduces feed intake in livestock but can also lead to goiter (neck swelling) and internal organ abnormalities**.
- In India, the **dry seeds of standard mustard** (Brassica juncea) contain around **120-130 parts per million (ppm or mg/kg) of glucosinolates**. In contrast, canola seeds contain notably lower levels, around sub-30 ppm."

What is this Gene Editing breakthrough:

- The synthesis of glucosinolates takes place **within the leaves and pod walls of mustard plants.**
- Transferring and accumulating these compounds in the seeds is **orchestrated by glucosinolate transporter (GTR) genes.**Two distinct classes of these genes, **GTR1 and GTR2**, encompass a **total of 12 genes with six copies each.**
- In a significant breakthrough, researchers **employed CRISPR/Cas9**, a gene-editing tool leveraging an e**nzyme functioning as 'molecular scissors,'** to precisely cleave the DNA at targeted locations in **10 out of the 12 GTR genes**.
- This process **activates the natural DNA repair mechanism,** rendering the encoded proteins responsible for glucosinolate transport to seeds non-functional.
- By accomplishing this, the **scientists have produced mustard lines with diminished glucosinolate content** to match the concentration in dry seeds, thereby **achieving oil and meal quality akin to canola-quality rapeseed (Brassica napus)** in terms of pungency.
- Notably, these **new mustard lines edited with GTR genes are free of transgenes, rendering them non-genetically modified (**GM). They **lack foreign genes commonly found in other genetically modified organisms,** such as Bacillus thuringiensis bacteria genes in cotton or **Bar-Barnase-Barstar genes from other soil bacteria present in GM hybrid mustard (DMH-11)**

What is difference between Genome editing and Genetically modified organisms:

- The fundamental contrast betwee**n genome editing and genetic modification** lies in their mechanisms.
- In **genome editing, foreign genetic material isn't introduced**; instead, **targeted modifications are made** within the organism's own genome.
- In contrast, **genetic modification involves the introduction of external genetic material, potentially from unrelated species,** to confer specific traits.

What is Genetic Engineering Appraisal Committee (GEAC)

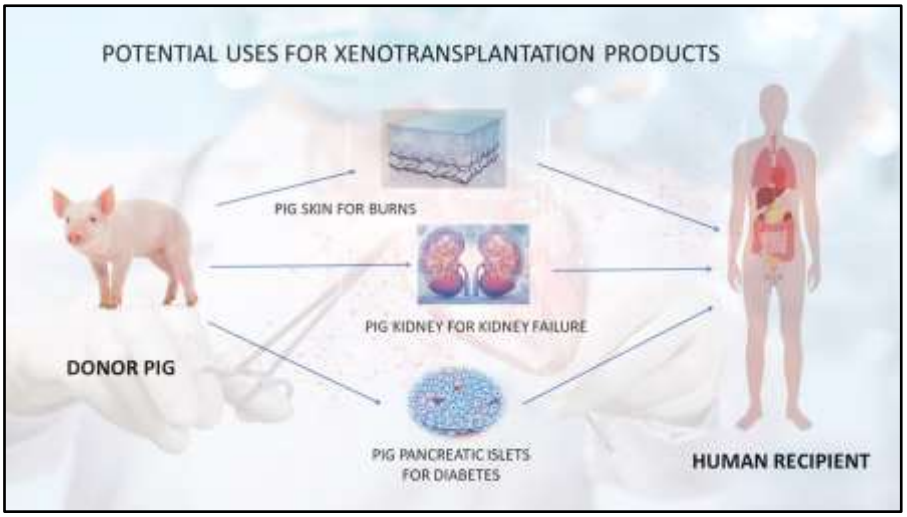
- The Genetic Engineering Appraisal Committee (GEAC) **functions in the Ministry of Environment, Forest and Climate Change (MoEF&CC).**
- It is **responsible for appraisal of activities involving large scale use of hazardous microorganisms and recombinants** in research and industrial production from the environmental angle.
- The committee is also responsible for **appraisal of proposals relating to release of genetically engineered (GE) organisms** and products into the environment including experimental field trials.
- GEAC is **chaired by the Special Secretary/Additional Secretary of MoEF & CC and co-chaired by a representative from the Department of Biotechnology (DBT).** Presently, it has 24 members and **meets every month to review the applications in the areas indicated above.**

Some more facts:

- Use of the **unapproved GM variant** can attract a **jail term of 5 years and fine of Rs 1 lakh under the Environmental Protection Act, 1989.**
- **Import of any GM material** is governed by the **Environment Protection Act 1985.**
- GM import proposals ar**e examined by the Genetic Engineering Appraisal Committee (GEAC) under the Environment Ministry** for making a recommendation to either accept or reject the proposal.

Topic 13. XENOTRANSPLANTATION

Important for the subject: Science and technology



After decades of failed attempts, last year, University of Maryland surgeons tried to save a dying man with a pig heart — and he survived for two months.

What is Xenotransplantation:

- Xenotransplantation is any procedure that involves the **transplantation, implantation, or infusion into a human recipient of either** Live cells, tissues, or organs **from a nonhuman animal source,** or **Human body fluids, cells, tissues, or organs that have had ex vivo** (outside of the living body) contact **with live non-human animal cells, tissues, or organs.**

Why Pigs are popular candidates for organ transplantation.

- Pigs are **increasingly becoming popular** candidates for **organ transplantation**. Pigs offer **advantages over primates** for organ procurements, because they are **easier to raise and achieve adult human size in six months.**
- The pig's **anatomical and physiological parameters are similar to that of humans,** and the breeding of pigs in farms is widespread and cost-effective.

Process of Xenotransplantation:

Some breakthrough in Xenotransplantation:

- In **2017, Chinese surgeons** reportedly transplanted p**ig cornea to restore sight in a human.**
- In **2020, US** experts attached a g**enetically-altered kidney** to a brain-dead person.

Topic 14. WHAT ARE ACOUSTIC SIDE CHANNEL ATTACKS AND HOW IS AI USED TO INCREASE ITS ACCURACY?

Important for the subject :Science and technology

Introduction

Research paper: "**A Practical Deep Learning-Based Acoustic Side Channel Attack on Keyboards"**

Published and supported by the **ethics committee of Durham University, U.K. AI** used to **decode passwords by analyzing sound from keystrokes** Highlighted accuracy of **Acoustic Side Channel Attacks (ASCA)** using deep learning models for laptop keystrokes classification and mitigation

Understanding ASCA

- **Side Channel Attacks (SCAs)** method for hacking cryptographic algorithms Analyzing **auxiliary systems**
- **Collecting signals**: **electromagnetic waves, power consumption, mobile sensors, sound from keyboards, printers**
- **ASCA**: using **keyboard sound** to analyze keystrokes and leak sensitive information Users underestimate the misuse of keyboard sound, not hiding keystroke sounds

Impact of AI on ASCAs

- **AI and deep learning increase the risk** of side channel attacks
- **Laptop models with same keyboard increase** ASCA scope
- More microphones near keyboards due to modern technology AI-enabled **deep learning models** can **interpret acoustics**

Accuracy of ASCA Attacks

- Research by Cornell University, Durham University, University of Surrey, Royal Holloway University of London
- Used audio recordings from Zoom calls, smartphone mics, off-the-shelf equipment

ASCA attack accuracy: **95% with nearby phone keystrokes**

- Deep learning model achieved **state-of-the-art accuracy on MacBook Pro keyboard**
- Smartphone microphone data achieved 95% accuracy, dropped to 93% with Zoom calls

Historical Context of ASCA Attacks

- ASCA attacks date back to **1950**, using **acoustic emanations to crack encryption**
- **1982**: **United States NSA** declassified documents listing acoustic emanations as compromise source

Topic 15. THE HARSH REALITIES OF SPACE THAT CHANDRAYAAN 3 IS BUILT TO BRAVE

important for the subject :science and technology

The Solar Wind and Spaceflight Challenges

Solar Wind and Earth's Magnetic Field

The sun's scorching hot surface emits a **constant stream of charged particles known as the solar wind.**

Solar wind includes **protons and electrons** moving at high speeds. **Earth's magnetic field** deflects and guides solar wind particles toward the magnetic poles.

- Interaction of solar wind particles with **oxygen and nitrogen** in Earth's upper atmosphere leads to collisions.
- Oxygen and nitrogen atoms absorb electrons, **releasing excess energy as photons (light)** of different frequencies.
- **Oxygen contributes to green and orange hues**, while **nitrogen contributes to blues.**
- These interactions create the mesmerizing phenomenon of the **northern lights. Vulnerability of Spacecraft**
- Unlike on Earth, spacecraft **lack natural protection from solar wind** and other space hazards.
- Spacecraft equipment must withstand impacts from solar wind particles to **avoid catastrophic failure.**
- **Example**: **Canada's Anik E2 satellite** experienced complete malfunction due to solar wind impact in 1982.

Solar Wind Effects on Electronics

Displacement Damage

- Result of **charged particles displacing atoms in electronic chips**.
- Leads to **permanent chip performance decay**.
- Caused by strong impacts from solar wind particles.

Single-Event Transients (SET)

- **Temporary signal fluctuations** due to solar wind particles. Corrupts transmitted messages **momentarily**.
- **Example**: Belgium's 2003 election – a bit flip in a voting machine led to miscounted votes.

Radiation-Hardened Electronics

- Engineers develop radiation-hardened electronics to safeguard spacecraft electronics from **radiation effects.**

- Radiation-hardened design **considers radiation levels during chip design, manufacturing, and packaging.**
- **Multiple layers of protective measures** are integrated into software and hardware components.
- **Triple modular redundancy (TMR)** involves transmitting three identical signal copies.
- In **signal corruption** (single-event transients), **other uncorrupted signals can outvote the corrupted one**.

Other Challenges and Safeguards

- Instruments onboard spacecraft must withstand **vibrations** during launch from the launchpad.
- **Severe vibrations** experienced during the launch process can affect instrument functionality.

Temperature Fluctuations and Material Challenges

- Spacecraft in space face extreme **temperature fluctuations.**
- **Chandrayaan 3's** operational temperature range is **-200°C to 200°C**, depending on its position relative to the Moon and the Sun.
- Extreme temperatures can lead to **wire breakage, solder failure, and chip cracking.**
- **Copper materials i**n solar panels can become more **'active'** and **seep through solar cells,** affecting efficiency.
- **Outgassing** occurs when some materials release trapped air molecules in a vacuum.
- **Example**: Outgassed air molecules can deposit on a camera lens, affecting image quality.

Metal Coatings and Unexplained Problems

- Some metal coatings form **electrically conductive protrusions** called **whiskers**. Whiskers can **short circuits** and lead to satellite failures.
- Whisker growth is attributed to **built-up stress in the metal during vacuum conditions.**
- Expert selection and application of metal coatings are essential to prevent whiskerrelated issues.

Topic 16. ISRO RELEASES IMAGES OF THE FAR SIDE AREA OF THE MOON

Important for the subject :Science and technology

The images were captured on August 19 by the **Lander Hazard Detection and Avoidance Camera (LHDAC)** which is onboard the Lander.

ISRO has already released three videos of the moon captured by its **third moon mission Chandrayaan-3**.

- One of them was taken by the **Lander Position Detection Camera (LPDC)** on August 15, 2023.

- Another one taken by the **Lander Imager (LI) Camera-1** just after the separation of the **Lander Module from the Propulsion Module**.

Far side of the moon:

- The far side of the Moon is the **lunar hemisphere** that always faces away from Earth, opposite to the near side, because of **synchronous rotation in the Moon's orbit**.
- Compared to the near side, the far side's terrain is **rugged**, with a multitude of impact craters and relatively few flat and dark lunar maria ("seas"), giving it an appearance closer to other barren places in the **Solar System** such as **Mercury** and Callisto.
- It has **one of the largest craters in the Solar System**, the **South Pole–Aitken basin.**
- The hemisphere has sometimes been called the **"dark side of the Moon",** where **"dark"** means **"unknown"** instead of **"lacking sunlight"** – each side of the Moon experiences two weeks of sunlight while the opposite side experiences two weeks of night.
- About **18 percent** of the **far side is occasionally visible from Earth due to libration**.
- The remaining **82 percent remained unobserved until 1959**, when it was photographed by the **Soviet Luna 3 space probe.**
- The **Soviet Academy of Sciences** published the **first atlasof the far side in 1960**.
- The **Apollo 8 astronauts** were the **first humans to see the far side in person when they orbited the Moon in 1968**.
- All crewed and uncrewed soft landings had taken place on the **near side of the Moon**, until 3 January 2019 when the **Chang'e 4 spacecraft made the first landing on the far side.**
- Astronomers have suggested installing a large radio telescope on the far side, where the Moon would shield it from possible radio interference from Earth.

Lander Hazard Detection and Avoidance Camera (LHDAC):

- This camera that assists in locating a safe landing area — without boulders or deep trenches — during the descent is developed by ISRO at SAC.
- LHDAC enables terrain mapping, hazard detection and safe sites designation in real time during landing maneuvers.

About Chandrayaan-3:

- Chandrayaan-3 is a follow-on mission to Chandrayaan-2 to demonstrate end-to-end capability in safe landing and roving on the lunar surface.
- It consists of Lander and Rover configuration. It will be launched by **LVM3** from **SDSC SHAR, Sriharikota**.
- The propulsion module will carry the lander and rover configuration till 100 km lunar orbit.
- The propulsion module has **Spectro-polarimetry of Habitable Planet Earth (SHAPE)** payload to study the spectral and Polari metric measurements of Earth from the lunar orbit.

The mission objectives of Chandrayaan-3 are:

- To demonstrate Safe and Soft Landing on Lunar Surface
- To demonstrate Rover roving on the moon and
- To conduct in-situ scientific experiments.

To achieve the mission objectives, several advanced technologies are present in Lander such as:

- **Altimeters:** Laser & RF based Altimeters
- **Velocimeters:** Laser Doppler Velocimeter & Lander Horizontal Velocity Camera
- **Inertial Measurement:** Laser Gyro based Inertial referencing and Accelerometer package
- **Propulsion System:** 800N Throttleable Liquid Engines, 58N attitude thrusters & Throttleable Engine Control Electronics
- **Navigation, Guidance & Control (NGC):** Powered Descent Trajectory design and associate software elements
- **Hazard Detection and Avoidance:** Lander Hazard Detection & Avoidance Camera and Processing Algorithm Landing Leg Mechanism.

Lander payloads

Objectives

Radio Anatomy of Moon Bound

Hypersensitive ionosphere and Atmosphere (RAMBHA) and **Langmuir probe (LP)**

- To measure the near surface plasma (ions and electrons) density and its changes with time

Chandra's Surface Thermo physical Experiment (ChaSTE)

- To carry out the measurements of thermal properties of lunar surface near polar region.

Instrument for Lunar Seismic Activity (ILSA)

- To measure seismicity around the landing site and delineating the structure of the lunar crust and mantle.

Laser Retroreflector Array (LRA)

Rover:

- It is a passive experiment to understand the dynamics of Moon system.

Rover payload

Objective

LASER induced

Breakdown Spectroscope (LIBS)

- Qualitative and quantitative elemental analysis & To derive the chemical Composition and infer mineralogical composition to further our understanding of Lunar-surface.9/30

Alpha- particle X-Ray Spectrometer (APXS)

- To determine the elemental composition (Mg, Al, Si, K, Ca,Ti, Fe) of Lunar soil and rocks around the lunar landing site.

Propulsion Module Payload

Objective

Spectro polarimetry of HAbitable Planet Earth (SHAPE)

- Future discoveries of smaller planets in reflected light would allow us to probe into variety of Exo-planets which would qualify for habitability (or for presence of life).

Topic 17. ACTIVISTS SEEK DIALOGUE ON CONTROLLED HUMAN INFECTION TRIALS POLICY

Important for the subject :Science and technology

The group, including an advocate, researcher, journalist and others, have submitted a 15-page document calling for more transparency, clear definitions of **'deliberate infection'** and **'deliberate harm'** and specific assurances on compensation for adverse events.

The group has sought to know how **CHIS** can take place when laws such as the

- **Madras Public Health (Amendment) Act 1958**, state that any act performed with a deliberate intention to cause an infection, is **illegal.** A CHIS may be in direct contravention of Acts such as this one.
- It calls for information on the capacity, effectiveness and efficiency of current regulatory mechanisms for clinical trials.
- It has also called for the publication of all results of CHIS – including of failed CHIS, and negative results.
- These publications must include a clear estimation of adverse events and harms.

Adverse events:

The group demands for:

- Assurance of compensations in case a person is adversely injured. All those involved should be accountable for adverse events. The drug control regulators' ethical obligations must be specified
- Creation of a separate section for **complete details of safety requirements**. **ICMR**

statement should describe a **"knowledge threshold"** so that healthy participants in the drug trial are not exposed to something about which the researchers do not have adequate knowledge.

- The terms **"Deliberate infection"** and **"Deliberate harm"** must be defined and the conceptual difference between the two explained.

Topic 18. WHY ISRO'S ADITYA L-1 MISSION IS UNIQUE IN MANY WAYS

Important for the subject: Science and technology

ISRO's Aditya L-1 mission, the Indian space agency's most complex mission ever, is scheduled to launch by the end of August or early September.

Why is it unique?

- For the **first time,India** is building a **'space observatory'** — the spacecraft that will be peering at the Sun all the time, checking out the ball of fire 24×7.

India hasnever put a spacecraft at a Lagrange point.

- **Lagrange point** is a point between two or more massive objects (like the Sun and the Earth) where the massive objects exert equal pull over the spacecraft so that it "stays" right there.
- There are **five Lagrange points** in the **Sun-Earth system;Aditya** is going to be positioned at **Lagrange-1**.
- There are **7 instruments** onboard **Aditya L-1.** The **two principal instruments** are completely **designed and built by Indian scientists** at **Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune.**

SUIT (Solar Ultraviolet Imaging Telescope)

- The Sun is not solid like the Earth is, but a huge ball of gas with different layers, all surrounded by the corona.
- Each layer spins at a different speed. **SUIT** will simultaneously map different parts of the Sun — **photosphere and chromosphere** of the Sun using **11 filters** sensitive to different wavelengths and covering different heights in the solar atmosphere.
- This will help in the understanding of the processes involved in the transfer from mass and energy from one layer to the other.

VELC (Visible Emission Line Coronagraph):

- The **VELC** will study the **corona**. It will do both **photography (optical imaging) and spectrograph,** which is splitting of light into its constituent wavelengths — a study of the spectrographic lines can tell a lot about the sun.
- This is a unique experiment, because this has never been done by anybody from space.
- The VELC can investigate the red and green spectroscopic lines, which give a peek into

the temperature of the region of the Sun from where the light has come.

- The **VELC** will do **'spectropolarimetric measurements'** to study the **magnetic field of the Sun — for the first time by any country from space.** The other five instruments pick up and analyse X-rays and particles from the Sun.

Broad comparison of SUIT and VELC:

- The **SUIT** will be looking at the disc of the Sun, which comprises the inner photosphere and the outer chromosphere, while the **VELC** will peer into the rim (corona).
- The **SUIT** will capture the near-ultraviolet rays (200-400 nm wavelength) coming from the Sun; **VELC** will pick up the near-Infra red radiation from the Sun.

Payloads along with their major capability of scientific investigation

Type Payload Capability

Remote Sensing Payloads

- Visible Emission Line Coronagraph(VELC)
- Corona/Imaging & Spectroscopy
- Solar Ultraviolet Imaging
- Telescope (SUIT) Photosphere and Chromosphere Imaging- Narrow & Broadband Solar Low Energy X-ray
- Spectrometer (SoLEXS) Soft X-ray spectrometer: Sunas-a-star observation
- High Energy L1 Orbiting Xray Spectrometer(HEL1OS)
- Hard X-ray spectrometer: Sunas-a-star observation

In-situ Payloads

- Aditya Solar wind Particle Experiment(ASPEX)
- Solar wind/Particle Analyzer Protons & Heavier Ions with directions
- Plasma Analyser Package For Aditya (PAPA)
- Solar wind/Particle Analyzer Electrons & Heavier Ions with directions
- Advanced Tri-axial High
- Resolution Digital Magnetometers
- In-situ magnetic field (Bx, By and Bz).

Why the interest in the Sun?

- The **Aditya L-1 spacecraft** is essentially a **space telescope.**
- The **Aditya L-1 mission** has **two purposes** — **long term** (scientific quest) and **short term** (protecting our satellites).
- The **genesis** of this project was in **2006**, when scientists from **Indian Institute of Astrophysics** and the **Astronomical Society of India** showed concern about protecting the satellites from harmful effects of the sun's emissions.
- **Prof U. R. Rao, a former Chairman of ISRO,** suggested that an spacecraft can be

placed at Lagrange-1 point fro observation of the sun.

Main idea behind it was:

- To provide an early warning against **solar storms** that can damage satellites and electric grids
- **Coronal mass ejections** (billions of tons of matter flung out of the Sun) **Solar flares** (Sudden burst of energy from sun contains X-rays, electromagnetic waves or high-energy particles) that can disrupt radio communications and harm astronauts.

Long term goals include monitoring the UV-rays.

- **Ultraviolet rays (UV rays)** from the Sun can impact climate on the Earth and the ozone layer in the atmosphere.
- **UV radiation of wavelengths between 200 and 310 nanometres** is **absorbed by the oxygen** and **ozone in the Earth's atmosphere**.
- **UV radiation above 310 nm pierces through the atmosphere**. We need to know **what kind of UV the Sun is likely to emit.**
- **Changes in UV radiation** can influence **cloud formation, water vapor content** and **temperature patterns** in the **Earth's lower atmosphere.**

Why Lagrange point 1 (L1)?

- The **L-1 point** lies between the **Sun and the Earth,** affording a spacecraft placed there an **excellent view of the Sun.**
- **L-1 (along with L-2 and L-3)** are **'halo orbits'**, where a spacecraft placed there keeps going round an **invisible center.**
- An object kept there is **very unstable,** because the spacecraft is Important for the subject to constant pulls and pushes in space.
- Placing a satellite at L-1 is tough and keeping it there is even tougher, but **L-1** has a vantage point for excellent observation of the Sun's activity.

Topic 19. INDIA ACCOUNTS FOR 35% OF CARGO HANDLED BY MURMANSK THIS YEAR

Important for the subject: Geography

India's engagement with **Russia's Arctic region** has been strengthening with India-bound goods constituting the maximum share of cargo handled this year by **Murmansk,** located about 2,000 km northwest of Moscow.

Northern Sea Route (NSR):

- The **Northern Sea Route (NSR)** is a shipping route about **5,600 kilometres** (3,500 mi) long, defined by **Russian legislation** as running from the entrances to the **Novaya Zemlya straits** in the **west,** (along the **Russian Arctic coast** above **Siberia** through the Kara Sea, Laptev Sea, East Siberian Sea, and Chukchi Sea), to **Cape Zhelaniya** on the

Bering Strait, at parallel **66 °N** and **meridian** of **168 ° 58′37 ″ W.**

- India was also getting involved in the **Northern Sea Route (NSR),** which is the **shortest shipping route** connecting the **western part of Eurasia** and the **AsiaPacific region.**
- But there are challenges in navigating the **5,600-km-long NSR.** The route includes the seas of the Arctic Ocean [Kara, Laptev, East Siberian and Chukchi] which remain icebound during most parts of the year.
- India and Russia are considering a sea-corridor proposal to link Chennai and Vladivostok.

Murmansk port:

- **Murmansk Commercial Seaport** is a seaport located on the **eastern shore** of the **Kola Bay** of the **Barents Sea** in the city of **Murmansk, Russia**.
- **Murmansk port,** the main northern gateway of Russia and a **transshipment hub.**
- The port ranks fourth in Russia in terms of processed goods and is the **second-largest port in northwest Russia** (after the port of St. Petersburg).
- **Murmansk seaport** is one of the largest **ice-free ports** in **Russia** and forms the backbone of the economy of the city.
- The port is managed and operated by **JSC Murmansk Commercial Port.**

Significance of the port:

- The route from **Murmansk to Yokohama** in Japan across the Arctic Ocean, including the **NSR**, is about **6,000 nautical miles (NM)**. Alternatively, the distance via the **traditional shipping routes** is about **13,000 NM.**

Topic 20. INDIA STEPS UP EXPLORATION FOR CRITICAL MINERALS, INCLUDING LITHIUM

Important for the subject :Geography

India has stepped up its exploration for critical and strategic minerals, including lithium, rare earth elements, and vanadium, among others.

Minerals such as antimony, cobalt, gallium, graphite, lithium, nickel, niobium, and strontium, among others, are **critical for green technologies, high-tech equipment, aviation,** and **national defence manufacturing needs.** India has a high import dependence for many of these minerals.

Lithium exploration:

- Lithium, a non-ferrous alkali mineral, is in demand for the lithium-ion batteries.
- As per **Geological Survey of India (GSI)** the lithium exploration is underway in **3 states:**
- **Korba** district in Chhattisgarh; **South Garo Hills** and **East Garo Hills** in Meghalaya; and **Jammu, Ramban, Resai, Rajoury** and **Udhampur** in Jammu and Kashmir.
- **India's only lithium** find has been in **Resai,** to the tune of **5.9 million tonnes (mt)**.
- The **Mineral Exploration and Consultation Ltd** — a public sector enterprise under the

Union Ministry of Mines — is carrying out exploration for **lithium** and **potassium** (under the **National Mineral Exploration Trust**) at the **Merak block** in the **Union Territory of Leh**.

Lithium as 'White Gold':

- Due to its importance in technologies such as lithium-ion batteries, electric vehicles, and renewable energy storage solutions.
- This nickname reflects its economic significance akin to traditional precious metals.

Rare Earth Element find:

- There are **17 REEs** — 15 lanthanides (lanthanum, cerium, praseodymium; neodymium, promethium; samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium and lutetium), scandium, and yttrium.
- The lanthanide elements are divided into two groups — light and heavy. **REEs** are used in industrial applications including electronics, clean energy, aerospace, automotive and defence.

Usage of REEs:

- **Manufacture of permanent magnets** is the single largest and most important end-use for **REEs**, accounting for **43 per cent** of demand in 2021.
- **Vanadium,** an elemental metal, is rarely found in nature, but once isolated artificially, the formation of an oxide layer stabilises the free metal against further oxidation.
- **Niobium** — used in jet engines and rockets, girders and beams.

Exploration across states:

The explorations are spread across states like:

- **Chhattisgarh** (Raigarh),
- **Maharashtra** (Nagpur, Chandrapur, and Sindhudurg),
- **Bihar, Jharkhand** (Giridh, Simdega, and Koderna),
- **Odisha** (Nayagarh, Ganjam, and Angul),
- **West Bengal** (Purulia),
- **Arunachal Pradesh** (KurungKumey),
- **Assam** (West Karbi Anglong),
- **Meghalaya** (South West Khasi Hills and Ri-Bhoi),
- **Uttar Pradesh** (Lalitpur and Sonbhadra),
- **Andhra Pradesh** (Anantapur, East Godavari, Alluri Sitharama Raju, Chittoor, Annamayya, Nellore, and Prakasam),
- **Kerala** (Kottayam, Idukki, Thiruvananthapuram, Kollam, and Wayanad),
- **Telangana** (Bhadradri and Jayashankar),
- **Tamil Nadu** (Kanyakumari),

- **Karnataka** (Chamarajanagar),
- **Gujarat** (Chhota Udepur, Aravalli, Mehsana, and Banaskantha), and
- **Rajasthan** (Alwar, Udaipur, Sirohi, and Barmer), among others.

GSI Assessment method and stages:

- Geological Assessment, which is more or less like the classification as per **ISP** adopted by **GSI** and other agencies in India.
- The process of geological assessment is generally conducted in stages of increasing details.

The typical successive stages of geological investigation:

- Reconnaissance, Prospecting, General exploration and detailed exploration, Generate resource data with clearly defined degrees of geological assurance.
- The mineral extraction process typically begins with the **G4 stage**.
- **These four stages** are therefore used as geological assessment categories in the classification.

The geological assessment has 4 codes i.e.

- Detailed Exploration (G1)
- General Exploration (G2)
- Preliminary Exploration (G3)
- Reconnaissance (G4)
- The **G3 stage** is further categorized into a **six-step process** to extract Lithium from Salt-flat brines or Mineral ores.
- **Stage 1: Geological Surveys:** Mapping on a more extensive scale and linking prepared maps with a top grid. Assessment of lithology, structure, surface mineralisation, analysis of old workings etc.
- **Stage 2:** Perform Geochemical sampling rock type wise, soil survey.
- **Stage 3:** Detailed ground geophysical work and borehole logging.
- **Stage 4:** Check the technicality of pits/trench to explore the mineralised zone and drill borehole spacing
- **Stage 5:** Sampling for litho geochemical from a well-known section, pit/trench and core sample
- **Stage 6:** Petrographic and mineralogical studies: the combined study of rocks in thin sections and the chemistry, crystal structure and physical properties of the mineral constituents of rocks.
- According to the **Indian Bureau of Mines (IBM),** apart from the thorough examination of the above-mentioned geological axis, the proposal to mine minerals also needs to be assessed from a feasibility point of view along with the prospects of economic viability.

Mineral Exploration and Consultation Ltd (MECL):

- MECL was established as an **autonomous Public Sector Company** in October **1972**, under the **administrative control** of the **Ministry of Mines, Government of India** for systematic exploration of minerals, to bridge the gap between the initial discovery of a prospect and its eventual exploitation.
- **MECL has the Mission** "to provide high quality, cost effective and time bound geo scientific services for exploration and exploitation of minerals".

National Mineral Exploration Trust (NMET):

- The **NMET** was established by the **Government of India** vide Gazette Notification G.S.R.633(E) of **14th August 2015,** in pursuance of **subsection(1)** of **Section 9C** of the **Mines and Minerals (Development and Regulation) Act, 1957,** with the **objective** to expedite mineral exploration in the country.

Topic 21. INDIA LAUNCHES 'FLOODWATCH' APP FOR REAL-TIME FLOOD UPDATES

Important for the subject: Geography

The **Central Water Commission** launched an app, called **'Floodwatch',** which can **forecast the chances of floods a day in advance**.

Features of the App- Floodwatch:

- It also provides a **seven-day advisory on the chances of floods** at various stations in the country where the **CWC** maintains its measurement gauges.
- The app has a **map of India** with coloured circles at water stations across the country indicating the current risk of flooding.
- A **'green'** circle indicates **'normal'; yellow, above normal; orange, 'severe' and red, 'extreme'.**
- Clicking on a circle shows the current water level at the station, the highest level historically attained, the danger level and warning level. The warnings are in English or Hindi with an option for a voice-enabled prompt.
- The app will also provide **State-wise/basin-wide flood forecast up to 24 hours or flood advisory,** up to seven days, that can be accessed via selecting specific stations.
- **Floodwatch** uses **advanced technologies** such as **satellite data analysis, mathematical modelling** and **real-time monitoring to deliver accurate and timely flood forecasts**. With this app, users can access essential information regarding flood situations.

Central Water Commission (CWC):

- **Central Water Commission** is an attached office of the **Ministry of Jal Shakti**, **Department of Water Resources, River Development and Ganga Rejuvenation**.
- The Commission is entrusted with the general responsibilities of initiating, coordinating and furthering in consultation of the State Governments concerned, schemes for control, conservation and utilization of water resources throughout the country, for purpose of

Flood Control, Irrigation, Navigation, Drinking Water Supply and Water Power Development.

- It also undertakes the investigations, construction and execution of any such schemes as required.
- **CWC** is headed by a **chairman**, with the status of **Ex-Officio Secretary** to the Government of India.

The work of the Commission is divided among 3 wings namely:

- Designs and Research (D&R) Wing, River Management (RM) Wing and Water Planning and Projects (WP&P) Wing.
- A separate Human Resources Management Unit headed by a Chief Engineer, deals with Human Resources Management or Development, Financial Management, Training and Administrative matters of the CWC.
- **National Water Academy** located at **Pune** is responsible for training of Central and State in-service engineers and it functions directly under the guidance of Chairman.
- **Headquarters:** New Delhi.

Topic 22. NDMA STARTS TESTING EMERGENCY CELL BROADCAST TECH

Important for the subject: Geography

The **National Disaster Management Authority (NDMA)** has started testing the **emergency cell broadcast technology** developed by **C-DOT** that will alert people at the time of natural disaster.

About the Emergency cell broadcast technology:

- It **aims** to enhance **public safety and provide timely alerts during emergencies**.
- The messages were sent in both Hindi and English languages. The technology is currently available only with a foreign vendor and hence **C-DOT** is developing it in house.
- The **cell broadcast technology** is under development. It will be implemented by **NDMA** for sending out alerts at the time of disaster directly on the mobile phone screens. It is currently being tested on the **Jio** and **BSNL network.**
- The sample test message with the title, 'Emergency alert: Severe', was sent to subscribers on Jio and BSNL networks.

C-DOT:

- Headquarters: **New Delhi, India.**
- **Ministry:** Department of telecommunications (DOT), Ministry of communication.
- The **Centre for Development of Telematics (C-DOT)** is an Indian Government owned telecommunications technology development centre.
- It was established in **1984** with the **initial mandate of designing and developing digital exchanges.**
- **Sam Pitroda** started the **C-DOT** as an autonomous telecom R&D organisation. **C-DOT**

has expanded to develop intelligent computer software applications.

- It has offices in **Delhi, Bangalore** and **Kolkata**.
- It is one of the few government organisations in India which have been appraised at Maturity Level 5 of CMMI-DEV v1.3.

NDMA:

- **Parent body:** Ministry of Home Affairs.
- **Primary Objective:** To coordinate response to natural or man-made disasters and for capacity-building in disaster resiliency and crisis response.
- **Origin:** NDMA was established through the **Disaster Management Act** enacted by the **Government of India** in **2005**.

Organisation setup:

- The Prime Minister is the ex-officio chairperson of the NDMA, who chairs a 9- member board.
- The remainder of the board consists of members nominated based on their expertise in areas such as, planning, infrastructure management, communications, meteorology etc.
- The day-to-day management of the agency is overseen by the office of the Vice Chair.

Topic 23. CAG FLAGS SERIES OF OVERRUNS IN UP'S MAJOR IRRIGATION PROJECTS

Important for the subject: Geography

Canal irrigation is provided in **only 17 per cent of Uttar Pradesh's net irrigated area** despite the government pumping huge amounts of money into its **major irrigation projects**, found a performance audit by the **Comptroller and Auditor General of India (CAG)**.

- The findings are **critical** as the economy of Uttar Pradesh is primarily **agrarian,** with about **65 per cent** of the total population dependent on agriculture.
- Of a total**24.09 million hectare area** of the **state,18.77 million hectares** is **agricultural land**, of which **77 per cent** is the **net irrigated area**.

The two major canal irrigation projects:

- Bansagar Canal Project and The modernisation of the Chaudhary Charan Singh Lahchura Dam Project (also include Pahari Dam).

Bansagar Canal Project:

- Joint project between: **Madhya Pradesh, Uttar Pradesh and Bihar**
- Located on: **Son river**
- The project aimed to increase the irrigation intensity of the nine existing canal systems from 85-150 per cent in the Culturable Command Area (CCA) of 0.23 million hectares in

Prayagraj and **Mirzapur districts**.

Chaudhary Charan Singh Lahchura Dam Project:

- It provides water to **Dhasan Canal System**, with a **CCA of 97,169-hectare area** in **Mahoba** and **Hamirpur districts. Lahchura Dam,** apart from its own storage, receives water from **Pahari Dam**.

Issues with the canal projects:

- Insufficient water storage capacity.
- Unable to provide canal irrigation in the entire command area
- Current unavailability of water in the canal systems
- Low irrigation intensity
- Huge cost overruns due to delay in the project execution.
- Inadequate quality control

Topic 24. HURRICANE HILLARY

Important for the subject: Geography

Hurricane Hilary is set to become the **first tropical storm to hit Southern California** in more than 80 years.

Hurricane Hilary is on the verge of **making an extraordinary mark** as the **first tropical storm to make landfall in Southern California** in over eight decades.

- The **National Weather Service (NWS) reports** a historical trend wherein approximately five hurricanes typically hit the US coastline within a span of three years, but **none have ventured towards the western coast**.
- Consequently, the impending arrival of Hurricane Hilary, rapidly approaching Southern California and Mexico, stands as a highly uncommon and notable occurrence.
- As per latest estimates, the hurricane will make **landfall in the Baja peninsula** in Mexico, roughly 330 km south of the port of Ensenada.

What is Hurricane:

- A hurricane is a powerful and destructive tropical storm characterized by strong winds, heavy rainfall, and low atmospheric pressure.
- Hurricanes are also known as cyclones or typhoons in different parts of the world.In the **Atlantic Ocean and eastern North Pacific**, they are called **hurricanes,** while in the **northwestern Pacific,** they are referred to as **typhoons,** and in the **South Pacific and Indian Ocean, they are known as cyclones.**

Key characteristics of hurricanes:

Low Pressure Center

- Hurricanes have a w**ell-defined centre of low atmospheric pressure,** known as the **eye.**
- The eye is **typically calm and clear**, with **light winds**, surrounded by a ring of intense thunderstorms called the eyewall.

Strong Winds

- Hurricanes are known for their **powerful winds** that can reach sustained speeds of at least **74 miles per hour** or higher.

Heavy Rainfall

- Hurricanes produce heavy rainfall, which can lead to flooding, landslides, and storm surges

Formation

- Hurricanes **form over warm ocean water**s when the **sea surface temperature is typically above 26 degrees Celsius**.
- **Warm, moist air rises** from the ocean's surface, creating an area of low pressure.
- As the air cools and condenses, it releases heat, which fuels the storm's development.

Categories

- Hurricanes are categorized on the **Saffir-Simpson Hurricane Wind Scale** based on their **maximum sustained wind speeds.**
- The scale ranges from **Category 1 (weakest) to Category 5 (strongest),** with each category representing a higher wind speed and potential for damage.

Why Hurricane Hillary is so rare:

Nature of the ocean:

- The Pacific coast **rarely experiences tropical storms** or hurricanes due to the characteristics of the ocean.
- For hurricanes to form, **ocean waters must be above 26 degrees Celsius** (78.8 degrees Fahrenheit).
- Ocean temperatures **below this threshold hinder hurricane formation** or cause rapid weakening when storms pass over cooler waters.
- **While warm temperatures prevail during hurricane season along the US east coast, the Pacific's west coast remains significantly colder.**
- The **Atlantic's warm equatorial** waters are transported northward along the US coast via the **Gulf Stream.**
- Conversely, the **Pacific's cold current brings cooler waters from higher latitudes** towards equatorial regions, making hurricanes less likely.

Vertical wind shear:

- Vertical wind shear refers to **changes in wind speed** with altitude in the Earth's atmosphere, particularly in the upper levels.
- This plays a c**ritical role in hurricane formation**, as hurricanes can extend up to **16 km** into the atmosphere.
- Strong upper-level winds inhibit hurricane formation by disrupting the storm's structure, displacing warm temperatures above the eye, and limiting vertical ascent of air parcels.
- **Eastern Pacific winds tend to have stronger wind shear compared to the Gulf of Mexico, leading to fewer hurricanes along the western coast.**

Influence of wind steering patterns:

- **Trade winds** are significant in directing hurricanes towards the US east coast, while **deflecting them away from the west coas**t. Hurricanes originating in the eastern Pacific, often near central Mexico's coastline, typically follow a west-northwest trajectory that **takes them away from the coast.**

Topic 25. BRAZIL FOUND THE LAST SURVIVORS OF AN AMAZON TRIBE

Important for the subject :Geography

Who are Piripkura:

The Piripkura are an **indigenous tribe** that resides in the **Amazon rainforest** of Brazil. They are among the last known nomadic hunter-gatherer tribes of the Amazon rainforest.

They are known for their extreme isolation and limited contact with the outside world. The Piripkura territory is located in the Mato Grosso, Brazil. The Piripkura tribe is estimated to consist of only three individuals.

Some other tribes of Amazon Rainforest:

- **Yanomami:** The Yanomami are **one of the largest indigenous groups** in the Amazon. They live in the rainforests of Brazil and Venezuela. Known for their complex social structure and **shamanistic practices**, they have faced significant threats from diseases brought by outsiders and illegal mining activities.

Kayapo: The Kayapo people are found in the **Brazilian states of Pará and Mato**

- **Grosso.** They are known for their **vibrant traditions, including body painting and intricate beadwork**. The Kayapo have been involved in environmental and land rights activism to protect their territory from deforestation and mining.
- **Ashaninka**: The Ashaninka inhabit parts of **Peru and Brazil**. They have a strong cultural identity and have **played a role in advocating for their rights and protecting their land against logging and illegal coca cultivation**.
- **Tukano:** The Tukano live in the **Upper Amazon region of Brazil, Colombia, and Venezuela.** They are known for their **spiritual practices and sophisticated knowledge of the rainforest ecosystem.**

- **Awá:** The Awá are considered one of the world's **most endangered tribes** due to threats from illegal logging, mining, and other encroachments. They reside in the Brazilian state of **Maranhao.**
- **Waiapi**: The Waiãpi live in the **Brazilian state of Amapa**. They have a deep connection to their ancestral lands and have faced challenges from mining activities on their territory.
- **Matses:** The Matses inhabit the **border region of Brazil and Peru.** They are known for their **traditional knowledge of plants and medicine**, and they maintain their way of life through hunting, fishing, and gathering.
- **Xavante:** The Xavante people live in **central Brazil.** They have a strong cultural identity and have faced historical challenges related to land loss and assimilation efforts.
- **Bora:** The Bora people inhabit the Peruvian and Colombian Amazon. They are known for their intricate weaving and vibrant art forms.
- **Awa-Guaja**: Also known as the Guaja, they live in the Brazilian state of Maranhão.
- They are known for their unique language and have faced threats from illegal logging and land invasion.

Topic 26. WHAT EXTREME HEAT MEANS FOR THE MEDITERRANEAN SEA

Important for the subject: Geography

What are the solutions to heat stress:

Weeks of scorching heat have **tormented the Mediterranean.** Wildfires **blazed across nine nations, spanning Algeria to Greece**.

Beyond threatening land and ecosystems, these surging temperatures also **imperil marine life.** By July's end, the sea surface shattered records at 28.7°C (83.66°F), exceeding 30°C in the east. With **August's heat looming**, further escalation is likely.

Some facts about the Mediterranean Sea:

- It is an **intercontinental sea that is bordered by the continent of Europe in the north**, by **Asia in the east, and by Africa in the south.**
- In the west, the **Mediterranean Sea is connected to the Atlantic Ocean via the narrow Strait of Gibraltar.**
- In the extreme **northeast**, it is connected to the **Black Sea via the Dardanelles Strait**, the **Sea of Marmara, and the Bosporus Strait**.
- The Mediterranean Sea is also **connected to the Red Sea via the Suez Canal** in the southeast.
- **22 countries and one territory (Gibraltar – a British Overseas Territory) have coasts** on the Mediterranean Sea.
- The **European Countries** are **Spain, France, Italy, Malta, Monaco, Slovenia, Croatia, Bosnia and Herzegovina, Montenegro, Albania, and Greece.**
- The **West Asian (Middle Eastern)** countries bordering the Mediterranean Sea are **Turkey, Syria, Lebanon, Israel, the Palestine Gaza Strip and the divided island of**

Cyprus.

- **Five North African** nations have coasts on the Mediterranean Sea: **Morocco, Algeria, Tunisia, Libya and Egypt.**
- The Mediterranean Sea offers a **staggering 46,000 km (28,600 mi) long coastline and includes 15 marginal seas, such as the Balearic Sea, the Adriatic Sea, the Levantine Sea and the Ionian Sea.**

What is Marine Heat Waves:

- A marine heatwave is **defined as when seawater temperatures exceed a seasonally-varying threshold** (usually the 90th percentile) for at **least 5 consecutive days.** Successive heatwaves **with gaps of 2 days or less** are considered part of the same event.
- Due to **increased greenhouse gas emissions, extended periods of extreme warming in seas and oceans have increased in frequency by 50%** in the past 10 years and are becoming more severe.

What are the causes of Marine Heat Waves:

- The m**ain cause of marine heat waves is the increase in ocean temperature** due to the **absorption of greenhouse gasses** from the atmosphere, which leads to global warming.
- **Natural climate variability** can also contribute to marine heat waves, **including changes in ocean currents, weather patterns, and atmospheric circulation.**
- El Niño-Southern Oscillation (ENSO) and the Indian Ocean Dipole (IOD) can contribute to the occurrence of marine heat waves.
- The **other common drivers of marine heatwave**s include **ocean currents** which can build up areas of **warm water** and air-sea heat flux, or warming through the ocean surface from the atmosphere.
- Winds can **enhance or suppress the warming** in **a marine heatwave, and climate modes like El Niño** can change the likelihood of events occurring in certain regions.

What species and ecosystems are worst hit by marine heat waves:

- Rising water temperatures **prove most detrimental to benthic species** residing at the ocean, lake, or river bottoms. These organisms, such as **corals, mussels, and seagrasses, are unable to migrate and are critical for ecosystem health.**
- Benthic creatures play roles in **water filtration, food chains, and habitat provision**. Notably, the **Neptune grass** is **severely impacted,** hindering its role as a **carbon sink.**

What is the Impacts of Marine Heatwaves:

- **Coral bleaching**: Marine heatwaves can **lead to coral bleaching**, which is the loss of **photosynthetic algae, called zooxanthellae**, from the coral. This can ultimately lead to the death of coral.
- **Ocean acidification:** Marine heatwaves can exacerbate ocean acidification, which is the **increase in acidity of seawater** due to the absorption of carbon dioxide from the

atmosphere.

- This can have negative impacts on marine organisms that build shells or skeletons out of calcium carbonate, such as corals and some types of plankton.
- **Harmful algal blooms**: Marine heatwaves can cause harmful algal blooms, which can **produce toxins** that are harmful to humans and marine life.
- **Ocean circulation**: Marine heatwaves can also affect ocean circulation by **altering the temperature and density of ocean water**, which can have implications for ocean currents and the transport of nutrients and heat around the globe.
- **Marine biodiversity:** Marine heatwaves can **affect the composition and abundance of marine specie**s, leading to changes in marine biodiversity.

Topic 27. DRILLING IN THE NORTH SEA — HISTORY AND ENVIRONMENTAL CONCERNS

Important for the subject: Geography

U.K. Prime Minister Rishi Sunak recently backed plans for new fossil fuel drilling off Britain's coast, worrying environment experts even as the world continues its stride towards irreversible climate change.

The move will help Britain become more energy independent.

- The **North Sea Transition Authority (NTSA),** responsible for regulating oil, gas and carbon storage industries, is currently running its **33rd offshore oil and gas licensing round**. The **U.K.** has set a goal to reach **Net Zero Carbon Emission by 2050.**

A short history of drilling in the U.K. North Sea:

- In **1964** the **U.K. Parliament** passed the **Continental Shelf Act.** The **Act** provides for exploration and exploitation of the continental shelf based on the **1958 Geneva convention**.
- It delineated the jurisdiction the U.K. had over oil and gas resources (excluding coal) under the seabed near its shores.
- **1964:** British Petroleum (BP) was awarded a license for exploration in the North Sea.
- **1965:** BP discovered the natural gas reserve in the North Sea, off the east Anglican coast. **Sea Gem, the BP-operated drilling rig,** collapsed in December **1965.**
- **1970:** BP made its first discovery of commercial oil in the large Forties Field east of Aberdeen, Scotland.
- **1975:** Hamilton, an American oil company, was the first to bring North Sea oil to the shore.
- In the **next 15 years, BP** started more than **15 fields in the U.K. North Sea** (and four in the **Norwegian North Sea**).
- **1988** disaster at the **Piper Alpha oil platform** where more than 165 people were killed.
- **1990s:** The **Foinaven and Schiehallion fields** were discovered, opening up the **West of Shetland area** for exploration and exploitation.
- According to the **U.K. government**, production from the **North Sea peaked in 1999** to **1,37,099 thousand tonnes** of crude oil and natural gas liquids. By **2022**, the total production **declined to 38,037 thousand tonnes**.
- The **1958 Geneva Conventionon the Continental Shelf** was the **first international legislation to establish the rights of countries over the continental shelves adjacent to their coastlines** and paved the way for exploration in the **North Sea.** The treaty came into force in **1964**.

Why is offshore drilling problematic?

- The offshore drilling puts “workers, waters, and wildlife” at risk.
- Threat to climate change Warms oceans and raises sea levels.
- A direct risk to marine biodiversity.
- An indirect risk to coral reefs and shellfishes from acidic waters.
- Carbon pollution due to acidification of oceans

Is the U.K. honouring its climate commitments?

- According to the 2023 Progress Report to the U.K. Parliament, the U.K. has not adequately prepared for climate change under the second National Adaptation Programme.
- In the **U.K. National Adaptation Programmes are statutory programmes** that the government must follow to help prepare the country for climate change, as required under the **Climate Change Act.**
- The **second National Adaptation Programme** covered the period of **2018 – 2023**.
- According to **Climate Action Tracker, U.K.’s climate action** is **not consistent** with the

Paris Agreement.

About the North Sea:

- **Geographically,** the **North Sea** lies between **England and Scotland** on its **west**, the **Netherlands, Belgium,** and **France** on its **south,** and **Norway, Denmark,** and **Germany** on its **west.**
- An **epeiric sea** (an inland sea either completely surrounded by **dry land** or connected to an ocean by a river, strait or "arm of the sea") on the E**uropean continental shelf**.
- It **connects** to the **Atlantic Ocean** through the **English Channel** in the **south** and the **Norwegian Sea** in the **north.**
- It hosts **key north European shipping lanes** and is a **major fishery**. The coast is a popular destination for recreation and tourism in bordering countries, and a rich source of energy resources, including wind and wave power.

Topic 28. ECUADORIANS REJECT OIL DRILLING PROJECT IN HISTORIC DECISION

Important for the subject: Geography

In a historic decision, **Ecuadorians** voted on Sunday against the **oil drilling of a protected area** in the **Amazon** that's home to two uncontacted tribes and serves as a biodiversity hotspot.

Oil-drilling project in Yasuni National Park:

- Oil drilling company: **Petroecuador** The **oil-drilling project** is in the area of **Yasuni National Park,** one of the **world's most biodiverse regions**.
- The area is **inhabited** by the **Tagaeri** and **Taromenani,** who live in self-isolation. In **1989, Yasuni** was designated a **world biosphere reserve** by the **United Nations Educational, Scientific and Cultural Organisation (UNESCO).**
- Encompassing a surface area of over 1 million hectares (2.5 million acres), it boasts 610 species of birds, 139 species of amphibians, and 121 species of reptiles.

At least three species are endemic.

- This biodiverse region is a **convergence point** for **three unique regions**, the **Equator,Andes Mountains,** and the **Amazon rainforest**.

Ecuador:

- Bordered by **Colombia** on the **north**, **Peru** on the **east** and **south**, and the **Pacific Ocean** on the **west.**
- **Ecuador** also **includes** the **Galápagos Islands** in the **Pacific**, about 1,000 kilometers (621 mi) **west** of the mainland.
- The country's **capital** and largest city is **Quito**. The Equator passes through Ecuador.

Topic 29. HC BATS FOR ANIMALS' RIGHT TO LIVE WITHOUT FEAR, ORDERS RELOCATION OF 495 FAMILIES NEAR T.N. TIGER RESERVE

Important for the subject :Environment

Highlighting the **right of animals to live free from fear and distress,** the Madras High Court has ordered relocation of 495 families of **Thengumarahada village**, situated within the eastern boundary of the **Mudumalai Tiger Reserve,** on payment of ₹15 lakh each in compensation.

The compensation will be released from the **Compensatory Afforestation Fund Management and Planning Authority (CAMPA) funds** to the **National Tiger Conservation Authority (NTCA).**

The **NTCA** was directed to transfer the amount to the **Tamil Nadu Principal Chief Conservator of Forests (PCCF)** within two months. After receiving the amount, the **PCCF** must disburse the compensation and relocate the villagers within a month.

Thengumarahada village:

- **Thengumarahada** was formed through **State action** after the issuance of a Government Order on **August 5, 1948** for leasing out **100 acres** to **ThengumarahadaVivasayaCorproation** (now Thengumarahada Cooperative Society) for farming.
- In **1961**, the extent was increased to **500 acres**.
- This human settlement in the forest area was leading to **man-animal conflict** as the village was **located at the confluence of the rich biodiversity regions of the Eastern Ghats and the Western Ghats** and was serving as a **corridor** for most of the **long-ranging wild animals**.
- It blocks the **crucial migratory routes** of **elephants** in the **MudumalaiSathyamangalam landscape.**
- **Thengumarahada area** and the adjoining landscape is **one of the rare places** in India where healthy breeding populations of **tiger, elephant, leopard, sloth bear, wild dog, hyena, black buck, four horned antelope, barking deer, mouse deer** and **sambar** are found together.
- The place is also home to many **reptiles** like **star tortoise, rock python, russell's viper, saw scaled viper, cobra** and **common krait** to name a few.

Compensatory Afforestation Fund:

- The **CAF Act** was passed by the centre in **2016** and the related rules were notified in **2018**.
- The **CAF Act** was enacted to manage the funds collected for compensatory afforestation which till then was managed by ad hoc **Compensatory Afforestation Fund Management and Planning Authority (CAMPA).**
- **Compensatory afforestation** means that every time forest land is diverted for non-forest

purposes such as mining or industry, the user agency pays for planting forests over an equal area of non-forest land, or when such land is not available, twice the area of degraded forest land.

- As per the rules, **90%** of the **CAF money** is to be given to the states while 10% is to be retained by the Centre.
- **The funds can be used for** treatment of catchment areas, assisted natural generation, forest management, wildlife protection and management, relocation of villages from protected areas, managing human-wildlife conflicts, training and awareness generation, supply of wood saving devices and allied activities.

Objectives of CAMPA:

- **Compensatory Afforestation Fund Management and Planning Authority (CAMPA)** are meant to promote afforestation and regeneration activities as a way of compensating for forest land diverted to non-forest uses.
- **National CAMPA Advisory Council** has been established as per orders of The Hon'ble Supreme Court with the following mandate:
- Lay down broad guidelines for State CAMPA. Facilitate scientific, technological and other assistance that may be required by State CAMPA.
- Make recommendations to State CAMPA based on a review of their plans and programmes.
- Provide a mechanism to State CAMPA to resolve issues of an inter-state or Centre-State character.

Mudumalai Tiger Reserve:

- Mudumalai National Park is a national park in the **Nilgiri Mountains** in **Tamil Nadu,** south India.
- It shares boundaries with the states of **Karnataka** and **Kerala.** It was declared a **tiger reserve** in **2007.**
- It is a part of **Nilgiri Biosphere Reserve** (1st Biosphere Reserve in India) along with **Wayanad Wildlife Sanctuary (Kerala)** in the **West, Bandipur National Park (Karnataka)** in the **North**, **Mukurthi National Park** and **Silent Valley** in the **South.**
- It is bordered in the north by **Bandipur National Park,** in the **east** by **Sigur Reserve Forest** and in the **west** by **Wayanad Wildlife Sanctuary.** In the **south**, it is bordered by **Singara Reserve Forest.**
- The **Moyar River** and its tributaries drain this area, and several artificial waterholes provide drinking water for wildlife during dry seasons.
- The **river Moyar**, which flows along the **Tamil Nadu-Karnataka border, divides the two states.** The Park is bisected by the **Mysore-Ooty highway,** which follows the direction of the **Moyar River**, which divides **Mudumalai**and **Bandipur**.

Flagship Species: Tiger and Asian Elephant.

- The Reserve has **tall grasses**, commonly referred to as **'Elephant Grass'.** Tropical Evergreen Forest, Moist Mixed Deciduous Forest, Moist Teak Forest, Dry Teak Forest, Secondary Grasslands, Shrubs, and Swamps are among the habitats found here.

Topic 30. 275 BIRD SPECIES COUNTED DURING SURVEY AT CORBETT TIGER RESERVE

Important for the subject: Environment

About the survey report:

Survey conducted by: World Wide Fund (WWF) India, Tiger Conservation Foundation and Village Volunteer Protection Force. The report is compiled by **Oriental Trials,** an NGO working for conservation of wildlife.

About **275 bird species**, including **two critically endangered, four vulnerable ones** and **two endangered species,** were counted during the bird survey at **Corbett Tiger Reserve in Nainital**.

- **Two species,** namely **white-rumped vulture** and **red-headed vulture,** considered **critically endangered** by the **International Union for Conservation of Nature (IUCN) list,** have been documented in the survey, which covered the vast range of landscape in the reserve, including grassland, dense forest, rivers and hilly terrains.
- **Two endangered species** — **Pallas's fish-eagle, Egyptian vulture** were also counted by the researchers in the survey.
- **Four vulnerable bird species** — **great hornbill, great slaty woodpecker, greycrowned prinia and river tern** — have also been counted in the survey.
- About **10 near-threatened bird species** — river lapwing, red-breasted parakeet, oriental darter, lesser fish-eagle, Himalayan griffon, great thick-knee, gray-headed fish-eagle, black-necked stork, Asian woolley-necked stork and Alexandrine parakeet — have also been found at the reserve.
- About **256 species** documented in the survey are considered to be of **least concern** by the IUCN.

About Corbett Tiger Reserve:

- It is located in the **Nainital district** of **Uttarakhand** which encompasses the **Patli Dun valley.**
- The Ramganga, Sonanadi, Palain and Mandal, and Kosi rivers form the prominent hydrological resource for the Corbett.
- The core area of the reserve contains the **Corbett National Park** and the **Sonanadi Wildlife Sanctuary** is part of its buffer area.
- **Flora:** The trees which contribute to the Flora of Corbett consist of evergreen Sal and its combined trees, the Sheesham, and the Kanju found extensively on the ridges.
- **Fauna:** Tiger, Leopard, Elephant, Hog deer, spotted deer, Samber etc.

Topic 31. WITH AMENDED ACT KICKING IN, ODISHA HAS NO 'DEEMED FOREST'

Important for the subject: Environment

The **Odisha government** has sent a letter to district officials underlining that **industry requests to divert forest land for non-forestry purposes now ought to conform with the amended Forest Act** and that **'deemed forests'** as a category would **cease to exist.**

- **Deemed forest** is forest land that hasn't been recorded as such by the Centre or States. The **1996 Godavarman verdict** by the Supreme Court enjoined States to bring in such unrecorded land that conformed to the 'dictionary' meaning of forest. Nearly half of Odisha's forest land was **'deemed forest'**, before the amended act came into existence.
- The **amended Act** clearly specifies and defines **forest**. The concept of deemed forest is now removed.
- **Protection** under the **Forest Act** means that land cannot be diverted **without the consent of the Centre as well as gram panchayats** in the regions concerned.
- It also puts the onus on those diverting land to grow trees on an equivalent plot of land twice the razed area, along with a significant monetary penalty, thus acting as a deterrent to deforestation.
- The **Forest Act, 1980,** now renamed as the **Van (Sanrakshan Evam Samvardhan) Adhiniyam** — translated as **Forest Conservation and Augmentation** — only accorded protection to forest that is notified so in government and revenue records on or after 1980.
- In **1996**, the Supreme Court expanded the remit of the Act to areas that weren't notified as forest but conformed to the "dictionary" definition of forests.
- If notified forest land was legally diverted between 1980 and 1996, for non-forest use, the Forest Conservation Act would not apply.

Deemed forests in Odisha:

- The **Odisha government**, since **1996**, had with the help of expert committees at the district level identified nearly **66 lakh acres as 'deemed forest'** but many of them weren't officially notified as such in government records.
- As per the **new amendment** there will be **no check on forest diversion.** It will be easier to divert forest land. As **'deemed forest'** is not considered the **'forest'** under the new amendment.
- The latest **Forest Survey of India** records **Odisha** as having **52,156 square km** (approx. 130 lakh acres) of **forest coverage,** which is **33.50%** of the **State's geographical area**, as compared to **21.71%** of **forest cover at the national level**.

Topic 32. EXPLAINING MOEFCC'S U-TURN TO MERGE AUTONOMOUS BODIES

Important for the subject: Environment

In June, the **Ministry of Environment, Forests and Climate Change (MoEFCC)** issued a notification quietly walking back on its move to establish **integrated regional offices** by merging offices of the **Forest Survey of India (FSI), the National Tiger Conservation Authority (NTCA), the Wildlife Crime Control Bureau (WCCB)**, and the **Central Zoo Authority (CZA)**, and thus bring them under the Ministry.

Criticism of the merger:

- It would render the key environmental organisation **'toothless'.**
- For example, in the existing structure, the **NTCA** can oppose a **forest clearance** for an infrastructure project for diverting Tiger Reserve areas. The **proposed merger** would have rendered this difficult as the **NTCA** would have come under the **Deputy Director General of Forests,** who is in charge of the **Integrated Regional Office** and **reports to the Ministry**.
- The **MoEFCC** justified the merger for **"ease of doing business"** whereas the **NTCA** had opposed it, as it could lead to:
- Administrative confusion, Loss of independence, Undue interference in decision making, Loss of focus in discharging duties and responsibilities.

Rejection of the merger plan:

- The **MoEFCC** dropped the merger plan, likely owing to technical and administrative difficulties in merging the institutions in question.

Merger of Project Tiger and Project Elephant:

- Last month, the Indian government announced a plan to merge Project Tiger and Project Elephant.
- **Tiger Reserves** are recognised under the **Wildlife Protection Act 1972** but **Elephant Reserves are not**.

About National Tiger Conservation Authority (NTCA):

- It is a **statutory body** under the **Ministry of Environment, Forest, and Climate Change (MoEFCC)**.
- It was established in **2006** under **Wildlife (Protection) Act 1972.** The **NTCA** is the managing authority of **Project Tiger** and **India's Tiger Reserves**.

Objectives:

- Providing statutory authority to Project Tiger so that compliance of its directives become

legal.

- Fostering accountability of Center-State in management of Tiger Reserves by providing a basis for MoU with States within the federal structure.
- Providing for an oversight by Parliament. Addressing livelihood interests of local people in areas surrounding Tiger Reserves.

NTCA Members:

- Minister in charge of MoEFCC (as Chairperson), Minister of State in MoEFCC (as Vice-Chairperson), three members of Parliament, the Secretary (MoEFCC), and other members.

Forest Survey of India (FSI):

- Founded in **June 1981**
- Headquartered at **Dehradun in Uttarakhand**
- FSI is the **Government of India Ministry of Environment, Forest and Climate Change organization** which conducts forest surveys, studies and researches to periodically monitor the changing situations of land and forest resources and present the data for national planning, conservation and sustainable management of environmental protection as well as for the implementation of social forestry projects.
- **Forest Survey of India** is the **successor** of **"Preinvestment Survey of Forest Resources" (PISFR),** a project initiated in **1965** by the **government of India** with the sponsorship of **Food and Agriculture Organization (FAO)** and **United Nations Development Programme (UNDP)**.
- In its report in **1976**, the **National Commission on Agriculture (NCA)** recommended the creation of a **National Forest Survey Organization** for a regular, periodic and comprehensive forest resources survey of the country, leading to the creation of **FSI** in the same year.

Publications:

- FSI has biennial **"The Indian State of Forest Reports"** and area-specific reports on **"The Reports on Inventory and Wood Consumption Studies"**.

Wildlife Crime Control Bureau (WCCB):

- Wildlife Crime Control Bureau (WCCB) is a **statutory body** established by the Government of India under the **Ministry of Environment, Forest and Climate Change** to combat **organized wildlife crime.**
- The **Wild Life (Protection) Amendment Act, 2006** provisions came into force on **6 June 2007.** It became operational in the year **2008**.
- It is a **law enforcement agency. WCCB** won the prestigious **2010 Clark R. Bavin Wildlife Law Enforcement Awards** for its outstanding work on wildlife law enforcement in the country.
- **UNEP** has also awarded **WCCB** with **Asia Environment Enforcement Award, 2018**.

- **WCCB** is also partnering with **United Nations University** and **CIESIN-Earth Institute** at **Columbia University** through the **Wildlife Enforcement Monitoring System Initiative**.
- Motto: **"Fighting Transboundary Environmental Crime"**
- Headquarters: **New Delhi**

Central Zoo Authority (CZA): Founded in **1992**

- Headquarters: **New Delhi**
- The **Central Zoo Authority (CZA)** is the body of the Government of India responsible for oversight of zoos.
- It is an affiliate member of the **World Association of Zoos and Aquariums (WAZA)**.
- The **CZA** was formed to bring Indian zoos up to international standards. The **Central Zoo Authority** has been constituted under the **section 38A** of **Wild Life (Protection) Act 1972.**
- The Authority consists of a **Chairman, ten members** and a **Member Secretary.** The **main objective** of the authority is to complement the national effort in conservation of wild life. Standards and norms for housing, upkeep, health care and overall management of animals in zoos has been laid down under the **Recognition of Zoo Rules, 1992**.
- Every zoo in the country is required to obtain recognition from the Authority for its operation.
- Apart from the **primary function of grant of recognition and release of financial assistance,** the **Central Zoo Authority** also **regulates the exchange of animals** of endangered category Listed under **Schedule-I** and **II** of the **Wildlife Protection Act** among zoos.
- **Exchange of animals** between Indian and foreign zoos is also **approved** by the Authority before the requisite clearances under **EXIM Policy** and the **CITES** permits are issued by the competent authority.

Topic 33. BAGHJAN BLOWOUT: NGT DIRECTS ASSAM GOVERNMENT TO PAY AID TO AFFECTED FAMILIES

Important for the subject: Environment

The **National Green Tribunal (NGT)'s principal bench** ordered the Assam government to disburse interim compensation to the victims of **Baghjan oil and gas leak** that displaced close to 9,000 people in 2020 in **Tinsukia** district of **Assam**.

Baghjan oil and gas leak- 2020:

- The **2020 Assam gas and oil leak,** also referred as the **Baghjan gas leak,** is a **natural gas blowout** that happened in **Oil India Limited's Baghjan Oilfield** in **Tinsukia district, Assam**, India on 27 May 2020.
- It also impacted the fragile ecology of the villages situated close to **DibruSaikhowa National Park** and **Maguri-Motapung Wetland.**

- **NGT** appointed a committee led by **Justice (retired) BP Katakey** to investigate the leak, which revealed many **violations of environmental laws** deeming the entire **Baghjan oil and gas field** as **illegal** in November 2020.

Dibru- Saikhowa National Park:

- Located in **Dibrugarh** and **Tinsukia districts, Assam, India**. It was designated a **Biosphere Reserve** in July 1997.
- It is located at about 12 km (7.5 mi) north of Tinsukia town at an average elevation of 118 m (387 ft), ranging from 110 to 126 m (361 to 413 ft).
- The park is **bounded by** the **Brahmaputra and Lohit rivers** in the **north** and **Dibru River** in the **south.**
- It mainly consists of **moist mixed semi-evergreen forests, moist mixed deciduous forests, canebrakes and grasslands**.
- It is the **largest salix swamp forest** in **north-eastern India**, with a **tropical monsoon climate with a hot and wet summer and cool and usually dry winter**.

Annual rainfall ranges from **2,300 to 3,800 mm** (91 to 150 in).

- It is a haven for many **endangered species** and rich in fish diversity. In December 2020, **Gauhatihighcourt** stayed a permission given to Oil India Limited for hydrocarbon exploration at seven locations inside the protected area.

Species in the park:

- Species include Bengal tiger, Indian leopard, clouded leopard, jungle cat, sloth bear, dhole, small Indian civet, Malayan giant squirrel, Chinese pangolin, Ganges dolphin, slow loris, pig tailed macaque, Assamese macaque, rhesus macaque, capped langur, Hoolock gibbon, Asian elephant, wild boar, Sambar deer, hog deer, barking deer, Asiatic water buffalo, and feral horse. The park is **one of the few places in the world** which is home to **feral horses.**

Maguri-Motapung Wetland:

- Maguri Motapung Beel is a wetland and lake **located** near to **Dibru-Saikhowa National Park** and **Motapung Village** of **Tinsukia district in Assam.** MaguriMotapung Beel serve as a natural home to wildlife and provides a source of livelihood to the local communities.

Topic 34. RISING METHANE COULD BE A SIGN THAT EARTH'S CLIMATE IS PART-WAY THROUGH A 'TERMINATION-LEVEL TRANSITION'

Important for the subject: Environment

Since 2006, the amount of **heat-trapping methane** in Earth's atmosphere has been rising fast.

Methane emission:

- Methane is a much more potent greenhouse gas than CO_2 but it lasts slightly less than a decade in the atmosphere compared with centuries for CO_2.
- Methane emissions threaten humanity's ability to limit warming to relatively safe levels.
- Sudden surges in methane marked the transitions from cold ice ages to warm interglacial climates.
- **Methane** was about **0.7 parts per million (ppm)** of the air before humans began burning fossil fuels. Now it is over **1.9 ppm** and rising fast.
- Unlike the rise in **carbon dioxide (CO_2), methane's** recent increase seems to be driven by **biological emissions,** not the burning of fossil fuels.
- Roughly **three-fifths of emissions** come from **fossil fuel use, farming, landfills** and **waste.**
- The remainder is from **natural sources,** especially v**egetation rotting in tropical and northern wetlands.**

The methane record:

2006 to present:

- In late **2006, atmospheric methane unexpectedly began rising**. Methane had risen fast in the 19th and 20th centuries but plateaued by the end of the 1990s. This rise was driven by fossil fuel emissions, especially from gasfields and coal mines.
- During the 2020s the growth rate has become yet faster, faster even than during the peak of gas industry leaks in the 1980s.

Regions of high methane emission:

- Today's growth seems to be driven by new emissions from **wetlands**, especially near the **equator** but perhaps also from **Canada (beavers are methane factories which pull huge amounts of plant matter into ponds they've made)** and **Siberia.**

Causes of emission:

- Increasing rainfall has made wetlands wetter and bigger while rising temperatures have boosted plant growth, providing more decomposing matter and so more methane.
- **Emissions from huge cattle lots** in **tropical Africa, India** and **Brazil** may also be rising and **rotting waste** in **landfills** near **megacities like Delhi** are important sources too.

Climate termination:

- Methane is trapped in glaciers of polar regions. Global warming led glacier melting is causing sharp rises in atmospheric methane.
- In the past few million years, **Earth's climate has flipped repeatedly** between **long, cold glacial periods,** with **ice sheets** covering northern Europe and Canada and **shorter warm interglacials**.
- These great climate flips that ended each ice age are known as **terminations**. **Around 131,000 years ago** during **Termination II,** the **British climate** suddenly **flipped** from

glaciers in the **Cotswolds** to **hippopotami wallowing** in what is now **Trafalgar Square**.

- **Full terminations** take several thousands of years to complete, but many include a creeping onset of warming, then a **very abrupt phase of extremely rapid climate change** that can take a century or less, followed by a longer, slower period during which the great ice caps finally melt.

Is something dramatic underway?

- **Methane** fluctuated widely in **pre-industrial times**. But its **increasingly rapid growth** since **2006** is comparable with records of methane from the **early years of abrupt phases of past termination events,** like the one that **warmed Greenland** so dramatically less than **12,000 years ago.**

There is already lots of evidence that the climate is shifting:

- Atlantic ocean currents are slowing, Tropical weather regions are expanding, The far north and south are warming fast, Ocean heat is breaking records and Extreme weather is becoming routine.
- In **glacial terminations,** the entire climate system reorganizes. In the past, this took Earth out of stable ice age climates and into **warm interglacials**. But we are already in a **warm interglacial**.

Steps to curb the rise of methane emission:

- Plugging leaks in the oil and gas industry, Covering landfills with soil, Reducing crop-waste burning.
- Shooting the methane messenger won't stop climate change, which is primarily driven by CO_2 emissions, but it will help.

Topic 35. COASTAL RAPTORS MAKE POWER TOWERS THEIR HOME

Important for the subject: Environment

White-bellied sea eagles in **India** are beginning to emulate their counterparts in **Australia** and **Thailand** by making their **homes on power towers** holding hightension wires.

- The **nests** of the **white-bellied sea eagles** were found on **powerline towers** about **2 km** away from the sea in **Ramanathapuram** of **Tamil Nadu**.
- The **nesting sites** were **strategic** for the **birds** to conveniently scan the marine area for food.
- In **India,** the **bird's nesting** was earlier reported on a **telecommunication tower** from **Andhra Pradesh.**
- The **use of man-made structures as nesting sites** can be both **risky** and **beneficial** to these **coastal raptors** and humans in the vicinity, but the development points to a **lack of trees** and other **natural nesting alternatives.**

White-bellied sea eagle:

- The **white-bellied sea eagle (Haliaeetus leucogaster)** is a **resident raptor** belonging to the family **Accipitridae**.
- It has a **wide distribution range** on the **sea coast of Indiafrom Mumbai to the eastern coast of Bangladesh, and Sri Lanka** in **southern Asia,** through **all coastal south-eastern Asia, southern China to Australia**.
- The raptor, a **diurnal monogamous bird of prey**, is categorised as being of **'least concern'** on the **Red List** of the **International Union for Conservation of Nature**.
- **Feeding** mainly on **sea snakes and fish,** the bird is occasionally seen in inland waters along tidal rivers and in freshwater lakes. It occupies the same localities for years and generally **builds nests in tall trees** near the seacoast, tidal creeks, and estuaries.

Topic 36. WARMING-INDUCED GLACIER RETREAT COULD CREATE NOVEL ECOSYSTEMS

Important for the subject: Environment

Climate change caused by human activity under a high-emissions scenario may halve the area covered by glaciers outside the Antarctic and Greenland ice sheets by the end of the century, as per a study published in Nature.

Less than half of glacial areas are located in protected areas.

- This will have marked **ecological and societal cascading consequences**, as **novel ecosystems develop to fill emerging new habitats**.
- However, there has been no complete spatial analysis carried out to quantify or anticipate the important changeover.

What does the study say?

- Under a **high-emissions scenario** (in which **global greenhouse gas emissions triple by 2075**), about **half of 2020 glacier area could be lost by 2100**.
- However, this could be **curbed by a low-emissions scenario** (in which **net zero is achieved by 2050**), which would **reduce this loss to approximately 22%**.
- As per the modeling exercise undertaken by **Jean-Baptiste Bosson from the Conservatory of Natural Areas of Haute-Savoie, Annecy, France and others,** the **loss of glacier area** will range from **22% to 51%,** depending on the climate scenario.
- It would mean that by **2100**, the **decline of all glaciers outside the Antarctic and Greenland ice sheets** may produce **"new terrestrial, marine and freshwater ecosystems over an area ranging from the size of Nepal (1,49,000 sq. km) to that of Finland (3,39,000 sq. km)"**.

Probable features of novel ecosystem:

- In the **deglaciated areas**, the new ecosystems will be characterised by: **"Extreme to mild**

ecological conditions" encompassing terrestrial, freshwater and even marine habitats.

Might favour primary productivity

- **Increased numbers of non-native species** that can thrive as **cold-adapted species and generalist species**.
- It will increase the **complexity of glacial dynamics** and will **increase the challenge of glacier conservation.**

Probable solution:

- There is an urgent need to urgently and simultaneously enhance climate-change mitigation and the in-situ protection of these ecosystems to secure their existence, functioning and values.

Topic 37. DIGGING ICE-CAPPED ARCTIC DEPTHS TO UNDERSTAND CLIMATE CHANGE

Important for the subject: Environment

The heat content of the Arctic Ocean is crucial globally, affecting climate, weather, sea levels, and ecosystems.

It serves as an **indicator** of broader climate change effects worldwide, connecting ecosystems, economies, and societies globally.

Arctic study model by IIT Madras:

- Researchers from **IIT Madras** have created an **artificial neural network (ANN) model** to estimate **Ocean Heat Content (OHC)** in ice-covered Arctic regions.
- They have linked **satellite-based sea ice data to in-situ CTD (conductivity, temperature, depth) profiles** to estimate **OHC up to 700 metres deep**.
- This model accurately predicts **OHC** changes and tracks spatio-temporal variations, offering insights into historical trends and regional patterns.

About the Study:

- The study uses **satellite data products** like sea ice concentration, sea ice thickness, surface temperature, ambient air temperatures, and snow depth.
- **Daily sea ice thickness and surface temperature products** from the **APP-x product suite** were used in the study.
- **Surface** and **2m air temperatures** from satellite observations over the Arctic region were utilized.
- **Snow depth data** were collected from the **TOPAZ4 reanalysis products.** In combination with the satellite data products, the researchers used data from instruments like the **WHOI-ITP,** which measures temperature and other properties of the ocean under the ice.

- The model is based on theoretical considerations about various factors affecting heat transfer in the region, including:
- Heat advection by Atlantic and Pacific waters, Heat exchange at different boundaries (ocean-atmosphere, ocean-continent, ocean-seabed) and Sea ice state (thickness, extent, properties).
- The model also provides a **promising tool for estimating spatial and temporal OHC changes in the ice-covered Arctic** and has the potential to be further refined for deeper layers.

Artificial Neural Network (ANN):

- **ANN** is a **machine learning technique** that learns patterns from data and establishes relationships between inputs and outputs.
- They experimented with different configurations of the **ANN architecture**, including the number of hidden layers, number of neurons, activation functions, and scaling techniques.
- The **ANN model** takes these inputs, processes them through multiple layers, and produces an estimate of OHC change.
- A comparison is made between the **model-derived OHC values** and the **OHC values** obtained from the **Multi Observation Global Ocean ARMOR3D L4 analysis system**.

Topic 38. INDIA TO ENTER CATHODE ACTIVE MATERIAL (CAM) PRODUCTION

Important for the subject: Economy

India aims for self-reliance in cathode materials by partnering with **Altmin** to produce Lithium Ferrous Phosphate, a crucial component of Cathode Active Materials used in advanced Lithium-ion cells for EVs.

ARCI (**International Advanced Research Centre** for Powder Metallurgy and New Materials), which works under the **Union Ministry of Science and Technology**, in collaboration with **Altmin** has come out with the maiden product – **Lithium Ferrous**

- **Phosphate (LFP)**, the key component of CAMs.
- This product is used in the manufacturing of advanced Lithium-ion cells that would help the electric vehicles industry and other industrial applications.

What is Altmin?

- It is a non-government private limited company.The company was formed to support the Government of India's Advanced Chemistry Cell – PLI scheme, targetted to localise the manufacturing of Li-ion cells and batteries in India and will continue to operate in a public-private partnership with ARCI.
- The company has partnered up with YLB of **Bolivia** for a consistent and secure supply of battery grade lithium carbonate necessary for the production.

Cathode active materials

- Cathode active materials are crucial components in rechargeable batteries, playing a central role in energy storage and release during the battery's charging and discharging cycles.
- These materials are typically used in lithium-ion batteries and other advanced battery technologies. Cathode active materials are responsible for the movement of ions between the cathode (positive electrode) and anode (negative electrode) during battery operation.
- These materials are chosen for their ability to efficiently store and release electrical energy. Common cathode active materials include lithium cobalt oxide ($LiCoO_2$), lithium iron phosphate ($LiFePO_4$), lithium manganese oxide ($LiMn_2O_4$), and nickel cobalt manganese oxide (NCM or NMC).
- The selection of cathode active material influences a battery's capacity, voltage, energy density, cycle life, and overall performance characteristics.

Topic 39. AS INFLATION RISES & LIQUIDITY TIGHTENS, BOND, T-BILL YIELDS RISE SHARPLY

Important for the subject: Economy

RBI status quo stance, incremental CRR (ICRR), inflationary pressure and weakening Rupee push yields on 10-year benchmark bonds and Treasury Bills sharply.

Bond yields have been increasing driven by three major factors: Liquidity squeeze because of ICRR, inflation and weakening Rupee.

- The 10-year is ruling at 7.25 per cent and it does look like that there can be some further upward movement expected as liquidity tightens in the market.The rise in yields is not restricted to India alone.

Liquidity:

- Reduction of liquidity in the system is getting reflected in the market as elevated bond yields. As liquidity is tightened and pressure gets mounted on short-term interest rates.
- The primary reason is the invocation of the **incremental CRR (ICRR)**. The temporary measure will suck out over Rs 1 lakh crore of excess liquidity from the banking system. Surplus liquidity has dried up to just Rs 21,000 crore as of August 14.
- RBI had, last week, directed banks to maintain an incremental cash reserve ratio (I-CRR) of 10 per cent for banks in order to manage surplus liquidity in the banking system.

Inflation:

- Secondly with retail inflation spiking to **7.44 per cent** in July, the expectation is for interest rates to stay elevated for the near future.
- July retail inflation spiked to 7.44 per cent from 4.87 per cent in the previous month as vegetable and cereals prices skyrocketed.

Weakening of Rupee:

- The rupee has fallen below the 83 level against the dollar with the dollar strengthening and foreign investors in a nervous mood. This is causing fund outflow seen in FPI selling.
- The trade deficit caused by falling exports has also adding to the sentiment. To steady the Rupee, RBI is likely to avoid any easing on interest rate front.

Topic 40. RBI CIRCULAR: 'RESET OF FLOATING INTEREST RATE ON EQUATED MONTHLY INSTALMENTS (EMI) BASED PERSONAL LOANS'

Important for the subject: Economy

RBI's Guidelines on Interest Rate Reset:

Lenders must provide borrowers with **clear information about how changes in the benchmark interest rate can affect personal loans.**

Communicate **potential changes in EMI and/or tenor** during the loan sanction process. REs to ensure that the instructions contained in the circular are extended to existing as well as new loans, suitably **by December 31, 2023** Direct borrowers towards **making informed decisions.**

Option to Switch to Fixed Rate:

- Borrowers can choose to switch to a fixed interest rate during the interest rate reset period.
- The policy should **define the frequency and conditions** for switching during the loan term.
- Banks **can limit the number of switches** to maintain financial stability.
- **Prevents** borrowers from **exploiting rate changes** for personal gain.

Borrowers have the choice to:

- Opt for a **higher EMI or longer tenor.**
- **Prepay** a part or the entirety of the loan during its term. Provides **flexibility** based on individual financial situations. **Prevents overburdening** borrowers with rigid terms.

Charges and Transparency:

- Charges for switching and services **must be fully disclosed.** Foreclosure charges or pre-payment penalties will be Important for the subject to extant instructions Transparent communication about charges **during revisions**.

Quarterly Statement and Reporting

Quarterly Statements:

- Lenders are required to share a statement with borrowers at the **end of each quarter.**

The statement should include:

- Principal and interest recovered to date. Remaining EMIs.
- EMI amount. Annualized interest rate.
- Enables borrowers to **track** their loan progress. Statements must be **easily comprehensible.**

Broad Applicability:

- **Not limited to personal loans** only. Applies to all equated installment-based loans with varying periodicities.

Personal Loan Definition

- Personal loans encompass various categories:
- Consumer credit.
- Education loans.
- Loans for immovable assets.
- Loans for financial assets.
- **Outstanding personal loan amount:** Rs 42.60 lakh crore as of June 2023.

RBI's Directive on Penal Interest

- RBI directs lenders **not to charge penal interest for non-compliance, benefiting consumers.**
- Norms are introduced due to observed **excessive penal rates by regulated entities (RE).**
- Penal charges are defined as **additional fees for late EMI payments, defaults, and non-compliance**.
- **No capitalization of penal charges**; regular compounding for interest applies. New guidelines apply to banks, **excluding payments banks, NBFCs, housing finance, and co-operative banks.** Lenders are **prohibited from adding new interest rate components**; must follow board-approved policy.

Consumer Impact and Transparency

- Individual borrower penalties for non-compliance aligned with non-individuals.
- REs must transparently disclose penalty amounts and reasons in agreements, **KFS (Key Fact Statement**), and websites.
- Communication of penalties with **non-compliance reminders**; reasons communicated.
- New instructions **effective from January 1, 2024**; existing loans transition within 6 months or the next review (whichever is earlier).

Exemptions

- Instructions are **not applicable to credit cards, external borrowings, trade credits, or structured obligations.**

Topic 41. GOVT BOLSTERS ONION BUFFER BY ADDITIONAL 2 LAKH TONNES

Important for the subject :Economy

- *In News*: Government raises the quantum of onion buffer to 5 lakh tonne this year, after achieving the initial procurement target of 3 lakh tonne.
- Government has announced it will procure an **additional 2 lakh tonnes of onion** in order to maintain a total buffer stock of 5 lakh tonnes this year and use that for retail intervention.
- The announcement has come a day after the government imposed a 40 per cent duty on the export of onions to **improve local supplies and check its prices**.
- For the current 2023-24 fiscal, the target for onion buffer was kept at 3 lakh tonnes, which has already been procured. Currently, the same buffer stock is being disposed of in the targeted markets in select states to improve the local availability and check price rise.
- According to the official data, all-India **average retail price** of onion was ruling 19 per cent **higher** at Rs 29.73 per kg on Sunday compared to Rs 25 per kg in the year-ago period.

How it works?

- The buffer stock is maintained under the **Price Stabilisation Fund (PSF)** to meet any exigencies, if rates go up significantly during the lean supply season.
- The **National Cooperative Consumers' Federation of India (NCCF)** and the **National Agricultural Cooperative Marketing Federation of India (NAFED)** have been directed to procure one lakh tonne each to achieve the additional procurement target alongside calibrated **disposal** of the procured stocks in **major consumption centres.**
- Apart from releasing in major markets, onions from the buffer are also being made available to retail consumers at a subsidized rate of Rs 25 per kg through retail outlets and **mobile vans of NCCF** from August 21 in key markets.

Opposition:

- Growers in Maharashtra have threatened to agitate against the Centre's move to release onion from the buffer stock of 3 lakh tonnes created this year.
- Their view is that this move will hurt the return on their crops. National Cooperative Consumers Federation of India (NCCF):
- It was established on 16th October 1965 to function as the apex body of consumer cooperatives in the country.
- It is an organization to promote consumer cooperative movement in the country, aspires to facilitate the voluntary formation and democratic functioning of cooperatives, based on self-reliance and mutual aid for overall economic betterment and financial autonomy.
- It is registered under the Multi-State Co-operative Societies Act, 2002. NCCF functions under the Ministry of Consumer Affairs, Food and Public Distribution, Government of India.

National Agricultural Cooperative Marketing Federation of India (NAFED)

- National Agricultural Cooperative Marketing Federation of India Ltd (NAFED) is an apex organization of marketing cooperatives for agricultural produce in India. t was founded on 2 October 1958 to promote the trade of agricultural produce and forest resources across the nation.
- It is registered under the Multi-State Co-operative Societies Act. NAFED is now one of the largest procurement as well as marketing agencies for agricultural products in India.

Topic 42. WHAT A SLOWING CHINA MEANS FOR INDIA

Important for the subject: Economy

Government has initiated work on **drafting policies** to make India a global hub for **sourcing sustainable and circular textiles and garments**.

The latest economic data show that the world's second largest economy has slipped into **deflationary mode**. Both retail sales and industrial production missed forecasts in July.

- According to the National Bureau of Statistics (NBS), retail sales in July grew 2.5 per cent year-on-year, compared to a 3.1 per cent in June, and value added industrial output expanded by 3.7 per cent y-o-y, slowing from the 4.4 per cent growth witnessed in June.
- China's exports fell by 14.5 per cent in July compared with a year earlier, while imports dropped 12.4 per cent.
- And overall unemployment rate had risen to 5.3 per cent in July. Youth unemployment, a keenly watched indicator, hit a record 21.3 per cent in June.
- China's debt is now estimated at 282 per cent of GDP, which is more that of the US.
- The **most worrying aspect is shrinking domestic demand**. The prices of apartments and a range of goods and services have fallen, with the **Consumer**
- **Price Index**-based inflation **dropping by 0.3 per cent after flatlining (i.e. – 0.3 %)** in June.

Why China facing deflation?

- Chinese economy is currently facing a crisis of confidence. Several factors has led to this.
- The major one is the near collapse of the decades long **debt-fuelled housing sector**, which contributes to about 30 per cent of China's GDP.
- The country's protracted and **stringent lockdown** — shutting schools, offices, parks, etc — all but choked the domestic economy.
- It created global supply-chain upheavals as well. These, along with **geopolitical tensions**, triggered manufacturing relocations, weakening domestic growth and consumer spending further.
- Government's **crack down on its vibrant tech sector** – video gaming, edtech, e-commerce — on the grounds that the tech companies were getting too big and powerful. This has resulted in huge losses of revenues and jobs, as many of these firms had to downsize or shut shop.

- Amidst the **declining and uncertain economic environment**, Chinese investors and households are **cutting back on spending**, leading to a deflationary situation.

Impact on the world economy?

- A slowdown in China will affect global demand. Not only is China the world's largest manufacturing economy, but it is also the largest consumer of key commodities. It accounts for almost half of the world's metal consumption.
- A cut in prices of Chinese manufactured goods could impact employment by way that it **could hit investment by businesses**.
- A period of falling prices in China could also hit company profits and consumer spending. This may then lead to higher unemployment overall.

Is a slowing China good or bad for India?

- India is hoping to compete with China as a major player in the global supply chain and as a manufacturing hub. It has unveiled schemes like PLI (Production Linked Incentive) to boost domestic manufacturing. India's **China plus strategy** can get a boost if Chinese exports taper down.
- **If** China begins **exporting base metals and other commodities at reduced prices**, due to slowing demand, it could benefit our manufacturers. On the other hand, **if** Chinese producers begin **cutting back on production** of metals and other commodities due to slowing domestic demand, it will push commodity prices higher.
- If investment in the Chinese economy is lowered owing to the increasing slowing rate of their economy, and now deflation, India could **potentially emerge and take over as the manufacturing hub** for the developed economies. This is also something the developed countries seem to have been pushing for in a **bid to eliminate the monopoly-like hold China has over the manufacturing sector**

(**China plus strategy**).

- Deflation is when the prices of goods and services decrease across the entire economy, increasing the purchasing power of consumers. It is the opposite of inflation and can be considered bad for a nation as it can signal a downturn in an economy, leading to a recession or depression

Topic 43. OVERNIGHT CALL MONEY RATE HARDENS BEYOND MSF RATE

Important for the subject :Economy

Liquidity shortfall in the banking system on account of the incremental cash reserve ratio (ICRR) and other factors results in call money rate going beyond the marginal standing facility of 6.75 %

- Overnight call money market rates have hardened, going beyond the **marginal standing facility (MSF) rate of 6.75 per cent**, indicating liquidity tightness in the banking system.

- The liquidity shortfall from all the above has been estimated to be about ₹2-lakh crore.
- Generally the **interest rate for longer duration is higher** as the longer the period for which money is lent, higher is the risk.

The several reasons for this liquidity squeeze are:

- Reserve Bank of India decision requiring banks to temporarily maintain incremental cash reserve ratio (I-CRR) of 10 %
- Outflow on account of companies making payment towards GST RBI's intervention in the forex market to support a falling Rupee

What does RBI do when the call money rate crosses the upper end of LAF corridor?

- Usually, when call money rate touches the upper-end of the LAF corridor, RBI conducts variable rate repo auction to inject liquidity and bring the rate closer to the repo rate (of 6.50 per cent).Decision to mandate temporary ICRR?
- With effect from the fortnight beginning August 12, 2023, RBI asked scheduled banks to maintain an incremental cash reserve ratio (I-CRR) of 10 per cent on the increase in their deposits between May 19, 2023 and July 28, 2023.
- This measure is intended to absorb the surplus liquidity generated by various factors such as return of ₹2000 banknotes to the banking system, RBI's surplus transfer to the government, pick up in government spending and capital inflows
- The existing cash reserve ratio (CRR) remains unchanged at **4.5 per cent** Marginal Standing Facility (MSF)
- Under the operating framework of the monetary policy, the RBI keeps call money in the Liquidity Adjustment Facility (LAF) corridor. The corridor width is 50 basis points (0.5%).
- The LAF corridor comprises **Standing Deposit Facility (6.25%)** at the lower end and **Marginal Standing Facility (6.75%)** at the upper end.
- The **Standing Deposit Facility** is to absorb surplus liquidity while the **Marginal Standing Facility** is to inject liquidity, with the **repo rate being the mid-point** (6.50 per cent).
- RBI aims to modulate call money within this corridor.

Call Money Market

- The call money market, also known as the money market, refers to a segment of the financial market where **short-term funds are borrowed and lent among financial institutions**, primarily banks and other financial intermediaries.
- Participants in call/notice money market currently include banks (excluding RRBs) and Primary Dealers (PDs), both as borrowers and lenders. **Non-bank institutions** are **not permitted** in the call/notice money market with effect from **2005**.

List of Institutions Permitted to Participate in the Call/Notice Money Market both as

Lenders and Borrowers

- All Scheduled Commercial Banks (excluding RRBs).
- All Co-operative Banks other than Land Development Banks.

All Primary Dealers (PDs).

- The transactions in the call money market typically involve loans with very short maturities, often ranging from one day to two weeks.
- The interest rate in the call money market, also known as the call rate, is determined by the demand and supply of funds. It fluctuates based on prevailing market conditions.
- Financial institutions use the call money market to manage their short-term liquidity needs. Banks with surplus funds lend to those in need of funds, and this lending and borrowing activity helps institutions maintain their required reserves and manage their balance sheets effectively.
- The call money market provides a crucial mechanism for financial institutions to manage their short-term liquidity needs efficiently.
- It also serves as a key component of the broader money market, which includes various short-term instruments like Treasury bills, commercial paper, and certificates of deposit.

Topic 44. THE DEBATE OVER INDIA'S SMARTPHONE MANUFACTURING DREAMS

Important for the subject :Economy

Over the last few months, **former RBI governor Raghuram Rajan** and the **Minister of State for Electronics Rajeev Chandrasekhar** have sparred over **how well a Central government scheme to boost electronics manufacturing has been faring**.

Mr. Rajan, along with two other economists, released a brief discussion paper arguing that **the programme isn't really pushing India towards becoming a self sufficient manufacturing powerhouse.** Instead, **the government is using taxpayer money to create an ecosystem of low-level assembly jobs** that will still depend heavily on imports.

What is the PLI scheme?

- **Production Linked Incentive,** or **PLI,** scheme of the **Government of India** is a form of **performance-linked incentive** to give companies **incentives** on **incremental sales** from products manufactured in domestic units.
- It is **aimed** at boosting the **manufacturing sector** and to **reduce imports. Objective** of these schemes entail **Make in India,** incentivising foreign manufacturers to start production in India and incentivise domestic manufacturers to expand their production and exports.
- The **Government of India (GoI)** has introduced **Rs 1.97 lakh cr (US$ 28 b) PLI schemes** for **14 sectors.**

The 14 sectors are:

1. Mobile Manufacturing and Specified Electronic Components,
2. Critical Key Starting Materials/Drug Intermediaries & Active Pharmaceutical Ingredients,
3. Manufacturing of Medical Devices Automobiles and Auto Components,
4. Pharmaceuticals Drugs,
5. Specialty Steel,
6. Telecom & Networking Products,
7. Electronic/Technology Products,
8. White Goods (ACs and LEDs),
9. Food Products,
10. Textile Products: MMF segment and technical textiles,
11. High efficiency solar PV modules,
12. Advanced Chemistry Cell (ACC) Battery,
13. Drones and Drone Components.

Advantage of PLI scheme:

- The industry that has shown the most enthusiasm for the scheme is **smart phone manufacturing. Companies** like **Micromax, Samsung, and Foxconn** (which makes phones for Apple) can get up to **6% of their incemental sales income through the PLI programme**.
- And with the scheme, **mobile phone exports jumped from $300 million in FY2018** to an astounding **$11 billion in FY23.** And while **India imported mobile phones worth $3.6 billion in FY2018, it dropped to $1.6 billion in FY23.**

What was Mr. Rajan arguing?

- While imports of fully put-together mobile phones have come down, the imports of mobile phone components — including display screens, cameras, batteries, printed circuit boards — shot up between FY21 and FY23.
- In effect the companies are importing all of the necessary parts and assembling them in India to create a **'Made in India' product.**
- This is important as **low-level assembly work doesn't produce well-paying jobs** and doesn't nearly have anywhere the same multiplier effect that actual manufacturing might provide.

What the Minister has to say?

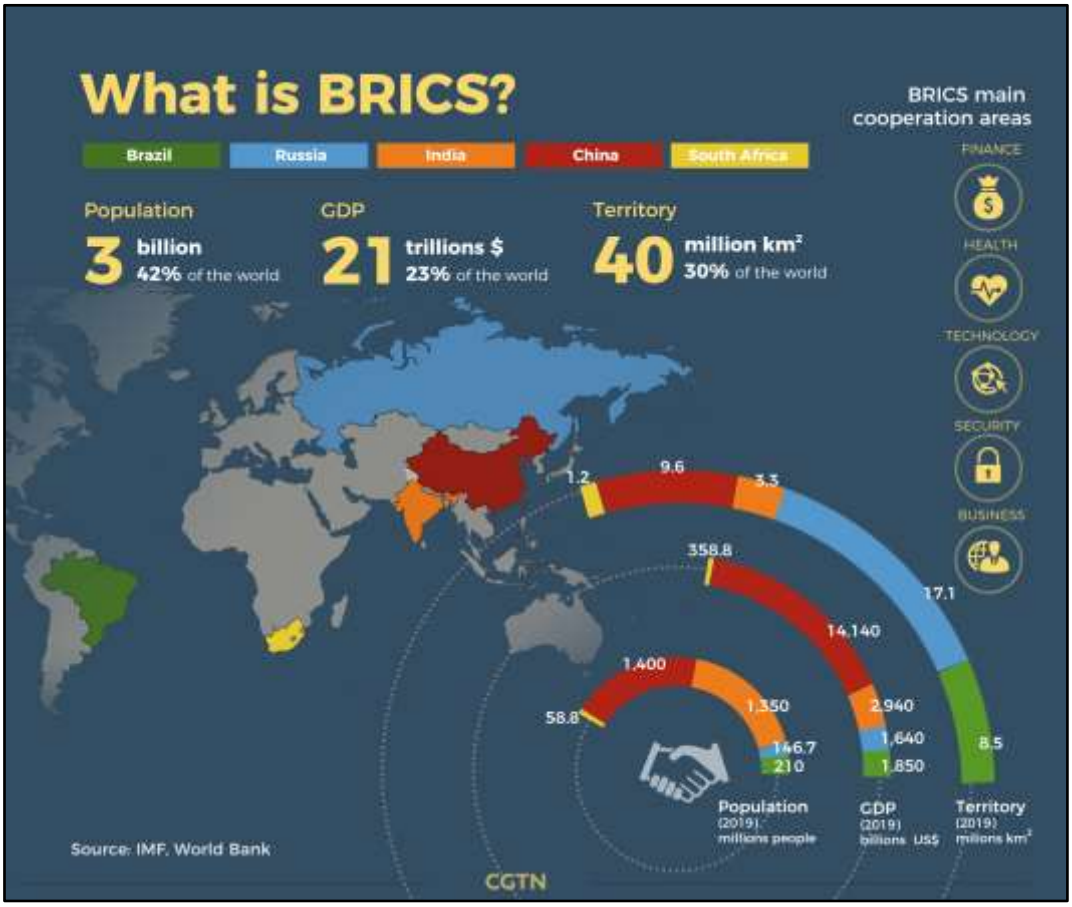
- All imports of screens, batteries, etc. are not used to make mobile phones, some of them are used also for computer monitors, DSLR cameras, electric vehicles etc.
- Not all mobile phone production in India is supported by the PLI scheme, only around 22% so far.

Who is right?

- Even if only 60% of screens, batteries, etc. are used to make mobile phones, the final import tally would still beat the final export tally.
- **Mr. Rajan** believes that **without proof of PLI's success, there is an opportunity cost.**
- After all, every rupee spent in PLI payments is money that could have gone into improving, say, the education system, an investment that would also help the Indian economy.

Topic 45. BRICS SUMMIT AND ITS IMPORTANCE FOR INDIA

Important for the subject: International Relations



The 15th BRICS Summit will be hosted by South-Africa in Johannesburg. The 15th BRICS Summit is sc**heduled to be held in Johannesburg, South-Africa.**

The theme of the Summit is "BRICS and Africa: Partnership for Mutually Accelerated Growth, Sustainable Development, and Inclusive Multilateralism"

- This will be the f**irst in-person summit since 2019** ,the COVID19 pandemic and Russian invasion of Ukraine.

What's the big item on the agenda:

- The main items on the agenda include attracting attention for their potential for a greater **geopolitical consolidation** of the grouping, and a **plan to expand the membership of**

BRICS.

- **Over 40 countries** have expressed **interest in joining BRICS, and at least 19 have formally applied** for membership such as **Argentina, Mexico from Latin**
- **America; Nigeria, Algeria, from Africa; Saudi Arabia, UAE, from West Asia; Kazakhstan from Central Asia; Bangladesh and Afghanistan from South Asia.**
- The leaders are also expected to take forward earlier talks on **intra BRICS trading in national currencies,**

What is BRICS:

- BRICS is an **acronym** for the **grouping of the world's leading emerging economies**, namely **Brazil, Russia, India, China, and South Africa**.
- In **2001**, the British Economist **Jim O'Neill** coined the **term BRIC** to describe the **four emerging economies of Brazil, Russia, India, and China.**
- The grouping was **formalized** during the **first meeting of BRIC Foreign Ministers'** in **South Africa** was invited to join BRIC in **December 2010**, after which the group adopted the acronym BRICS

Some Facts about BRICS:

- BRICS is an important grouping bringing together the major emerging economies from the world, comprising:
- **41%** of the **world population.**
- **24%** of the **world GDP Over 16%** share in **world trade.**
- **Total combined area of 29.3%** of the **total land surface** of the world

What are Few Initiatives of the BRICS:

New Development Bank:

- During the **Sixth BRICS Summit in Fortaleza** (Brazil) **in 2014**, the leaders **agreed** to set up NDB.
- The NDB became **fully operational in 2016** with **headquarters** established in **Shanghai**.
- Each member holds an **equal amount of shares 20%** in the NDB.

Contingent Reserve Arrangement:

- In **2014**, the BRICS governments had signed a treaty on the setting up of the **contingent reserve arrangement**
- The arrangement is aimed at **forestalling short-term balance of payments pressures, providing mutual support** and **strengthening financial stability** of the BRICS nations.

BRICS Payment System:

- BRICS countries are trying to create a **payment system** as an **alternative** to the SWIFT payment system.

- This has taken on a new urgency as **post Ukraine war**, Russia has been frozen out of SWIFT.

Customs Agreements:

- Customs agreement were **signed to coordinate and ease** trade transport between BRICS countries

Launched of Remote Sensing Satellite:

- A Remote Sensing constellation of satellites has been launched – with **6 satellites including 2 from India, 2 from China, 1 from Russia, and 1 Brazil-China collaboration**

Topic 46. G20 HEALTH MINISTER MEET

Important for the subject: International Relations

The health ministers' meeting under G20 ended in Gandhinagar with the adoption of the Indian Health Ministry spear-headed outcome document.

India's G20 presidency has managed to build consensus on **setting up R&D** and **manufacturing networks for vaccines**, **therapeutics, and diagnostics,** and **setting up a platform for making open-source**, inter-operable digital solutions readily available.

- The **Global Initiative Digital Health, a platform** for **sharing digital goods and knowledge** was also launched at the meeting. It will have **four pillars Investment tracker, Ask tracker to track technologies the countries need, A library of available digital tools, A platform for knowledge-sharing to implement these technologies at scale**
- The **priority on health emergency prevention preparedness** and **response ended** with a **commitment to negotiate a legally binding WHO convention**, agreement, or other international instrument **by May 2024.**
- The **G20 countries reaffirmed** their commitment to strengthen dialogue through the **G20 Joint Finance-Health Task Force.**
- They welcomed the **successful conclusion of the First Call for Proposals of the Pandemic Fund**, focusing on disease surveillance, lab capacity, and public health workforce. This **fund, with $2 billion** from the previous G20 presidency, **aims to enhance health emergency preparedness in low to middle-income countries.**

What is G20 Summit:

- **G-20** was a **group of finance ministers** and **central bank governors from 19 individual countries and the European Union**.
- It was **established in 1999 and** was **elevated to a forum of Heads of Government in 2008** to effectively **respond to the global financial crisis of 2008.**
- G-20 is a forum, **not a legislative body** and its **agreements and decisions have no legal**

impact, but they do influence countries' policies and global cooperation..

- The G20 membership accounts for **Two-thirds** of the **world's population, 85%** of global **gross domestic product**, **80%** of **global investment 75%** of **global trade**.
- Contribute **79% of the world carbon emissions** G20 **does not have any permanent secretariat** or headquarters.
- The **G20 Summit** is formally known as the **"Summit on Financial Markets and the World Economy".**

How G20 works:

- Since the G20 **has no permanent secretariat**. The**agenda and work are coordinated by** representatives of the G20 countries, known as **'Sherpas**'.
- The **presidency of the G20 rotates every year among members**, and the country holding the presidency, together with the previous and next presidency-holder, forms the '**Troika'.**
- Troika **ensures continuity of the G20 agenda**. **During India's presidency**, **India, Indonesia and Brazil will form the troika.**

More about India Presidency:

- **India** assumes the presidency of G20 from **1st of December.** The **G20 Presidency** also marks the **beginning of "Amritkaal"**, the **25-year period beginning from the 75th anniversary of its independence on 15 August 2022.**
- **Guest countries** during India's presidency will include **Bangladesh, Egypt, Mauritius, Netherlands, Nigeria, Oman, Singapore, Spain and the UAE**

Topic 47. INDIA AND ASEAN AGREE TO REVIEW GOODS TRADE PACT BY 2025 TO FIX 'ASYMMETRY'

Important for the subject : International Relations

India and a 10-member bloc of South-East Asian nations have **agreed to review their free trade agreement, signed in 2009.**

India and ASEAN nations have agreed to **review their free trade pact for goods by 2025.**

- The focus of the review is on **addressing trade imbalances**. The Joint Committee of the ASEAN-India Trade in Goods Agreement has finalized terms for negotiations.
- The review's progress will be **discussed at the India-ASEAN Leaders' Summit in September.**

More about ASEAN:

- The Association of Southeast Asian Nations is a **regional organization** which was established to **promote political and social stability amid rising tensions among the Asia-Pacific's post-colonial states**. ASEAN, was **established on 8 August 1967** in Bangkok, Thailand, with the **signing of the ASEAN Declaration i.e Bangkok**

Declaration

- The **motto** of ASEAN is **"One Vision, One Identity, One Community"**. The **ASEAN Secretariat** is located in **Jakarta.**

Some facts about ASEAN:

- It is the **3rd largest market** in the world, **larger than the EU and North America.**
- It is the **6th largest economy** in the world, **3rd in Asia.** The **Fourth** most **popular investment** destination globally
- It is th**e 4th largest trading partner** of India. India and ASEAN registered a bilateral trade of **US$ 131.5 billion in 2022-2023.**

ASEAN-INDIA FTA:

- India had **signed an FTA** in goods with the **regional bloc in 2009**, known as the Asean–India Free Trade Agreement (AIFTA). The trade in **goods pact** came into force from **January 2010.** In **2014**, an **FTA in services** was also **included.**

What is FTA:

- It is a **pact between** two or more nations to **reduce barriers to imports and exports among them.**
- Under a free trade policy, **goods and services can be bought and sold across international borders with little or no government tariffs,** quotas, subsidies, or prohibitions to inhibit their exchange.
- FTAs can be categorized as **Preferential Trade Agreements, Comprehensive Economic Cooperation Agreement (CECA) and Comprehensive Economic Partnership Agreements (CEPA).**
- India has **signed 13 Free Trade Agreements (FTAs) with its trading partners**, including the **3 agreements,** namely **India-Mauritius Comprehensive Economic Cooperation and Partnership Agreement (CECPA), India-UAE Comprehensive Partnership Agreement (CEPA) and India-Australia Economic Cooperation and Trade Agreement (IndAus ECTA)** along with **6 limited coverage Preferential Trade Agreements (PTAs).**

Topic 48. HIGH IN THE ANDES, LAKE TITICACA'S WATER LEVELS FALL TO HISTORIC LOWS

Important for the subject: International Relations

The waters of **Lake Titicaca** are within 10 inches (25 centimeters) of their all-time low, a record set in 1996.

At its **highest point in 1986**, water levels reached **12 feet higher** than they are today, topping out at **12,504.2 feet (3,811 meters) above sea level**. But in **1996,** they had fallen to **12,491.4 feet above sea level.**

Falling water levels are "the result of climate change" and the outlook is not good. **El-Nino** and **La-Nina events** have a major impact on the water level of **lake Titicaca.**

Lake Titicaca:

- **Lake Titicaca** is a **large freshwater lake** in the **Andes mountains** on the **border of Bolivia and Peru**.
- It is often called the **highest navigable lake in the world**. By both volume of water and by surface area, **it is the largest lake in South America**.
- It is the **highest of the world's large lakes** and is **one of the largest in South America**, after **Venezuela's Lake Maracaibo** (which is actually connected to the Caribbean Sea) and **Brazil's Lagoa dos Patos, a coastal lagoon**.
- The lake is located at the **northern end** of the **endorheic Altiplano basin** high in the **Andes** on the **border of Peru and Bolivia.**
- The **western part** of the lake lies within the **Puno Region of Peru,** and the **eastern side** is located in the **Bolivian La Paz Department**.
- **Five major river systems** feed into Lake Titicaca. In order of their relative flow volumes these are **Ramis, Coata, Ilave, Huancané, and Suchez**. More than 20 other smaller streams empty into Titicaca. The lake has **41 islands,** some of which are densely populated.

Other important lakes:

Lakes Description

Lake Baikal

- Located in Siberia, Russia. The deepest lake in the world [1,637 metres deep] It is the world's largest lake by volume. It is the second longest.

Lake Tanganyika

- The longest lake in the world. [660 kilometres long] It is also the second largest by volume. It is the second deepest lake in the world, after lake Baikal.

World's highest and lowest lakes

- The **world's highest lake**, if size is not a criterion, may be the **crater lake of Ojos del Salado**, at 6,390 metres. It is in **Andes.** The **highest large lake in the world** is the **Pumoyong Tso (Pumuoyong Tso),** in the **Tibet Autonomous Region** of China.
- [5,018 metres above sea level]
- The **world's highest commercially navigable lake** is **Lake Titicaca in Peru and Bolivia** border at 3,812 m. It is also the largest lake in **South America**. The **world's lowest lake** is the **Dead Sea**, bordering **Israel** and **Jordan** at **418 metres below sea level.** It is also one of the lakes with **highest salt concentration**.14/28

Largest lake by continents

- **Australia –** Lake Eyre (salt lake)
- **Africa –** Lake Victoria, also the third-largest freshwater lake on
- Earth. It is one of the Great Lakes of Africa.
- **Antarctica –** Lake Vostok (subglacial)
- **Asia –** Lake Baikal (if the Caspian Sea is considered a lake, it is the largest in Eurasia, but is divided between the two geographic continents)
- **Europe –** Lake Ladoga, followed by Lake Onega, both located in northwestern Russia.
- **North America –** Lake Superior.
- **South America –** Lake Titicaca

Aral Sea

- It was a lake lying between **Kazakhstan** in the **north** and **Uzbekistan,** in the **south.**
- **Aral Sea** has been steadily **shrinking** since the **1960s** after the rivers that fed it were diverted by Soviet irrigation projects.

Caspian Sea

- The Caspian Sea is the world's largest inland body of water, often described as the world's largest lake or a full-fledged sea.
- It lies between **Europe** and **Asia:east** of the **Caucasus**, **west** of the **broad steppe of Central Asia, south** of the fertile plains of **Southern Russia in Eastern Europe,** and **north** of the **mountainous Iranian Plateau** of **West Asia**.
- It is bounded by **Kazakhstan** to the **northeast, Russia** to the **northwest**, **Azerbaijan** to the **southwest, Iran** to the **south**, and **Turkmenistan** to the **southeast.**

Andes mountain Range:

- The **Andes Mountains** or **Andean Mountain Range** are the **longest continental mountain range in the world,** forming a continuous highland along the **western edge of South America.**
- The range is **8,900 km (5,530 mi) long, 200 to 700 km (124 to 435 mi) wide** (widest between 18°S – 20°S latitude), and has an **average height of about 4,000 m** (13,123 ft).
- The Andes extend from **north to south** through **seven South American countries:** Venezuela, Colombia, Ecuador, Peru, Bolivia, Chile and Argentina.

Geology:

- The **Andes** are a **Mesozoic–Tertiary orogenic belt of mountains** along the **Pacific Ring of Fire**, a zone of volcanic activity that encompasses the Pacific rim of the Americas as well as the Asia-Pacific region. The Andes are the result of **tectonic plate processes,** caused by the **subduction of oceanic crust** beneath the **South American Plate** as the **Nazca Plate** and **South American Plate converge**.

Topic 49. THE IMPORTANCE OF THE SULINA CHANNEL TO UKRAINE GRAIN TRADE

Important for the subject: International Relations

Russia, in overnight drone strikes targeted ports and grain storage facilities along the Danube river in Ukraine.

The **Danube delta** has provided **Ukraine** with an alternative passage for its grain after Russia withdrew from the **Black Sea grain deal** last month.

The deal, brokered by the **UN** and **Turkey**, used to provide safe passage for cargo ships carrying grain from **Ukrainian Black Sea ports** of **Odessa, Chornomorsk** and **Pivdennyi**.

Sulina Channel:

- The **'new' trade route** is the **Sulina Channel** – a 63 km long distributary of the **Danube,** connecting major Ukrainian ports on the river to the **Black Sea,** lying completely within the borders of **Romania,** a NATO member.
- Near **Tulcea, Romania,** some 80 km from the sea, the river Denube begins to spread out into its delta which has **three major channels** – **Chilia, Sulina** and **St George**.
- Of these, the **Sulina Channel** is the **only one deep and wide enough for freight transport**. This makes it crucial for transport of goods from inland to the Black Sea.
- Ships carrying grain from Ukraine leave from **Ukrainian ports** such as **Izmail** and **Reni** on the mainstream (or the Chilia Channel), and head to the **port of Sulina,** at the mouth of the Sulina Channel.
- From there, they head around **140 km south** to **Constanta, Romania's biggest seaport**.
- Here the cargo is transferred to bigger ships that carry it out of the **Black Sea** into the **Mediterranean** through the **Bosphorus straits.** This route is under constant surveillance and protection of NATO.

Topic 50. FOOD TRANSITIONS IN AGE OF CLIMATE CRISIS SHOULD FOCUS ON DIVERSIFYING OPTIONS

Important for the subject: International Relations

Despite increased food production aided by technology, global hunger persists, affecting **828 million in 2021 — up by 150 million since 2019.**

A **52 per cent increase in food production** is needed by **2050** to meet the requirements of the projected population of 9.9 billion.

Food regimes:

- **Food regimes** explored shifts in power dynamics, from nation-states to global markets and the dominance of neoliberalism.
- The **first regime (1870-1914)** involved colonialism, markets and British hegemony, while the **post-war regime (1947-1973)** was centred on nation-states, market

interventions and the dominance of the United States.

- The **corporate food regime (1980s-present)** led to the emergence of neoliberalism, agro-food corporations and food sovereignty.
- **A graph showing the global food scenario in terms of the difference in the actual and potential number of people fed.**

Scientific study of crops:

- The **scientific study of food crops** started with **Linnaeus** in the **16th century**. **Alphonse de Candoli** highlighted **key crop origins** in **Southwest Asia, the Americas** and **China.**
- **Vavlov's expeditions (1916-1934)** identified **primary centres of origin** based on **gene spread and selection**.
- Crops are spread from primary to secondary centres, where most diversity is found.
- **Vavlov** proposed **eight primary centres** in the **Old World**, which was further extended to **12 mega gene centres** by **Zhukovsky.**

Vegetative propagation:

- **Vegetative reproduction** (also known as vegetative propagation, vegetative multiplication or cloning) is any form of **asexual reproduction** occurring in plants in which a new plant grows from a fragment or cutting of the parent plant or specialized reproductive structures, which are sometimes called **vegetative propagules**.
- Many plants have become **seedless** and depend on **vegetative propagation**, altering their reproductive patterns and threatening pollinators.
- **Vegetative propagation techniques** have been used to overcome **male sterility in plants** like **onion.**
- **Regional concentrations of food production** create **food islands** and distribution pathways, as depicted in the figure below.

Nyeleni Declaration on food sovereignty:

- It ensures that the rights to use and manage our lands, territories, waters, seeds, livestock and biodiversity are in the hands of those of us who produce food.
- Food sovereignty implies new social relations free of oppression and inequality between men and women, peoples, racial groups, social classes and generations.
- It emphasized people's rights over domestic production, trade and self-reliance on food.
- It views power as relational, advocating pluralistic approaches to decision-making for combating hunger and malnutrition.

Topic 51. SC PLANS EXPANSION OF INFRA; E-COURTS TO OFFER NATIONAL LINK

Important for the subject :Polity

Announcement by CJI D.Y. Chandrachud

Plans to expand Supreme Court with **27 additional courts and 51 judges' chambers. Currently**, Supreme Court has 17 courtrooms and 2 registrar courts.

Current judicial strength: 32 judges.

Importance of Overhaul

- CJI emphasizes need for overhaul of court infrastructure **for accessibility and inclusivity.**
- Focus on **modernizing** judicial infrastructure.

Phases of Expansion

First Phase

- Demolition of court museum and annexe building.
- Construction of new building with 15 courtrooms, judges' chambers, SCBA library, offices for SCBA and SCAoRA, canteen, women lawyers bar room, and other facilities.

Second Phase

- Demolition of portion of existing court complex. Construction of new building with 12 courtrooms, judges' chambers, registrar courts, and SCBA and SCAoRA lounge.
- **eCourts Project Overview and Implementation Details**

Introduction and Origin

- The eCourts Project was launched based on the "**National Policy and Action Plan for Implementation of Information and Communication Technology (ICT) in the Indian Judiciary – 2005."**
- The **eCommittee**, Supreme Court of India, proposed the project to transform the judiciary through the adoption of technology.

Project Phases and Implementation

- The eCourts Project operates **under the National eGovernance Plan**.
- **Phase I, concluded in 2015, computerized 14,249 Court sites across the country.**
- **Phase II** aims to computerize 18,735 District & Subordinate courts to enhance technology-enabled justice.
- **Phase III envisions** further modernization and accessibility of judicial processes.

Project Milestones and Achievements

WAN Connectivity

- 99.3% of court complexes (2972 out of 2992 sites) now connected with bandwidth speeds ranging from 10 Mbps to 100 Mbps.
- Various technologies such as **Optical Fiber Cable (OFC), Radio Frequency (RF), and Very Small Aperture Terminal (VSAT)** used for connectivity.

- **Case Information Software (CIS)** based on customized **Free and Open-Source Software (FOSS).**
- CIS National Core Version 3.2 implemented in District Courts. CIS National Core Version 1.0 implemented for High Courts. COVID-19 Management Patch integrated into CIS for intelligent scheduling of cases, **prioritizing urgent cases.**

National Judicial Data Grid (NJDG)

- Utilizes **elastic search technology**. Offers **access to case status information for a massive 20.86 crore cases and over 18.02 crore orders/judgments**.
- NJDG includes **reasons for case delays** to improve transparency. Introduction of **open APIs** allows government departments to leverage **NJDG data for research and analysis.**

Citizen-Centric Services and Technological Initiatives

Service Delivery Channels

- Various channels established to provide real-time information to lawyers and litigants.
- Services include **SMS Push and Pull** (sending and receiving SMS notifications), **Email notifications**, **multilingual eCourts services Portal**,
- **Judicial Service centres**, **Info Kiosks**, **eCourts Mobile App**, **JustIS** app for judges.

Virtual Courts

- **20 Virtual Courts** operational across 16 States/UTs.
- These courts **primarily handle traffic offense cases**.

Video Conferencing

- Video conferencing used extensively in **District and High Courts**. District courts held 1,28,76,549 cases, and High Courts heard 63,76,561 cases (totaling 1.92 crore cases) through video conferencing till 30.04.2022.
- Supreme Court conducted 2,61,338 hearings via video conferencing since the beginning of the lockdown period.

eFiling and eSewaKendras

- Version 3.0 of the eFiling system introduced with **advanced features**. Allows online submission of V**akalatnama, eSigning, online video recording of oath, online payment**, and more.
- eSewaKendras established to **bridge the digital divide** and provide e-filing services and assistance to lawyers and litigants.
- **Nyay Kaushal Centre** inaugurated in **Nagpur**, facilitating e-filing and access to e-Court service

Additional Technological Initiatives

- "**Judgment & Order Search**" portal inaugurated for easy search of judgments. **National Service and Tracking of Electronic Processes (NSTEP)** developed for technology-enabled process serving and summons issuing.
- Various other initiatives like **Justice Clock, secure website services**, and more implemented to enhance accessibility and efficiency.

Phase II Implementation

- Phase II of the eCourts project a**ims to computerize 18,735 District &**

Subordinate Courts.

- Outlay of Rs. 1670 crore for Phase II.

Steps Taken for ICT Enablement

Allocation of funds for various components:

- **Additional hardware provision** for courts. Setting up **technical infrastructure** in existing and new court complexes. **Replacement of obsolete laptops** for Judicial Officers.
- Installation of **VC equipment in Courts and Jails.**
- **Cloud connectivity** for all Court Complexes. **WAN** connectivity establishment. **Solar energy provision** in 5% Court Complexes. **Software development** components like CIS, eFiling, ePayments, etc.

Phase III Vision and Ecosystem Approach

Evolving Vision

- Phase III envisions an **accessible, efficient, and equitable judicial system**. Aims to create a **digitally native infrastructure**. Aims to **simplify processes and transform them** for the digital environment. Strives to **enable remote case filing, hearings, and digital administrative processes.**

Ecosystem Approach for Change

- **Redefining Dispute Resolution**: Phase III recognizes dispute resolution as both a sovereign function and a service, involving diverse actors from the public, private, and citizen sectors.
- **Encouraging Innovation**: Rather than creating all solutions internally, Phase III aims to foster rapid innovation by providing open APIs, standards, and specifications for an ecosystem of solutions.

Key Building Blocks

- **Simplifying Procedures:** Streamlining processes and adopting digital technology to enhance efficiency and user experience.
- **Foundational Digital Infrastructure**: Creating a flexible infrastructure with open APIs

and standards for a range of services.

- **Institutional and Governance Framework**: Establishing technology offices to oversee infrastructure design and development, enabling collaboration.

Key Goals

- **Hardware Installation**: Ensuring essential hardware, reliable connectivity, and power supply to enable digital services.
- **Data Governance**: Balancing open courts' principles with privacy and security considerations.
- **Digital Infrastructure**: Developing capabilities for **intelligent scheduling**, interoperability, digital case management, e-filing, and more.
- **Access to Services**: Providing tools for digital case management, live streaming, transcriptions, notice service, and assistance in court and remotely.

e-Committee

- The e-Committee oversees the **e-Courts Project,** a nationwide initiative under the "**National Policy and Action Plan for ICT in Indian Judiciary-2005**".

Purpose and Origin:

- Conceived to modernize the judiciary through technology.
- Proposed by **former Chief Justice of India, Mr. Justice R.C. Lahoti**.

Digital Transformation:

- Empowers stakeholders with real-time access to judicial data. Enables case tracking, pendency management, and resource optimization. Facilitates fast-tracking of specific case categories. Analyzes data to gauge judiciary's competency and efficiency.

e-Committee Composition:

- **Patron-in-Chief and Chairperson**: Hon'ble Dr. Justice Dhananjaya Y. Chandrachud, **The Chief Justice of India.**

Members:

- **Judicial Representatives**: Judges provide insights on tech integration while upholding justice values.
- **Legal and Tech Experts**: Professionals in law and tech offer strategic guidance for effective integration.
- **Government Officials**: Align e-Courts with wider government initiatives. **Academics**: Provide research-based insights for tech infusion. **IT Specialists**: Ensure practical, secure, and scalable solutions.

Topic 52. ON I-DAY, STALIN SEEKS TRANSFER OF EDUCATION BACK TO STATE LIST

Important for the subject :Polity

Tamil Nadu Chief Minister M.K. Stalin on Tuesday called for transferring education back to the State List of the **Seventh Schedule** of the Constitution.

The objective is to eliminate **centralized examinations like NEET** and regain control over the education sector.

The Education Important for the subject **was initially under the purview of states** but was moved to the Concurrent List during the **Emergency** under the governance of Indira Gandhi.

Seventh Schedule of the Indian Constitution

Union List, State List, Concurrent List – Overview

- **Article 246** stands as the architect of the **7th Schedule**, outlining the Union List, State List, and Concurrent List.
- The **Union List,** comprising 100 Important for the subjects, vests exclusive legislative authority in the Parliament.
- The **State List**, encompassing 61 Important for the subjects, confers power upon state legislatures for independent decision-making.
- The **Concurrent List**, housing 52 Important for the subjects, illustrates the shared jurisdiction between the Center and the States.
- The **challenge** lies in achieving harmonious coexistence of local autonomy with national uniformity.

Union List

- **Originally containing 97 Important for the subjects**, the Union List now encompasses 100 Important for the subjects.
- This list delineates Important for the subjects **under the exclusive control of the Parliament**, including vital areas like **defense and international relations**.
- A strong central role is aimed at fostering **national unity and coherence** in important policy areas.
- The **NEET controversy** highlights the potential drawbacks of centralization, as regional disparities affect education accessibility.
- In cases of conflict between **laws** enacted by the Parliament and state legislatures, the **Parliament's law prevails**.
- Parliament's authority also extends to imposing duties on states and conferring powers on them.
- The **power to impose taxes on 15 Important for the subjects solely resides with the Parliament**, bolstering central fiscal authority.
- The **88th Amendment expanded the Union List** by introducing "taxes on services" as a

new Important for the subject.

- The **Supreme Court's jurisdiction** on matters within the Union List can be extended by the Parliament.

State List

- The State List **originally contained 66 Important for the subjects**, which was later reduced to 61.
- The **42nd Amendment transferred five Important for the subjects** from the State List to the Concurrent Lis:

Education,

- Forests, Protection of wild animals and birds, Weights and measures, and Administration of justice
- Balancing local governance with centralized decision-making, the State List gives **states the exclusive right to legislate** on these Important for the subjects.
- However, the Parliament can legislate on State List Important for the subjects under specific circumstances, such as **during a national emergency (Article 250)**.
- State resolutions, **Rajya Sabha resolutions**, and **multi-state resolutions** provide mechanisms for Parliament's involvement in State List Important for the subjects.
- The complexity arises in cases where laws made by Parliament on states' resolutions are applicable only to states that passed the same resolution.
- While the State List focuses on matters of regional and local importance, there are exceptions like **Delhi's special provisions regarding certain Important for the subjects**.
- The **69th Constitutional Amendment Act** introduced special provisions for the National Capital Region, restricting Delhi's legislative authority on specific

State List Important for the subjects.

- The State List also includes **20 Important for the subjects on which state legislatures have the exclusive power to levy taxes**.

Concurrent List

- The Concurrent List consists of 52 Important for the subjects that can be legislated upon by both the Central Government and state governments.
- The **42nd Amendment transferred** five Important for the subjects from the State List to the Concurrent List, leading to shared jurisdiction.
- This concept is derived from the **Australian Constitution** and aims to balance centralized and localized governance.
- Both levels of government can enact laws on Concurrent List Important for the subjects, but **in the case of conflicting laws, the Central Government's law prevails.**
- The Concurrent List focuses on **matters that require uniform legislation throughout**

the country but not at the cost of regional diversity.

- Notably, there are **three Important for the subjects in the Concurrent List on which both the Central and state governments have the authority to levy taxes**.

Important Important for the subjects Under Each List

- **Union List Important for the subjects**: Defense, Army, International Relations, Ports, Railways, Highways, Communication
- **State List Important for the subjects**: Public order, Police, Public health, Betting and gambling, Local governance
- **Concurrent List Important for the subjects**: **Education**, Forest, Trade unions, Marriage, Adoption, Succession, Environment

Residual Powers of the Seventh Schedule

- The residual list comprises Important for the subjects not attributed to any legislative list.
- **Article 248** empowers **the Parliament** to enact laws concerning these residual

Important for the subjects.

- Modern domains like **information technology and space technology** find their place in this realm.

Topic 53. BILKIS BANO CASE: SUPREME COURT QUESTIONS SELECTIVE APPLICATION OF REMISSION POLICY IN GUJARAT

Important for the subject: Polity

The Supreme Court raised concerns over the Gujarat government's alleged selective application of its **premature release policy for prisoners**.

During the hearing, **Justice B.V. Nagarathna** directed probing questions at Additional Solicitor-General S.V. Raju, who was representing Gujarat.

Release of Convicts in Bilkis Bano Case

- The Gujarat government released **11 convicts involved** in the Bilkis Bano gang rape and murder case, citing its remission policy.
- The release was prompted by **Radheshyam Shah's appeal**, who had served 15 years and 4 months of his sentence.

Gujarat's Remission Policy and Its Applicability

- The **1992 remission policy** allowed prisoners who had served **a minimum of 14 years to apply for early release.**
- The policy empowered the state to consider the remaining sentence **based on conduct, Important for the subject to verification.**
- The **Supreme Court invalidated** the 1992 policy in 2012

- The court ruled that remission under Section 432 of the CrPC requires **obtaining the judge's opinion and reasons from the convicting or confirming court**, allowing only case-specific, not wholesale, decisions.
- In response, Gujarat crafted a **new policy in 2014**, introducing **exclusions for specific types of crimes.**
- Radheshyam Shah sought remission under the 1992 policy, which did not have post-2014 exclusions.
- **Legal Aspects of Remission and Release Articles 72 and 161 of the Indian Constitution** confer **pardon and remission powers on the President and Governors**, respectively.
- Chapter XXXII of the **CrPC (Sections 432 to 435)** outlines the procedures for remission, suspension, and commutation of sentences.
- Remission aims to address aspects not fully covered during court proceedings. Convicts **can be released with or without conditions based on remission**.
- Convicts **serving life sentences become eligible for remission after completing 14 years of imprisonment.**
- **Section 433A of the CrPC** restricts the power of the President and Governors to commute death sentences to less than 14 years of life imprisonment.
- The remission process involves **consultation between the state and the court**, followed by **an executive decision**.
- The power of remission must be exercised fairly and without arbitrariness. The Supreme Court, in ***'State of Haryana v. Mahender Singh and Others' (2007)***, underscored that remission should be assessed on a **case-by-case basis**, considering relevant factors.
- Remission, a product of good behavior, **should not be viewed as an act of compassion but as a legal duty.**
- Remission contributes to **reformation** while respecting constitutional principles.
- In the landmark case ***'Laxman Naskar v. Union of India' (2000)***, the Supreme Court laid down **five criteria for granting remission:**
- Whether the offense is an individual act of crime that does not affect society;
- Whether there is a chance of the crime being repeated in the future;
- Whether the convict has lost the potentiality to commit a crime;
- Whether any purpose is being served in keeping the convict in prison; and Socio-economic conditions of the convict's family.

Topic 54. CCI STARING AT LACK OF QUORUM LOGJAM AGAIN

Important for the subject: Polity

Absence of quorum affecting work at CCI, especially with regards anti profiteering under GST

Absence of quorum affecting work at CCI, which also includes major matters including mergers & acquisition (M&A) anti-profiteering matter (GST).

- **Section 8 of the Competition Commission Act** says the Commission shall consist of a **chairperson and not less than two** and not more than six other members to be appointed by the central government.
- As of date, CCI has **just two members**, with one member acting as chairperson, which means no quorum is possible, making it difficult for CCI to take up anti-profiteering matters.
- Even in the previous regime to deal with anti-profiteering, **CGST rule** prescribed a **minimum of three members** of the **Authority (erstwhile NAA or National Anti-Profiteering Authority)** to constitute quorum at its meetings.
- Section 22 of the act necessitates a **quorum of three members** for such meetings of the commission.

M&As on hold

- As CCI does not have the requisite quorum to transact business. This has put several M&As on hold and also impacted the time-bound resolution process of several companies under the Insolvency and Bankruptcy Code as many such cases are referred to the CCI by the National Company Law Tribunal (NCLT).
- One of the key mandates of CCI is to review combinations (M&As) and if this is not done within 210 days then the transaction is deemed approved.

National Anti-Profiteering Authority (Now CCI)

- NAA **ceased to exist** on December 1 **2022**, and it was decided that all profiteering-related matters **would be examined by CCI**.
- NAA was set up after the introduction of GST, initially for two years, which was extended twice subsequently.
- **Section 171 of the CGST Act** deals with **anti-profiteering measures** and prescribes that ***any reduction in the rate of tax on any supply of goods or services or the benefit of input tax credit shall be passed on to the recipient*** by way of a commensurate reduction in prices. In this regard, complaints can be filed with the NAA. Now the task is with CCI.
- The Central Government, on the recommendations of the **Goods and Services Tax Council**, empowers the **Competition Commission of India**, established under sub-section (1) of section 7 of the Competition Act, 2002, to examine whether input tax credits availed by any registered person or the reduction in the tax rate have actually resulted in a commensurate reduction in the price of the goods or services or both supplied by him
- Even after three months of taking over to deal with anti-profiteering under the Goods and Services Tax (GST) mechanism, the Competition Commission of India (CCI) is yet to dispose of a single matter.
- The fundamental issue of what would constitute “commensurate reduction in price” and various methods employed by companies like increasing grammage, practice of zeroing etc. would continue to remain disputed before various High Courts.

Topic 55. PM MODI'S NEW SCHEME TO HELP URBAN POOR BUILD HOUSES

Important for the subject :Schemes

Prime Minister Narendra Modi on August 15 announced a new scheme to help urban poor build houses in cities. Under this program, they would receive relief in interest rates and loans taken from banks to construct their houses.

- Aimed at assisting **the urban poor** in building houses in **cities**. **Relief in interest rates and loans from banks** for house construction.
- Targeting those living in **rented houses, slums, chawls, and unauthorized colonies. Middle-class families** also benefit from the scheme.
- Government's support **to help save lakhs of rupees for the beneficiaries**. **Existing Scheme – Pradhan Mantri Awas Yojana Urban (PMAY-U)**
- Launched in **2015** by the **Ministry of Housing and Urban Affairs (MoHUA).** Mission to address urban housing shortage for **economically backward sections.** Constitutes a key component of the **'Housing for All' initiative.**
- Ensuring **'pucca'** houses for eligible urban households by **2022**. The scheme **extended till December 2024** to complete all sanctioned houses.
- **Divisions**: beneficiary-led construction, affordable housing in partnership, in-situ slum redevelopment.
- Seeks to **transform slums into viable urban neighborhoods. Credit-linked subsidy scheme (CLSS) not extended beyond March 31, 2022.**

Beneficiaries

- **Female members** of beneficiary families are preferred as the **head of the household.**
- **Widows, transgenders, and differently-abled individuals** receive special attention. Focuses on **empowering women** through **property ownership.**
- **Beneficiary selection** involves thorough **surveys and verification.**

Verticals of PMAY-U

In Situ Slum Redevelopment (ISSR)

- Encourages the use of **underutilized slum land** for housing development. Incorporates **private sector participation** to leverage investment and expertise. Aims to improve the **quality of life** in slums by providing better amenities.

Affordable Housing through Credit Linked Subsidy (CLSS)

- Aims to make housing loans **affordable for EWS, LIG, and MIG Interest subsidy benefits** are linked to the loan amount and income category. **Reduces the financial burden** on beneficiaries and promotes homeownership.

Affordable Housing Through Partnership (AHP)

- Promotes **collaboration between public and private sectors** for housing projects. Supports the creation of a diverse **mix of housing options** within projects.

Beneficiary-led Individual House Construction (BLC)

- Emphasizes **beneficiary-driven construction or improvement of houses**. Beneficiaries can use the assistance for constructing **new houses or adding rooms.**

Features of PMAY-U

Demand-driven Approach

- Conducts surveys to assess **housing demand at the city and state levels.** Beneficiary demand shapes the scale and scope of housing projects. Helps **avoid underutilization of resources and mismatched housing supply.**

Geotagging

- Geotagging involves adding geographical coordinates to identify the location. Houses are geotagged using the **Bhuvan platform developed by ISRO.** Enhances transparency by enabling beneficiaries to verify house locations.

Women Empowerment

- Provides recognition and ownership rights to women in property matters. Helps in **bridging the gender gap** in property ownership. Promotes **women's financial security** and decision-making power.

Various Initiatives under PMAY-U

Affordable Rental Housing Complexes (ARHCs)

- Aims to provide **rental housing for urban migrants and informal sector** workers.
- Aims to curb the growth of slums and improve living conditions. Private and public agencies are encouraged to participate in creating ARHCs.

Global Housing Technology Challenge (GHTC) – India

- Aims to identify innovative, sustainable, and affordable construction technologies.
- Focuses on **reducing construction time and costs while maintaining quality.** Seeks to promote the adoption of **advanced construction methods**.

CLSS Awas Portal (CLAP)

- A **web-based platform** to monitor the progress of housing projects. Ensures **timely subsidy disbursemen**t and efficient project tracking. Increases transparency and accountability throughout the implementation process.

Progress of PMAY-U

- A total of 75.51 lakh completed houses, 71.39 lakh occupied. Uttar Pradesh leads with 12, 87, 307 houses completed. Gujarat, Andhra Pradesh, and Tamil Nadu also show significant progress.

Challenges

- **Land Acquisition and Availability:** Scarcity of available land for housing projects in densely populated urban areas.
- **Quality Assurance**: Ensuring the durability and quality of constructed homes to prevent future maintenance issues.
- **Private Sector Participation**: Encouraging private developers to participate by addressing concerns related to profitability and project viability.
- **Technology Adoption:** Overcoming resistance to adopting new construction technologies and materials.
- **Financial Sustainability**: Balancing the need for affordable housing with the financial sustainability of the scheme.

Topic 56. VISHWAKARMA YOJANA SOON FOR ARTISANS, SAYS PM

Important for the subject : Schemes

Introduction

Prime Minister Narendra Modi's **Independence Day address** from Red Fort. **Vishwakarma Yojana** was introduced to support traditional artisans' skill development. Allocation of around **₹13,000 to ₹15,000 crore** to empower **traditional craftsmanship.**

Beneficiaries include weavers, goldsmiths, blacksmiths, laundry workers, barbers, etc. Launch on Vishwakarma Jayanti, starting with initial allocation.

Support for Women Self-Help Groups (SHGs)

- Introduction of **drones** for **women SHGs** to aid **agricultural activities.** Empowerment of rural women through **skill training in drone operation** and **repair**.
- Government's target of creating two crores **"lakhpatididis"** in villages. Drones facilitate agricultural work and expand women's economic opportunities. **Synergy with Vishwakarma Yojana** for holistic rural upliftment.

Pradhan Mantri Vishwakarma Kaushal Samman

- Initiative to **preserve and revive traditional arts and crafts**. Financial aid, skill training, and technological advancement. Integration within the **MSME value chain** to amplify impact. Drive for **self-sufficiency and global recognition of Indian craftsmanship**.

Key Features

- Scheduled launch on **17 September (Vishwakarma Jayanti)** with initial ₹13,000-15,000 crore allocation.
- The main focus is on **traditional craftsmen and workers**, particularly from the **OBC community.**
- **Ministry of Micro, Small and Medium Enterprises (MSME)** as the coordinating body.
- Aiming to bolster **unorganized sector workers** facing financial challenges. The scheme covers **18 trades**, enhancing livelihoods across multiple sectors.

Other Government Schemes and Efforts

- **PM SVANidhi scheme** allocated ₹50,000 crore for street vendors' support.
- Direct deposit of ₹2.5 lakh crore into farmers' accounts through **PM Kisan Samman Nidhi.**

Holistic Institutional Support for Artisans

- PM Vishwakarma Yojana provides **comprehensive institutional assistance** to artisans.
- Enhancing artisans' skills, **easier access to loans, and technical guidance**. Aim to transform artisans into **entrepreneurs**, fostering economic growth. **Improved product quality** through appealing design, packaging, and branding. A dual focus on both **domestic and international** markets.

Significance

- Elevating the status of craftsmen across the nation. Upskilling artisans and expanding the reach of their creations. Synergy with the MSME sector and access to global markets. Reinforcing India's reputation as a hub of traditional arts.

Vishwakarma in Hinduism

- Vishwakarma is revered as the **deity of craftsmanship in Hindu belief**. **Creator of divine chariots, weapons, and celestial palaces**. Linked to **various mythological narratives and intricate creations**.

Topic 57. LACK OF INTERNET ACCESS IN KERALA'S TRIBAL COLONIES

Important for the subject :Schemes

Kerala declared the **right to the Internet as a basic right.** However, 189 Adivasi ***ooru*** (**tribal colonies**) across 12 districts lack access to Internet and mobile connection. Over 5,000 tribal students in these colonies are affected.

The initiative by Scheduled Tribes Development Department:

- The department seeks permission from the **Forest department** to set up towers in tribal colonies within forests. **Forest Rights Act provisions** are used for tower installation.
- Tower setup is planned to begin post permission.

- **Expected Outcome and Timeline:** The goal is to address the digital divide in tribal colonies by December.

Use of Community Study Rooms:

- The government provides community study rooms in various locations. These facilities offer Internet access. However, students from disconnected tribal colonies rarely use these facilities.

Kerala High Court's stance on Internet access (*Faheema Shirin v. State of Kerala*, 2019):

- Internet access is part of the **fundamental right to education**.
- Also protected under the **right to privacy (Article 21 of the Constitution).**
- **KFON: Kerala's Scheme for Universal Internet Connectivity Kerala Vision Broadband**, an initiative of cable TV operators, provides internet service in many districts. **Kerala Fibre Optical Network (KFON)** infrastructure benefits private service providers through its **cable network.**

Internet Speed and Mobile Connectivity:

- KFON promises speeds from **10 Mbps to 10 Gbps.**
- KFON's connection to mobile towers accelerates the 4G and 5G transition.

Stakeholders and Implementation:

- Rs 1,611-crore project by **Kerala State Electricity Board (KSEB) and Kerala State IIT Infrastructure Limited.**
- **Started in 2019,** to be functional by 2021. Implementation led by a consortium including **Central PSU Bharat Electronics Limited.**
- BEL manages optical fiber networks, network locations, and government institution connectivity.
- Project funded by **Kerala Infrastructure Investment Fund Board (KIIFB).**

Services Provided by KFON:

- Aims to create a **non-discriminatory core network infrastructure**. Connects government offices, offers leased lines, fiber to the home, wifi hotspots, colocation services, IPTV, OTT, and cloud hosting.

Topic 58. PIPELINE EXCAVATION UNCOVERS MEGALITHIC SITE IN KERALA

Important for the subject: History

Recent salvage excavation by State Archaeology Department at Nagaparamba, Kuttippuram village, near **Tirunavaya**, **Kerala**.

- Discovery of numerous **megalithic hat stones**, also known as ***Thoppikkallu***, used as **lids for burial urns** during the megalithic era.

- The unprotected site reveals possibly the **largest collection of hat stones** in the State.
- Led by archaeologist **K. Krishnaraj**, **Pazhassi Raja Archaeological Museum, Kozhikode.**
- Recovery of earthen urns and **unique iron implements** offering insights into ancient life (**2,000+ years ago**).
- Unconventional architectural attributes of the **rock-cut cave**. Different designs of recovered pots compared to regular urns at such sites.
- Discovery of **special ashes within pots** and under hat stones, unlike typical cremated bones.

Significance of the site:

- Urgent appeal to grant **heritage village status** to **Tirunavaya** due to its historical significance on **Bharathapuzha's banks**.

Megalithic Monuments and their Types

- Megalith' refers to **monuments with large stone blocks**. Kerala megaliths were constructed over a broad time frame, c. 1st millennium BCE to the middle of 1st millennium CE.

Major types in Kerala:

Surface Megaliths:

Type of Megalith Definition

Dolmens

- Large stone blocks arranged above ground in a square or rectangular shape with a capstone.

Cists

- Architectural variant of dolmens, mostly underground, with a capstone covering the burial area.

Dolmenoid Cists

- Subtype of dolmens, partially buried in the ground.
- Sometimes used interchangeably with 'dolmen'.

Menhirs

- Monolithic slab, often made of granite, erected vertically.

Kudakkal

- Mushroom-shaped laterite monument with an umbrella-like stone supported by clinostats

(slanting stone blocks).

Topikkal

- Hemispherical laterite stone is used as a lid on a burial urn.

Pathikkal

- Dressed blocks of laterite arranged to resemble a snake's hood.

Stone Circle

- Circles made of granite and laterite stones marking burial sites, arranged in single or multiple circles.

Cairn

Circular packing of rubble associated with a stone circle, often covered by soil and vegetation.

Sub-Surface Megaliths:

Type of Megalith Definition

Rock-cut Caves

- Subterranean laterite monuments with single or multiple chambers. May have carved stone benches and portholes.
- Urns Pyriform (pear-shaped) handmade jars buried with burial goods inside a pit. Sarcophagus Legged terracotta coffin, is rare in Kerala compared to other burial forms.

Topic 59. BLOOD TRAIL FROM THE 1857 WAR TO A FLIGHT DOWN SOUTH

Important for the subject: History

Introduction

Uncovering **Descendants of 1857 Ajnala Massacre Victims The Ajnala massacre** occurred during **India's 1857 first War of Independence.**

Event led to significant **migration of families** from northern India to the southern regions.

Victims were from the **26th Native Bengal Infantry Regiment Analysis of Remains from Ajnala**

- In 2014, amateur historian **Surinder Kochhar** discovered skeletal remains of **282 soldiers** in a **well beneath a gurdwara in Ajnala**, **near Amritsar, Punjab.**
- Remains accompanied by artifacts like **bullets, epaulets, and coins of the East India Company.**
- Scientific analysis of certain **markers** in the remains indicated **their origin from the Gangetic plains.**

- Current DNA data includes **mitochondrial DNA from 50 martyrs**.
- Plan to enhance information through **nuclear DNA analysis**, offering more comprehensive insights.

Forced Migration and Descendant Search

- After the massacre, British **forces harassed families of soldiers**, leading to their **displacement**.
- Families migrated **from places like Dumtahar, Rae Bareli in northern India to Tamil Nadu in the south.**

Historical Context: Ajnala Massacre of 1857

- **Location**: Ajnala, Amritsar district, Punjab. Sipahis of the 26th Native Infantry stationed in **Mian Mir, Lahore.**
- **Sequence of Events and Inhumane Treatment May 13, 1857:Sipahis disarmed** due to **army-wide outbreaks**.
- **July 30**, rebellion breakout after killing officers, camped at **Ravi banks**.
- British troops led by **Tahsildar Pram Nath attacked**, killing 150 sipahis. Remaining **escaped sipahis surrendered** to Deputy Commissioner **Frederic Cooper.**
- Transported to Ajnala and imprisoned. **August 1**: 237 sipahis **tied and shot by firing squad without trial.** 45 detained sipahis died in unventilated prison from suffocation and heat stroke.

Bodies disposed of in a local well.

Rediscovery and Memorial

- February 28, 2014: Local amateur archaeologists found the well. Well named **Shaheedan da Khu (Well of Martyrs).** Memorial constructed to honor the martyrs' memory.